ICASM 2025

International Congress of Aviation and Space Medicine | SINGAPORE

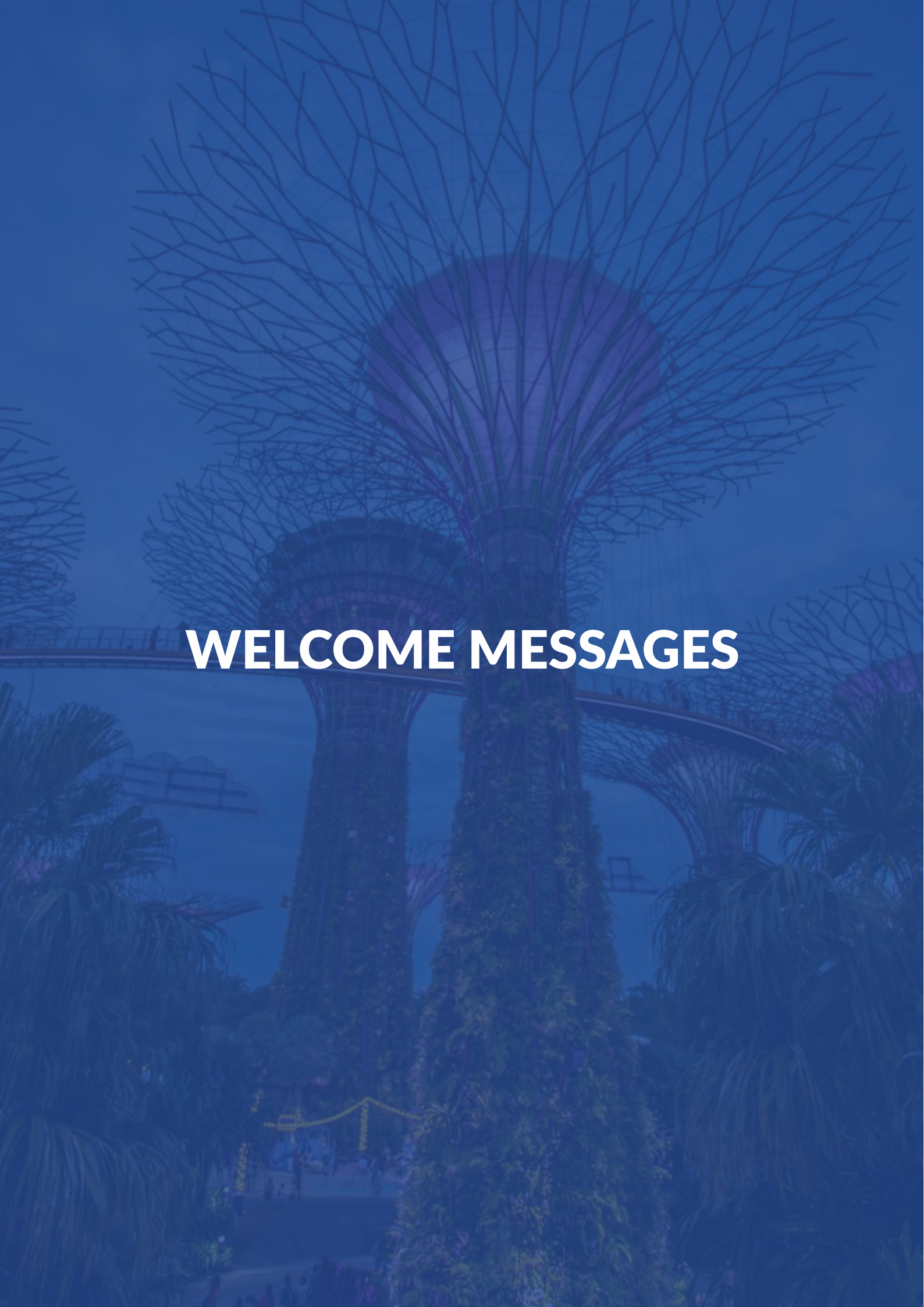
71st International Congress of Aviation and Space Medicine | SINGAPORE

27 to 30 October 2025

Soaring Towards New Horizons in Aviation and Space Medicine

PROGRAMME BOOKLET

CONTENT



WELCOME MESSAGES

ICASM ORGANISING CHAIRMAN MESSAGE

Dear Colleagues and Friends,

I am excited and honored to share that the 71st International Congress of Aviation and Space Medicine (ICASM) will take place in Singapore from 27-30 October 2025.

ICASM 2025 aims to unite the international community of aviation and space medicine practicioners, scientists, academicians and researchers in the sunny island of Singapore for an unforgettable experience of learning, networking and collaboration. ICASM 2025 will include a rich scientific programme spanning over 3 days as well as unique visits and tours on the last day.

The theme for ICASM 2025 is "Soaring Towards New Horizons in Aviation and Space Medicine". My team and I will be curating a compelling and forward-looking scientific programme that will highlight the latest advancements and emerging trends in aviaiton and space medicine, as well as other related fields. We look forward to your valued contribution as presenters, sponosrs and participants.

The congress will be held at One Farrer Hotel, situated in one of Singapore's cultural districts. The location of this hotel holds historical significance as the first flight in Singapore took off here. On 16 March 1911, a Bristol Boxkite biplane took flight from the old Race Course at Farrer Park, the site which sits adjacent to this hotel.

One Farrer Hotel boasts a plethora of water and tropical gardens within its compounds, and also has a fully operational farm which provides greens in the food it serves. This provides a distinctive and inspiring backdrop for the conference, and showcases Singapore as a Garden City for all to enjoy.

Singapore is home to a global metropolis, a City in Nature, and a rich tapestry of rich and diverse cultures. During your stay in Singapore and as part of ICASM 2025, you will be introduced to a wide variety of food and cuisines, a stunning city skyline, and plenty of sunshine.

I would like to extend a warm welcome to friends from all around the world to join me in Singapore for ICASM 2025. With an exciting lineup of events and activities, I am certain you will have an unforgettable experience. See you in Singapore!

Dr. Benjamin Tan (Singapore)
Chairman,
Organizing Committee
ICASM 2025

IAASM PRESIDENT MESSAGE

Dear Colleagues,

As President of the International Academy of Aviation and Space Medicine (IAASM), I look forward to seeing you at our 71st International Congress of Aviation and Space Medicine (ICASM) in Singapore in October 27-29, 2025.

The Academy selects a country and organization from around the world to host ICASM biennially and we are very pleased that we will be going to the city-state of Singapore in the year of the celebration of the 70th Anniversary of the Academy in 2025.

The ICASM can be considered the flagship of the Academy in the same way the key conferences are too many other scientific societies and organizations. It is a forum open to everyone interested in aerospace medicine and presents a golden opportunity to learn and share new knowledge from the daily aeromedical clinical practice to the most updated advances and research in the field.

The main goals of the Academy, since the very beginning, was to search and promote new knowledge in aviation and space medicine and contribute to international co-operation and exchange of information among those devoted to education and research in this field.

Over the years the Academy's objectives have remained the same. But as you can imagine, the structure, methods, organization and future goals of the Academy has been continuously updated by the officers who lead the organization, with the continuous support, knowledge and professionalism of the members of the Academy.

The ICASM 2025 Scientific Committee has put together a great programme that will contain not only our prestigious Andre Allard Lecture and Ernsting Panel but also varied and interesting sessions of original research and education across the practice of aviation and space medicine and its underpinning scientific disciplines.

In addition to an exciting scientific programme, delegates will have the unique chance to undertake one out of several very interesting aviation related educational visits.

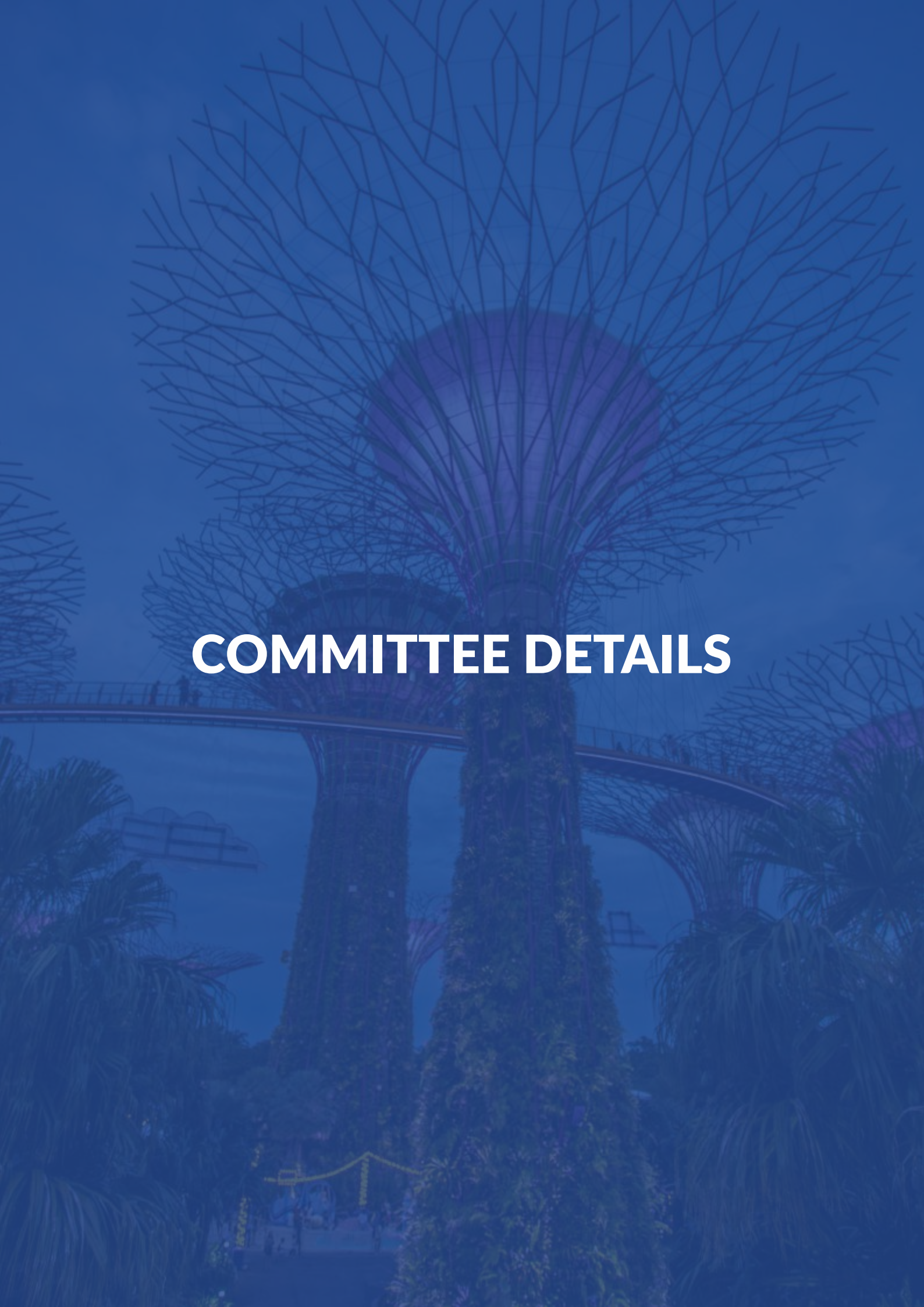
I want to thank and express my deepest gratitude to the Organising Committee. I have been following all the arrangements and detailed preparation for the Congress, and I can assure that the level of enthusiasm, professionalism and effort has been nothing short of remarkable and no effort was spared in ensuring the positioning of a complete and attractive venue for everyone, including presenters, participants, academicians, sponsors, collaborating institutions and partnering organizations.

I am also sure that many of you would be taking this opportunity to experience and witness the diverse cultures found in this exciting city-state and that your accompanying person would have the wonderful opportunity to enjoy the fabulous City of Singapore through the Accompanying Person Programme. The organisers have put together many opportunities to enable everyone of you to have a professional and culturally enriching time in Singapore.

All my best wishes for a very productive Congress! One that is full of deep learning and reflection; brainstorming for solutions and intervention strategies; cultivating a positive impact on aviation safety; and better understanding of the overall human dimension when integrated with the future of aviation systems.

Enjoy ICASM 2025, immerse in many delights found in the beautiful Singapore, and many thanks for your participation. I look forward to meeting you there.

