

Leitlinienreport der S2e Leitlinie

Cardiopulmonary resuscitation (CPR) during spaceflight - a guideline for CPR in microgravity from the German Society of Aerospace Medicine (DGLRM) and the European Society of Aerospace Medicine Space Medicine Group (ESAM-SMG)

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1. Informationen zum Leitlinienreport

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1.2 Federführende Fachgesellschaften

Deutsche Gesellschaft für Luft- und Raumfahrtmedizin (DGLRM) e.V.



European Society for Aerospace Medicine (ESAM) e.V., Space Medicine Group



1.3 Finanzierung der Leitlinie

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1.5 Zitierweise

S2e Leitlinie „Cardiopulmonary resuscitation (CPR) during spaceflight - a guideline for CPR in microgravity from the German Society of Aerospace Medicine (DGLRM) and the European Society of Aerospace Medicine Space Medicine Group (ESAM-SMG)“, Leitlinienreport, 2021, AWMF-Registernummer 182 - 002

1.6 Gender-Disclaimer

Aus Gründen der besseren Lesbarkeit wird in diesem Leitlinienreport das generische Maskulinum verwendet. Weibliche und anderweitige Geschlechteridentitäten werden dabei ausdrücklich mitgemeint.

1.7 Weitere Dokumente zur Leitlinie

Originalveröffentlichung im Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine:

<https://sjtrem.biomedcentral.com/articles/10.1186/s13049-020-00793-y>

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1.8 Abkürzungsverzeichnis

ACCD	Automated Chest Compression Devices
AED	Automated External Defibrillator
AHA	American Heart Association
ALS	Advanced Life Support
BLS	Basic Life Support
CHeCS	Crew Health Care System
CMO	Crew Medical Officer
CMRS	Crew Medical Restraint System
CPR	Cardiopulmonary Resuscitation
DGLRM	Deutsche Gesellschaft für Luft- und Raumfahrtmedizin, German Society of Aviation and Space Medicine
ER	Evetts-Russomano
ERC	European Resuscitation Council
ESAM	European Society of Aerospace Medicine
ESAM-SMG	Space Medicine Group, European Society of Aerospace Medicine
ETT	Endotracheal tube
GRADE	The Grading of Recommendations Assessment, Development and Evaluation
HS	Handstand
ILCOR	International Liaison Committee on Resuscitation
LEO	Low Earth Orbit
LMA	Laryngeal mask
NASA	National Aeronautics and Space Administration
PEA	Pulseless Electric Activity
PICO	Population, Intervention, Comparison, Outcome
pVT	Pulseless Ventricular Tachycardia
RBH	Reverse Bear Hug
ROSC	Return of Spontaneous Circulation
SAD	Supraglottic Airway Device
SGA	Supraglottic Airway
TI	Tracheal intubation
TT	Tracheal Tube
VF	Ventricular Fibrillation

2. Geltungsbereich und Zweck der Leitlinie

2.1 Adressaten

Die Leitlinie richtet sich an die Fachgesellschaften DGLRM e.V. und ESAM e.V. und dient zur Information für alle Beteiligten Mitarbeiter von Raumfahrtorganisationen, die mit medizinischer Ausbildung, Missionsplanung oder Missionsdurchführung betraut sind.

2.2 Zielsetzung

Das Ziel dieser Leitlinie ist es, die aktuell verfügbare Evidenz zum Themenkomplex der kardiopulmonalen Reanimation im Rahmen einer Raumfahrtmission unter den Bedingungen der Mikrogravitation zu bündeln. Basierend auf diesen Erkenntnissen sollen evidenzbasierte Empfehlungen zu Diagnostik und Therapie eines Patienten mit Herz-Kreislaufstillstand in Mikrogravitation erstellt werden.

2.3 Gültigkeitsdauer und Aktualisierungsverfahren

Diese Leitlinie ist ab der letzten Aktualisierung 5 Jahr gültig.

3. Zusammensetzung der Leitliniengruppe

3.1 Koordination und Redaktion

Prof. Dr. Jochen Hinkelbein, Klinik für Anästhesiologie und Operative Intensivmedizin, Uniklinik Köln

Steffen Kerkhoff, Klinik für Anästhesiologie und Operative Intensivmedizin, Uniklinik Köln

3.2 Beteiligte Autoren

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3.3 Patientenbeteiligung

Die Zielpopulation dieser Leitlinie ist zum Zeitpunkt Ihrer Veröffentlichung auf professionelle Astronauten beschränkt, bezieht jedoch in Zukunft auch kommerzielle Weltraumtouristen mit ein. Zum Zeitpunkt der Leitlinienerstellung existiert noch keine Patientenorganisation für Weltraummissionen.

4. Fragestellungen und Gliederung

Diese Leitlinie stellt die weltweit erste evidenzbasierte Handlungsempfehlungen zum Themenkomplex der Kardiopulmonalen Reanimation in Mikrogravitation dar. Obwohl Reanimationsbehandlung seit den 1960er Jahren ein etabliertes und stark beforschtes Gebiet der Medizin darstellt ist dies nicht der Fall für die besondere Umgebung der Mikrogravitation während einer Weltraummission.

Die erprobten und standardisierten Leitlinien des ERC[1]/der AHA[2] können in dieser besonderen Umgebung nur sehr eingeschränkt angewandt werden. Insbesondere die Durchführung von Thoraxkompressionen ist im Vergleich zur erdbasierten Methode deutlich erschwert, da Patient und Helfer in Mikrogravitation frei im Raum schweben und kein Widerlager durch den auf dem Boden liegenden Patienten gebildet wird. Es sind daher besondere Techniken notwendig, um eine adäquate Kraftübertragung von Helfer auf den Brustkorb des Patienten auszuüben und schlussendlich einen relevanten Auswurf des Herzens zu erzeugen.

4.1 Themenkomplexe

Nach Bildung der Forschungsgruppe erfolgte ein online Brainstorming der Gruppenmitglieder bezüglich der Fragen, welche durch die Literaturrecherche und spätere Bewertung bearbeitet werden sollten. Es wurden zunächst 15 Themenkomplexe gebildet (Tabelle 1), die als Grundlage für die spätere systematische Literaturrecherche dienten.

1. Chest compressions	2. Automated chest compression devices	3. Airway management
4. Ventilation	5. Suction	6. Defibrillation
7. Intravenous access	8. Medication	9. Medical Training
10. ROSC	11. Death	12. Telemedicine
13. Reversible causes of cardiac arrest	14. Technical limitations of spaceflight	15. Ethics

Tabelle 1: Aspekte zu CPR in Mikrogravitation, welche im Rahmen der Leitlinie adressiert werden sollen

5. Methodisches Vorgehen

5.1 Vorbereitung der systematischen Literaturrecherche

Nach Definierung der relevanten Themenbereiche erfolgte die Erstellung 134 PICO- Fragen[3] (Patient, Intervention, Control, Outcome). Teilweise konnten einige Fragen nicht alle Bestandteile des PICO Schemas enthalten (Ethische Fragen, etc.), sodass sie in abgewandelter Form erstellt wurden. Auf Basis dieser PICO-Fragen wurden die Suchstrategien für MEDLINE erstellt (Tabelle 2). Insgesamt konnten 59 unterschiedliche Suchstrategien erstellt werden.

Number	Question	Search string	hits
1	Should future astronauts be informed straightforward about medical capabilities	((((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR "cardiopulmonary	6

	onboard (limited ICU capabilities, prognosis of CPR in space)?	resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR ("cardio"[All Fields] AND "pulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardio pulmonary resuscitation"[All Fields])) AND (((("prognosis"[MeSH Terms] OR "prognosis"[All Fields]) OR "prognosis"[MeSH Terms]) OR (medical[All Fields] AND capabilities[All Fields])) AND ((((((("space flight"[MeSH Terms] OR ("space flight"[MeSH Terms] OR ("space"[All Fields] AND "flight"[All Fields]) OR "space flight"[All Fields])) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "spacecraft"[MeSH Terms] OR ("spacecraft"[MeSH Terms] OR "spacecraft"[All Fields])) OR "aerospace medicine"[MeSH Terms] OR ("aerospace medicine"[MeSH Terms] OR ("aerospace"[All Fields] AND "medicine"[All Fields]) OR "aerospace medicine"[All Fields]))	
2	Should future astronauts should make a “patient decree” before the mission with regards to the special medical circumstances of space flight (e.g. DNR, prolonged unconsciousness after CPR, what to do with their corpse)	(((("patients"[MeSH Terms] OR "patients"[All Fields] OR "patient"[All Fields]) AND decree[All Fields]) OR "living wills"[MeSH Terms]) OR ("living wills"[MeSH Terms] OR ("living"[All Fields] AND "wills"[All Fields]) OR "living wills"[All Fields] OR ("living"[All Fields] AND "will"[All Fields]) OR "living will"[All Fields])) AND ((((((("space flight"[MeSH Terms] OR ("space flight"[MeSH Terms] OR ("space"[All Fields] AND "flight"[All Fields]) OR "space flight"[All Fields])) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "spacecraft"[MeSH Terms] OR ("spacecraft"[MeSH Terms] OR "spacecraft"[All Fields])) OR "aerospace medicine"[MeSH Terms] OR ("aerospace medicine"[MeSH Terms] OR ("aerospace"[All Fields] AND "medicine"[All Fields]) OR "aerospace medicine"[All Fields]))	91
3	What safety protocols onboard a spacecraft could restrict our procedures for CPR?	(((safety) OR equipment safety[MeSH Terms])) AND (((((((spacecraft) OR spacecraft[MeSH Terms]) OR microgravity) OR microgravity[MeSH Terms]) OR weightlessness) OR weightlessness[MeSH Terms]) OR spaceflight) OR spaceflight[MeSH Terms])) AND ((((((resuscitation) OR cardio pulmonary resuscitation[MeSH Terms]) OR cardiopulmonary resuscitation[MeSH Terms]) OR endotracheal intubation[MeSH Terms]) OR intubation) OR chest compression)	3

4	<p>Could the vibrations caused by chest compressions (HS method, automated chest compression devices) endanger the structural integrity of the spacecraft? (Are there comparable scientific findings, e.g. from the use of physical training devices)</p>	<p>((((((((chest compressions) OR cardio pulmonary resuscitation[MeSH Terms]) OR cardiopulmonary resuscitation[MeSH Terms]) OR resuscitation) OR cpr[MeSH Terms]) OR cpr))) AND (((vibration[MeSH Terms]) OR vibrations[MeSH Terms]) OR vibration)</p>	71
5	<p>Should CPR in space be divided into different time sections, analogous to the terrestrial guidelines (BLS→ALS, chain-of-survival in space)? Should the ER- (or RBH-) be mainly seen as an instrument of first aid, until the patient can be transported to and fixed on the restraint system</p>	<p>((((((((((phase[MeSH Terms]) OR phase) OR stage[MeSH Terms]) OR stage) OR basic cardiac life support[MeSH Terms]) OR basic life support) OR advanced cardiac life support[MeSH Terms]) OR advanced life support)) AND (((((((cpr[MeSH Terms]) OR cpr) OR cardio pulmonary resuscitation[MeSH Terms]) OR cardio pulmonary resuscitation) OR cardiopulmonary resuscitation[MeSH Terms]) OR cardiopulmonary resuscitation) OR resuscitation[MeSH Terms]) OR resuscitation) OR chest compression)) AND (((((((space flight[MeSH Terms]) OR space flight) OR microgravity[MeSH Terms]) OR microgravity) OR spacecraft[MeSH Terms]) OR spacecraft) OR aerospace medicine[MeSH Terms]) OR aerospace medicine)</p>	40
6	<p>Should the HS-technique be mainly seen as an instrument of advanced CPR for a patient strapped to the restraint system?</p>	<p>((("restraint, physical"[MeSH Terms] OR restraint[All Fields]) OR "immobilization"[MeSH Terms]) OR ("immobilisation"[All Fields] OR "immobilization"[MeSH Terms] OR "immobilization"[All Fields])) AND (((((((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR ("cardio"[All Fields] AND "pulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardio pulmonary resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR (("thorax"[MeSH Terms] OR "thorax"[All Fields] OR "chest"[All Fields]) AND compression[All Fields])) AND (((((((space flight"[MeSH Terms] OR ("space flight"[MeSH Terms] OR ("space"[All Fields] AND "flight"[All Fields]) OR "space flight"[All Fields])) OR</p>	9

