Clinical Finding Form (CliFF)

Branch	Baseline

ICL96_Space Adaptation - Nasal Congestion

A few minutes to a few hours after being weightless a sensation of fullness in the head is commonly reported along with nasal congestion. Subjectively crew members complain of discomfort feeling of facial fullness, especially behind the eyes and the in the maxillary and frontal sinus areas. This last from a few hours to a few days, and it usually resolves to a tolerable level when new set points for fluid regulation are established (Baker, 2008). Although nasal congestion poses minimal risk to the crew, it can distract from mission tasks and increase insensible fluid loss from mouth breathing (Marshburn, 2008).

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

(Johnston, 1975) Provides in-flight data from all Apollo missions. Authors collected data in the form of events, and split nasal congestion into "rhinitis" and "nasal stuffiness." Since these were split, there is a possibility that one crewmember had more than one event. (Johnston, 1977) provides in-flight data from 3 Skylab missions. Surgeons report describes all crewmembers complained of "congestion" but did not specify type or location. (Crucian, 2016) Provides in-flight data from a 20 year span and includes 46 astronauts. This data was also collected in the form of events, so it is unclear whether or not a single crewmember had multiple events of nasal congestion. Wotring (2015) Provides in-flight data from a 10-year span of ISS missions and includes 24 crewmembers. This study provides clear data on the number of crewmembers who complained of nasal congestion, as well as the percentage of crewmembers who had prolonged symptoms. "

ANALOG LITERATURE

N/A

TERRESTRIAL LITERATURE

N/A

OVERALL INCIDENCE SUMMARY

INCIDENCE

mean 0.5676 & SD 0.01747.

INCIDENCE SUMMARY

The Bayesian posterior distribution for the incidence proportion given the spaceflight data (458 events over 807 person-missions) under an uninformative prior is Beta(shape1=455.87, shape2=347.29) with mean 0.5676 and SD 0.01747. Several spaceflight relevant articles were reviewed. (Walton, 2017) was chosen as its historical coverage (all LSAH recorded data through expedition 37/38) spanned and included the ranges within the other papers. 458 events over 807 person-missions. IP: 0.5675 (95%CI: 0.5325, 0.6020).

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
0.567595

SD
0.01747

Beta
(Alpha): 455.87
(Beta): 347.29

Onset Timing (Hours)
(Min): 1
(Max): 120
(Most Likely): 12

TABLE 2. INCIDENCE LEVEL OF CONFIDENCE (LOC)

Citation	Source	LOC Value
Johnston, et al. 1975	Spaceflight	4
Johnston, et al. 1977	Spaceflight	4
Crucian, et al. 2016	Spaceflight	4
Wotring, 2015	Spaceflight	4

(Johnston, 1975) is an accurate population and data is in-flight from all Apollo missions. Lower confidence level due to age of study and uncertainty as to whether the events of "nasal stuffiness" and "rhinitis" were from the same or four different astronauts. (Johnston, 1977) is an accurate population and data is in-fight from 3 Skylab missions. Surgeons report describes in narrative that crewmembers suffer from "congestion" but does not specify nasal vs. head congestion. (Crucian, 2016) is an accurate representation of the population, contains in-flight data, recent within the past 20 years. The data represents events, so it is unclear if multiple events occurred for a single crewmember. Wotring (2015) Recent publication containing in-flight data within the past 20 years. There is some overlap with the data from Crucian (2016) as the missions are the same but date range of data collection varies. This study was more specific in their data collection. Data showed crewmembers rather than number of events, so we know that the data does not include multiple events for a single person. "

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

No specific preflight preventative measures found at NASA Life Sciences Data Archive: Medical Operations [https://lsda.jsc.nasa.gov/MRID] . Regarding vehicle requirements: crew comments and flight surgeon observations report that adequate filtering of the spacecraft air lessens nasal congestion (Marshburn, 2008). Likewise, reports suggest that exercise improves the head fullness sensation and eating lessens the feeling, to some degree (Gibson II, 1975).

BEST CASE SCENARIO DEFINITION

Nasal congestion that resolves spontaneously.

WORSE CASE SCENARIO DEFINITION

Nasal congestion requiring treatment.

CONDITIONS INCLUDED, BUT NOT EXPLICITLY STATED (CNES)

Space adaptation nasal congestion only; and does not include non-space adaption nasal congestion. "Space adaptation conditions" identify medical events that occur during the first 5 DAYS of spaceflight.