Francisco Rios Tejada MD, PhD
President,
International Academy of Aviation and Space Medicine



COMMITTEE DETAILS

ORGANISING COMMITTEE

Dr Benjamin Tan

Dr Dominic Tan

Dr Benjamin Seah

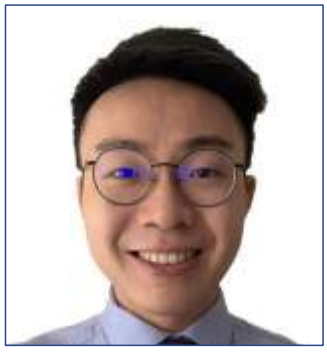
Dr Aaron Chua

Dr Alvin Woo

Dr Randy Cheong

Dr Isaac Chay

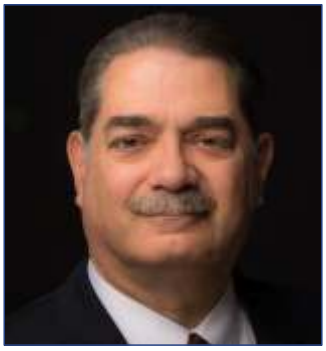
Dr Lily Yang



Dr Ong Sze Chuan

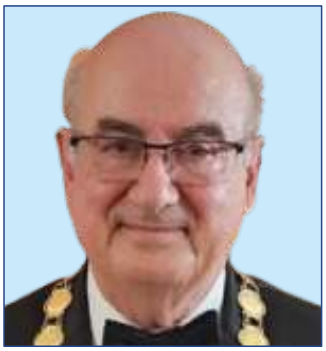
SCIENTIFIC COMMITTEE

A/Prof Ng Wee Tong
(Scientific Committee Chairman)



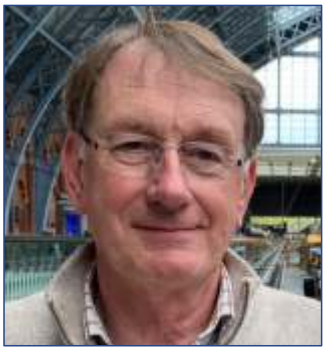
Dr John Barson

ADVISORS



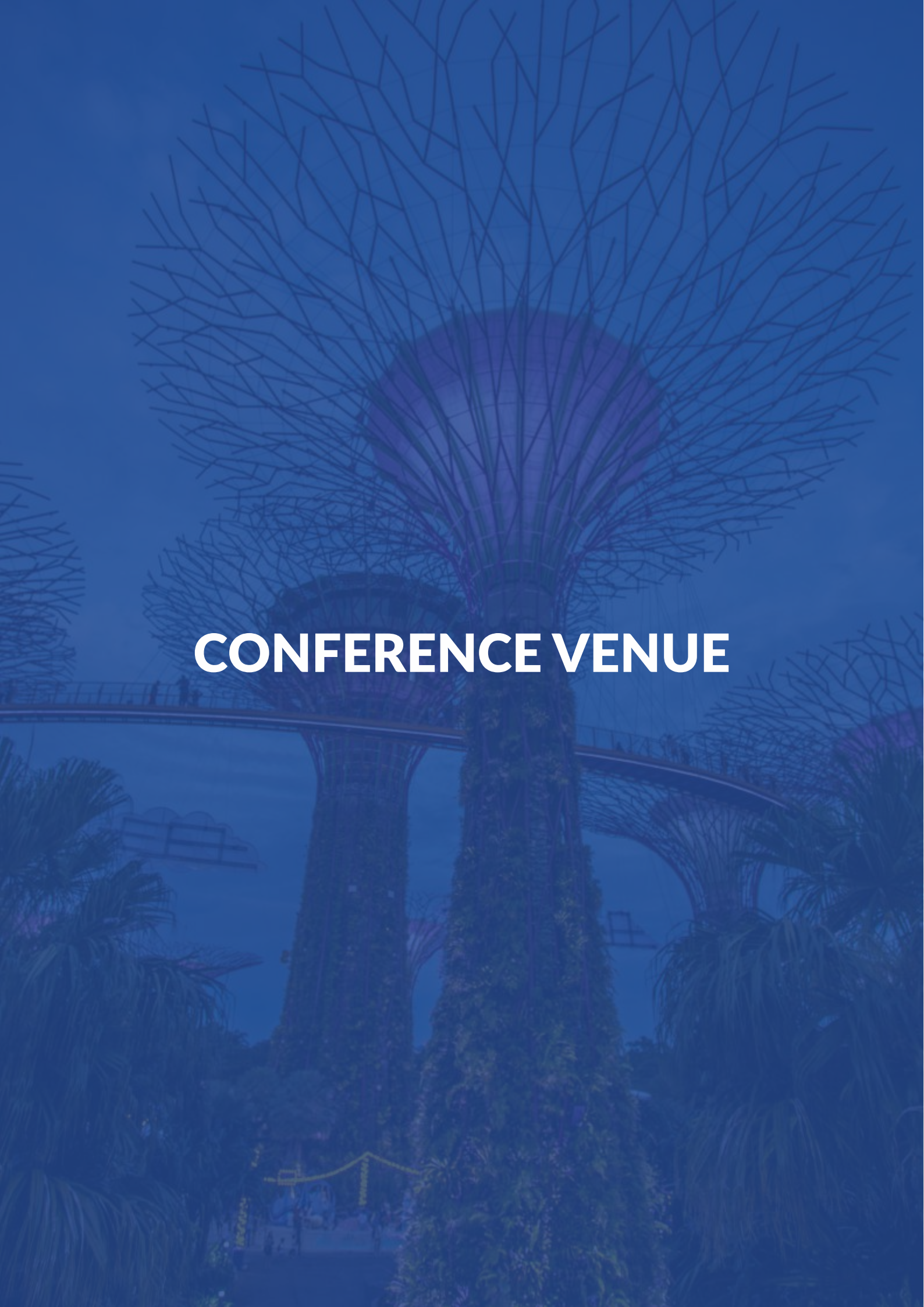
Dr Francisco Rios Tejada

Dr Sally Evans MBE



Prof David Gradwell

Dr Benjamin Ng Boon Lui



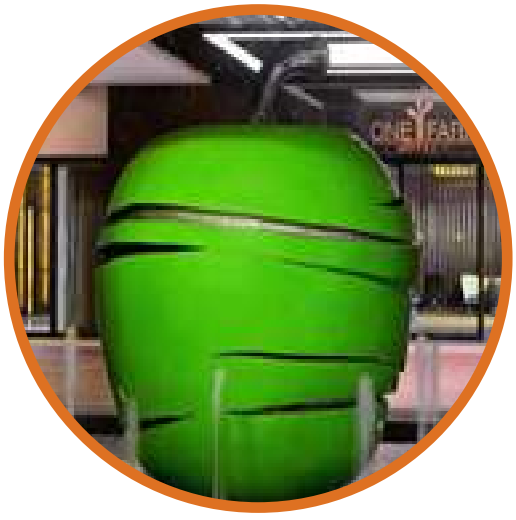
CONFERENCE VENUE

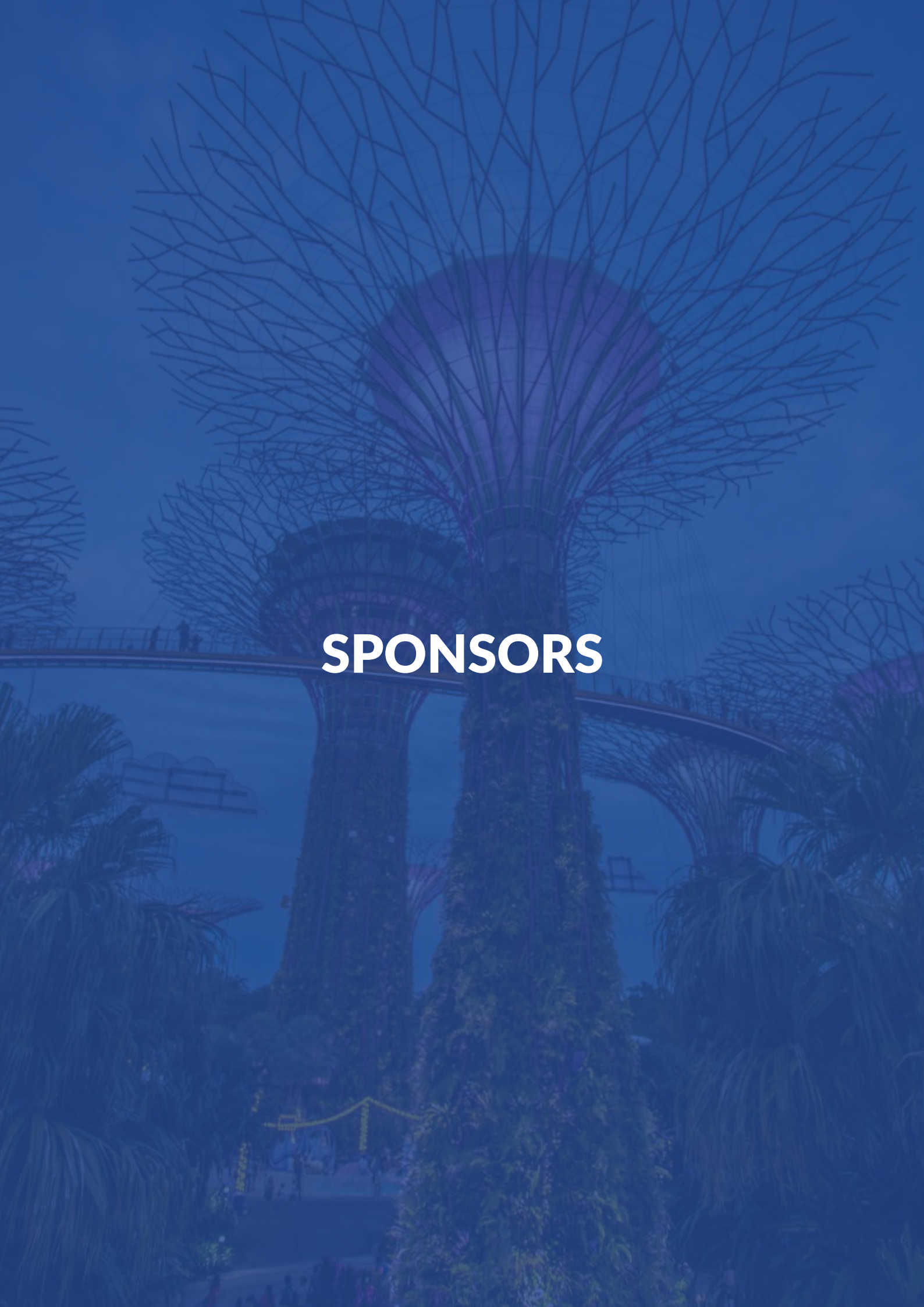
CONFERENCE VENUE

ONE FARRER HOTEL

The One Farrer Hotel Conference Center is located on Level 6 of the Hotel and is the venue for ICASM 2025. With its Grand Ballroom and versatile meeting rooms, the venue offers the perfect balance between elegance and the functionality for plenary sessions and workshops.

For more details about the venue, please visit: https://www.onefarrer.com/conference-center





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ACADEMY OF MEDICINE SINGAPORE

PROGRAMME

DAY 0 – 26 October 2025

IMPORTANT NOTE: The Registration will commence from 09.00 to 17.00 in Pre-function Area of Grand Ballroom (Level 6)

DAY 1 – 27 October 2025

GRAND BALLROOM

Session	Time	Activity	Speaker
	07.30	**REGISTRATION**	
Opening Ceremony	**09.00**	Opening Address by 71st ICASM Organising Chairman	
		Address by IAASM President Presentation of IAASM James T Webb Award 2025	
		Address by SAMPS President	
		Keynote Address by Guest of Honour Official Launch of 71st ICASM	
	10.00	**COFFEE BREAK**	
André Allard Memorial Lecture	**10.30**	Defining The Futureof Global Systems Governing Health and Wellbeing of Populations: Amidst the Revolution in Aviation and Space Travel	Prof Teo Yik Ying
Ernsting Panel **Mod:** Dr Punita Masrani	**11.30**	New Paradigms and Approaches in Aviation Mental Health	Dr Ansa Jordaan Dr Quay Snyder Dr Cristian Panait Dr Tim Sprott Dr Kate Manderson Dr Benjamin Tan
	13.00	**LUNCH** **POSTER SESSION 1/2/3**	

Plenary Lecture	**14.00**	Infectious Disease Pandemics- A Future Crisis or Captivating Opportunities for The Aviation Industry?	Prof Vernon Lee
SESSION 1A **Infectious Disease And Air Travel** **Mod:** Dr Kris Belland / Dr Paulo Alves	**14:45**	Clearing The Air Update - A New Layer of Defense: The Case for UV-C Disinfection in Preventing In-Flight Disease Transmission & Translocation [*ABS 05*]	Dr Kris Belland
	15.00	Travel Prophylaxis for Flight Crew – An Update [*ABS 203*]	Dr Joerg Siedenburg
	15.15	Risk Of Malaria Infection in Aircrews During Layovers in Western Africa [*ABS 222*]	Dr Tobias Dingwerth
	15.30	**COFFEE BREAK**	
Innovation in Aeromedical Transportation	**16.00**	Innovation in the Handling of In-Flight Medical Events and Aeromedical Transportation	Dr Paulo Alves Dr David Teo
SESSION 2A **Aeromedical Transportation** **Mod:** Dr Kris Belland / Dr Paulo Alves	**17.00**	Impact of Medical Volunteers During In-Flight Medical Events [*ABS 205*]	Dr Paulo Alves
	17.15	Australian Bush Pilots From Helicopter Mustering to Long Distance Mail Runs these Unique Pilots need a Tailored Approach to Human Factor and Aeromedical Risk Management, and an Aeromedical Examiner Who Doubles as their Family Doctor [*ABS 26*]	A/Prof Michael Clements
	17.30	Experience in the Construction of Emergency Medical Aviation Rescue Service System about Mountainous Areas in China: An Analysis of The Lishui Model [*ABS 170*]	Dr Xie Lutao
	17.45	**END OF TECHNICAL AGENDA**	
	19:00	**Conference Reception** **Venue: *Saranggong Terrase*** (Dress Code: Lounge Attire)	