		"weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "spacecraft"[MeSH Terms] OR ("spacecraft"[MeSH Terms] OR "spacecraft"[All Fields])) OR "aerospace medicine"[MeSH Terms] OR ("aerospace medicine"[MeSH Terms] OR ("aerospace"[All Fields] AND "medicine"[All Fields]) OR "aerospace medicine"[All Fields]))	
7	What is the risk of musculoskeletal injury performing manual CPR after prolonged exposure to microgravity? (E.g. are current onboard exercise regimes sufficient to maintain required muscle strength and stability for safe and effective CPR without causing injury)	((("wounds and injuries"[MeSH Terms] OR ("wounds and injuries"[MeSH Terms] OR ("wounds"[All Fields] AND "injuries"[All Fields]) OR "wounds and injuries"[All Fields] OR "injury"[All Fields])) AND (((((((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardio pulmonary resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms] OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR ((("thorax"[MeSH Terms] OR "thorax"[All Fields] OR "chest"[All Fields]) AND compression[All Fields])) AND (((((((("space flight"[MeSH Terms] OR ("space flight"[MeSH Terms] OR ("space"[All Fields] AND "flight"[All Fields]) OR "space flight"[All Fields])) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "spacecraft"[MeSH Terms] OR ("spacecraft"[MeSH Terms] OR "spacecraft"[All Fields])) OR "aerospace medicine"[MeSH Terms] OR ("aerospace medicine"[MeSH Terms] OR ("aerospace"[All Fields] AND "medicine"[All Fields]) OR "aerospace medicine"[All Fields]))	33
8	Does the chest compression technique (HS, ER, RBH) influence the feasibility of gaining iv-access?	(((((("infusions, intravenous"[MeSH Terms] OR ("infusions, intravenous"[MeSH Terms] OR ("infusions"[All Fields] AND "intravenous"[All Fields]) OR "intravenous infusions"[All Fields] OR ("intravenous"[All Fields] AND "infusion"[All Fields]) OR "intravenous infusion"[All Fields])) OR (intravenous[All Fields] AND access[All Fields])) OR "injections, intravenous"[MeSH Terms] OR ("injections, intravenous"[MeSH Terms] OR	2

		<p>("injections"[All Fields] AND "intravenous"[All Fields]) OR "intravenous injections"[All Fields] OR ("intravenous"[All Fields] AND "injection"[All Fields]) OR "intravenous injection"[All Fields]) AND (((((((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR ("cardio"[All Fields] AND "pulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardio pulmonary resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR (("thorax"[MeSH Terms] OR "thorax"[All Fields] OR "chest"[All Fields]) AND compression[All Fields])) AND (((((((("space flight"[MeSH Terms] OR ("space flight"[MeSH Terms] OR ("space"[All Fields] AND "flight"[All Fields]) OR "space flight"[All Fields])) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "spacecraft"[MeSH Terms]) OR ("spacecraft"[MeSH Terms] OR "spacecraft"[All Fields])) OR "aerospace medicine"[MeSH Terms]) OR ("aerospace medicine"[MeSH Terms] OR ("aerospace"[All Fields] AND "medicine"[All Fields]) OR "aerospace medicine"[All Fields]))</p>	
9	Does the chest compression technique (HS, ER, RBH) influence the feasibility of securing the airway?	<p>(((((("intubation, intratracheal"[MeSH Terms] OR ("intubation"[MeSH Terms] OR "intubation"[All Fields])) OR "intubation, intratracheal"[MeSH Terms]) OR "airway management"[MeSH Terms]) OR airway[All Fields]) AND (((((((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR ("cardio"[All Fields] AND "pulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardio pulmonary resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR (("thorax"[MeSH Terms] OR "thorax"[All Fields] OR "chest"[All Fields]) AND compression[All Fields])) AND (((((((("space flight"[MeSH Terms] OR ("space flight"[MeSH Terms] OR ("space"[All Fields] AND "flight"[All Fields]) OR "space flight"[All Fields])) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "spacecraft"[MeSH Terms]) OR ("spacecraft"[MeSH Terms] OR "spacecraft"[All Fields])) OR "aerospace medicine"[MeSH Terms]) OR ("aerospace medicine"[MeSH Terms] OR ("aerospace"[All Fields] AND "medicine"[All Fields]) OR "aerospace medicine"[All Fields]))</p>	45

		"resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields]) OR (("thorax"[MeSH Terms] OR "thorax"[All Fields] OR "chest"[All Fields]) AND compression[All Fields])) AND ((((((("space flight"[MeSH Terms] OR ("space flight"[MeSH Terms] OR ("space"[All Fields] AND "flight"[All Fields]) OR "space flight"[All Fields])) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "spacecraft"[MeSH Terms]) OR ("spacecraft"[MeSH Terms] OR "spacecraft"[All Fields])) OR "aerospace medicine"[MeSH Terms]) OR ("aerospace medicine"[MeSH Terms] OR ("aerospace"[All Fields] AND "medicine"[All Fields]) OR "aerospace medicine"[All Fields]))	
10	Does the HS-technique compared to the ER-technique accomplish better compressions depths in patients in cardiac arrest in microgravity?	(((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms]) AND (((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms])	34
11	Does the HS-technique compared to the ER-technique accomplish a better cardiac output during CPR in patients in cardiac arrest in microgravity?	(((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms]) AND (((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms])	34
12	Can the HS-technique compared to the ER-technique be performed more consistent regarding compression frequency during CPR in patients in cardiac arrest in microgravity?	(((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms]) AND (((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms])	34

13	Should a patient in cardiac arrest in microgravity be fastened on the crew medical restraint system for CPR or should he be free floating regarding feasibility of CPR?	((("restraint, physical"[MeSH Terms] OR restraint[All Fields]) OR "restraint, physical"[MeSH Terms]) OR fasten[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]) AND (((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR cardiopulmonary[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms] OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]))	30
14	Should a patient in cardiac arrest in microgravity be fastened on the crew medical restraint system for CPR or should he be free floating regarding beginning of effective chest compressions?	((("restraint, physical"[MeSH Terms] OR restraint[All Fields]) OR "restraint, physical"[MeSH Terms]) OR fasten[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]) AND (((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR cardiopulmonary[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms] OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]))	30
15	Does an automated chest compression device have an advantage over manual chest compressions (HS-technique) regarding compression depth during CPR in patients in cardiac arrest in microgravity?	((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]) AND (((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms] OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms])	34
16	Does an automated chest compression device have an advantage over manual chest compressions (HS-technique) regarding cardiac output during CPR in patients with cardiac arrest in microgravity?	((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]) AND (((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms] OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms])	34
17	Does an automated chest compression device have an advantage over manual	((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR	34

	chest compressions (HS-technique) regarding consistency of compression frequency during CPR in patients with cardiac arrest in microgravity?	"weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms] AND (((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms])	
18	Can an automated chest compression device be applied to a patient in cardiac arrest in microgravity in an adequate amount of time compared to CPR in the HS-technique?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms]) AND (((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms])	34
19	Can an automated chest compression device be operated effectively while being used on a patient in cardiac arrest free floating in microgravity?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms]) AND (((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms])	34
20	Can an automated chest compression device be operated safely while being used on a patient in cardiac arrest free floating in microgravity?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms]) AND (((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms])	34
21	Can an automated chest compression device be operated effectively while being used on a patient in cardiac arrest strapped to the restraint system in microgravity?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms]) AND (((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields]))	34

		OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms])	
22	Can an automated chest compression device be operated safely while being used on a patient in cardiac arrest strapped to the restraint system in microgravity?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms]) AND ((((((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms]))	34
23	Is it reasonable to transport an 8,0 kg heavy automated chest compression device on a space mission compared to the lack of this device for use in CPR of a patient in cardiac arrest in microgravity?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms]) AND ((((((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms]))	34
24	Is the endotracheal laryngoscopy-guided intubation superior compared to the use of a supraglottic airway device (SGA) regarding the time to establish the airway during CPR in a patient with cardiac arrest in microgravity?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms]) AND (((((((((((("intubation"[MeSH Terms] OR "intubation"[All Fields]) OR "intubation"[MeSH Terms]) OR endotracheal[All Fields]) OR "intubation, intratracheal"[MeSH Terms]) OR "airway management"[MeSH Terms]) OR airway[All Fields]) OR "laryngeal masks"[MeSH Terms]) OR ("laryngeal masks"[MeSH Terms] OR ("laryngeal"[All Fields] AND "masks"[All Fields]) OR "laryngeal masks"[All Fields] OR ("laryngeal"[All Fields] AND "mask"[All Fields]) OR "laryngeal mask"[All Fields])) OR combitube[All Fields]) OR ("larynx"[MeSH Terms] OR "larynx"[All Fields] OR "laryngeal"[All Fields]) AND tube[All Fields])) OR i-gel[All Fields]))	55
25	Is the endotracheal laryngoscopy-guided intubation superior compared to the use of a SGA regarding the training time of the care provider during CPR in a patient with cardiac arrest in microgravity?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms]) AND (((((((((((("intubation"[MeSH Terms] OR "intubation"[All Fields]) OR "intubation"[MeSH Terms]) OR endotracheal[All Fields]) OR "intubation, intratracheal"[MeSH Terms]) OR "airway management"[MeSH Terms]) OR airway[All Fields]) OR "laryngeal masks"[MeSH Terms]) OR ("laryngeal masks"[MeSH Terms] OR ("laryngeal"[All Fields] AND "masks"[All Fields]) OR "laryngeal masks"[All Fields] OR ("laryngeal"[All Fields] AND "mask"[All Fields]) OR "laryngeal mask"[All Fields])) OR combitube[All Fields]) OR ("larynx"[MeSH Terms] OR "larynx"[All Fields] OR "laryngeal"[All Fields]) AND tube[All Fields])) OR i-gel[All Fields]))	55
26	Is the endotracheal laryngoscopy-guided intubation superior compared to the use of a SGA regarding the success	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms]) AND (((((((((((("intubation"[MeSH Terms] OR "intubation"[All Fields]) OR	55

