Clinical Finding Form (CliFF)

Branch Baseline

ICL57_Fracture- Thoracic/Lumbar Spine

There is no IMM CliFF for Fracture - Thoracic Lumbar Spine. There is an IMM CliFF for Lumbar Spine Fracture. This IMM CliFF is based on a Glenn Research Center biomechanical and bone loading model that accounts for the microgravity environment of the ISS. The incidence of a lumbar spine fracture based on this model is estimated as 0.00014 events/ person-year. There have been no occurrences of thoracic or lumbar spine fractures in spaceflight to date. Therefore, terrestrial data is used to estimate incidence and outcomes for of thoracic and lumbar spine fractures for this CliFF. This may result in an overestimation of the probability of thoracic and lumbar spine fractures in spaceflight. However, the Glenn Research Center biomechanical and bone loading model and terrestrial data does not account for possible bone loss of the thoracic and lumbar spine associated with spaceflight microgravity and partial gravity environments.

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

No occurrences of thoracolumbar fractures reported in space flight.

ANALOG LITERATURE

The analog literature includes 3 studies from military environments, including military aviators (Belmont et al., 2001), helicopter accidents (Auffret et al., 1982), injuries related to parachutes and aircraft ejections (Stemper et al., 2011). Population is younger males in the military with injuries related to aerospace trauma.

TERRESTRIAL LITERATURE

Population Incidence of Sweden recorded in hospital records. Data includes patients under the age of 60 and overall data (Jansson et al., 2010).

OVERALL INCIDENCE SUMMARY

INCIDENCE

mean 2.08E-7 and SD 1.82E-9

INCIDENCE SUMMARY

This is a surface-ops EVA condition. The posterior distribution for the incidence rate of fracture given the terrestrial data under an uninformative prior is Gamma(shape=13189.83, rate=43387607) with mean 3.04E-4 and SD 2.65E-6. The resulting posterior distribution for the probability of experiencing a fracture over a 6-hour surface-ops EVA is Beta(shape1=13146, shape2=63171129290) with mean 2.08E-7 and SD 1.82E-9. This condition is modeled as a surface-ops EVA-related condition and assumes an EVA length of 6 hours in the probability calculation. A distribution for the probability of an event within the EVA window is specified but within the notes, the incidence rate distribution will also be captured. This will allow for adjustment of the EVA length assumption should the need arise.

TABLE 1. INCIDENCE MODEL

Incidence Details

Incidence Type
EVA

Segment
EVA Surface

Env. Exposure
NA

Sex
Any

Crowns
Any

Contacts
Any

Pregnancy
Any

Incidence Distribution

Occurrence Dist
Binomial

Incidence Dist.
Beta

Mean
2.08101E-07

SD
1.81501E-09

Beta
(Alpha): 13146
(Beta): 6.31711E+10

TABLE 2. INCIDENCE LEVEL OF CONFIDENCE (LOC)

Citation	Source	LOC Value
B. D. STEMPER, 2011	analog terrestrial	0
Auffret, 1982	analog terrestrial	0
Belmont, 2001.	analog terrestrial	0
Jansson, 2010	terrestrial general population	1

(Jansson, 2010) using the incidence data for patients under the age of 60.

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 preflight preventive measures. Prevention through vehicle and habitat design, and safety training.

BEST CASE SCENARIO DEFINITION

A non-displaced fracture with no dislocation, and mild to moderate pain that responds to analgesics and conservative treatment.

WORSE CASE SCENARIO DEFINITION

A displaced fracture or dislocation resulting in spinal instability, severe pain, or requiring surgery.

CONDITIONS INCLUDED, BUT NOT EXPLICITLY STATED (CNES)

None

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 (85%) Worst Case Probability (15%)

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

Citation	Source	LOC Value
Jansson, 2010	Terrestrial	3

A nice epidemiologic study; however, this excluded patients not admitted to the hospital and was not representative of the astronaut population.

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 2.08E-7 and SD 1.82E-9	85 - 85	100	1.5	5.18204	1344	2016	0	0	0	0	0
Treated Worst Case (TWC)		15 - 15	100	2	26.3354	2880	4320	14.4567	100	100	0	0
Untreated Best Case (UTBC)	N/A	N/A	N/A	1.5	19.8379	1344	2016	0	0	0	0	0
Untreated Worst Case (UTWC)	N/A	N/A	N/A	2	54.903	2880	4320	37.3107	100	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

Best Case/Worst Case percent = 85%/15% based on (Jansson, 2010). 15% of fractures were treated with surgery. LOE = 3 (somewhat confident).