DAY 1 – 27 October 2025

READ & SPOTTISWOODE ROOMS

Session	Time	Activity	Speaker
SESSION 1B **Space Medicine 1** **Mod:** Dr Joseph Dervay / Dr Annette Sobel	**14.45**	Multilateral Integrated Medical Support of The International Space Station (ISS) [*ABS 90*]	Dr Joseph Dervay
	15.00	Blood Flow Dynamics in Carotid Artery During Simulated Microgravity and Lunar Gravity [*ABS 25*]	Dr Biswajit Sinha
	15.15	AI-Enhanced Wearable Systems for Proactive Musculoskeletal Monitoring in Long-Duration Spaceflight A Review of Opportunities and Challenges [*ABS 228*]	Dr Roberta Manuel
	15.30	**COFFEE BREAK**	
SESSION 2B **Space Medicine 2** **Mod:** Dr Joseph Dervay / Dr Annette Sobel	**16.00**	Novel Platform for Radiation Measurements for Crew Health [*ABS 162*]	Dr Annette Sobel
	16.15	Cardiopulmonary Resuscitation During Spaceflight: Challenges, Techniques, and Future Directions [*ABS 62*]	Dr Nidhi Kakkar
	16.30	Determining The Best Technique: Methods, Challenges, and Innovations of Performing Microgravity CPR [*ABS 53*]	Ms Amber Smowton
	16.45	Effectiveness of Chest Compressions During Cardiopulmonary Resuscitation in Artificial Microgravity: Testing the Atmed Restraint System in a Human Training Centrifuge [*ABS 89*]	Lt. Col MD Arkadiusz Trzos
	17.00	The Effect of Bisphosphonates on Bone Metabolism in Spaceflight and Bed Rest Studies [*ABS 194*]	Mrs Zsuzsanna Pasztorne Benyo
	17.15	**END OF TECHNICAL AGENDA**	

Day 2 – 28 October 2025

GRAND BALLROOM

Session	Time	Activity	Speaker
SESSION 3 **Aviation Cardiology** **Mod:** Dr Norbert Guettler / Dr Jason Low	**08.30**	Heart Health and Peak Performance: Optimizing Cardiovascular Risks for Pilots, Soldiers, and Sailors [*ABS 04*]	Dr Eddie Davenport
	08.45	Routine Use of Echocardiography in Initial Aeromedical Class 1 and Class 3 Evaluations: Experience From 231 Cases at a Single Aeromedical Center [*ABS 52*]	Dr Camilla Sigurtà
	09.00	The Effects of G-Force on Echocardiographic Parameters: Two Decades of Echocardiographic Follow-Up in Air Force Pilots [*ABS 186*]	LTC (Dr) Ivan Gur
	09.15	Utility of Transthoracic Echocardiography in the Investigation of Applicants with Isolated RSR In The Republic of Singapore Air Force [*ABS 160*]	CPT(Dr) Yang Wei Yun Lily
	09.30	Is there any use of Echocardiography Screening in Military Pilot Applicants? [*ABS 181*]	Dr Norbert Guettler
	09.45	The Proportion of Metabolic Syndrome Among Airline Pilots in Indonesia Before and During The COVID-19 Pandemic [*ABS 220*]	Mr Luis Anthony Jayanata
	10.00	**COFFEE BREAK**	
SESSION 4 **Women in Aviation** **Mod:** LTC(Dr) Magdalene Lee / Dr Sarita Dara	**10.30**	Addressing The Gender Gap: Female-Inclusive Flight Suits in the Irish Air Corps [*ABS 45*]	Dr Louise Fitzgerald
	10.45	Space Flight, Sex Differences, and Clinical Considerations in Women's Health [*ABS 209*]	Prof Dominique Luton
Invited Panel **Mod:** Ms Tan Siew Huay	**11.00**	Women in Aviation Panel	Ms Julia Ho Ms Kristin Toh Ms Nah Jinping Dr Ansa Jordaan Dr Kate Manderson
	12.00	**LUNCH** **POSTER SESSION 4/5/6**	

SESSION 5 Civil Aviation Medicine & Regulatory Medicine **Mod:** Dr Richard Tan / Dr Koh Choong Hou	**13.00**	Healthy Lifestyle and Prediction of Non-Communicable Disease (NCD) Among Civil Pilots In India [*ABS 41*]	Prof Sudhanshu Mohapatra
	13.15	The Case for New Standards Of Medical Certification for Low-Risk Sport Aviation [*ABS 174*]	Dr Geoffrey Mccarthy
	13.30	Establishing Safe Standards in A Rapidly Emerging Aerospace Frontier: A Call to Define Medical Requirements for Operating Vertical Takeoff and Landing Aircraft [*ABS 168*]	Dr Ajitesh Anand
	13:45	Bridging Healthcare Disparities in Indonesia: The Role of Aeromedical Evacuation and Comparative Regulatory Insights [*ABS 217*]	Ms Rachmy Hamdiyati
	14:00	Factors Associated with Fatal and Non-Fatal Commercial Aviation Accidents in Indonesia (2007-2018) [*ABS 67*]	Dr Adre Dwi Wiratama
	14:15	Barotraumatic Otitis in Commercial Aircrew: Impact of Cabin Pressure Altitude Over a 10-Year Observational Study [*ABS 114*]	Dr Pietro Scaramuzzo
	14.30	Research on Medical Events of In-Flight Incapacitation in Civil Transport Air Crew, 2017-2024 [*ABS 24*]	Dr Zhu Yiwen
	15.00	**COFFEE BREAK**	
SESSION 6A Military Aviation Medicine **Mod:** Dr Hernando Ortega / LTC(Dr) Dominic Tan	**15.30**	USAF Medical Waivers and Pilot Training Outcomes A Retrospective Analysis [*ABS 232*]	Dr Daniel Shoor
	15.45	Incidence of Clinically-Diagnosed Overweight & Obesity Among the US Military as a Whole and Among US Military Aviators, 2006-2023 [*ABS 99*]	Dr John Caldwell
	16.00	Sports Therapists for RSAF Aircrew: A Single-Centre Pilot Interventional Study [*ABS 158*]	LTC(Dr) Benjamin Seah
	16.15	Medical Waivers and Attrition in USAF Pilot Training A Focus on Diagnostic Categories during T-6 Phase: A Diagnosis-Based Sub-Analysis of USAF Medical Waivers and Pilot Training Outcomes [*ABS 233*]	Dr Hernando Ortega
	16.30	A Comparison of Subjective and Objective Measures of Vestibular Adaptation in Rotary Chair Among Indian Military Aircrew [*ABS 31*]	Dr Nandishwar Rathore
	16.45	Republic of Singapore Air Force (RSAF) Helicopter Search-And-Rescue (SAR) Medical Evacuation: A 10-Year Study [*ABS 159*]	LTC(Dr) Isaac Chay
	17.00	Asthma in Active Military Aircrew: Long-Term Health and Flight Performance [*ABS 183*]	Dr Omer Angel
	17.15	A Study of Dehydration in Navy Student Pilots [*ABS 204*]	Dr Alexander Wrigley
	17.30	**END OF TECHNICAL AGENDA**	

Day 2 – 28 October 2025

READ & SPOTTISWOODE ROOMS

Session	Time	Activity	Speaker
The Future of Aerospace Medicine Training **Mod:** Prof Tracy Smart	**13.00**	The Future of Aerospace Medicine Training What's the Next Game Changer?	AVM Bussakorn Pamorn Col (Dr) Zulkefley Mohammad GPCAPT Collette Richards SLTC(NS) (Dr) Jason Low
Trends in Aviation Medicine and Training	**14.00**	Trends in Aviation Medicine and Training: A Critical Review of Human Factors in Recent Mishaps	Mr Robert Laurent Dr. Swee Weng Fan Prof Brian S. Bradke
	15.00	**COFFEE BREAK**	
SESSION 6B **Aviation Psychology And Training** **Mod:** Ms Delicia Ser / Mr Chris De Roza	**15.30**	Does Pre-Training Heart Rate Variability Predict Completion of the Israeli Air Force Pilot Training? [*ABS 180*]	Ms Aya Ekshtein
	15.45	Sensor-Based Tracking in Aviation Pilot Training [*ABS 91*]	Dr Botond Szűcs
	16.00	Transforming the Republic of Singapore Air Force (RSAF) Heli-Medevac Search-And-Rescue (SAR) Combat Medic Training: A Comparative Analysis of Traditional Didactic Training vs. a Novel E-Learning Module [*ABS 152*]	Dr Aaron Thio
	16.15	Development of a Game-Based Personality Tool [*ABS 188*]	Ms Delicia Ser
	16.30	Research on Multidimensional Influencing Factors and Intervention Strategies for Psychological Resilience in Aviation Professionals [*ABS 46*]	Dr Liu Yanhua
	16.45	Utilizing an Escape Room Style Simulation to Evaluate Human Behaviour and Performance Competencies [*ABS 48*]	Dr Leigh Speicher
	17.00	Development of a Competency Framework for Thai Aviation Medicine Instructor Physicians: Documentary Research [*ABS 225*]	Dr Phithak Onsiri
	17.15	**END OF TECHNICAL AGENDA**	

Day 3 – 29 October 2025

GRAND BALLROOM

Session	Time	Activity	Speaker
SESSION 7A **Human Factors, Survivability & Accident Investigation** **Mod:** Dr John Crowley/ Ms Cheng Chin Yi	**08.30**	Human Systems Integration: What it is and How it can Save Aircrew Lives [*ABS 43*]	Dr Andrew Bellenkes
	08.45	OBVA Eye Tracking Research for Performance Improvement, Assessing Daily Fatigue for Risk Mitigation and Long Duration Flight Workload and Fatigue Assessment [*ABS 236*]	Dr Steven Hadley
	09.00	Drivers of Safety Behaviours in Organisations and the Measurement of Organisational Drift [ABS 187]	Ms Cheng Chin Yi
	09.15	Pilot Preconditions and Errors Affect Flight Accidents in Indonesia: Analysis Based On 245 Accident Investigation Reports from 2007 To 2024 [*ABS 02*]	Dr Inne Yuliawati
	09.30	Occupant Survival in Helicopter Accidents The Effect of Crashworthy Design Features In Utility and Attack Helicopters [*ABS 231*]	Dr John Crowley
	09.45	Measuring What Matters Assessing the Real-World Impact of Flight and Duty Time Limits on Crew Fatigue [*ABS 47*]	Mr Tomas Klemets
	10.00	**COFFEE BREAK**	
SESSION 8A **High Performance Aviation, Acceleration, Altitude and Hypoxia** **Mod:** Prof Tracy Smart / Dr Kenneth Fong	**10.30**	Biometric Monitoring and AI Algorithms to Predict Physiologic Stress in High Performance Flight [*ABS 105*]	Dr Thomas Flipse
	10.45	Sudden Inflight Incapacitation During a High-G-Manoeuvre Due to a Cerebellar Arteriovenous Malformation: A Case Report [*ABS 115*]	Col Dr Hans Noblé
	11.00	10-Year Analysis of Medical Events Following Human Training Centrifuge Training In Republic of Singapore Air Force Aircrew [*ABS 154*]	CPT(Dr) To Yi Hui
	11.15	Comparison of Intermittent Hypoxia Exposure at High Altitude and Routine Acclimatisation - A Pilot Study [*ABS 33*]	Dr Srinivasa Bhattachar
	11.30	Enhancing Hypoxia Recognition and Visual Performance in Rotary Wing Aircrew through Simulated High-Altitude Training [*ABS 212*]	Col Dr Zulkefley Mohammad