	rate of correct insertion during CPR in a patient with cardiac arrest in microgravity?	"intubation"[MeSH Terms]) OR endotracheal[All Fields]) OR "intubation, intratracheal"[MeSH Terms]) OR "airway management"[MeSH Terms]) OR airway[All Fields]) OR "laryngeal masks"[MeSH Terms]) OR ("laryngeal masks"[MeSH Terms] OR ("laryngeal"[All Fields] AND "masks"[All Fields]) OR "laryngeal masks"[All Fields] OR ("laryngeal"[All Fields] AND "mask"[All Fields]) OR "laryngeal mask"[All Fields])) OR combitube[All Fields]) OR (("larynx"[MeSH Terms] OR "larynx"[All Fields] OR "laryngeal"[All Fields] AND tube[All Fields])) OR i-gel[All Fields])	
27	Is the use of a SGA superior to the use of bag-mask-ventilation regarding time to establish the airway during CPR in a patient with cardiac arrest in microgravity?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms]) AND (((((((("airway management"[MeSH Terms] OR airway[All Fields]) OR "laryngeal masks"[MeSH Terms]) OR ("laryngeal masks"[MeSH Terms] OR ("laryngeal"[All Fields] AND "masks"[All Fields]) OR "laryngeal masks"[All Fields] OR ("laryngeal"[All Fields] AND "mask"[All Fields]) OR "laryngeal mask"[All Fields])) OR combitube[All Fields]) OR (("larynx"[MeSH Terms] OR "larynx"[All Fields] OR "laryngeal"[All Fields] AND tube[All Fields])) OR i-gel[All Fields]) OR (bag[All Fields] AND ("masks"[MeSH Terms] OR "masks"[All Fields] OR "mask"[All Fields]) AND ("ventilation"[MeSH Terms] OR "ventilation"[All Fields] OR "respiration"[MeSH Terms] OR "respiration"[All Fields]))) OR bag-mask-ventilation[All Fields]) OR bvm[All Fields]))	54
28	Is the use of a SGA superior to the use of bag-mask-ventilation regarding the training time of the care provider during CPR in a patient with cardiac arrest in microgravity?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms]) AND (((((((("airway management"[MeSH Terms] OR airway[All Fields]) OR "laryngeal masks"[MeSH Terms]) OR ("laryngeal masks"[MeSH Terms] OR ("laryngeal"[All Fields] AND "masks"[All Fields]) OR "laryngeal masks"[All Fields] OR ("laryngeal"[All Fields] AND "mask"[All Fields]) OR "laryngeal mask"[All Fields])) OR combitube[All Fields]) OR (("larynx"[MeSH Terms] OR "larynx"[All Fields] OR "laryngeal"[All Fields] AND tube[All Fields])) OR i-gel[All Fields]) OR (bag[All Fields] AND ("masks"[MeSH Terms] OR "masks"[All Fields] OR "mask"[All Fields]) AND ("ventilation"[MeSH Terms] OR "ventilation"[All Fields] OR "respiration"[MeSH Terms] OR "respiration"[All Fields]))) OR bag-mask-ventilation[All Fields]) OR bvm[All Fields]))	54
29	Is the use of a SGA superior to the use of bag-mask-ventilation regarding the success rate of adequate ventilation during CPR in a patient with cardiac arrest in microgravity?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms]) AND (((((((("airway management"[MeSH Terms] OR airway[All Fields]) OR "laryngeal masks"[MeSH Terms]) OR ("laryngeal masks"[MeSH Terms] OR ("laryngeal"[All Fields] AND "masks"[All Fields]) OR "laryngeal masks"[All Fields] OR ("laryngeal"[All Fields] AND "mask"[All Fields]) OR "laryngeal mask"[All Fields])) OR combitube[All Fields]) OR (("larynx"[MeSH Terms] OR "larynx"[All Fields] OR "laryngeal"[All Fields] AND tube[All Fields])) OR i-gel[All Fields]) OR (bag[All Fields] AND ("masks"[MeSH Terms] OR "masks"[All Fields] OR "mask"[All Fields]) AND ("ventilation"[MeSH Terms] OR "ventilation"[All Fields] OR "respiration"[MeSH Terms] OR "respiration"[All Fields]))) OR bag-mask-ventilation[All Fields]) OR bvm[All Fields]))	54
30	Is the use of a SGA superior to the use of bag-mask-ventilation regarding leakage during CPR in a patient with cardiac arrest in microgravity?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms]) AND (((((((("airway management"[MeSH Terms] OR airway[All Fields]) OR "laryngeal masks"[MeSH Terms]) OR ("laryngeal masks"[MeSH Terms] OR ("laryngeal"[All Fields] AND "masks"[All Fields]) OR "laryngeal masks"[All Fields] OR ("laryngeal"[All Fields] AND "mask"[All Fields]) OR "laryngeal mask"[All Fields])) OR combitube[All Fields]) OR (("larynx"[MeSH Terms] OR "larynx"[All Fields] OR "laryngeal"[All Fields] AND tube[All Fields])) OR i-gel[All Fields]) OR (bag[All Fields] AND ("masks"[MeSH Terms] OR "masks"[All Fields] OR "mask"[All Fields]) AND ("ventilation"[MeSH Terms] OR "ventilation"[All Fields] OR "respiration"[MeSH Terms] OR "respiration"[All Fields]))) OR bag-mask-ventilation[All Fields]) OR bvm[All Fields]))	54

		Fields] OR ("laryngeal"[All Fields] AND "mask"[All Fields]) OR "laryngeal mask"[All Fields])) OR combitube[All Fields] OR (("larynx"[MeSH Terms] OR "larynx"[All Fields] OR "laryngeal"[All Fields] AND tube[All Fields])) OR i-gel[All Fields] OR (bag[All Fields] AND ("masks"[MeSH Terms] OR "masks"[All Fields] OR "mask"[All Fields]) AND ("ventilation"[MeSH Terms] OR "ventilation"[All Fields] OR "respiration"[MeSH Terms] OR "respiration"[All Fields])) OR bag-mask-ventilation[All Fields] OR bvm[All Fields])	
31	Is the free floating position superior to the restrained position regarding laryngoscopy-guided endotracheal intubation in a patient in cardiac arrest in microgravity?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields] OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]) AND (((((((("intubation"[MeSH Terms] OR "intubation"[All Fields]) OR "intubation"[MeSH Terms]) OR endotracheal[All Fields] OR "intubation, intratracheal"[MeSH Terms]) OR "airway management"[MeSH Terms]) OR airway[All Fields] OR "laryngoscopy"[MeSH Terms]) OR ("laryngoscopy"[MeSH Terms] OR "laryngoscopy"[All Fields]))	56
32	Is the free floating position superior to the restrained position while performing laryngoscopy-guided endotracheal intubation regarding the time to establish the airway in a patient in cardiac arrest in microgravity?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields] OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]) AND (((((((("intubation"[MeSH Terms] OR "intubation"[All Fields]) OR "intubation"[MeSH Terms]) OR endotracheal[All Fields] OR "intubation, intratracheal"[MeSH Terms]) OR "airway management"[MeSH Terms]) OR airway[All Fields] OR "laryngoscopy"[MeSH Terms]) OR ("laryngoscopy"[MeSH Terms] OR "laryngoscopy"[All Fields]))	56
33	Is the free floating position superior to the restrained position while performing laryngoscopy-guided endotracheal intubation regarding the training time of the care provider in a patient in cardiac arrest in microgravity?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields] OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]) AND (((((((("intubation"[MeSH Terms] OR "intubation"[All Fields]) OR "intubation"[MeSH Terms]) OR endotracheal[All Fields] OR "intubation, intratracheal"[MeSH Terms]) OR "airway management"[MeSH Terms]) OR airway[All Fields] OR "laryngoscopy"[MeSH Terms]) OR ("laryngoscopy"[MeSH Terms] OR "laryngoscopy"[All Fields]))	56
34	Is the free floating position superior to the restrained position while performing laryngoscopy-guided endotracheal intubation regarding the success rate of correct insertion in a patient in cardiac arrest in microgravity?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields] OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]) AND (((((((("intubation"[MeSH Terms] OR "intubation"[All Fields]) OR "intubation"[MeSH Terms]) OR endotracheal[All Fields] OR "intubation, intratracheal"[MeSH Terms]) OR "airway management"[MeSH Terms]) OR airway[All Fields] OR "laryngoscopy"[MeSH Terms]) OR ("laryngoscopy"[MeSH Terms] OR "laryngoscopy"[All Fields]))	56
35	Is the endotracheal video-laryngoscopy-guided intubation superior to the laryngoscopy-guided intubation regarding the time to establish the airway during CPR in a patient in cardiac arrest in microgravity?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields] OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]) AND (((((((((((("intubation"[MeSH Terms] OR "intubation"[All Fields]) OR "intubation"[MeSH Terms]) OR endotracheal[All Fields] OR "intubation, intratracheal"[MeSH Terms]) OR "airway management"[MeSH Terms]) OR airway[All Fields] OR "laryngoscopy"[MeSH Terms]) OR ("laryngoscopy"[MeSH Terms] OR "laryngoscopy"[All Fields])) OR videolaryngoscopy[All Fields] OR (("videotape recording"[MeSH Terms] OR "videotape"[All Fields] AND "recording"[All Fields]) OR "videotape recording"[All Fields] OR "video"[All Fields]) AND ("laryngoscopy"[MeSH Terms] OR "laryngoscopy"[All Fields])))) OR ("bronchoscopy"[MeSH Terms] OR "bronchoscopy"[All Fields])) OR "bronchoscopy"[MeSH Terms])	56

36	Is the endotracheal video-laryngoscopy-guided intubation superior to the laryngoscopy-guided intubation regarding success rate of correct insertion during CPR in a patient in cardiac arrest in microgravity?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]) AND (((((((("intubation"[MeSH Terms] OR "intubation"[All Fields]) OR "intubation"[MeSH Terms]) OR endotracheal[All Fields] OR "intubation, intratracheal"[MeSH Terms]) OR "airway management"[MeSH Terms] OR airway[All Fields] OR "laryngoscopy"[MeSH Terms] OR ("laryngoscopy"[MeSH Terms] OR "laryngoscopy"[All Fields])) OR videolaryngoscopy[All Fields] OR ("videotape recording"[MeSH Terms] OR ("videotape"[All Fields] AND "recording"[All Fields]) OR "videotape recording"[All Fields] OR "video"[All Fields]) AND ("laryngoscopy"[MeSH Terms] OR "laryngoscopy"[All Fields]))) OR ("bronchoscopy"[MeSH Terms] OR "bronchoscopy"[All Fields])) OR "bronchoscopy"[MeSH Terms])	56
37	Is the endotracheal video-laryngoscopy-guided intubation superior to the laryngoscopy-guided intubation regarding the training time of the care provider during CPR in a patient in cardiac arrest in microgravity?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]) AND (((((((("intubation"[MeSH Terms] OR "intubation"[All Fields]) OR "intubation"[MeSH Terms]) OR endotracheal[All Fields] OR "intubation, intratracheal"[MeSH Terms]) OR "airway management"[MeSH Terms] OR airway[All Fields] OR "laryngoscopy"[MeSH Terms] OR ("laryngoscopy"[MeSH Terms] OR "laryngoscopy"[All Fields])) OR videolaryngoscopy[All Fields] OR ("videotape recording"[MeSH Terms] OR ("videotape"[All Fields] AND "recording"[All Fields]) OR "videotape recording"[All Fields] OR "video"[All Fields]) AND ("laryngoscopy"[MeSH Terms] OR "laryngoscopy"[All Fields]))) OR ("bronchoscopy"[MeSH Terms] OR "bronchoscopy"[All Fields])) OR "bronchoscopy"[MeSH Terms])	56
38	Could microgravity increase the difficulty of laryngeal intubation?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]) AND (((((((("intubation"[MeSH Terms] OR "intubation"[All Fields]) OR "intubation"[MeSH Terms]) OR endotracheal[All Fields] OR "intubation, intratracheal"[MeSH Terms]) OR "airway management"[MeSH Terms] OR airway[All Fields] OR "laryngoscopy"[MeSH Terms] OR ("laryngoscopy"[MeSH Terms] OR "laryngoscopy"[All Fields]))	56
39	Are the skills with laryngeal intubation at usual gravity sufficient for laryngeal intubation in microgravity?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]) AND (((((((("intubation"[MeSH Terms] OR "intubation"[All Fields]) OR "intubation"[MeSH Terms]) OR endotracheal[All Fields] OR "intubation, intratracheal"[MeSH Terms]) OR "airway management"[MeSH Terms] OR airway[All Fields] OR "laryngoscopy"[MeSH Terms] OR ("laryngoscopy"[MeSH Terms] OR "laryngoscopy"[All Fields]))	56
40	Is an electrical suction unit more efficient regarding suction volume per minute compared to a manual suction unit during CPR in a patient with cardiac arrest in microgravity?	((("suction"[MeSH Terms] OR ("suction"[MeSH Terms] OR "suction"[All Fields])) OR aspiration[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms])	38
41	Is an electrical suction unit more efficient regarding simplicity of use compared to a manual suction unit	((("suction"[MeSH Terms] OR ("suction"[MeSH Terms] OR "suction"[All Fields])) OR aspiration[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms])	38