TREATED BEST CASE (TBC) SCENARIO COMMENTS

A non-displaced fracture with no dislocation, and mild to moderate pain that responds to analgesics and conservative treatment. In the treated best case scenario, treatment with analgesics, activity modification, and possibly the use of a spinal support (bracing). RTDC is not expected. LOCL is not expected.

TREATED WORST CASE SCENARIO (TWC) COMMENTS

A displaced fracture or dislocation resulting in spinal instability, severe pain, or requiring surgery. In the treated worst case scenario, analgesics, activity modification, and spinal support (bracing) should be available. Surgical treatment most likely will not be available in spaceflight. RTDC is expected due to limited treatment capabilities available in spaceflight. LOCL is not expected.

UNTREATED BEST CASE (UTBC) SCENARIO COMMENTS

No treatment is available, but RTDC and LOCL is not expected.

UNTREATED WORST CASE (UTWC) SCENARIO COMMENTS

Since no treatment is available. RTDC is expected. LOCL is not expected.

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

Citation	Source	LOC Value
Gnanenthiran, 2012	Terrestrial	4
Aleem, 2016	Terrestrial	
Moller, 2007	Terrestrial	
Stadhouder, 2009	Terrestrial	

Treated best case and untreated best case CP2 durations = 8 weeks (1344 hours) to 12 weeks (2016 hours) based on (Genev, 2017). Treated worst case and untreated worst case CP2 durations = 4 months (2880 hours) to 6 months (4320 hours) based on (Ataizi, 2018). LOE = 3 (somewhat confident).

TABLE 6. RTDC LEVEL OF CONFIDENCE (LOC)

Citation	Source	LOC Value
Stadhouder, 2008	Terrestrial	
Jansson, 2010	Terrestrial	

Citation	Source	LOC Value 4
Hitchon, 2014	Terrestrial	
Moller, 2007	Terrestrial	
Dai, 2008	Terrestrial	

RTDC is not expected in treated best case scenario or untreated best case scenario based on best case definition. LOE = 4 (confident). RTDC is expected is expected in treated worst case scenario and untreated worst case scenario based on best case definition. LOE = 4 (confident).

TABLE 7. LOCL LEVEL OF CONFIDENCE (LOC)

Citation	Source	LOC Value
Cotton, 2005	Terrestrial	4
Schinkel, 2006	Terrestrial	
Bellabarba, 2010	Terrestrial	
Melton, 2013	Terrestrial	

LOCL is not expected in any scenarios for the astronaut population. LOE = 4 (confident).