SESSION 9A **Space Medicine 3** **Mod**: Dr Soh Feng Wei / Dr James Vanderploeg	**13.00**	The Practice Domains of Aerospace Psychiatry and Future Challenges for Commercial Spaceflight [*ABS 234*]	Dr Philip Brady
	13.15	Challenges to Developing Astropharmacy: A Qualitative Study using the Theoretical Domains Framework [*ABS 61*]	Dr Toh Li Shean
	13.30	Spaceflight Immune Signatures: Can Routine CBC Data Reflect Omics Findings?[*ABS 104*]	Ms Riya Nagar
	13.45	Impact of Microgravity and Radiation on Immune Cellular and Cytokine Regulation [*ABS 211*]	Dr Tooba Tahir
	14.00	Determining the Safe Staging Distance for Medical Rescue Forces During Launch Operations at the Kennedy Space Center [*ABS 171*]	Dr Kenneth Myers
	14.15	The A.R.T.E.M.I.S. Primer for Potential Osteopathic Manipulative Treatment in Spaceflight [*ABS 107*]	Dr Jason-Flor Sisante
	14.30	**COFFEE BREAK**	
SESSION 10 **Clinical Aviation Medicine 2** **Mod:** Dr Soh Feng Wei / Dr Henry Lupa	**15.00**	Internal and External Risk Factors Analysis on Pilot Precondition in Indonesia [*ABS 23*]	Dr Inne Yuliawati
	15.15	Clinical Characteristics and 24-Hour Urinary Risk Factors in Asymptomatic Urolithiasis Patients [*ABS 78*]	Dr Qin Dongfang
	15.30	Obstructive Sleep Apnea Related Incapacitation *[ABS 92]*	Dr Harry Wicaksana
	15.45	Role of the Aemc in Diagnosis and Assessment of Obstructive Sleep Apnea Syndrome [*ABS 86*]	Prof Jonathan Monin
	16.00	**END OF TECHNICAL AGENDA**	
	18:30	**Congress Gala Dinner** **Venue: One Farrer Hotel Grand Ballroom** (Dress Code: Formal or National Attire)	

Day 3 – 29 October 2025

READ & SPOTTISWOODE ROOMS

Session	Time	Activity	Speaker
SESSION 7B **Aviation Psychiatryand Mental Health** **Mod:** MAJ(Dr) Gabriel Tan / Dr Dandaithapani Thyagarajan	**08.30**	Impact of COVID-19 on Military Aircrew Mental Health [*ABS 146*]	MAJ(Dr) Gabriel Tan
	08.45	The Aviation Psychiatrist A Major Role in Diagnosis and Follow-Up [*ABS 87*]	Dr Laëtitia Marion
	09.00	Mental Health Supportin the Republic of Singapore Air Force(RSAF) [*ABS 161*]	Ms Elaine Soon
	09.15	Understanding Cultural Ritualsin Aviation Medicine: A Case of Annual Self-Flagellation and Mental Health Clearance[*ABS 100*]	Dr Kapil Ojha
	09.30	Dissociative Amnesiain A Pilot and the Role of Psychometric Assessment in Aeromedical Decision Making - A Case Report[*ABS 40*]	Dr Dandaithapani Thyagarajan
	09.45	Andropause and Aeromedical Risk A Systematic Reviewof Testosterone Deficiency in Male Pilots' Performance and Mental Health[*ABS 141*]	Dr Watcharaphol Alexandre Kamnerdsiri
	10.00	**COFFEE BREAK**	
SESSION 8B **Aviation Ophthalmology** **Mod:** Prof John Barbur/ LTC(Dr) Isaac Chay	**10.30**	An Efficient, Two-Step Approachto Color Assessment [*ABS 179*]	Prof John Barbur
	10.45	Prevalence and Influencing Factorsof Dry Eye Syndrome among Pilots: A Survey Study[*ABS 49*]	Prof Zhang Mingyue
	11.00	Prevalence of Dry Eye Syndromeamong Flight Crews: A Comparative Study Between Airline and General Aviation Operators[*ABS 51*]	Dr Anna Fachinett
	11.15	Helmet-Mounted Displays Reshape Ocular Dominance and Refractive Symmetryin AH-64 Apache Helicopter Pilots [*ABS 182*]	Mr Ofek Salama
	11.30	Ophthalmic Evaluation Following Corneal Cross-Linking Procedures and Implications for Aircrew Return to Flight [*ABS 223*]	Mrs Liora Levian Moadim
	11.45	Impact of the COVID-19 Pandemic on Myopia Progression among Israeli Air Force Flight Academy Candidates [*ABS 221*]	Mrs Liora Levian Moadim
	12.00	**LUNCH** **POSTER SESSION7/8/9**	

SESSION 9B Clinical Aviation Medicine 1 **Mod:** Prof Erik Hohmann / Dr Robin Low	**13.00**	Shoulder Surgeryin Pilots and Cabin Crew: Accelerating Returnto work through Aviation-Focused Surgical Practiceand Musculoskeletal Rehabilitation Unit [*ABS 39*]	Prof Erik Hohmann
	13.15	Correlations between Clinical Spinal Featuresand MRI Findings in Aircrew Members[*ABS 184*]	Dr Ofek Arieli
	13.30	Prevalence of Musculoskeletal Conditionsin RSAF Aircrew: A Single-Centre, Six-Year Retrospective review from 2019 To 2024[*ABS 155*]	CPT(DR) Jonathan Pong
	13.45	Vestibular and Stabilometricfindings in Neck Pain and Vertebral Injuriesin Pilots [*ABS 123*]	Cpt Claudia Milella
	14.00	Case Reportof Decompression Illness Following Altitude Chamber Trainingin 2024 at the RMAF's Instituteof Aviation Medicine[*ABS 176*]	Lt Col (Dr) Noor Saadiah Zainal
	14.30	**COFFEE BREAK**	
FOR ACADEMICIANS ONLY	**16.00**	**IAASM GENERAL MEETING**	

POSTER PRESENTATION

Screen No.	Poster Title	Presenter
	Poster Session 1 **Day 1 - 27 October 2025 - 1.00pm - 1.20pm**	
1	Occupational Safety and Health in Commercial Space Travel [ABS 59]	Dr Joerg Hedtmann
2	Electrical Signal Migration Across Human Cardiomyocytes in Microgravity : Implications for Expedition Class Missions [ABS 60]	Dr Erik Leroy
3	Use of C60-Serinol to Prevent Radiation -Induced Cataracts in Astronauts [ABS 85]	Dr Onur Sahin
4	Pre-Flight Assessment of Aeromedical Evacuation in Lung Malignancy Cases [ABS 219]	Ms Rachmy Hamdiyati
5	Design of Aeromedical Evacuation Decision Support Simulation System Based on Discrete Event Simulation [ABS 207]	Prof Xiaoli Zhang
6	Comparison Study of Diagnostic Techniques for Dyschromatopsia currently employed for Flight Fitness Assessment [*ABS 79*]	Dr Andrea Mazzoni

Screen No.	Poster Title	Presenter
	Poster Session 2 **Day 1 - 27 October 2025 - 1.20pm - 1.40pm**	
1	Dengue Risk Assessment in Italian Air Force Personnel: Current Practice and Prospects [*ABS 64*]	Dr Carmen Nigro
2	Comparative Analysis of Vestibular Function Test Results and Aeromedical Evaluation of Pilots in the Period of COVID-19 Infection [*ABS 72*]	Prof Zhikang Zou
3	Management of Malaria Prevention and Case Response among Air France Flight Crews [*ABS 122*]	Dr Marie-Andrée Comesse
4	Comparative Analysis of Automated Cardiopulmonary (CPR) Machines for Resuscitation of Helicopter Medical Evacuation (Heli -Medevac) Casualties [*ABS 157*]	CPT(Dr) Jerry Jay Yeo
5	Transporting a Critically Ill Elder by The Helicopter Supported by 5G and Beidou Navigation Satellite System - Case Report [*ABS 173*]	Dr Wei Han

Screen No.	Poster Title	Presenter
	Poster Session 3 **Day 1 - 27 October 2025 - 1.40pm - 2.00pm**	
1	Evolution of Aviation Physiology Training in the RSAF - Now and In the Future [*ABS 151*]	LTC (Dr) Aaron Chua
2	An Overview of Training Strategies to Strengthen Air Base Medical Operational Support in the Republic of Singapore Air Force [*ABS 156*]	Ms Linda Teow
3	Simulator-Based, Machine Learning-Modelled, Psychophysiological Measurement-Augmented Pilot Screening in the Republic of Singapore Air Force [*ABS 202*]	Mr Nicklaus Koh
4	Management of Incidental findings found on Brain MRI in Military Pilots [*ABS 210*]	Dr Ronel D Amico
5	Understanding Cognitive Load-Performance Dynamics in Simulated Air Traffic Control Training [*ABS 198*]	Dr Koh Tze Hui

Screen No.	Poster Title	Presenter
	Poster Session 4 **Day 2 - 28 October 2025 - 12.00pm - 12.20pm**	
1	Pilot Health and Disqualification Trends : A 25-Year Analysis (2000-2024) in South Korea [*ABS 22*]	Dr Lim Juwon
2	Lufthansa Medical Center Frankfurt Pilot Referral Statistics as an Indication of Health Problems [*ABS 27*]	Dr Roland Nowak
3	The Effect of Norepinephrine Transporter Inhibitors on Systolic Blood Pressure for Deep Vein Thrombosis Risk Mitigation: A Systematic Review and Meta -Analysis [ABS 227]	Raihakim Hidajat
4	Effectiveness of Lifestyle Interventions on Health Outcomes among Airline Pilots : A Meta -Analysis [*ABS 190*]	Mr Kenoah Kovara
5	The Relationship between Physical Activity , Fatigue , and Other Factors with Sleep Quality of Cabin Crew in Indonesia [*ABS 213*]	Dr Arwin Okwandi

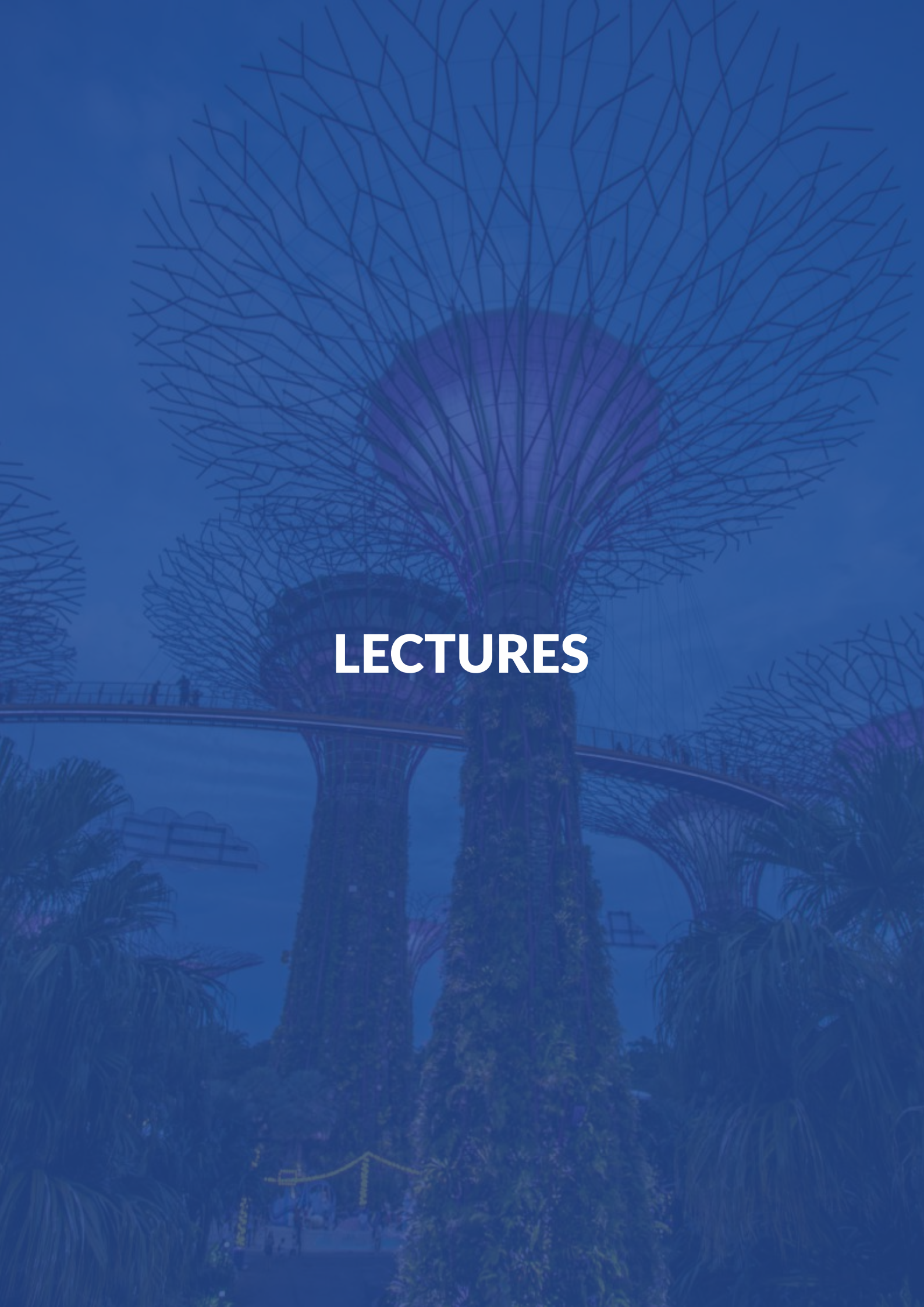
Screen No.	Poster Title	Presenter
	Poster Session 5 **Day 2 - 28 October 2025 - 12.20pm - 12.40pm**	
1	Clinical Efficacy of Flow Diverter in Treating Intracranial Aneurysms in Military Pilots and Implications for Aviation Medical Certification [*ABS 73*]	Prof Lou Zhengxue
2	Assessment of Anthropometric Measurement and Body Composition Features in Female Military Flight Cadets [*ABS 77*]	Mr Lin You-Jin
3	Assessment of Changes in Psychomotor Skills under The Influence of a Special Training Process in Cadet Pilots [*ABS 117*]	Mr Szymon Biesiada
4	Personality Traits and Autonomic Nervous System activity during a Simulated Military Flight [*ABS 147*]	Prof Dagmara Bartczak-Szermer
5	Haemodynamic Assessment of Mild Atrioventricular Valve Regurgitation in the Aero-Medical Aspect [*ABS 200*]	Prof Ewelina Zawadzka-Bartczak
6	Grounded by a Virus: Parvovirus B19 Presenting as Acute Polyarthritis in an Aircrew Member [*ABS 88*]	Dr Kapil Ojha