	during CPR in a patient with cardiac arrest in microgravity?	"weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	
42	Is an electrical suction unit more efficient regarding contamination while suctioning compared to a manual suction unit during cpr in a patient with cardiac arrest in microgravity?	((("suction"[MeSH Terms] OR ("suction"[MeSH Terms] OR "suction"[All Fields])) OR aspiration[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	38
43	Is flammability in a space vehicle higher when ventilating a patient during CPR with 100% oxygen compared to ventilating the patient with room air with no additional gas extraction?	((((((((((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR cardiopulmonary[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR "anesthesia"[MeSH Terms]) OR ("anaesthesia"[All Fields] OR "anesthesia"[MeSH Terms] OR "anesthesia"[All Fields])) OR ("stupor"[MeSH Terms] OR "stupor"[All Fields] OR "narcosis"[All Fields])) OR "stupor"[MeSH Terms]) AND (((((((("ventilation"[MeSH Terms] OR "ventilation"[All Fields] OR "respiration"[MeSH Terms] OR "respiration"[All Fields]) OR ("ventilation"[MeSH Terms] OR "respiration"[MeSH Terms])) OR ("ventilators, mechanical"[MeSH Terms] OR ("ventilators"[All Fields] AND "mechanical"[All Fields]) OR "mechanical ventilators"[All Fields] OR "ventilator"[All Fields])) OR "ventilators, mechanical"[MeSH Terms]) OR ("oxygen"[MeSH Terms] OR "oxygen"[All Fields])) OR "oxygen"[MeSH Terms])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	99
44	Does a patient in CPR in microgravity benefit from a ventilation with 100% oxygen regarding rate of ROSC compared to ventilation with room air?	((((((((((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR cardiopulmonary[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR "anesthesia"[MeSH Terms]) OR ("anaesthesia"[All Fields] OR "anesthesia"[MeSH Terms] OR "anesthesia"[All Fields])) OR ("stupor"[MeSH Terms] OR "stupor"[All Fields] OR "narcosis"[All Fields])) OR "stupor"[MeSH Terms]) AND (((((((("ventilation"[MeSH Terms] OR "ventilation"[All Fields] OR "respiration"[MeSH Terms] OR "respiration"[All Fields]) OR ("ventilation"[MeSH Terms] OR "respiration"[MeSH Terms])) OR ("ventilators, mechanical"[MeSH Terms] OR ("ventilators"[All Fields] AND "mechanical"[All Fields]) OR "mechanical ventilators"[All Fields] OR "ventilator"[All Fields])) OR "ventilators, mechanical"[MeSH Terms]) OR ("oxygen"[MeSH Terms] OR "oxygen"[All Fields])) OR "oxygen"[MeSH Terms])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	99
45	Should the expiratory air in a patient with cardiac arrest in microgravity who is ventilated with 100%	((((((((((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR cardiopulmonary[All	99

	oxygen be expelled from the space vehicle or should it be kept inside regarding the risk of fire development?	Fields)) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR "anesthesia"[MeSH Terms]) OR ("anaesthesia"[All Fields] OR "anesthesia"[MeSH Terms] OR "anesthesia"[All Fields])) OR ("stupor"[MeSH Terms] OR "stupor"[All Fields] OR "narcosis"[All Fields])) OR "stupor"[MeSH Terms]) AND (((("ventilation"[MeSH Terms] OR "ventilation"[All Fields] OR "respiration"[MeSH Terms] OR "respiration"[All Fields]) OR ("ventilation"[MeSH Terms] OR "respiration"[MeSH Terms])) OR ("ventilators, mechanical"[MeSH Terms] OR ("ventilators"[All Fields] AND "mechanical"[All Fields]) OR "mechanical ventilators"[All Fields] OR "ventilator"[All Fields])) OR "ventilators, mechanical"[MeSH Terms]) OR ("oxygen"[MeSH Terms] OR "oxygen"[All Fields])) OR "oxygen"[MeSH Terms])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	
46	Should capnometry be used during ventilation of a patient in cardiac arrest in microgravity regarding verification of correct airway establishment?	((("capnography"[MeSH Terms] OR "capnography"[All Fields]) OR "capnography"[MeSH Terms]) OR "capnometry"[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	0
47	Should capnometry be used during ventilation of a patient in cardiac arrest in microgravity for quality control of CPR compared to no capnometry?	((("capnography"[MeSH Terms] OR "capnography"[All Fields]) OR "capnography"[MeSH Terms]) OR "capnometry"[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	0
48	Should capnometry be used during ventilation of a patient in cardiac arrest in microgravity regarding the recognition of ROSC compared to no capnometry?	((("capnography"[MeSH Terms] OR "capnography"[All Fields]) OR "capnography"[MeSH Terms]) OR "capnometry"[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	0
49	Should a quantitative capnometer be used over a simple qualitative capnometer in a patient in cardiac arrest in microgravity to verify correct ventilation and tube location?	((("capnography"[MeSH Terms] OR "capnography"[All Fields]) OR "capnography"[MeSH Terms]) OR "capnometry"[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	0
50	Which levels of positive pressure should be used in microgravity ?	((((((((((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR cardiopulmonary[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR "anesthesia"[MeSH Terms]) OR ("anaesthesia"[All Fields] OR "anesthesia"[MeSH Terms] OR "anesthesia"[All Fields])) OR ("stupor"[MeSH Terms] OR "stupor"[All Fields] OR "narcosis"[All Fields])) OR "stupor"[MeSH Terms]) AND (((("ventilation"[MeSH Terms] OR "ventilation"[All Fields] OR "respiration"[MeSH Terms] OR "respiration"[All Fields]) OR ("ventilation"[MeSH Terms] OR "respiration"[MeSH Terms])) OR	99

		("ventilators, mechanical"[MeSH Terms] OR ("ventilators"[All Fields] AND "mechanical"[All Fields]) OR "mechanical ventilators"[All Fields] OR "ventilator"[All Fields])) OR "ventilators, mechanical"[MeSH Terms] OR ("oxygen"[MeSH Terms] OR "oxygen"[All Fields]) OR "oxygen"[MeSH Terms]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms])	
51	Is a defibrillator with adhesive electrodes more efficient regarding detection time of shockable heart rhythms in a patient in cardiac arrest in microgravity compared to a defibrillator with hard-paddles?	((("defibrillators"[MeSH Terms] OR "electric countershock"[MeSH Terms]) OR ("defibrillators"[MeSH Terms] OR "defibrillators"[All Fields] OR "defibrillator"[All Fields])) OR ("electric countershock"[MeSH Terms] OR ("electric"[All Fields] AND "countershock"[All Fields]) OR "electric countershock"[All Fields] OR "defibrillation"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms])) AND (((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields]) OR "resuscitation"[MeSH Terms])	0
52	Is a defibrillator with adhesive electrodes more efficient regarding application time in a patient in cardiac arrest in microgravity compared to a defibrillator with hard-paddles?	((("defibrillators"[MeSH Terms] OR "electric countershock"[MeSH Terms]) OR ("defibrillators"[MeSH Terms] OR "defibrillators"[All Fields] OR "defibrillator"[All Fields])) OR ("electric countershock"[MeSH Terms] OR ("electric"[All Fields] AND "countershock"[All Fields]) OR "electric countershock"[All Fields] OR "defibrillation"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms])) AND (((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields]) OR "resuscitation"[MeSH Terms])	0
53	Is a defibrillator with adhesive electrodes safer for crew and patient in a patient in cardiac arrest in microgravity compared to a defibrillator with hard-paddles?	((("defibrillators"[MeSH Terms] OR "electric countershock"[MeSH Terms]) OR ("defibrillators"[MeSH Terms] OR "defibrillators"[All Fields] OR "defibrillator"[All Fields])) OR ("electric countershock"[MeSH Terms] OR ("electric"[All Fields] AND "countershock"[All Fields]) OR "electric countershock"[All Fields] OR "defibrillation"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms])) AND (((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields]) OR "resuscitation"[MeSH Terms])	0

		OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms])	
54	Should a patient in cardiac arrest in microgravity be restrained on an electrically isolated surface for defibrillation regarding potential electric conduction of the interior or space vehicle construction compared to no precaution?	(((((defibrillator) OR defibrillator[MeSH Terms]) OR electric defibrillation[MeSH Terms])) AND (((((weightlessness) OR weightlessness[MeSH Terms]) OR microgravity) OR microgravity[MeSH Terms]) OR space flight[MeSH Terms]))	1
55	Should a doctor on board of a space mission have access to a fully equipped emergency monitor/defibrillator (12-lead-EKG, SpO ² , RR, CO ² , defibrillation, pacer) when confronted with a patient in cardiac arrest in microgravity or only to an AED?	(((((("critical care"[MeSH Terms] OR ("critical"[All Fields] AND "care"[All Fields]) OR "critical care"[All Fields]) OR "critical care"[MeSH Terms]) OR ("emergencies"[MeSH Terms] OR "emergencies"[All Fields] OR "emergency"[All Fields])) OR ("emergency treatment"[MeSH Terms] OR "emergency medical services"[MeSH Terms])) OR "emergency medicine"[MeSH Terms]) AND ("monitoring, physiologic"[MeSH Terms] OR ("monitoring, physiologic"[MeSH Terms] OR ("monitoring"[All Fields] AND "physiologic"[All Fields]) OR "physiologic monitoring"[All Fields] OR "monitor"[All Fields])))) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms]))	21
56	Should a crew medical officer on board of a space mission have access to a fully equipped emergency monitor/defibrillator (12-lead-EKG, SpO ² , RR, CO ² , defibrillation, pacer) when confronted with a patient in cardiac arrest in microgravity or only with an AED?	(((((("critical care"[MeSH Terms] OR ("critical"[All Fields] AND "care"[All Fields]) OR "critical care"[All Fields]) OR "critical care"[MeSH Terms]) OR ("emergencies"[MeSH Terms] OR "emergencies"[All Fields] OR "emergency"[All Fields])) OR ("emergency treatment"[MeSH Terms] OR "emergency medical services"[MeSH Terms])) OR "emergency medicine"[MeSH Terms]) AND ("monitoring, physiologic"[MeSH Terms] OR ("monitoring, physiologic"[MeSH Terms] OR ("monitoring"[All Fields] AND "physiologic"[All Fields]) OR "physiologic monitoring"[All Fields] OR "monitor"[All Fields])))) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms]))	21
57	Should a normal crew member on board of a space mission have access to a fully equipped emergency monitor/defibrillator (12-lead-EKG, SpO ² , RR, CO ² , defibrillation, pacer) when confronted with a patient in cardiac arrest in microgravity or only with an AED?	(((((("critical care"[MeSH Terms] OR ("critical"[All Fields] AND "care"[All Fields]) OR "critical care"[All Fields]) OR "critical care"[MeSH Terms]) OR ("emergencies"[MeSH Terms] OR "emergencies"[All Fields] OR "emergency"[All Fields])) OR ("emergency treatment"[MeSH Terms] OR "emergency medical services"[MeSH Terms])) OR "emergency medicine"[MeSH Terms]) AND ("monitoring, physiologic"[MeSH Terms] OR ("monitoring, physiologic"[MeSH Terms] OR ("monitoring"[All Fields] AND "physiologic"[All Fields]) OR "physiologic monitoring"[All Fields] OR "monitor"[All Fields])))) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms]))	12
58	Should the AED be equipped with acoustic instructions for use by crewmembers (no CMO/doctor) in a patient in cardiac arrest in	((("defibrillators"[MeSH Terms] OR "defibrillators"[All Fields] OR "defibrillator"[All Fields]) OR "defibrillators"[MeSH Terms]) OR aed[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms]))	3

	microgravity compared to no instructions regarding correct electrode placement/correct chest compression depth/ correct compression&ventilation-ratio?		
59	Should the AED be equipped with a metronome for use by crewmembers (no CMO/doctor) in a patient in cardiac arrest in microgravity compared to no metronome regarding correct electrode placement/correct chest compression depth/ correct compression&ventilation-ratio?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]) AND ((((((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms]))	34
60	Should the AED be equipped with a feedback mechanism for use by crewmembers (no CMO/doctor) in a patient in cardiac arrest in microgravity compared to no feedback mechanism regarding correct electrode placement/correct chest compression depth/ correct compression&ventilation-ratio?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]) AND ((((((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms]))	34
61	Is there justification for cpr in microgravity in the absence of a defib?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]) AND ((((((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms]))	34
62	Is there justification for defib in microgravity in the absence of medical skills / equipment for on-going medical support in the event of return of spontaneous circulation?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]) AND ((((((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "resuscitation"[MeSH Terms]))	34

		resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields]) OR "resuscitation"[MeSH Terms])	
63	Should reserve defibrillators/batteries be carried on the spacecraft? What risks could arise if shelf life is exceeded?	((("exhalation"[MeSH Terms] OR "exhalation"[All Fields] OR "expiration"[All Fields]) AND date[All Fields]) OR durability[All Fields]) AND (("defibrillators"[MeSH Terms] OR "defibrillators"[All Fields] OR "defibrillator"[All Fields]) OR "defibrillators"[MeSH Terms])	25
64	How many spare defibrillation electrodes should be carried on a mission (LEO vs. long-duration space mission)? What risks could arise if shelf life is exceeded?	((("exhalation"[MeSH Terms] OR "exhalation"[All Fields] OR "expiration"[All Fields]) AND date[All Fields]) OR durability[All Fields]) AND (("defibrillators"[MeSH Terms] OR "defibrillators"[All Fields] OR "defibrillator"[All Fields]) OR "defibrillators"[MeSH Terms])	25
65	Do you need defibrillator with capability to do synchronized shock in event of supraventricular/ventricular tachycardia?	("tachycardia, supraventricular"[MeSH Terms] OR ("tachycardia"[MeSH Terms] OR "tachycardia"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	54
66	What is the minimum safety distance between space team and the defibrillator during the electrical shock in microgravity?	((("defibrillator) OR defibrillator[MeSH Terms]) OR electric defibrillation[MeSH Terms])) AND (((("weightlessness) OR weightlessness[MeSH Terms]) OR microgravity) OR microgravity[MeSH Terms]) OR space flight[MeSH Terms])	1
67	Should the Defibrillator be tested to work when subjected to zero gravity?	((("defibrillator) OR defibrillator[MeSH Terms]) OR electric defibrillation[MeSH Terms])) AND (((("weightlessness) OR weightlessness[MeSH Terms]) OR microgravity) OR microgravity[MeSH Terms]) OR space flight[MeSH Terms])	1
68	Is it possible to have an electromagnetic interference during shock? How would this influence safety onboard of the spacecraft?	"electromagnetic fields"[MeSH Terms] AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	32
69	Can the application of an intravenous catheter at the arm be performed quicker than the insertion of an intraosseous needle at the tibial tuberosity (EZ-IO) in a patient in cardiac arrest in microgravity?	((("injections, intravenous"[MeSH Terms] OR intravenous[All Fields]) OR "infusions, intravenous"[MeSH Terms]) OR "infusions, intraosseous"[MeSH Terms]) OR intraosseous[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	47
70	Is the success rate of an intravenous catheter application at the arm higher than the insertion of an intraosseous needle at the tibial tuberosity (EZ-IO) in a patient in cardiac arrest in microgravity?	((("injections, intravenous"[MeSH Terms] OR intravenous[All Fields]) OR "infusions, intravenous"[MeSH Terms]) OR "infusions, intraosseous"[MeSH Terms]) OR intraosseous[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	47
71	Is a drilling machine-type intraosseous device more effective regarding	("infusions, intraosseous"[MeSH Terms] OR intraosseous[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR	2

	successful insertion rate than a spring-type intraosseous device in a patient in cardiac arrest in microgravity?	"weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]	
72	Is a drilling machine-type intraosseous device more effective regarding insertion time than a spring-type intraosseous device in a patient in cardiac arrest in microgravity?	("infusions, intraosseous"[MeSH Terms] OR intraosseous[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms])	2
73	Is a drilling machine-type intraosseous device safer regarding complication rate than a spring-type intraosseous device in a patient in cardiac arrest in microgravity?	("infusions, intraosseous"[MeSH Terms] OR intraosseous[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms])	2
74	Is a drilling machine-type intraosseous device safer regarding possible damage to the space vehicle than a spring-type intraosseous device in a patient in cardiac arrest in microgravity?	("infusions, intraosseous"[MeSH Terms] OR intraosseous[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms])	2
75	Is a drilling machine-type intraosseous device more effective regarding successful insertion rate than a hand-driven needle in a patient in cardiac arrest in microgravity?	("infusions, intraosseous"[MeSH Terms] OR intraosseous[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms])	2
76	Is a drilling machine-type intraosseous device more effective regarding insertion time than a hand-driven needle in a patient in cardiac arrest in microgravity?	("infusions, intraosseous"[MeSH Terms] OR intraosseous[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms])	2
77	Is a drilling machine-type intraosseous device safer regarding complication rate than a hand-driven needle in a patient in cardiac arrest in microgravity?	("infusions, intraosseous"[MeSH Terms] OR intraosseous[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms])	2
78	Is a drilling machine-type intraosseous device safer regarding possible damage to the space vehicle than a hand-driven needle in a patient in cardiac arrest in microgravity?	("infusions, intraosseous"[MeSH Terms] OR intraosseous[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms])	2

79	Is the use of standard CPR medication (1mg/10ml epinephrine, 300mg amiodarone) in ready-to-use plastic syringes superior compared to normal glass ampoules regarding application time in a patient in cardiac arrest in microgravity?	(((((medication) OR medication[MeSH Terms]) OR intravenous injection[MeSH Terms]) OR intravenous) OR syringe[MeSH Terms]) OR syringe)) AND (((((weightlessness) OR weightlessness[MeSH Terms]) OR microgravity) OR microgravity[MeSH Terms]) OR space flight[MeSH Terms])	368
80	Is the use of standard CPR medication (1mg/10ml epinephrine, 300mg amiodarone) in ready-to-use plastic syringes safer compared to normal glass ampoules regarding environment contamination with package parts (e.g. glass splinters) in a patient in cardiac arrest in microgravity?	(((((medication) OR medication[MeSH Terms]) OR intravenous injection[MeSH Terms]) OR intravenous) OR syringe[MeSH Terms]) OR syringe)) AND (((((weightlessness) OR weightlessness[MeSH Terms]) OR microgravity) OR microgravity[MeSH Terms]) OR space flight[MeSH Terms])	368
81	Is the use of standard CPR medication (1mg/10ml epinephrine, 300mg amiodarone) in plastic ampoules superior compared to normal glass ampoules regarding application time in a patient in cardiac arrest in microgravity?	(((((medication) OR medication[MeSH Terms]) OR intravenous injection[MeSH Terms]) OR intravenous) OR syringe[MeSH Terms]) OR syringe)) AND (((((weightlessness) OR weightlessness[MeSH Terms]) OR microgravity) OR microgravity[MeSH Terms]) OR space flight[MeSH Terms])	368
82	Is the use of standard CPR medication (1mg/10ml epinephrine, 300mg amiodarone) in plastic ampoules safer compared to normal glass ampoules regarding environment contamination with package parts (e.g. glass splinters) in a patient in cardiac arrest in microgravity?	(((((medication) OR medication[MeSH Terms]) OR intravenous injection[MeSH Terms]) OR intravenous) OR syringe[MeSH Terms]) OR syringe)) AND (((((weightlessness) OR weightlessness[MeSH Terms]) OR microgravity) OR microgravity[MeSH Terms]) OR space flight[MeSH Terms])	368
83	Is it reasonable to accept the higher transport volume of ready-to-use plastic syringes compared to the standard material for glass ampoules in spaceflight missions?	(((((medication) OR medication[MeSH Terms]) OR intravenous injection[MeSH Terms]) OR intravenous) OR syringe[MeSH Terms]) OR syringe)) AND (((((weightlessness) OR weightlessness[MeSH Terms]) OR microgravity) OR microgravity[MeSH Terms]) OR space flight[MeSH Terms])	368
84	Is the application of intravenous fluids via syringe pump more effective regarding consistency of infusion	((("syringes"[MeSH Terms] OR "syringes"[All Fields] OR "syringe"[All Fields]) AND pump[All Fields]) OR (("pressure"[MeSH Terms] OR "pressure"[All Fields]) AND infusion[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR	30

	rate than the use of an infusion bag fixed into a blood pressure cuff in a patient in cardiac arrest in microgravity?	"microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]	
85	Should first aid training for the whole crew include CPR training in simulated microgravity compared to training in sea level gravity?	((("first aid"[MeSH Terms] OR ("first aid"[MeSH Terms] OR ("first"[All Fields] AND "aid"[All Fields]) OR "first aid"[All Fields])) OR ("education"[Subheading] OR "education"[All Fields] OR "training"[All Fields] OR "education"[MeSH Terms] OR "training"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])) AND (((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR "resuscitation"[MeSH Terms]))	10
86	Should the normal crewmembers be trained in ALS compared to normal first aid/BLS training for CPR in microgravity?	((("first aid"[MeSH Terms] OR ("first aid"[MeSH Terms] OR ("first"[All Fields] AND "aid"[All Fields]) OR "first aid"[All Fields])) OR ("education"[Subheading] OR "education"[All Fields] OR "training"[All Fields] OR "education"[MeSH Terms] OR "training"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])) AND (((("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields]) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) OR "cardiopulmonary resuscitation"[MeSH Terms]) OR "resuscitation"[MeSH Terms]))	10
87	Should controlled mild hypothermia be induced in a patient with ROSC after cardiac arrest in microgravity compared to normothermia regarding neurological outcome?	("hypothermia"[MeSH Terms] OR ("hypothermia"[MeSH Terms] OR "hypothermia"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	19
88	Should controlled mild hypothermia be induced in a patient with ROSC after cardiac arrest in microgravity compared to normothermia regarding survival rate after (insert variable timeframe)?	("hypothermia"[MeSH Terms] OR ("hypothermia"[MeSH Terms] OR "hypothermia"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	19
89	Which SGA is best suited for use in microgravity? Laryngeal tube, I-gel, laryngeal mask or combitube?	(((((airway[All Fields] OR "airway management"[MeSH Terms]) OR ("laryngeal masks"[MeSH Terms] OR ("laryngeal"[All Fields] AND "masks"[All Fields]) OR "laryngeal masks"[All Fields] OR ("laryngeal"[All Fields] AND "mask"[All Fields]) OR "laryngeal mask"[All Fields])) OR "laryngeal masks"[MeSH Terms]) OR i-gel[All Fields]) OR combitube[All Fields]) OR ("larynx"[MeSH Terms] OR "larynx"[All Fields] OR "laryngeal"[All Fields] AND tube[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	54

90	Should an SGA with an option for later endotracheal intubation be used? I-LTSD, intubation laryngeal mask or LMA fastrach?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]) AND (((((((("intubation"[MeSH Terms] OR "intubation"[All Fields]) OR "intubation"[MeSH Terms]) OR endotracheal[All Fields]) OR "intubation, intratracheal"[MeSH Terms]) OR "airway management"[MeSH Terms] OR airway[All Fields]) OR "laryngeal masks"[MeSH Terms] OR ("laryngeal masks"[MeSH Terms] OR ("laryngeal"[All Fields] AND "masks"[All Fields]) OR "laryngeal masks"[All Fields] OR ("laryngeal"[All Fields] AND "mask"[All Fields]) OR "laryngeal mask"[All Fields])) OR combitube[All Fields]) OR ("larynx"[MeSH Terms] OR "larynx"[All Fields] OR "laryngeal"[All Fields]) AND tube[All Fields])) OR i-gel[All Fields])	55
91	Should the CMO be trained in surgical cricothyrotomy for a can-not-ventilate-can-not-intubate-situation in a patient in cardiac arrest in microgravity?	cricothyrotomy[All Fields] AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms])	0
92	Do electrical suction units (like the Weinmann Accuvac Pro/ Laerdal LSU/ Laerdal CSU4) work properly in microgravity?	((("suction"[MeSH Terms] OR ("suction"[MeSH Terms] OR "suction"[All Fields])) OR aspiration[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms])	38
93	Do any other manual suction units except for a syringe-style suction work in microgravity?	((("suction"[MeSH Terms] OR ("suction"[MeSH Terms] OR "suction"[All Fields])) OR aspiration[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms])	38
94	Should an intravenous access always be attempted before insertion of an intraosseous needle in a patient in cardiac arrest in microgravity?	((("injections, intravenous"[MeSH Terms] OR intravenous[All Fields]) OR "infusions, intravenous"[MeSH Terms]) OR "infusions, intraosseous"[MeSH Terms] OR intraosseous[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms])	47
95	How do you handle medication or medical equipment with expiration dates on a space mission that exceeds those dates?	((("pharmaceutical preparations"[MeSH Terms] OR ("pharmaceutical"[All Fields] AND "preparations"[All Fields]) OR "pharmaceutical preparations"[All Fields] OR "medication"[All Fields]) OR ("exhalation"[MeSH Terms] OR "exhalation"[All Fields] OR "expiration"[All Fields]) AND date[All Fields])) OR expiry[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms])	315
96	How does the effect of epinephrine change after its expiration date? Can it be conserved for more than one year?	((("epinephrine"[MeSH Terms] OR "epinephrine"[All Fields]) AND (expiry[All Fields] AND date[All Fields])) OR ("exhalation"[MeSH Terms] OR "exhalation"[All Fields] OR "expiration"[All Fields]) AND date[All Fields])	445
97	How does the effect of amiodarone change after its expiration date? Can it be conserved for more than two years?	((("amiodarone"[MeSH Terms] OR "amiodarone"[All Fields]) AND (expiry[All Fields] AND date[All Fields])) OR ("exhalation"[MeSH Terms] OR "exhalation"[All Fields] OR "expiration"[All Fields]) AND date[All Fields])	443

