

Clinical Finding Form (ClIFF)

Branch

Baseline

ICL81_Respiratory Tract Infection - Lower

This condition refers to infectious conditions affecting the lower respiratory tract. These conditions interfere with oxygenation/ventilation and can range from mild illnesses with minimal effects to prolonged illnesses that severely impair the crew member. Per the definitions the best case is a viral lower respiratory infection such as bronchitis or influenza. These are generally self limited and non fatal but in some cases, such as influenza, can lead to prolonged feelings of illness. The definitions and resourcing was done with respect to a long duration lunar DRM. Since such crews will be tested and quarantined prior to launch influenza was not considered a significant threat and most of the best case definitions will likely be mild bronchitis. resources were assigned accordingly and are described in the Capabilities and Resource Table (CRT) section below but are largely symptomatic and aim to keep the individual functioning despite the relatively mild illness The worst case includes bacterial superinfections and pneumonia. These are potential threats on any mission since the bacteria responsible are often normal flora that opportunistically infect a weakened or otherwise compromised host. These tend to be more severe and can lead to life threatening illnesses if not addressed with appropriate antibiotic treatments. The data in this CLIFF and the resourcing was arranged appropriately. Again, most healthy individuals will suffer no more than moderate illness. However, there is always a non zero chance of progression or permanent lung damage is pneumonia is not treated and antibiotics for bacterial disease drastically shorten the course of illness, reduce mortality, and reduce the risk of permanent damage. For this reason treatment focuses heavily on the use of antibiotics in all cases of pneumonia regardless of apparent initial severity.

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

Antonsen et al. discusses bronchitis events (only 1 event total) in ISS missions. Crucian et al. discusses incidences of "flu-like illness" in STS missions, which include respiratory symptoms and fever, of which there have been 3 instances. There have been no reported cases of pneumonia in space except for toxic inhalation pneumonitis (not included here).

ANALOG LITERATURE

Schlaich et al discusses epidemiology of German cargo ship crews while on long voyages with minimal port contact. Influenza-like illnesses have a rate of 6.6 cases per 100 person-years. While population is not explicitly described, it is most likely healthy working-age males. The population and length of voyages without outside contact makes this a good analog for space missions.

TERRESTRIAL LITERATURE

Broulette et al breaks down incidence data of community-acquired pneumonia into age and risk category. The most applicable category for comparison to astronauts is 18-49 year old adults with low risk factors, which gives a risk of 7.5 per 1000 person-years.

OVERALL INCIDENCE SUMMARY

INCIDENCE

mean: 0.0089 per py, SD: 3.949E-5 per py

INCIDENCE SUMMARY

Incidence Distribution: Gamma(shape = 50793, rate = 5707103) mean: 0.0089 per py, SD: 3.95E-5 per py; the Bayesian Posterior of the hierarchical meta-analysis across references.

TABLE 1. INCIDENCE MODEL

Incidence Details
Incidence Type
General
Segment
All
Env. Exposure
NA
Sex
Any
Crowns
Any
Contacts
Any
Pregnancy
Any
Incidence Distribution
Occurrence Dist
Poisson
Incidence Dist.
Gamma
Mean
0.00889996
SD
3.94899E-05
Gamma
(Shape): 50793
(Rate): 5.7071E+06

TABLE 2. INCIDENCE LEVEL OF CONFIDENCE (LOC)

Citation	Source	LOC Value
Broulette, 2013	Terrestrial	4
Macfarlane, 2001	Terrestrial	3
Antonsen, 2017	Space	2
Crucian, 2013	Space	0
Schlaich CC, 2009	Analog	2

Broulette and Macfarlane references have the highest LOE values. Spaceflight incidence data are based on only a few cases and the diagnostic criteria may not be reliable.

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

none

BEST CASE SCENARIO DEFINITION

Influenza-like illness, or viral bronchitis that resolves with symptomatic treatment.

WORSE CASE SCENARIO DEFINITION

Bacterial suprainfected influenza-like illness or bronchitis or bacterial pneumonia, that requires treatment but does not result in ARDS or respiratory failure (see Respiratory Failure ClIFF, ICL80).