Screen No.	Poster Title	Presenter
	Poster Session 6 **Day 2 - 28 October 2025 - 12.40pm - 1.00pm**	
1	Civil Aviation Emergency Management Information Platform for Public Health Emergencies System: Information Technology Solution for Pandemic Preparedness, Response, and Management [*ABS 82*]	Mrs Cao Yuan
2	Methods of Diagnosing Aircraft Components as a Factor for Ensuring Safety in Air Training and Preventing Air Accidents Selected Aspects [*ABS 132*]	Lt. Col Prof Marcin Sztobryn
3	Sleep Restriction Impairs Working Memory under Hypoxia: Should it be a New Consideration for Flight Safety? [*ABS 169*]	Mr Ulysse Comte
4	Strengthening Pilot's Mental Health Through Peer Support Network and Programmes [*ABS 206*]	Cpt Jeffery Ang
5	Guarding The Point of Entry: A Lesson Learned From Airport Passenger Health Quarantine Systems [*ABS 226*]	Dr Santhi Sueningrum

Screen No.	Poster Title	Presenter
	Poster Session 7 **Day 3 - 29 October 2025- 12.00pm - 12.20pm**	
1	Validation of a Computational Model for G-Tolerance Prediction using a Second Participant [*ABS 01*]	Dr Samuel Stephenson
2	Establishment of a Practical Platform for Rapid Physiological Data Processing and G Tolerance Estimation [*ABS 57*]	Prof Lai Chung-Yu
3	The Impact and Mechanisms of Resistance Training on Hypoxia-Induced Muscle Atrophy [*ABS 63*]	Mr Wang Yongchun
4	A Pilot Study on Heart Rate Variability in Flight Cadets During Exposure to Hypobaric Hypoxia [*ABS 93*]	Ms Hsu Ju-Yun
5	Alterations in Oxidative Stress Before and After Hypobaric Chamber Training: Case Report [*ABS 97*]	Dr Shih Meng-Hung
6	Acute High-Altitude Hypoxia Triggers TNF-A Production in Vascular Smooth Muscle Cells via BMAL1-Mediated Endoplasmic Reticulum Stress [*ABS 106*]	Prof Lu Songhe

Screen No.	Poster Title	Presenter
	Poster Session 8 **Day 3 - 29 October 2025 - 12.20pm - 12.40pm**	
1	Concurrent Benign Paroxysmal Positional Vertigo in a Civil Aviation Pilot with Ipsilateral Sudden Sensorineural Hearing Loss [*ABS 32*]	Prof Yin Haiying
2	Challenges in Color Vision, Literature on New Methods for Deficiencies Description and Detection [*ABS 76*]	Dr Andrea Mazzoni
3	Aeromedical Certification of a Military Pilot with Asymptomatic Hyperparathyroidism: A Case Report and Literature Review [*ABS 71*]	Prof Jin Liang
4	Incidental Discovery of Blebs and Bullae in Fighter Pilots: Should they be Treated or Monitored? - A Case Report and Literature Review [*ABS 84*]	Dr Zakaria Iloughmane
5	Impact of 15s +9 Gz Acceleration on Contrast Sensitivity in Pilots: A Dynamic Simulator Study [ABS 131]	Prof Katarzyna Sowa

Screen No.	Poster Title	Presenter
	Poster Session 9 **Day 3 - 29 October 2025 - 12.40pm - 1.00pm**	
1	Nasal Polyposis in Flight Personnel: Traditional Therapeutic Approach or Choice of Biological Treatment? [*ABS 56*]	Col Federico Piccoli
2	Changes in Pain Intensity of Musculoskeletal Disorders in Flight Attendant Post Stretching Exercise Program [*ABS 109*]	Dr Maria Melania Muda
3	Managing Low Back Pain in Military Aviators: A Meta-Analysis of Core Stabilization Exercise Trials [*ABS 189*]	Mr Steven Lauren Xiu
4	Prolactinoma in Air Traffic Controller [*ABS 172*]	Dr Meena Nachiappar



LECTURES

ANDRÉ ALLARD MEMORIAL LECTURE

DEFINING THE FUTURE OF GLOBAL SYSTEMS GOVERNING HEALTH AND WELLBEING OF POPULATIONS: AMIDST THE REVOLUTION IN AVIATION AND SPACE TRAVEL

The global system of governance established post World War II, alongside the Bretton Woods Institutions, are currently under threat. The impending breakdown of these systems - originally established to maintain peace, security and economic growth - indicates that the world is at risk once again; not just to conflicts and wars, but also pandemics, climate destabilisation, and the dangerous rise of uncontrolled nationalism and short-termism.

What is often overlooked is that the global movement of people and goods requires global standards that are respected and maintained by international bodies including the International Civil Aviation Organisation and the International Air Transport Association, established in 1944 and 1945 respectively. Aviation global standards were under threat during the Covid-19 pandemic when governments worldwide unilaterally decided to close borders and restrict the movement of essential supplies and people.

Amidst the revolution in aviation and space travel - with urban air mobility, hydrogen-powered aircrafts and commercial space travel becoming a reality in the near future, agreement on international standards and regulations governing both aviation and space safety is ever more important. In this lecture, I will explore the future of global health governance and diplomacy, amidst the current megatrends shaping the world. The world will need to reach a consensus on the international regulations necessary for the future of aviation.

ICASM 2025 ANDRÉ ALLARD MEMORIAL LECTURE ORATOR

Professor Teo Yik Ying is Dean of the Saw Swee Hock School of Public Health at the National University of Singapore, and concurrently a Governing Board Member for the Southeast Asian Ministers of Education (SEAMEO) Regional Centre for Tropical Medicine and Public Health Network. Prior to his Deanship, he was the Director for the Centre for Infectious Disease Epidemiology and Research, and Founding Director for the Centre for Health Services and Policy Research for the School of Public Health.

Professor Teo is presently a member of the International Organising Committee for the Prince Mahidol Award Conference, as well as the M8 Alliance which forms the academic foundation for the World Health Summit. He is the Co-Director for the Asia Pacific Academic Consortium for Public Health's Collaborating Centres for Health Promotion, and sits on the Global Coalition of Deans of Schools of Public Health.

Professor Teo previously worked on the use of genetic technologies for the control and elimination of several infectious diseases, including malaria and tuberculosis. As a previous member of the global MalariaGEN network, he was actively involved in training and capacity development of research fellows from different African and Southeast Asian countries.

He received his BSc in Mathematics from Imperial College in 2000, MSc in Applied Statistics and DPhil in Statistics from the University of Oxford in 2001 and 2006 respectively.

In 2023, Prof Teo was appointed Vice President of NUS' new Office of Global Health, which is a multidisciplinary whole-of-University effort to drive NUS' health engagement efforts on the global stage. Besides influencing health and policy outcomes through interdisciplinary translational research, advocacy and analysis, the Office of Global Health will also build on NUS' strategic partnerships and develop local expertise in global health among neighbouring countries in the region through training and capacity-building.

HISTORY OF MEMORIAL LECTURE

The André Allard Memorial Lecture was instituted in 1980 to honor Dr. André Allard, the seventh President of the Academy (1971 - 1973) and prior to that, the Secretary General of the Academy (1959 - 1970). His contributions to the Academy had been profound and significant since he joined in 1958, and he continued to contribute immensely to the international aviation and space medicine community until his untimely death in 1978. Dr. André Allard was recognised as a hugely influential figure in aviation and space medicine during his time and known to many as a humble, approachable and generous person. Beyond his work in the Academy, Dr. André Allard started the European Airlines Medical Directors Association in the 1950s and was a Member and President of IATA Medical Committee until 1969.

PLENARY LECTURE

INFECTIOUS DISEASE PANDEMICS - A FUTURE CRISIS OR CAPTIVATING OPPORTUNITIES FOR THE AVIATION INDUSTRY?

The increasing frequency and scale of infectious disease outbreaks present both challenges and unique opportunities for aviation medicine. Key drivers such as rapid unplanned urbanisation, climate change, and increased global connectivity create conditions for rapid disease spread, and the aviation and travel health sector is both a vulnerable point and a critical intervention opportunity in securing global health security.

This lecture examines the evolving landscape of infectious disease threats and their implications for global air travel, while exploring innovative approaches to pandemic preparedness. From the COVID-19 pandemic to other outbreak experiences, we will explore the effectiveness of various aviation-specific interventions implemented, including novel approaches that facilitated the safe resumption of air travel, such as risk-calibrated border measures, automated public health systems, and integration of digital health/vaccine certificates.

We will discuss a modular approach to future preparedness and response, and opportunities for aviation medicine to strengthen its preparedness capabilities. These include developing scalable health operations that can be swiftly modified based on specific threat characteristics, leveraging technology to enable real-time data sharing and enhance health measures, and building robust collaborative networks for coordinated responses. These examples illustrate how aviation medicine can adapt and innovate under crisis conditions.

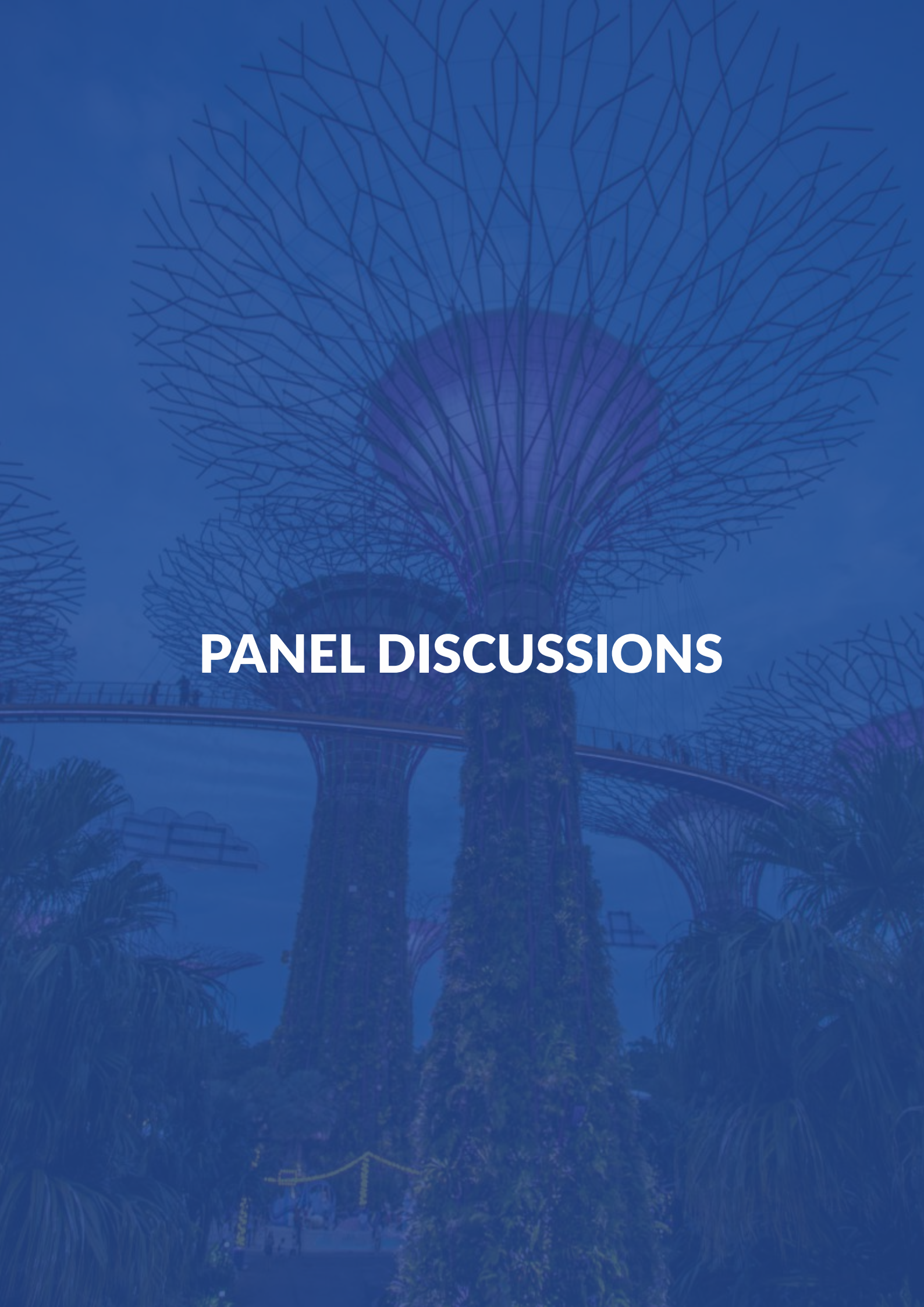
ICASM 2025 PLENARY LECTURE ORATOR

Professor Vernon Lee is a preventive medicine physician with extensive global health experience in pandemic preparedness and response, infectious disease epidemiology and health policy and management. He played an instrumental role in developing and implementing Singapore's COVID-19 pandemic response, and has also responded to the 2003 SARS outbreak, 2009 influenza pandemic, and the 2016 Zika outbreak in Singapore.