98	Is ROSC recognition different than in normal gravity?	((rosco OR return of spontaneous circulation)) AND (((weightlessness) OR weightlessness[MeSH Terms] OR microgravity) OR microgravity[MeSH Terms] OR space flight[MeSH Terms])	1
99	How should be dealt with the corpse of a crewmember after unsuccessful CPR?	((("death"[MeSH Terms] OR "death"[All Fields]) OR ("cadaver"[MeSH Terms] OR "cadaver"[All Fields] OR "corpse"[All Fields])) OR ("cadaver"[MeSH Terms] OR "cadaver"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	166
100	Should the corpse of a crewmember after unsuccessful CPR be stored inside the space vehicle or should it be removed?	((("death"[MeSH Terms] OR "death"[All Fields]) OR ("cadaver"[MeSH Terms] OR "cadaver"[All Fields] OR "corpse"[All Fields])) OR ("cadaver"[MeSH Terms] OR "cadaver"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	166
101	If the corpse is to be stored inside the space vehicle, in what kind of compartment should it be stored? Plastic body bag? Special Box? In which part of the space vehicle?	((("death"[MeSH Terms] OR "death"[All Fields]) OR ("cadaver"[MeSH Terms] OR "cadaver"[All Fields] OR "corpse"[All Fields])) OR ("cadaver"[MeSH Terms] OR "cadaver"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	166
102	Is it possible to burn the body or in any other way produce a reasonably small package of human remains to transport those remains back to earth? Could they be stored outside the space vehicle but enabling them to survive the reentry into earth orbit?	((("death"[MeSH Terms] OR "death"[All Fields]) OR ("cadaver"[MeSH Terms] OR "cadaver"[All Fields] OR "corpse"[All Fields])) OR ("cadaver"[MeSH Terms] OR "cadaver"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	166
103	If the corpse of a crewmember should not be stored inside the space vehicle in what way should he be dumped into the open space? Body bag? Coffin?	((("death"[MeSH Terms] OR "death"[All Fields]) OR ("cadaver"[MeSH Terms] OR "cadaver"[All Fields] OR "corpse"[All Fields])) OR ("cadaver"[MeSH Terms] OR "cadaver"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	166
104	What possible consequences arise from that decision? Possible contamination of space with biomaterial? What if a dead crewmember is dumped on or near Mars? Could future missions searching for life on Mars falsely recognize those human remains as an evidence for life on Mars?	((("death"[MeSH Terms] OR "death"[All Fields]) OR ("cadaver"[MeSH Terms] OR "cadaver"[All Fields] OR "corpse"[All Fields])) OR ("cadaver"[MeSH Terms] OR "cadaver"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	166
105	How can the remaining crew members deal with the death of their comrade	((("death"[MeSH Terms] OR "death"[All Fields]) OR ("cadaver"[MeSH Terms] OR "cadaver"[All Fields] OR "corpse"[All Fields])) OR ("cadaver"[MeSH Terms] OR "cadaver"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR	166

	and the decision regarding his corpse?	"weightlessness"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	
106	Should an electrical ventilator, independent of a gas source, (like the SAVell , AutoMedx) be used for a patient with ROSC in a space mission for prolonged ventilation regarding gas supply?	("ventilators, mechanical"[MeSH Terms] OR ("ventilators"[All Fields] AND "mechanical"[All Fields]) OR "mechanical ventilators"[All Fields] OR "ventilator"[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	9
107	Should an electrical ventilator, independent of a gas source, (like the SAVell , AutoMedx) be used for a patient with ROSC in a space mission for prolonged ventilation regarding safety issues (flammability if 100% oxygen is used in a gas operated ventilator)?	("ventilators, mechanical"[MeSH Terms] OR ("ventilators"[All Fields] AND "mechanical"[All Fields]) OR "mechanical ventilators"[All Fields] OR "ventilator"[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	9
108	How can intensive care in a patient with ROSC in a space mission be guaranteed regarding medication supply (sedation, iv-fluids, catecholamines, antibiotics, nutritional fluids)?	((("critical care"[MeSH Terms] OR ("critical care"[MeSH Terms] OR ("critical"[All Fields] AND "care"[All Fields]) OR "critical care"[All Fields] OR ("intensive"[All Fields] AND "care"[All Fields]) OR "intensive care"[All Fields])) OR "intensive care units"[MeSH Terms]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	65
109	How can intensive care in a patient with ROSC in a space mission be guaranteed regarding monitoring?	((("critical care"[MeSH Terms] OR ("critical care"[MeSH Terms] OR ("critical"[All Fields] AND "care"[All Fields]) OR "critical care"[All Fields] OR ("intensive"[All Fields] AND "care"[All Fields]) OR "intensive care"[All Fields])) OR "intensive care units"[MeSH Terms]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	65
110	How can intensive care in a patient with ROSC in a space mission be guaranteed regarding basic care (urination/defecation/positioning of the patient/hygiene)?	((("critical care"[MeSH Terms] OR ("critical care"[MeSH Terms] OR ("critical"[All Fields] AND "care"[All Fields]) OR "critical care"[All Fields] OR ("intensive"[All Fields] AND "care"[All Fields]) OR "intensive care"[All Fields])) OR "intensive care units"[MeSH Terms]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	65
111	How can weaning be accomplished in a patient with ROSC in a space mission after a prolonged phase of ventilation?	("weaning"[MeSH Terms] OR ("weaning"[MeSH Terms] OR "weaning"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	4
112	Can telemedicine support the crew during CPR of a patient in cardiac arrest in	(((((("critical care"[MeSH Terms] OR ("critical"[All Fields] AND "care"[All Fields]) OR "critical care"[All Fields]) OR "critical care"[MeSH Terms]) OR ("emergencies"[MeSH Terms] OR "emergencies"[All Fields] OR "emergency"[All Fields])) OR "emergency medicine"[MeSH Terms]) OR	25

	microgravity in low earth orbit?	("emergency treatment"[MeSH Terms] OR "emergency medical services"[MeSH Terms])) AND (((("telemedicine"[MeSH Terms] OR "telemedicine"[All Fields]) OR "telemedicine"[MeSH Terms]) OR ("telemetry"[MeSH Terms] OR "telemetry"[All Fields])) OR "telemetry"[MeSH Terms])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	
113	Can telemedicine support the crew during CPR of a patient in cardiac arrest in microgravity on a mars mission? What would be the expected time delay for communication from mars to earth?	(((((("critical care"[MeSH Terms] OR ("critical"[All Fields] AND "care"[All Fields]) OR "critical care"[All Fields]) OR "critical care"[MeSH Terms]) OR ("emergencies"[MeSH Terms] OR "emergencies"[All Fields] OR "emergency"[All Fields])) OR "emergency medicine"[MeSH Terms]) OR ("emergency treatment"[MeSH Terms] OR "emergency medical services"[MeSH Terms])) AND (((("telemedicine"[MeSH Terms] OR "telemedicine"[All Fields]) OR "telemedicine"[MeSH Terms]) OR ("telemetry"[MeSH Terms] OR "telemetry"[All Fields])) OR "telemetry"[MeSH Terms])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	25
114	Could teleanaesthesia (E.G. automated intubation) play a role in space CPR?	(((((("teleanaesthesia"[All Fields] OR "anesthesia"[MeSH Terms]) OR ("anaesthesia"[All Fields] OR "anesthesia"[MeSH Terms] OR "anesthesia"[All Fields])) OR ("intubation"[MeSH Terms] OR "intubation"[All Fields])) OR "intubation"[MeSH Terms]) AND (((("telemedicine"[MeSH Terms] OR "telemedicine"[All Fields]) OR "telemedicine"[MeSH Terms]) OR ("telemetry"[MeSH Terms] OR "telemetry"[All Fields])) OR "telemetry"[MeSH Terms])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields]) OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	5
115	Should the medical training for CMOs be extended above the 80-hour course and include advanced techniques for ALS and treatment of reversible causes for cardiac arrest?	(((((("medical"[All Fields] AND ("education"[Subheading] OR "education"[All Fields] OR "training"[All Fields] OR "education"[MeSH Terms] OR "training"[All Fields])) OR ("medical"[All Fields] AND skills[All Fields])) OR ("education, medical"[MeSH Terms] OR ("education"[All Fields] AND "medical"[All Fields]) OR "medical education"[All Fields] OR ("medical"[All Fields] AND "education"[All Fields])) OR ("first aid"[MeSH Terms] OR ("first"[All Fields] AND "aid"[All Fields]) OR "first aid"[All Fields]) AND ("education"[Subheading] OR "education"[All Fields] OR "training"[All Fields] OR "education"[MeSH Terms] OR "training"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	245
116	How should a possible Crew Medical Doctor (CMD) be trained and what medical branch should he be specialized in?	((("physicians"[MeSH Terms] OR "physicians"[All Fields] OR "doctor"[All Fields]) OR ("physicians"[MeSH Terms] OR "physicians"[All Fields] OR "physician"[All Fields])) AND (((("critical care"[MeSH Terms] OR ("critical"[All Fields] AND "care"[All Fields]) OR "critical care"[All Fields]) OR ("emergencies"[MeSH Terms] OR "emergencies"[All Fields] OR "emergency"[All Fields])) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields])) OR cardiopulmonary[All Fields]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	20

117	What is the minimum level of onboard medical skills / equipment / supplies for post ROSC medical management to justify on board CPR / defib?	(((((medical[All Fields] AND ("education"[Subheading] OR "education"[All Fields] OR "training"[All Fields] OR "education"[MeSH Terms] OR "training"[All Fields])) OR (medical[All Fields] AND skills[All Fields])) OR ("education, medical"[MeSH Terms] OR ("education"[All Fields] AND "medical"[All Fields]) OR "medical education"[All Fields] OR ("medical"[All Fields] AND "education"[All Fields]))) OR (("first aid"[MeSH Terms] OR ("first"[All Fields] AND "aid"[All Fields]) OR "first aid"[All Fields]) AND ("education"[Subheading] OR "education"[All Fields] OR "training"[All Fields] OR "education"[MeSH Terms] OR "training"[All Fields]))) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	245
118	What are the medical skill and training requirements to deliver cpr, defib and post-ROSC medical management?	(((((medical[All Fields] AND ("education"[Subheading] OR "education"[All Fields] OR "training"[All Fields] OR "education"[MeSH Terms] OR "training"[All Fields])) OR (medical[All Fields] AND skills[All Fields])) OR ("education, medical"[MeSH Terms] OR ("education"[All Fields] AND "medical"[All Fields]) OR "medical education"[All Fields] OR ("medical"[All Fields] AND "education"[All Fields]))) OR (("first aid"[MeSH Terms] OR ("first"[All Fields] AND "aid"[All Fields]) OR "first aid"[All Fields]) AND ("education"[Subheading] OR "education"[All Fields] OR "training"[All Fields] OR "education"[MeSH Terms] OR "training"[All Fields]))) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	245
119	What are the training / currency requirements during long duration spaceflight to ensure adequate CPR / defib / post-ROSC management? →repetition	(((((medical[All Fields] AND ("education"[Subheading] OR "education"[All Fields] OR "training"[All Fields] OR "education"[MeSH Terms] OR "training"[All Fields])) OR (medical[All Fields] AND skills[All Fields])) OR ("education, medical"[MeSH Terms] OR ("education"[All Fields] AND "medical"[All Fields]) OR "medical education"[All Fields] OR ("medical"[All Fields] AND "education"[All Fields]))) OR (("first aid"[MeSH Terms] OR ("first"[All Fields] AND "aid"[All Fields]) OR "first aid"[All Fields]) AND ("education"[Subheading] OR "education"[All Fields] OR "training"[All Fields] OR "education"[MeSH Terms] OR "training"[All Fields]))) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	245
120	What are the most expected reversible causes for cardiac arrest in microgravity?	(("heart arrest"[MeSH Terms] OR ("heart"[All Fields] AND "arrest"[All Fields]) OR "heart arrest"[All Fields] OR ("cardiac"[All Fields] AND "arrest"[All Fields]) OR "cardiac arrest"[All Fields]) OR "heart arrest"[MeSH Terms]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	11
121	Hypo-/hyperthermia: temperature regulation not working (Space vehicle or EVA suit) highly unlikely	(("hypothermia"[MeSH Terms] OR "hypothermia"[All Fields]) OR ("fever"[MeSH Terms] OR "fever"[All Fields] OR "hyperthermia"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	42
122	Hypo-/hyperkalemia: incidence in space? Why should it be higher? Blood gas analysis for detection	(("hypokalaemia"[All Fields] OR "hypokalemia"[MeSH Terms] OR "hypokalemia"[All Fields]) OR ("hyperkalaemia"[All Fields] OR "hyperkalemia"[MeSH Terms] OR "hyperkalemia"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	4