CAPABILITY RESOURCE TABLE (CRT) OVERVIEW

Capabilities and Resourcing Scope Overview Thoracic/Lumbar spine fracture encompasses any spinal fracture in the thoracic or lumbar region, with the best-case scenario representing uncomplicated fractures and the worst-case scenario representing complicated fractures. Note that this CRT was not scoped for open spinal fractures. Any fracture, if left untreated, could result in further complications such as malunion, loss-of function, and/or chronic pain. A worst-case scenario, left untreated, could result in additional significant complications. CNES: N/A Diagnostic Scope and Resourcing In the best-case scenario, diagnosis is based on history, physical examination (musculoskeletal, neurologic, and vital signs), and imaging. Plain film (X-Ray), CT, and MRI will be unavailable inflight. Musculoskeletal ultrasound was included in the CRT as it may serve as a useful adjunct in diagnosis for some cases, but it was not considered a necessary capability to diagnose a thoracic or lumbar fracture. In the worst-case scenario, diagnosis is based on history, physical examination (musculoskeletal, neurologic, and vital signs), and imaging. In some cases, musculoskeletal ultrasound may be contraindicated. The utility of musculoskeletal ultrasound would be determined on a case-by-case basis. It was included as a non-necessary capability. This diagnostic framework is consistent with the terrestrial workup for thoracic or lumbar fracture with the exception of the inability to perform plain film X-Ray (and if warranted CT or MRI), and thereby using Musculoskeletal Ultrasound as a possible surrogate. 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): 1.5 hours CP1 WC (Treated or Untreated: 2 hours This CRT includes a scope of practice code of 5 (which correlates to an “Experienced procedure trained generalist attending (ED attending)” and was included for musculoskeletal ultrasound and interpretation. Treatment Scope and Resourcing Terrestrially, evidence indicates that outcomes for bracing versus not bracing stable thoracic and lumbar fractures appear to be equivalent. Thus, bracing was not included in the best-case scenario, but is included as a necessity in the worst-case scenario. Prefabricated braces were included as resources, given the difficulty that making a spinal brace in-flight would pose. Although 3D printing offers potential for splinting of musculoskeletal injuries, it remains a largely experimental process and it is not within the scope of this CRT. Physical therapy is recommended regardless of immobilization. Exercise modification is also recommended, but not built into the CRT as this does not represent a clinical resource. Pain is variable depending on the patient. NSAIDs (both oral and topical), cold packs, lidocaine patches, and acetaminophen were included in the best-case treatment scenario, narcotics were additionally included in the worst-case scenario. Practice guidelines also recommend intranasal calcitonin for a duration of 4 weeks, a resource that requires refrigeration. This was included in both best and worst-case scenarios. Communications and Support Needs While real-time video and audio loop communications are desired for diagnosis and treatment, they were not considered a necessity, in the best-case scenario. For the WC, consultation with ground specialists to facilitate treatment and healing was considered necessary given the limited diagnostic and treatment capabilities in-flight. REFERENCES 1. McCarthy J, Davis A. Diagnosis and Management of Vertebral Compression Fractures. AFP 2016; 94:44–50. 2. O'Toole JE, Kaiser MG, Anderson PA, Arnold PM, Chi JH, Dailey AT, et al. Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Evaluation and Treatment of Patients with Thoracolumbar Spine Trauma: Executive Summary. Neurosurgery 2019; 84:2–6.

IMM CLIFF RECONCILATION COMMENTS

There is no IMM CliFF for Fracture - Thoracic Lumbar Spine. There is an IMM CliFF for Lumbar Spine Fracture. This IMM CliFF is based on a Glenn Research Center biomechanical and bone loading model that accounts for the microgravity environment of the ISS. The incidence of a lumbar spine fracture based on this model is estimated as 0.00014 events/ person-year.

LIMITATIONS SUMMARY

There is no spaceflight data for this CLIFF. The terrestrial environment that was used as a surrogate does not correlate well to that of EVA's on the lunar or Martian surface, but probably represents an upper bound. Because of the large sample size, the study used to compute the composite incidence most likely overestimates the confidence we have in the assigned value. Under-reporting for this condition could have been significant during past space missions due to subtle disease that may not have been apparent to the crew. This may result in underestimation of the incidence.

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)							145					
Untreated Best Case (UTBC)		664		89			145					
Treated Worst Case (TWC)		664					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)							34	211	390	3763	0.103641	10.3641
Untreated Best Case (UTBC)	132			22	196		34	211	1493	3763	0.396758	39.6758
Treated Worst Case (TWC)	132			22	196	34	34	211	1438	3763	0.382142	38.2142
Untreated Worst Case (UTWC)	132	564	414	22	196	34	34	211	2728	3763	0.724953	72.4953

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)							145					
Untreated Worst Case (UTWC)		664					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)									0	3763	0	0
Untreated Best Case (UTBC)									0	3763	0	0
Treated Worst Case (TWC)	132			22			34	211	544	3763	0.144566	14.4566
Untreated Worst Case (UTWC)	132			22	196		34	211	1404	3763	0.373107	37.3107

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
Jansson, Karl-Ake et al. “Thoracolumbar Vertebral Fractures in Sweden: An Analysis of 13,496 Patients Admitted to Hospital.” European journal of epidemiology 25.6 (2010): 431–437. Print. (Jansson, 2010). Spinal Compression Fracture Management: A Review of Current Treatment Strategies and Possible Future Avenues. Ivo K. Genev, et al. Global Spine Journal Vol. 7 Iss. 1/2017. (Genev, 2017). Bone turnover in vertebral fractures: Does it effect the decision of surgery? Zeki Ataizi and Hasan Aydin. Asian Journal of Neurosurgery, vol. 13, no. 2, 2018, p. 357. (Ataizi, 2018).

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