Prof Lee previously served as Advisor to the Assistant Director General for Health, Security and Environment at the WHO headquarters in Geneva; Medical Epidemiologist in the WHO's Country Office in Indonesia; and Head of the Biodefence Centre in the Singapore Armed Forces. Through his work, Prof Lee has been involved in major global health security collaborations, and in developing pandemic preparedness plans, risk assessment and disease management programmes. He continues to serve on expert committees at the international level.

An avid supporter of evidence-based health policy, Prof Lee has published about 200 scientific papers, many in top journals, including the New England Journal of Medicine (NEJM), Journal of the American Medical Association (JAMA), and the Lancet journals. He is an Adjunct Professor at the Singapore's Saw Swee Hock School of Public Health.

Prof Lee graduated from medical school at the National University of Singapore. He also holds a PhD in epidemiology from the Australian National University, and the Master in Public Health and Master of Business Administration degrees from the Johns Hopkins University, USA.



PANEL DISCUSSIONS

ERNSTING PANEL

Mental health in aviation is crucial for ensuring the wellbeing of pilots, crew, and ground staff, as well as for maintaining safety and operational efficiency in the industry. The aviation industry is characterized by high stress environments, irregular schedules, and significant responsibilities, which can lead to various mental health challenges such as anxiety, depression, and chronic fatigue. This is against a backdrop of rising mental health conditions in our population today. Today, approximately 1 in 4 pilots has experienced some form of psychological distress, highlighting the need for proactive mental health management. The 2025 Ernsting Panel puts together a group of leading experts with diverse perspectives in aviation mental health seen in various parts of the world. New paradigms and approaches are needed to address the rising concerns posed by mental health burden within the aviation sector.

MODERATOR

Dr Punita Masrani
Founder & COO
V M Medical Centre -
Mirra's Aeromedical Centre

SPEAKERS

Dr Ansa Jordaan
Chief, Aviation Medicine Section
ICAO

Dr Quay Snyder
President/CEO
Virtual Flight Surgeons
AMAS

Dr Cristian Panait
EASA Medical Expert

Dr Tim Sprott
Chief Medical Officer
CAA NZ

Dr Kate Manderson
Principal Medical Officer
ACASA

Dr Benjamin Tan
Deputy Chairman
Civil Aviation Medicine Board, CAAS

WOMEN IN AVIATION PANEL

Women have been involved in aviation since its inception. The first woman known to fly was Élisabeth Thible in 1784, and since then, many women have made significant contributions to aviation. Despite the historical contributions, women's representation in aviation has been limited. As of recent reports, women make up only about 3% of airline pilots globally. While the number of female pilots has increased, the percentage has remained stagnant since the 1980s. Women in aviation face challenges, including physiological and anthropometric differences as compared to men, as well as access to training and recruitment opportunities. Initiatives like IATA 25by2025 aim to improve gender diversity in the aviation industry by setting targets for female representation in various roles.This panel explores the role of women in aviation and how the aviation and space medicine community can contribute more to improve gender diversity. It is hoped that there would be more inclusive policies and medical standards to not only see women participate but thrive in aviation careers, and to inspire future generations to pursue their dreams in this dynamic field.

MODERATOR

Ms Tan Siew Huay
Director
(Special Projects – International Law)
CAAS

SPEAKERS

Ms Nah Jinping
Head, SAF Women's Outreach Office
Ministry of Defence

Ms Julia Ho
Director, IFALPA
IFALPA WPC, ALPA-S

Ms Kristin Toh
Lead for Pilot Advisory Group
ALPA-S

Dr Kate Manderson
Principal Medical Officer
ACASA

Dr Ansa Jordaan
Chief, Aviation Medicine Section
ICAO

SYMPOSIUMS

TRENDS IN AVIATION MEDICINE AND TRAINING

TRENDS IN AVIATION MEDICINE AND TRAINING: A CRITICAL REVIEW OF HUMAN FACTORS IN RECENT MISHAPS

This one-hour panel symposium will explore human performance challenges in military aviation, with a focus on trends in mishaps and strategies to reduce risk. Through real-world case studies, ETC subject matter experts will examine critical issues such as G-protection and spatial disorientation, highlighting practical mitigation approaches, including the use of flight simulation for training and skill development.

SPEAKERS

Robert Laurent
CEO and President, ETC

Dr. Swee Weng Fan
Director of Physiology Training and Senior Flight Surgeon Pilot, ETC

Brian S. Bradke, Ph.D.
F-16 Instructor Pilot, USAF (ret), Aircrew Training Specialist, ETC

DATE: 28 OCTOBER 2025 TIME: 1400H LOCATION: READ & SPOTTISWOODE ROOM

THE FUTURE OF AEROSPACE MEDICINE TRAINING

THE FUTURE OF AEROSPACE MEDICINE TRAINING: WHAT'S THE NEXT GAME CHANGER?

Aerospace medicine training for military aircrew has followed a very traditional structure for many years, with only incremental changes occurring over a long period of time. However, the introduction of new aviation technology and the emergence of new challenges in aircrew health and safety have necessitated innovation in training in many countries. This panel looks at new approaches in aerospace medicine training in the Asia Pacific region, with representatives from Thailand, Malayasia, Australian, and Singapore, and poses the question – what will be the next challenge in aerospace medicine training in these countries.

MODERATOR

Professor Tracy Smart
Professor, Military and Aerospace Medicine School of Medicine and Psychology College of Science and Medicine
The Australian National University

SPEAKERS

Air Vice Marshall Bussakorn Pamorn
Director of Aviation Medicine Institute, Royal Thai Air Force

Colonel (Dr) Zulkefley Mohammad
Head, Institute of Aviation Medicine, Royal Malaysian Air Force

Group Captain Collette Richards
Senior Aviation Medical Office – Clinical
Former Commanding Officer, Royal Australian Air Force Institute of Aviation Medicine

Senior Lieutenant Colonel (NS) (Dr) Jason Low
Avaition Medicine Physician, Changi General Hospital
Former Head Aeromedical Centre, Republic of Singapore Air Force

DATE: 28 OCTOBER 2025 TIME: 1300H LOCATION: READ & SPOTTISWOODE ROOM

INNOVATION IN AEROMEDICAL TRANSPORTATION

INNOVATION IN THE HANDLING OF IN-FLIGHT MEDICAL EVENTS AND AEROMEDICAL TRANSPORTATION

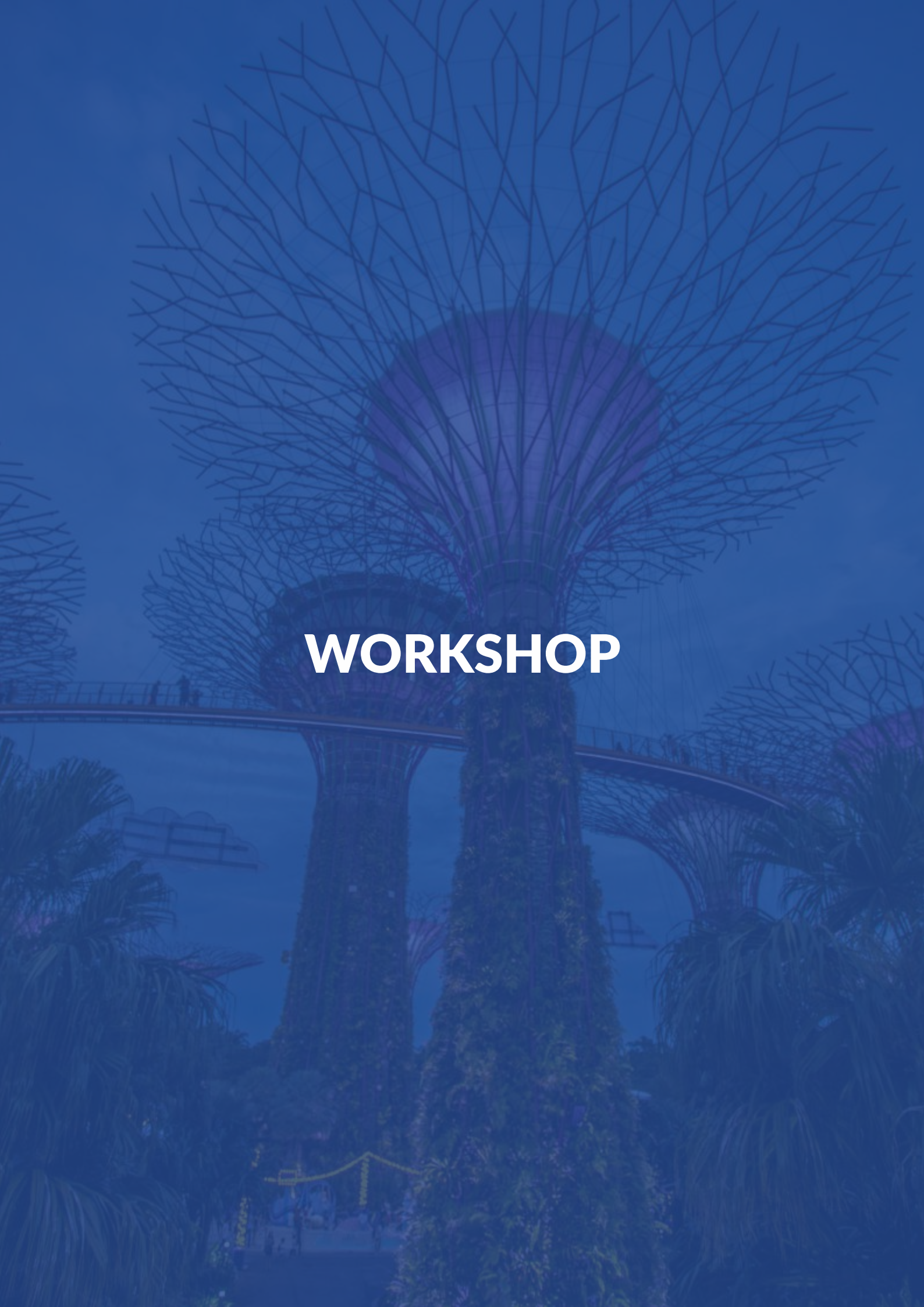
In an era of rapid global mobility, the ability to manage medical emergencies in the skies and ensure safe aeromedical transport has never been more critical. This session explores innovations transforming the landscape of in-flight medical event management and aeromedical evacuation. From AI-assisted diagnostics and TeleMedicine integration to advanced life-support systems and streamlined coordination protocols, discover how technology and interdisciplinary collaboration can enhance patient outcomes and operational efficiency. Join Dr Paulo Alves and Dr David Teo as they share insights, case studies, and future-forward strategies that are redefining the standards of care at 35,000 feet and beyond.

SPEAKERS

Dr Paulo Alves
Vice President
Aviation and Maritime Health
(Internatioanl SOS)

Dr David Teo
Regional Medical Director
Asia
(Internatioanl SOS)

DATE: 27 OCTOBER 2025 TIME: 1600H LOCATION: GRAND BALLROOM



WORKSHOP

VIRGIN GALACTIC AVIATION MEDICAL EXAMINER WORKSHOP

(This workshop doesn't provide CME credits)

The Virgin Galactic (VG) AME workshop is a 3-hour workshop conducted on 28 Oct, in the Read and Spottiswoode Rooms from 0830H to 1200H.

There are 3 sessions as part of this comprehensive workshop:

Session 1: Introduction to the Virgin Galactic future astronaut medical screening process.

SPEAKERS

Dr. Karen Ong
Flight Surgeon

James Willoughby
Vice President & General Manager, Customer Operations

Session 2: Virgin Galactic AME registration, profile creation, and legal documents.