		("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]	
123	Hypovolemia/hemorrhage: Burn wound? Anaphylaxis? Sepsis? Injury while doing EVA? Incidence of injuries in space	(((((("hypovolaemia"[All Fields] OR "hypovolemia"[MeSH Terms] OR "hypovolemia"[All Fields]) OR ("haemorrhage"[All Fields] OR "hemorrhage"[MeSH Terms] OR "hemorrhage"[All Fields])) OR burning[All Fields]) OR combustion[All Fields]) OR ("sepsis"[MeSH Terms] OR "sepsis"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms])	170
124	Hypoxia: oxygen system not working (space vehicle or EVA suit) incidence of serious events in the past? Drowning (malfunction of EVA suit)?	((("hypoxia"[MeSH Terms] OR "hypoxia"[All Fields]) OR ("drowning"[MeSH Terms] OR "drowning"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms])	149
125	Intoxication: Possible toxins during space missions? No drugs/alcohol. Maybe operating materials/chemicals?	(intoxication[All Fields] OR chemicals[All Fields]) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms])	78
126	Tension pneumothorax: incidence of spontaneous pneumothorax in space? Changing pressure levels? Young, athletic men? Penetrating chest trauma in space? blunt chest trauma in space? Association with barotrauma?	((("pneumothorax"[MeSH Terms] OR "pneumothorax"[All Fields]) OR ("pneumothorax"[MeSH Terms] OR "pneumothorax"[All Fields] OR ("tension"[All Fields] AND "pneumothorax"[All Fields]) OR "tension pneumothorax"[All Fields])) OR ("thoracic injuries"[MeSH Terms] OR ("thoracic"[All Fields] AND "injuries"[All Fields]) OR "thoracic injuries"[All Fields] OR ("chest"[All Fields] AND "trauma"[All Fields]) OR "chest trauma"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms])	12
127	Pulmonary embolism: incidence of spontaneous thrombosis/embolism in space? Probably higher incidence in immobile patients (affected by injury/infection/ other diseases)	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]) AND (((("embolism"[MeSH Terms] OR ("embolism"[MeSH Terms] OR "embolism"[All Fields])) OR "pulmonary embolism"[MeSH Terms] OR ("thrombosis"[MeSH Terms] OR "thrombosis"[All Fields]))	42
128	Pericardial tamponade: See pneumothorax	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]) AND ("cardiac tamponade"[MeSH Terms] OR ("pericardium"[MeSH Terms] OR "pericardium"[All Fields] OR "pericardial"[All Fields]))	2
129	Should echocardiography/sonography be used during CPR in microgravity to identify potentially reversible causes for cardiac arrest?	(((((("critical care"[MeSH Terms] OR ("critical"[All Fields] AND "care"[All Fields]) OR "critical care"[All Fields]) OR ("emergencies"[MeSH Terms] OR "emergencies"[All Fields] OR "emergency"[All Fields])) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields])) OR cardiopulmonary[All Fields] OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) AND (((("ultrasonography"[MeSH Terms] OR "ultrasonography"[All Fields] OR "sonography"[All Fields]) OR "echocardiography"[MeSH Terms] OR ("echocardiography"[MeSH Terms] OR "echocardiography"[All Fields])) AND	26

		(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]))	
130	What is the incidence of ebullism/ severe decompression sickness in space mission?	(((((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]) AND (ebullism[All Fields] OR ("decompression"[MeSH Terms] OR "decompression"[All Fields]))) AND (((("critical care"[MeSH Terms] OR ("critical"[All Fields] AND "care"[All Fields]) OR "critical care"[All Fields]) OR ("emergencies"[MeSH Terms] OR "emergencies"[All Fields] OR "emergency"[All Fields])) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields])) OR cardiopulmonary[All Fields]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields]))	46
131	What is the incidence of cardiac arrhythmia during space mission?	((("arrhythmias, cardiac"[MeSH Terms] OR ("arrhythmias"[All Fields] AND "cardiac"[All Fields]) OR "cardiac arrhythmias"[All Fields] OR "arrhythmia"[All Fields]) OR ("tachycardia"[MeSH Terms] OR "tachycardia"[All Fields])) OR ("bradycardia"[MeSH Terms] OR "bradycardia"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]))	143
132	How does medical preflight screening change the incidence of cardiac arrests in the screened population on space missions?	(((((preflight[All Fields] AND ("diagnosis"[Subheading] OR "diagnosis"[All Fields] OR "screening"[All Fields] OR "mass screening"[MeSH Terms] OR ("mass"[All Fields] AND "screening"[All Fields]) OR "mass screening"[All Fields] OR "screening"[All Fields] OR "early detection of cancer"[MeSH Terms] OR ("early"[All Fields] AND "detection"[All Fields] AND "cancer"[All Fields]) OR "early detection of cancer"[All Fields])) OR ("physical examination"[MeSH Terms] OR ("physical"[All Fields] AND "examination"[All Fields]) OR "physical examination"[All Fields] OR "examination"[All Fields])) OR ("diagnosis"[Subheading] OR "diagnosis"[All Fields] OR "screening"[All Fields] OR "mass screening"[MeSH Terms] OR ("mass"[All Fields] AND "screening"[All Fields]) OR "mass screening"[All Fields] OR "screening"[All Fields] OR "early detection of cancer"[MeSH Terms] OR ("early"[All Fields] AND "detection"[All Fields] AND "cancer"[All Fields]) OR "early detection of cancer"[All Fields])) AND (((("critical care"[MeSH Terms] OR ("critical"[All Fields] AND "care"[All Fields]) OR "critical care"[All Fields]) OR ("emergencies"[MeSH Terms] OR "emergencies"[All Fields] OR "emergency"[All Fields])) OR ("cardiopulmonary resuscitation"[MeSH Terms] OR ("cardiopulmonary"[All Fields] AND "resuscitation"[All Fields]) OR "cardiopulmonary resuscitation"[All Fields] OR "cpr"[All Fields])) OR cardiopulmonary[All Fields]) OR ("resuscitation"[MeSH Terms] OR "resuscitation"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]))	207
133	Do changes in cardiac cellular physiology in microgravity alter likelihood of arrhythmias or cardiac arrest or likelihood of successful resuscitation?	((("physiology"[Subheading] OR "physiology"[All Fields] OR "physiology"[MeSH Terms]) OR ("cells"[MeSH Terms] OR "cells"[All Fields] OR "cellular"[All Fields])) AND (((("arrhythmias, cardiac"[MeSH Terms] OR ("arrhythmias"[All Fields] AND "cardiac"[All Fields]) OR "cardiac arrhythmias"[All Fields] OR "arrhythmia"[All Fields]) OR ("tachycardia"[MeSH Terms] OR "tachycardia"[All Fields])) OR ("bradycardia"[MeSH Terms] OR "bradycardia"[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms] OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms] OR "space flight"[MeSH Terms]))	108

		"weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	
134	Incidence of spacesuit or habitat rapid or complete depressurization?	((depressurization[All Fields] OR (("pressure"[MeSH Terms] OR "pressure"[All Fields]) AND loss[All Fields])) OR (("pressure"[MeSH Terms] OR "pressure"[All Fields]) AND drop[All Fields])) AND (((("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields] OR "microgravity"[All Fields]) OR "weightlessness"[MeSH Terms]) OR ("weightlessness"[MeSH Terms] OR "weightlessness"[All Fields])) OR "weightlessness"[MeSH Terms]) OR "space flight"[MeSH Terms])	176

Tabelle 2: PICO Fragen mit „MEDLINE“- Suchstrategien, abgerufen am 31.07.2017

5.2 Durchführung der Literaturrecherche

Die Literaturrecherche fand primär mittels „MEDLINE“ (<http://pubmed.ncbi.nlm.nih.gov>) am 31. Juli 2017 mit den 59 verschiedenen, in Tabelle 2 genannten, Suchstrategien statt.

5.3 Screening der Ergebnisse

Insgesamt wurden 4165 Treffer erzielt. Diese Ergebnisse wurden mittels des Browser-basierten Sichtungsprogrammes AbstrackR (<http://abstrackr.cebm.brown.edu>) eines Screeningverfahrens unterzogen.

Im Einzelnen wurden Titel, Autoren und Abstract der gefundenen Treffer in das Sichtungsprogramm gespeist. Anschließend führten je 2 Mitglieder der Forschungsgruppe eine Bewertung der einzelnen Abstracts nach den in Tabelle 3 genannten Einschlusskriterien durch.

Einschlusskriterien Screeningverfahren
Englische Sprache
Kontrollierte Studie oder Observationsstudien oder Retrospektive Analysen
Durchführung in simulierter Mikrogravitation oder Parabelflug oder Unterwasser

Tabelle 3: Einschlusskriterien des primären Screeningverfahrens mittels AbstrackR

Die Abstracts wurden durch die Sichtenden in die Kategorien relevant, irrelevant oder unklar eingeordnet. Konflikte oder unklare Kategorisierungen wurden vom Vorsitzenden der Leitlinie Herrn Prof. Dr. Hinkelbein aufgelöst und entschieden. Insgesamt wurden im Screeningverfahren 432 Artikel für relevant befunden. Nach der Entfernung von Duplikaten verblieben 269 relevante Artikel.

5.4 Beschaffung der Originalarbeiten

Im Anschluss an das primäre Screeningverfahren wurden die Originalarbeiten der ausgewählten Artikel beschafft. Dies fand primär über den Universitätszugang der Uniklinik Köln über „MEDLINE“ und zusätzlich über „Google Scholar“ statt. Von den ausgewählten Artikeln konnten auf diese Weise 88 Originalarbeiten beschafft werden. Die restlichen 181 Artikel waren entweder, trotz größter Anstrengungen, nicht verfügbar, oder die Originalarbeit war nicht auf Englisch verfasst.

5.5 Bewertung des Vertrauens in die Evidenz in Anlehnung an GRADE

Die Bewertung der den Empfehlungen zugrundeliegenden Evidenz erfolgte in Anlehnung an das GRADE-Verfahren[4–6]. Hierbei findet eine Beurteilung in Bezug auf das Studiendesign für Bias statt. Insbesondere Selektions-, Durchführungs-, Erkennungs-, und Berichtsbias, sowie Hinweise auf einen Publikationsbias fließen in die Bewertung ein. Das Vertrauen in die Evidenz wurde in Anlehnung an GRADE in hoch, moderat, gering oder sehr gering eingeteilt. In Tabelle 4 findet sich das Ergebnis des modifizierten GRADE Verfahrens der 88 ausgewählten Arbeiten.

Tabelle 4 befindet sich im Anhang.

6. Formulierung der Empfehlung und formale Konsensfindung

6.1 Erarbeitung der Empfehlungen innerhalb der Forschungsgruppe

Im Anschluss an die systematische Literaturrecherche fand die eigentliche Empfehlungsformulierung in Kleingruppen innerhalb der Forschungsgruppe statt. Hierbei bildeten immer mindestens 2 Mitglieder der Forschungsgruppe eine Kleingruppe, welche zu einem der 15 Teilbereiche aus Tabelle 1 Empfehlungen formulierte. Jedem Forschungsgruppenmitglied wurden die Erkenntnisse der Literaturrecherche und nachfolgenden Bewertungsverfahrens zur Verfügung gestellt.

Insgesamt wurden 27 Empfehlungen vorgeschlagen, welche allen Mitgliedern der Forschungsgruppe zugestellt wurden. Diese Vorschläge bildeten die Grundlage des anschließenden Konsensfindungsverfahrens.