BEST CASE/WORST CASE PROBABILITY COMMENTS

Wotring (2015) is an excellent source which clarifies the breakdown of best and worst case probabilities, offering a clear distinction of pharmacologic use, by definition, the worst case. This study provides in-flight data from a 10-year span of ISS missions and includes 24 crewmembers. This study provides clear data on the number of crewmembers who complained of nasal congestion, and the percent of pharmacological intervention for these conditions.

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

Citation	Source	LOC Value
Wotring, 2015	Spaceflight	4

24 ISS long duration crewmembers. 55% of 24 = 13 crewmembers reporting symptoms of congestion. More than half (55%) of crewmembers treated symptoms of allergy or congestion during their missions; 38% of crewmembers treated such symptoms repeatedly or continuously. 38% used for WC incidence, i.e. reoccurring or continuous nasal congestion.

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 0.5676 & SD 0.01747	62 - 62	100	0.08	0	0.08	12	0	0	0	0	0
Treated Worst Case (TWC)		38 - 38	100	0.46	2.80361	0.08	216	0	0	0	0	0
Untreated Best Case (UTBC)	N/A	N/A	N/A	0.08	0	0.08	12	0	0	0	0	0
Untreated Worst Case (UTWC)	N/A	N/A	N/A	0.46	2.80361	0.08	216	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

Best case defined as nasal congestion that resolves spontaneously. Worst case defined as nasal congestion requiring treatment. RTDC and LOCL are not expected in this scenario and are 0%. Decongestants are the mainstay pharmacologic intervention. By definition, this condition is completely unique to microgravity and terrestrial incidence is NOT applicable.

TREATED BEST CASE (TBC) SCENARIO COMMENTS

Both articles, (Wallace, 2008) and (Greiner, 2006), are terrestrial data and can be considered analogous to space adaptation nasal congestion because it is thought that nasal congestion occurs in space due to allergens within the shuttle as well as cephalad fluid shift. (Greiner, 2006) provides guidelines for the treatment of allergic and non-allergic rhinitis, and cites topical pseudoephedrine nasal spray as the shortest alleviation of symptoms of 5 minutes. (Wallace, 2008) provides guidelines for the diagnosis and management of rhinitis and cites that nasal corticosteroid spray is the most effective monotherapy for nasal congestion and can take 3-12 hours for alleviation of symptoms. 12 hours can be considered the longest treated best case duration.

TREATED WORST CASE SCENARIO (TWC) COMMENTS

(Greiner, 2006) provides guidelines for the treatment of allergic and non-allergic rhinitis, and cites topical pseudoephedrine nasal spray as the shortest alleviation of symptoms of 5 minutes, similar to treated best case scenario. (Putcha, 1999) In-flight data representing persistent sinus congestion requiring medication use. This citation retrieved from the IMM CliFF.

UNTREATED BEST CASE (UTBC) SCENARIO COMMENTS

Using IMM CliFF (Walton, 2017) as precedence, untreated best case scenario is similar to treated best case scenario in calculating UTBC duration. LOCL and RTDC are expected to be 0% for this definition.

UNTREATED WORST CASE (UTWC) SCENARIO COMMENTS

Using IMM CliFF (Walton, 2017) as precedence, untreated worst case scenario is similar to treated worst case scenario in calculating UTWC duration. LOCL and RTDC are expected to be 0% for this definition.

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

Citation	Source	LOC Value
Wallace, et al. 2008	Terrestrial	3
Grenier, et al. 2006	Terrestrial	
Putcha, et al. 1999	Spaceflight	

(Wallace, 2008) May or may not be an accurate duration as pertains to space flight as this study examines terrestrial duration of allergic rhinitis, specifically when treated by corticosteroid spray. Unsure if this translates to congestion caused by cephalad fluid shift. (Greiner, 2006) This terrestrial study examines the onset of action of pseudoephedrine nasal spray which may also produce the same results in space flight, as this treatment would presumably resolve congestion from both allergens and cephalad fluid shift. (Putcha, 1999) is a space flight study which quantifies treated worst case scenario duration as it clearly states that drugs for sinus congestion were taken for 9 flight days.

TABLE 6. RTDC LEVEL OF CONFIDENCE (LOC)

Citation	Source	LOC Value
Walton, et al. 2017	Spaceflight	4

RTDC is 0% for this condition. Walton (2017), IMM CLiFF is used as precedence.