SPEAKER

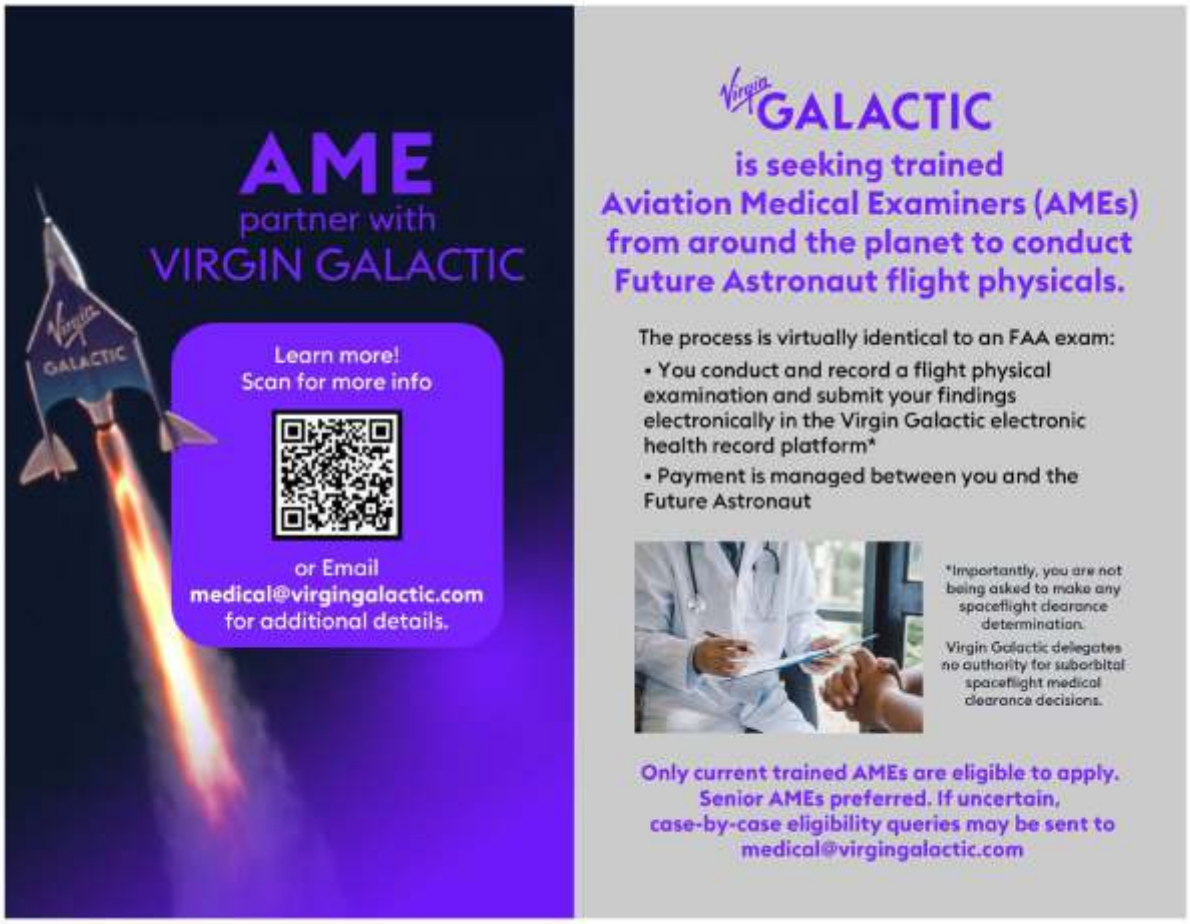
Johnene Vardiman-Ditmanson
Project Manager, Medical Operations

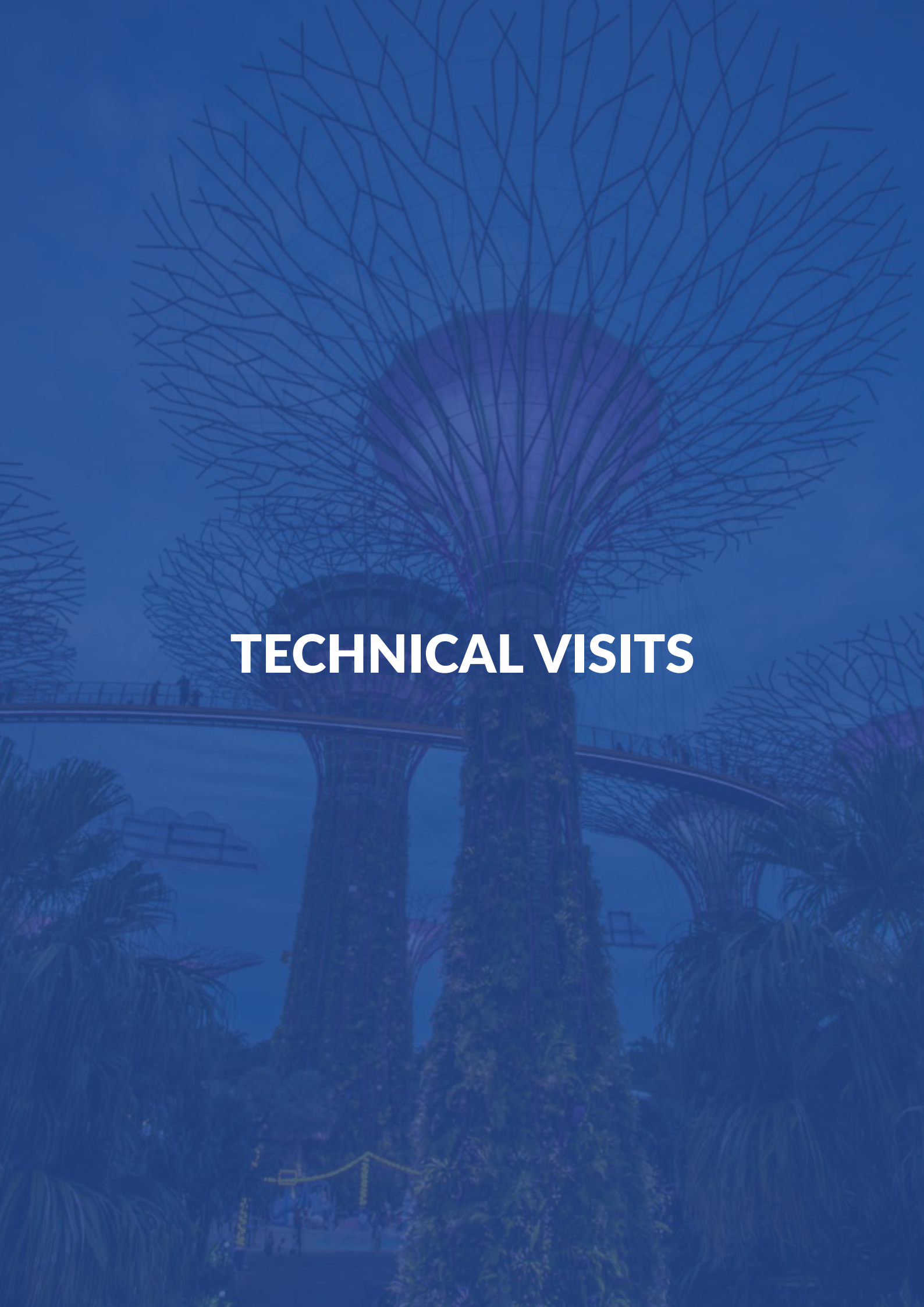
Session 3: Conducting and documenting a Virgin Galactic flight physical.

SPEAKER

Dr. Duncan Hughes
Chief Medical Officer

The workshop consists of 3 sessions and is an instructional session teaching AMEs the VG process for AME physicals. Please note that the workshop is not marketing or promotional in nature.





TECHNICAL VISITS

TECHNICAL VISITS

We are excited to offer four exclusive technical visits, each providing a unique opportunity to explore and learn about Singapore's aviation landscape. These visits are curated to deliver enriching, behind-the-scenes experiences for our delegates.

SINGAPORE AIRLINE TRAINING CENTRE (SIATC)

The SIATC was opened in January 1993 and is the hub of SIA's extensive range of training programmes for both cabin crew and tech crew. SIATC houses the SIA Heritage Gallery and is also equipped with full-scale cabin mock-ups and advanced flight simulators that replicate a wide range of aircraft models that SIA flies. Through this specially arranged technical visit to SIATC, delegates will experience first-hand how both the cabin crew and tech crew trainees are exposed to realistic scenarios, focusing on safety procedures, emergency responses, and premium customer service. Find out why SIA continues to be "A Great Way To Fly!" for many people around the world!

MITRE ASIA PACIFIC SINGAPORE (MAPS)

MITRE Asia Pacific Singapore (MAPS) is MITRE's first R&D center outside of the United States and the first of its kind in the Asia Pacific region. The integrated laboratory, established in partnership with the Civil Aviation Authority of Singapore (CAAS), is facilitating a long-term, collaborative program of research, development, and technology transition to support regional harmonization in aviation and transportation. The MAPS facility includes real-time and fast-time simulation tools, including a cockpit simulator, wrap-around tower, area and approach air traffic controller workstations and advanced traffic-flow management tools. Delegates will get to learn how MAPS has contributed to research in

1. Fatigue risk management,
2. Aircraft separation standards,
3. Airspace and procedures concept validation,
4. Controller decision making, efficiency and workload,
5. Weather translation capabilities as well as
6. Human factors evaluation and development of Smart Tower requirements.

ICASM 2025
International Congress of Aviation and Space Medicine | SINGAPORE

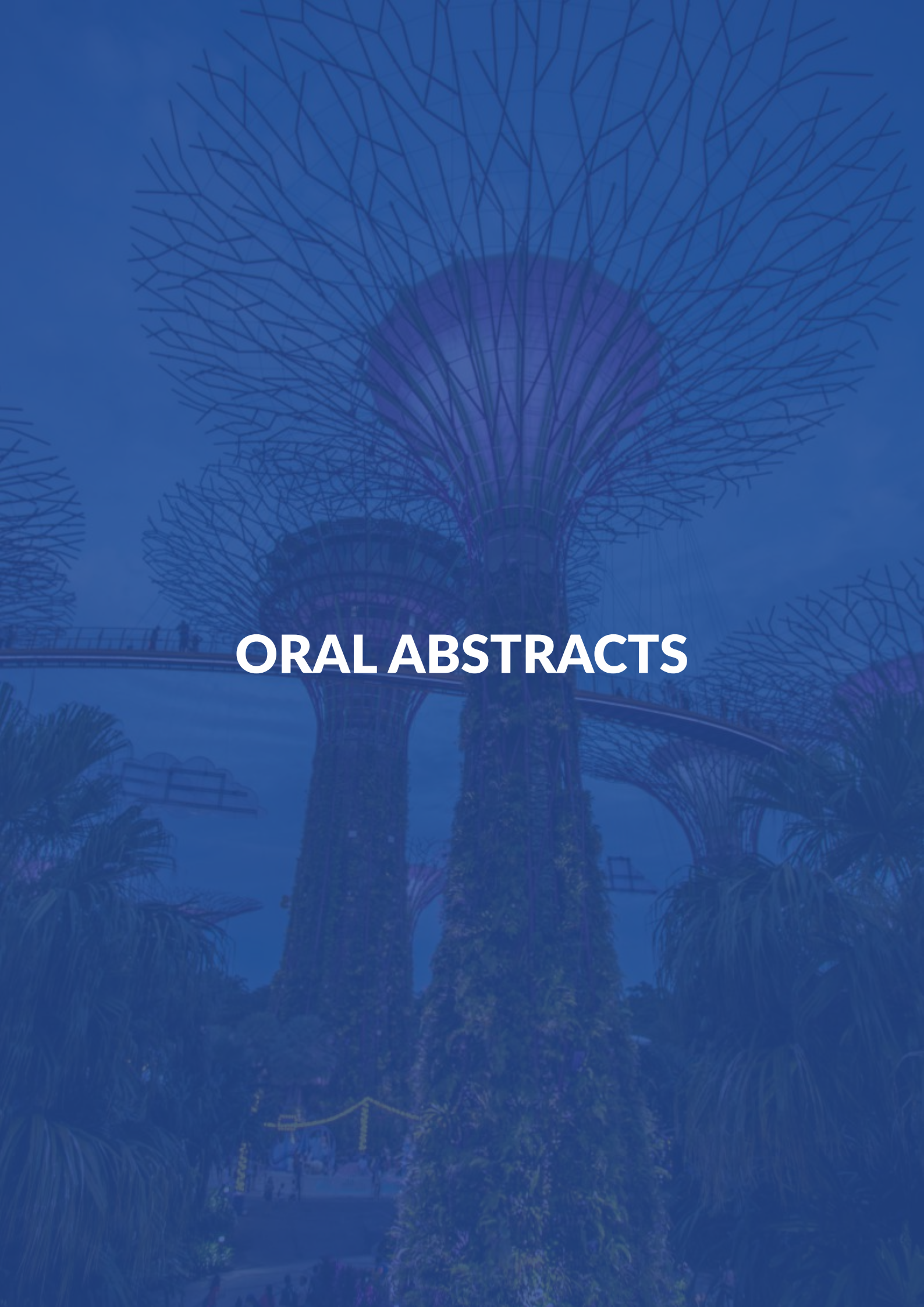
SINGAPORE CHANGI AIRPORT

This unique technical visit at Singapore's world famous Changi Airport combines the Changi Experience Studio and Behind-the-Scenes Tours. At the Changi Experience Studio, congress delegates will be brought on a journey of fun and discovery through the exciting virtual world of the Singapore Changi Airport! Engage in the wonder of amazing projection experiences and enjoy interactive games and immersive shows. Next, delegates will embark on a tour to learn what goes on behind-the-scenes to keep the Changi Airport going like clockwork. Go on a bus tour in the airside to learn interesting nuggets of information and gain insights to special jobs at the airport. This one-of-a-kind tour will let you experience Changi Airportlike never before!