6.2 Durchführung des Konsensfindungsverfahrens

Zur Bildung eines Konsenses wurde die DELPHI-Methode[7,8] verwendet. Aufgrund der Beschaffenheit der Forschungsgruppe mit internationalen Mitgliedern fand dieses Verfahren im Rahmen eines Online-Bewertungsverfahrens statt. In diesem Verfahren erhielten alle Gruppenmitglieder die vorgeschlagenen Empfehlungen und mussten ihre Zustimmung oder Abstimmung mitteilen. Zusätzlich war es möglich Kommentare zu den einzelnen Empfehlungen zu ergänzen. Die Ergebnisse der ersten Runde wurden aufgearbeitet und anonymisiert den Gruppenmitgliedern erneut zugesandt. In einer zweiten Runde wurden sie erneut gebeten ein Urteil zu fällen.

Nach der zweiten Runde des DELPHI-Verfahrens gab es zu jeder der 27 vorgeschlagenen Empfehlungen ein eindeutiges Votum.

Insgesamt wurden 22 Empfehlungen angenommen. Die Festlegung der Konsensstärken erfolgte in Abweichung zum AWMF-Regelwerk. 21 der Empfehlungen erreichten einen starken Konsens (>90% Zustimmung) und eine Empfehlung erreichte einen schwachen Konsens (50-70% Zustimmung). Keine Empfehlung erreichte einen mittleren Konsens (70-90% Zustimmung). Insgesamt 5 Empfehlungen wurden abgelehnt (<50% Zustimmung). Die einzelnen Empfehlungen sind in Tabelle 5 aufgelistet.

6.3 Festlegung des Evidenzgrades für die einzelnen Empfehlungen

Nach Abschluss des Konsensfindungsverfahrens wurde gemeinsam mit den Kleingruppen, die die Empfehlungen erarbeitet hatten, der Evidenzgrad festgelegt. Hierfür wurden die verwendete Literatur und das Ergebnis des GRADE-Verfahrens zugrunde gelegt. Das abschließende Urteil lag bei dem Vorsitzenden der Forschungsgruppe Prof. Dr. Hinkelbein.

6.4 Schema der Empfehlungsgraduierung

Neben dem Vertrauen in die Evidenz wird zusätzlich die Stärke der Empfehlung (Empfehlungsgrad) festgelegt. Hinsichtlich der Stärke der Empfehlung wurden in der Leitlinie zwei Empfehlungsgrade ausgewiesen. Diese setzten sich aus einer starken und schwachen Empfehlung zusammen.

6.5 Festlegung der Empfehlungsstärke

Die Empfehlungsstärke der einzelnen Empfehlungen wurde durch die Leitliniengruppe in einem erneuten DELPHI-Verfahren auf Grundlage der zuvor festgelegten Evidenzqualität und des Konsensergebnisses bestimmt. Hierbei erfolgte insbesondere eine Würdigung der Relevanz jeder Empfehlung für die besondere Umgebung der Mikrogravitation.

In den Empfehlungen wurden die Begriffe SHOULD (starke Empfehlung) und COULD (schwache Empfehlung) zur Graduierung der Empfehlungsstärke verwendet.

Number	Recommendation	SOR	QOE	Consensus
1	CPR in microgravity SHOULD be divided into a chain of survival consisting of Basic Life Support (BLS) and Advanced Life Support (ALS).	Strong	Very low	Strong
2	For BLS at the site of emergency, the Evetts-Russomano method (ER) SHOULD be applied initially. If the rescuer cannot perform adequate chest compressions with the ER method, the rescuer should switch to the Reverse-Bear-Hug method (RBH).	Strong	Moderate	Strong
3	As soon as the patient has been restrained on the Crew Medical Restraint System chest compressions SHOULD be applied using the Handstand-method (HS) if favored by the dimensions of the spacecraft and provider height.	Strong	Moderate	Strong
4	If the application of the HS method seems impossible either the restrained CPR method using the standard OR straddling position SHOULD be applied.	Strong	Moderate	Strong
5	An automated chest compression device COULD be used on a restrained patient if available, its installation however should not delay high quality chest compressions.	Weak	Very low	Weak
6	If no rescuer with extensive training in tracheal intubation is present, a second generation supraglottic airway device SHOULD be used for airway management.	Strong	Moderate	Strong

7	The tracheal intubation remains the gold standard for securing the airway if performed by a skilled provider and SHOULD be performed in that case.	Strong	Moderate	Strong
8	When tracheal intubation is attempted patient and rescuer SHOULD be restrained using the Crew Medical Restraint System.	Strong	Moderate	Strong
9	A manual suction device SHOULD be included in the emergency kit and be readily available during CPR, especially during airway management.	Strong	Very low	Strong
10	A defibrillator SHOULD only be used on a patient that is restrained to an electrically isolated and safe surface.	Strong	Very low	Strong
11	An automated external defibrillator (AED), with long duration batteries and long shelf-life self-adhesive pads, SHOULD be stored with the emergency equipment.	Strong	Low	Strong
12	The AED SHOULD have a user-friendly interface, a step-by-step instruction voice for correct pads positioning and electrical shock delivery and a timing device for correct chest compressions/ventilation rate.	Strong	Very low	Strong
13	All crewmembers SHOULD be trained in the use of the specific AED provided during the mission.	Strong	Very low	Strong
14	Even if survival is highly unlikely without defibrillation, CPR SHOULD start when a defibrillator is unavailable in the space vehicle, in patients who appear to be in cardiac arrest.	Strong	Very low	Strong
15	Although the survival rate is likely to be reduced in the absence of medical skills and/or equipment for on-going medical support in the event of ROSC in microgravity, defibrillation SHOULD take place when appropriate.	Strong	Very Low	Strong
16	Venous access SHOULD ONLY be performed if more than two rescuers are present during a cardiac arrest and high-quality CPR is performed.	Strong	Very low	Strong

17	As a first choice for the application of medication a peripheral venous cannulation SHOULD be used.	Strong	Very low	Strong
18	When a peripheral venous access cannot be established in a patient in cardiac arrest in microgravity, the intraosseous tibial route SHOULD be used.	Strong	Very low	Strong
19	For intravenous and intraosseous infusion, a degassed infusion bag encased in a pressure bag SHOULD be used.	Strong	Very low	Strong
20	In low earth orbit telemedicine support SHOULD be consulted in the event of a cardiac arrest, when it seems feasible and the manpower for its application is present.	Strong	Low	Strong
21	During space exploration missions to Mars telemedicine support will be impractical during CPR due to the communicational time-delay (3-23 minutes) and SHOULD only be attempted, when additional crewmembers, not involved in treating the patient, are present.	Strong	Low	Strong
22	The decision to terminate resuscitation SHOULD be made by the crewmember with the highest medical qualification after consultation with telemedicine support. Only if telemedicine support is unavailable or time delay prevents prompt feedback the decision has to be made by the crewmember with the highest medical qualification alone.	Strong	Very low	Strong

Tabelle 5: Empfehlungen der Leitlinie; SOR=Strength of Recommendation/Empfehlungsstärke, QOE=Quality of Evidence/Qualität der Evidenz

6.7 Erstellung des Leilinenmanuskripts

Nach Festlegung der Empfehlungen wurde das Leitlinienmanuskript durch Herrn Prof. Dr. Hinkelbein und Herrn Kerkhoff erstellt und mehrfach innerhalb der Forschungsgruppe zirkuliert. Insbesondere Jan Schmitz, Prof. Dr. Thais Russomano, Dr. Lucas Rehnberg, Prof. Dr. Alexander Nagrebetsky, Dr. Matthieu Komorowski und Dr. Christoph Adler wirkten beträchtlich an der Entstehung des Manuskriptes mit. Schlussendlich wurde es von allen Gruppenmitgliedern befürwortet und zur Publikation freigegeben.

Die Konsentierung durch die beteiligten Fachgesellschaften erfolgten durch die jeweiligen Vostandsghremien.

Für die DGLRM e.V. geschah dies am 22.03.2020 durch den Präsidenten Herrn PD Dr. med. Torsten Pippig.

Für die ESAM e.V. geschah dies am 25.03.2020 durch den Präsidenten Herrn Dr. Anthony Wagstaff.

7. Veröffentlichung der Leitlinie

Am 22. Juli 2020 wurde die Leitlinie im „Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine“ online eingereicht, am 07. Oktober 2020 ohne Korrekturnotwendigkeit angenommen und am 02. November 2020 veröffentlicht.

Link: <https://sjtrem.biomedcentral.com/articles/10.1186/s13049-020-00793-y>

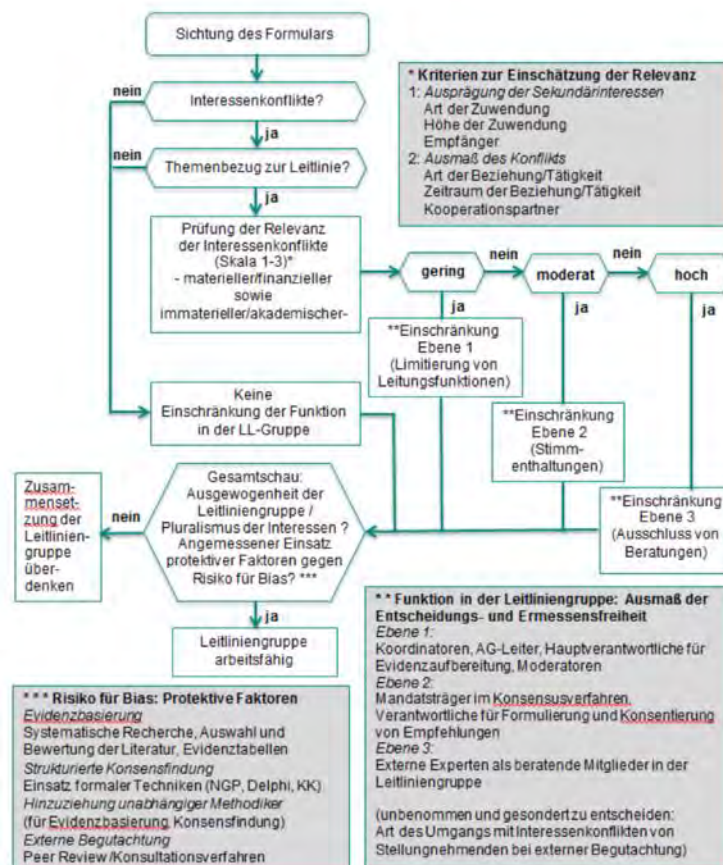
Ebenfalls wird die Leitlinie nach Prüfung durch die AWMF auf der Internetseite der AWMF verbreitet.

Link XXXX

8. Unabhängigkeit und Umgang mit Interessenkonflikten

Diese Leitlinie entstand ohne finanzielle Förderung. Die Veröffentlichung wurde durch die Klinik für Anästhesiologie und Operative Intensivmedizin, Prof. Bernd W. Böttiger, Uniklinik Köln finanziell unterstützt.

Interessenkonflikte wurden mittels angehängter Tabelle bei den Forschungsgruppenmitgliedern abgefragt. Dies basiert auf den Empfehlungen der AWMF (<https://www.awmf.org/leitlinien/awmf-regelwerk/II-entwicklung/awmf-regelwerk-01-planung-und-organisation/po-interessenkonflikte/interessenskonflikte.html>). Eine Bewertung erfolgte hier jeweils gegenseitig durch die Autoren des Leitlinienreports nach dem Entscheidungsbaum der AWMF:



Im Anhang befindet sich die zusammenfassende Tabelle möglicher Interessenkonflikte, deren Bewertung und ergriffene Maßnahmen.

Die Bewertung des Grades des Interessenkonfliktes erfolgte nach dem o.g. Schema in

- Gering: Z.B. Tätigkeit in oder Förderung durch eine nationale oder privatwirtschaftliche Weltraumorganisation
- Moderat: Z.B. Führungskräfte einer nationalen Weltraumorganisation, finanzielle Förderung von Vortragstätigkeit für die genannte Organisation
- Hoch: Z.B. Medizinischer Leiter einer nationalen Weltraumorganisation, Eigentümerinteressen/Wertpapierinteressen in Bezug auf notfallmedizinische Produkte für die medizinische Versorgung im Rahmen der Raumfahrt

Die formale Konsensbildung, die interdisziplinäre Erstellung der Leitlinie und die öffentliche Begutachtung der Leitlinie bilden weitere protektive Faktoren, die Verzerrungen durch Interessenkonflikte entgegenwirken.

9. Literaturverzeichnis

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