CONDITIONS INCLUDED, BUT NOT EXPLICITLY STATED (CNES)

Respiratory Tract Infection (Lower) - Influenza; Respiratory Tract Infection (Lower) - Bronchitis, Viral; Respiratory Tract Infection (Lower) - Pneumonia, Bacterial; Respiratory Tract Infection (Lower) - Coronavirus

BEST CASE/WORST CASE PROBABILITY COMMENTS

Condition Probability: The probability that ClIFF condition progresses to a worst case scenario. Best case scenario: 100%-Worst Case. Best Case Probability 90%- 99.5% Worst Case Probability 0.5% - 10%

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

Citation	Source	LOC Value
Prasso JE, 2016	Terrestrial	N/A
Gonzales R, 2000	Terrestrial	4

Bacterial pneumonia complicates only 0.5-0.6% of influenza cases (worst case) Prasso JE, Deng JC. Postviral Complications: Bacterial Pneumonia. Clin Chest Med. 2017 Mar;38(1):127-138. doi: 10.1016/j.ccm.2016.11.006. Epub 2016 Dec 13. PMID: 28159155; PMCID: PMC5324726. From microbiological studies only 10% of lower respiratory infections (bronchitis) have bacterial infection (worst-case) Gonzales R, Sande MA. Uncomplicated acute bronchitis. Ann Intern Med. 2000 Dec 19;133(12):981-91. doi: 10.7326/0003-4819-133-12-200012190-00014. PMID: 11119400.

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: 0.0089 per py, SD: 3.949E-5 per py	90 - 99.5	100	0.5	7.66676	72	264	0	0.3	0.9	0	0.0002
Treated Worst Case (TWC)		0.5 - 10	100	1.5	16.4895	120	264	0	7.4	19.5	0.1	4.6
Untreated Best Case (UTBC)	N/A	N/A	N/A	0.5	16.4895	72	264	0	0.5	1.1	0	0
Untreated Worst Case (UTWC)	N/A	N/A	N/A	1.5	50.3588	120	264	56.6038	100	100	27	50

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

TREATED BEST CASE (TBC) SCENARIO COMMENTS

TBC = influenza-like illness or viral bronchitis that resolves with supportive treatment (not antibiotics)

TREATED WORST CASE SCENARIO (TWC) COMMENTS

TWC is lower respiratory infection requiring antibiotics, bacterial pneumonia

UNTREATED BEST CASE (UTBC) SCENARIO COMMENTS

Best Case Scenario Definition: Influenza-like illness, or viral bronchitis that resolves with symptomatic treatment. For the untreated best case scenario, this condition should resolve even without treatment in the healthy astronaut population. Untreated best case scenario has higher task impairment and may have longer CP2 duration than treated best case scenario.

UNTREATED WORST CASE (UTWC) SCENARIO COMMENTS

Untreated worst case definition: Bacterial suprainfected influenza-like illness or bronchitis or bacterial pneumonia, that requires treatment but does not result in ARDS or respiratory failure (see Respiratory Failure ClIFF, ICL80). Untreated worst case has higher task impairment and may have longer CP2 duration than treated worst case scenario.

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

Citation	Source	LOC Value
Ebell, 2013	Terrestrial	2
Mandell LA, 2007	Terrestrial	
Gundrum, 1919	Terrestrial	
Caplan, 1939	Terrestrial	

Robust amount of information regarding duration of best and worst case scenarios when left treated or untreated. Not representative of the Astronaut Corps, but provides reasonable duration expectations

TABLE 6. RTDC LEVEL OF CONFIDENCE (LOC)

Citation	Source	LOC Value
Little P, 2017	Terrestrial	2
Broulette J, 2013	Terrestrial	
Moore M, 2019	Terrestrial	
Contreras CL, 2008-2012	Terrestrial	

Available data captures tens of thousands of patients. Patient populations do not represent the astronaut corps. Variability in healthcare systems where the studies were conducted could skew decisions of who is admitted and who is treated as an outpatient.

TABLE 7. LOCL LEVEL OF CONFIDENCE (LOC)

Citation	Source	LOC Value
Little P, 2017	Terrestrial	3
Fine MJ, 1997	Terrestrial	
Luna CM, 2016	Terrestrial	
Price, 2006	Terrestrial	

Consistent data demonstrating mortality from best and worst case scenarios, except for untreated bacterial pneumonia. Cohorts do not represent astronaut corps and high degree in treatment variability given international enrollments.