TABLE 7. LOCL LEVEL OF CONFIDENCE (LOC)

Citation	Source	LOC Value
Walton, et al. 2017	Spaceflight	4

RTDC is 0% for this condition. Walton (2017), IMM CLiFF is used as precedence.

CAPABILITY RESOURCE TABLE (CRT) OVERVIEW

Capabilities and Resourcing Scope

Overview

Space adaptation nasal congestion is nasal congestion occurring within the first 5 days of spaceflight.

CNES: None

Diagnostic Scope and Resourcing:

The best-case scenario was assumed to be self-awareness of increased nasal congestion. Therefore, no diagnostic capabilities were resourced for this scenario.

In the worst-case scenario, nasal congestion requiring treatment, the diagnosis is made by physical examination (ear, nose, and throat examination).

Clinical Phase 1 Duration and Rationale
This version of IMPACT presumes physician level knowledge, skill, and ability will be present on the mission. This CRT includes a scope of practice code of 4 (which correlates to an “Intern/PA/NP.”) The CRT working group SME consensus Clinical Phase 1 duration:

Best Case CP1: 0.08 hours
Worst Case CP1: 0.46 hours

Treatment Scope and Resourcing:

The definition for best-case scenario space adaptation nasal congestion indicates that it resolves spontaneously. Thus, no treatment resources were allocated to this scenario.

The worst-case scenario requires treatment. Pseudoephedrine, phenylephrine, and oxymetazoline were resourced as decongestants. Note, these were limited to a maximum of 3 days of treatment, consistent with terrestrial standards of care. Fluticasone was also included as a treatment capability.

Communications and Support Needs:

While real-time video and audio loop communications are desired for diagnosis and treatment, they were not considered a necessity for this condition.

References
1. Randel A. Guidelines for the Diagnosis and Management of Rhinosinusitis in Adults. AFP 2007; 76:1718.
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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 RECONCILATION COMMENTS

Incidence data was cited in IMM CLiFF and deemed best source by NASA biostatisticians, and reused for incidence distributions. (Crucian, 2016) and (Wotring, 2015) added to the literature for this CLiFF. The former study covered 46 crewmembers covering 20 yr. time span (ISS program-Expedition 37/38), yet unclear whether multiple events occurred for a single crewmember. The latter reviewed 24 ISS long duration crewmembers. 55% crewmembers reporting symptoms of congestion. More than half (55%) of crewmembers treated symptoms of allergy or congestion during their missions; 38% of crewmembers treated such symptoms repeatedly or continuously.

LIMITATIONS SUMMARY

Data comes from a handful of observational studies of actual symptoms and pharmacologic use in spaceflight. With that said, the definitions of nasal congestion are subjective and medicine usage by astronauts-- a key stratification in this condition, are widely driven by preference for symptomatic relief, rather than any firm criteria. As suggested in the pre-flight mitigation activities [i.e. clean air filters], some symptoms may not be purely related to cephalad fluid shifts, but air quality as well. One key limitation is that by definition, space adaptation conditions are only in the first 5 days of microgravity. The preponderance of our incidence data does not stratify onset of symptoms to these first 5 days. Specifically: • (Johnson, 1975) Apollo 9 symptoms prior to launch; Apollo 14 on 3rd day = 2 cases. • (Johnson, 1977) Unspecified on onset of symptoms. • (Crucian, 2016) Symptoms were batched as “upper respiratory symptoms, including congestion, rhinitis and/or sneezing.” 20 events over 20.57 flight-years, NOT stratified as to time of onset. • (Wotring, 2015) “More than half (55%) of crewmembers treated symptoms of allergy or congestion during their missions; 38% of crewmembers treated such symptoms repeatedly or continuously.” Unspecified on onset of symptoms. • (Walton, 2017) was chosen as its historical coverage (all LSAH recorded data through expedition 37/38) spanned and included the ranges within the other papers. 458 events over 807 person-missions. IP: 0.5675 (95%CI: 0.5325, 0.6020). Likewise, this aggregated data was not-stratified to the time of onset of symptoms. Therefore, it is likely that this data set overestimates incidence for SAS-related nasal congestion.

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)												
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	TI Decimal	TI %
Treated Best Case (TBC)									0	3763	0	0
Untreated Best Case (UTBC)									0	3763	0	0
Treated Worst Case (TWC)								211	211	3763	0.0560723	5.60723
Untreated Worst Case (UTWC)								211	211	3763	0.0560723	5.60723

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	TI Decimal	TI %
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 requring use of the alimentary sytem, 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 Condiltion 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
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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