CAPABILITY RESOURCE TABLE (CRT) OVERVIEW

Capabilities and Resourcing Overview The best case (BC) definition "resolves with symptomatic treatment" so the standard of care to bound capabilities and resources for this condition is that of ILI and of viral bronchitis. Per guidelines this is patient education and supportive care. , , For the worst case (WC) definition the standard of care is that of an uncomplicated healthcare associated pneumonia (HCAP) in both outpatient and inpatient settings. This accounts for both antibiotic sensitive and antibiotic resistant organisms as well as respiratory support for non critical care patients. The definition specifically excludes respiratory failure and ARDS so no critical care resources are included. Diagnostic Scope and Resourcing Both BC and WC include software resources to support diagnostics and prognostics. Given the mild nature of the BC definition there are minimal consequences for imprecise diagnoses from a treatment and outcomes perspectives.1,2,3 For this reason diagnostic capabilities are limited to vital signs, history taking and physical exam. There are higher consequences for resources and outcomes for an imprecise diagnosis in the WC definition (e.g. use of antibiotics, risk of mortality and lung damage). For this reason resources for imaging, lab capability, history, physical, and prognostic capability incorporating decision scores are included. , , While procalcitonin is sometimes included in local protocols to guide antibiotic use, it is still controversial and will add resources without necessarily "paying" for these additions by contributing to resource conservation through its' use. For this reason SME consensus is to exclude it from this iteration of the ICL-81 CRT. 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; CP1 BC: 0.5 hours for history, pulmonary physical exam, and vital signs. CP1 WC: 1.5 hour for an experienced provider history, pulmonary physical exam, vital signs, blood draw and lab work, ultrasound, and prognostic scoring such as CURB65. Treatment Scope and Resourcing Both the BC and WC for these conditions include software resources for treatment recommendations. The best case (BC) definition "resolves with symptomatic treatment." Given this definition, treatment resources include those for alleviating fever, myalgia, cough, dehydration, and throat discomfort. While effective antiviral treatments for influenza do exist, they are recommended for hospitalized patients, those with severe disease, and those at high risk for complications. These do not reflect the BC definition nor the astronaut population so these treatment resources are also excluded.1,2,3 The WC definition adds bacterial infection and the possibility of pneumonia without respiratory failure or ARDS. This requires the same symptomatic treatments from the BC and adds broad spectrum antibiotics, oxygen, and chest PT. Antibiotics are included for 3 days of IV antibiotics , , , followed by a transition to PO therapy for the duration of Clinical Phase 2. Communications and Support Needs The BC definition is one most humans have experienced personally and ground consultation is unlikely to change treatment decisions or outcomes. For this reason ground communication equipment is not considered necessary and are not included in the CRT. The WC definition carries the possibility of more complex disease and more significant risk. For this reason, resources for consultation with the ground and on board clinical decision support are more likely to be needed in ways that affect management and are included in the CRT.

IMM CLIFF RECONCILIATION COMMENTS

Respiratory Infection's functional impairments (FI) calculation follows the IMM mild non-space adaptation template. Pulmonary dysfunction ratings are based on Table 5-4, p.88 (American Medical Association, 2008). By definition in Clinical Phase I, FI is 100%. Duration of physical exam as described in ISS checklist for the best case scenario is estimated to be 15 minutes. During Clinical Phase II, FI is estimated at 0 to 9%. Duration is estimated to be from 96 to 168 hours (4-7 days). (Meneghetti, 2011) In Clinical Phase III, by definition, full recovery is expected. FI is 0%; EVAC and LOCL are not expected for the best case scenario.

LIMITATIONS SUMMARY

Spaceflight incidence data are based on only a few cases and the diagnostic criteria may not be reliable. Treated best case RTDC should be 0% based on the best case definition. Treated best case LOCL should be 0% based on the best case definition. Untreated worst case RTDC should be 100% based on worst case definition. Untreated CP2 durations should probably be equal to or greater than treated CP2 durations. Adjusted CP2 durations based on available data – assumed that the range of treated case durations are the same as the range of the untreated case durations. May be able to use the lowest end of the distribution for completely treated scenarios, shift towards the higher end of the distributions based on the

percent of unavailable resources for partially treated scenarios, and use the highest end of the distribution for the completely untreated scenarios. This is the approach currently used for EVAC and LOCL in IMM. Sanity check of adjusted input data gives reasonable outcomes for the probabilities of RTDC and LOCL for DRMs.

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)				89			145					
Untreated Best Case (UTBC)		664		89			145					
Treated Worst Case (TWC)		664		89			145					
Untreated Worst Case (UTWC)	223	664		89			145					
	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)	132							211	577	3763	0.153335	15.3335
Untreated Best Case (UTBC)	132							211	1241	3763	0.32979	32.979
Treated Worst Case (TWC)	132							211	1241	3763	0.32979	32.979
Untreated Worst Case (UTWC)	132				196			211	1660	3763	0.441137	44.1137
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					
	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		414	22	196		34	211	2130	3763	0.566038	56.6038

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: Interpersonal skills were considered to be impaired due to the risk of crewmembers spreading infection in close contact (i.e. they likely would be self-isolating to try to prevent infecting the rest of the crew). CP3: No comments.

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

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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