SINGAPORE CHANGI AEROMEDICAL CENTRE

Learn about the suite of aeromedical clinical and training services offered by Changi General Hospital (CGH) at the SCAC - a regional centre of excellence in aviation medicine that leverages modern hardware technology and CGH's expertise in aviation medicine to provide clinical screening and aviation physiology training services. The SCAC features comprehensive clinical examination capabilities alongside specialised equipment including a human training centrifuge, hypobaric chamber, spatial disorientation trainer and ejection seat trainer. Discover how SCAC's specialised clinical and training services can enhance aviation health and safety, crew performance and operational readiness for your organisation and people!

FOR MORE DETAILS, KINDLY CHECK ON THE TECHNICAL VISIT WEBPAGE OF ICASM 2025 WEBSITE.



ORAL ABSTRACTS

SESSION 1A: INFECTIOUS DISEASE AND AIR TRAVEL

ABS:05

Clearing the Air Update - A New Layer of Defense: The Case for UV-C Disinfection in Preventing In-Flight Disease Transmission & Translocation

Authors: *[1]Kris Belland*

Corresponding Author Mail: kris.belland@gmail.com

Introduction
Ongoing risk of infectious disease transmission aboard commercial aircraft underscores the need for effective and continuous disinfection strategies. This updated review evaluates the effectiveness and safety of ultraviolet-C (UV-C) technology as an adjunct to existing disinfection protocols, emphasizing its role in mitigating in-flight disease spread.

Methods
Systematic review was conducted assessing the historical impact of airborne disease transmission in aviation, estimated the economic burden, and compared the efficacy of UV-C with conventional methods. Particular emphasis was placed on UV-C's ability to supplement existing ventilation and filtration systems while maintaining safety within occupational exposure limits.

Results
Findings suggest that supplementing traditional aircraft disinfection methods with UV-C air treatment can reduce the risk of in-flight pathogen transmission. Economic modeling indicates that the installation of UV-C systems could lead to significant cost savings, preventing thousands of annual infections and deaths associated with in-flight transmission of diseases.

Discussion
Integration of UV-C disinfection in aircraft presents a promising additional risk mitigation strategy. Unlike manual disinfection, which is episodic, UV-C can provide continuous, real-time pathogen inactivation. The updated review highlights key engineering considerations, including redundant safety measures to ensure controlled exposure levels.

Conclusion
UV-C technology, when applied with appropriate engineering safeguards, offers a viable, scalable, and cost-effective solution for reducing airborne pathogen transmission in aviation. This study supports the adoption of UV-C as part of a multi-layered aircraft disinfection approach, reinforcing industry resilience against emerging infectious disease threats.

Relevance
This presentation highlights UV-C disinfection as a critical tool for reducing airborne disease transmission in aircraft, enhancing both safety and public health. By providing continuous pathogen inactivation, UV-C supplements existing protocols to mitigate the spread of respiratory illnesses. With broad implications for policy, efficiency, and sustainable aviation, this research supports UV-C as a scalable, cost-effective solution to strengthen resilience against future pandemics.

Keywords
UV-C disinfection, aircraft hygiene, airborne pathogen mitigation, risk-benefit analysis, pandemic preparedness, aviation safety, continuous air disinfection

ABS:203

Travel prophylaxis for flight crew - an update

Authors: *[1]Joerg Siedenburg*

Corresponding Author Mail: joerg.siedenburg@diplo.de

Introduction

Flights to tropical destinations expose flight crew to tropical and subtropical areas and a range of vectors and microorganisms. Proper pre-travel consultations in annual or biannual intervals should be conducted.
Preventive measures encompass exposure prophylaxis, vaccinations, chemoprophylaxis and early detection and treatment of infections. Clinical signs of infections encompass fever, diarrhoea, skin affections. Symptoms of fever and diarrhea occur frequently and require prompt medical consultation. Malaria is an insidious protozoan infection endemic in tropical countries, transmitted by Anopheles mosquitoes, active predominantly at night, dawn and dusk. Most of the infections are imported from West Africa, followed by East Africa. Flight crews operating in those high risk areas are at considerable risk and need to prevent infections by meticulous exposure prophylaxis and chemoprophylaxis. In case of fever or other suspicious symptoms after having stayed in endemic areas a malaria should be ruled out immediately in order to prevent complications or even a fatal outcome. Several infections can be prevented by vaccinations. Some vaccinations are generally recommended, others depending on potential exposure. Yellow fever vaccination is mandatory in many countries. The vaccination renders a life-long protection. Vaccinations against Dengue, Chikungunya ot Mpox are normally not indicated in flight crew. Traveller´s diarrhoea is common, more than 30 % of travellers to third world destinations are affected. Careful hand, food and drinking hygiene is critical. The most important therapeutic measure is rehydration and substitution of electrolytes. Skin infections are infrequent in flight crew, However, sun exposure may result in actinic dermatitis or sunburn. Sun- screen, proper clothing and sunglasses should be recommended.

Conclusion

To avoid several infections, flight crew should be counselled on preventive measures. Malaria chemoprophylaxis, exposure prophylaxis and vaccinations as well as timely diagnosis prevent serious outcomes

Keywords: pre-travel consultation, malaria, chemoprophylaxis, vaccinations, gastrointestinal infections

ABS:222

Risk of malaria infection in air crews during layovers in Western Africa

Authors: *[1]Tobias Dingwerth, [2]Anne-Marie Albuszies*

Corresponding Author Mail: tobias.dingwerth@dlh.de

Introduction
Malaria is a parasitic disease affecting more than 260 million people each year and accounting for nearly 600,000 deaths worldwide (WHO, 2023). It is an important infection in travelers returning from endemic countries to Europe. The travel conditions of air crew are normally not comparable to those of classical business or leisure travelers, as stays are shorter, limited to urban settings, and typically involve upmarket accommodation.

Methods
We assessed the risk of infection and the acceptance of malaria chemoprophylaxis in a major European commercial airline. Malaria cases reported to us and to the employers' liability insurance association between 2021 and 2024 were recorded and evaluated regarding the place of infection, disease severity/outcome, and the use of chemoprophylaxis. Infection rates were calculated based on the number of overnight stays for the years 2023 and 2024, respectively. Furthermore, the number of courses of chemoprophylaxis provided by the employer was compared to the number of crew trips.

Results
Malaria cases among crew members (CMs) increased continuously between 2021 and 2024, from 3 cases in 2021 to 11 cases in 2024. The number of cases nearly doubled between 2023 and 2024, while the number of overnight stays in the risk area increased only marginally (by less than 1%). In 2023, one infection occurred per 1,675 overnights, and in 2024, one per 922 overnights. Unfortunately, 17% of the cases met at least one criterion for severe malaria. 83% of the infected CMs did not take chemoprophylaxis or discontinued it too early, and 17% did not disclose whether they had taken prophylaxis. Based on the number of prophylactic medications distributed to crew members, we estimate that in 2024, roughly 20% of CMs opted for chemoprophylaxis.

Conclusion
Malaria represents a significant health risk for air crew travelling to West Africa. The risk of infection appears to be clearly increasing in this region.

Keywords: Malaria, Chemoprophylaxis, Air crew

SESSION 1B: SPACE MEDICINE 1

ABS:90

Multilateral Integrated Medical Support of The International Space Station (Iss)

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Introduction
For 25 years of continuous human presence aboard the ISS since 2000, crew health and performance were supported at programmatic, mission, and crew levels. The ISS medical system has met numerous challenges in areas such as prevention, monitoring, care, environmental health, and behavioral support. As ISS is completing 2.5 decades of crewed operation, it is important to understand the ISS medical partnership across five space agencies as a model for future space exploration initiatives.

Methods
NASA and Canadian, European, Japanese, and Russian partners operate multilateral medical authority bodies: Medical Policy Board, Space Medicine Board (certification), and Medical Operations Panel (MMOP). MMOP is the operational arm responsible for medical requirements and ongoing clinical care. It is supported by 12 expert Working Groups (WG) for each area of focus. MMOP holds weekly Space Medicine Operations Team clinical rounds (~1300 sessions in 25 years), where the state of health and well-being of each crewmember is fully reviewed along with the status of environment and medical systems.

Results
WG demands varied between construction (EVA) and utilization (Environmental Health, Countermeasures) phases. Close weekly medical reviews resulted in collective optimization of care. Medical outcomes of missions up to 371 days were favorable with no emergent crew returns. The system has responded to known (bone health) and newly identified (ocular, vascular) health risks. Over 65 physicians, across the partners, have been certified to support ISS crews terrestrially and on-orbit over the past 25 years.

Conclusions
The experience of the ISS integrated medical partnership has dramatically enriched the discipline of space medicine creating new knowledge and methodology. It enhances humankind's ability to sustain health in Low Earth Orbit and is model of international collaboration for exploration-class missions.

Keywords: ISS, Space Medicine, Multilateral Medical Operations Panel, medical care, environment, human spaceflight

ABS:25

Blood Flow Dynamics in Carotid Artery during Simulated Microgravity and Lunar Gravity

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Introduction
The carotid arteries play a crucial role in maintaining cerebral perfusion. While previous studies have examined the effects of microgravity on cerebral blood flow, there is limited research on carotid arterial blood flow dynamics under simulated microgravity and lunar gravity. This study aimed to investigate the impact of these gravitational conditions on carotid arterial blood flow.

Methods
Thirty healthy male volunteers in the age range of 20-35 years participated in a repeated measure experimental design. Microgravity was simulated using a -6° Head-down tilt, while lunar gravity by 10° Head-up tilt. A 4 MHz Doppler probe was used to measure the extracranial blood flow in the carotid artery. Key hemodynamic parameters, including Peak Velocity, Mean Velocity, Diastolic Velocity, Pulsatility Index (PI), Resistive Index (RI), Systolic-Diastolic Ratio (S/D), Systolic Rise Time, and Heart Rate, were recorded in the left and right carotid arteries at baseline (supine), after six hours of -6° HDT, and after six hours of 10° HUT.

Results
Peak velocity decreased significantly in both carotid arteries during simulated microgravity and lunar gravity. In the left carotid artery, peak velocity decreased from 62.0 ± 16.59 cm/s at baseline to 51.4 ± 10.61 cm/s during microgravity and 52.8 ± 12.78 cm/s during lunar gravity. Similarly, in the right carotid artery, peak velocity decreased from 64.2 ± 17.95 cm/s at baseline to 53.9 ± 18.22 cm/s (microgravity) and 54.7 ± 14.42 cm/s (lunar gravity). Mean Velocity, Diastolic Velocity, and Pulse Interval also showed significant reductions.

Conclusion
Simulated microgravity and lunar gravity resulted in an increase in intracranial pressure leading to significant alterations in carotid arterial blood flow. The observed reductions in peak, mean, and diastolic velocities, along with changes in PI and RI, suggest that these gravitational conditions induce substantial modifications in cerebral hemodynamics, likely due to cephalad fluid shifts and altered cerebrovascular regulation.

Keywords: Microgravity, Lunar Gravity, Carotid Arterial Blood Flow, Haemodynamics

ABS:228

AI-Enhanced Wearable Systems for Proactive Musculoskeletal Monitoring in Long-Duration Spaceflight: A Review of Opportunities and Challenges

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Long-duration spaceflight significantly deconditions the musculoskeletal (MSK) system, posing a critical risk to astronaut health. Traditional countermeasures such as resistance exercise are reactive and resource-intensive. Proactive, continuous monitoring is therefore essential to enable timely intervention. Recent advancements in wearable technologies and artificial intelligence (AI) offer a promising shift towards autonomous MSK health management, particularly valuable in deep-space missions especially with delayed earth-based support.

This narrative review explores the convergence of wearable biosensors and AI systems to support real-time, predictive MSK monitoring during spaceflight. Specifically, it aims to (1) evaluate emerging wearable technologies for MSK health tracking; (2) assess how AI enhances these systems to enable predictive and autonomous health management; and (3) highlight key barriers and propose future directions for deployment in long-duration missions.

Peer-reviewed literature and technical reports from NASA, CSA, and ESA were reviewed, focusing on wearable sensor development, AI integration, and validation in spaceflight and analogue settings. Three core themes were identified: hardware foundations, AI functionality, and system implementation challenges.

Theme 1 – Emerging Wearables: IMUs, electromyography (EMG), and smart textiles are being deployed to capture biomechanical and physiological MSK data. Devices such as NASA's MyotonPRO and CSA's Bio-Monitor have demonstrated in-orbit feasibility.

Theme 2 – Role of AI: AI techniques, including supervised learning and deep neural networks, enable early detection of atrophy, fatigue, and gait asymmetry. Platforms like CSA's Artemis enhance real-time diagnostics and personalisation, paving the way for autonomous astronaut health protocols. **Theme 3 – Challenges and Future Directions:** Barriers include limited astronaut-specific datasets, microgravity validation, computational constraints, and ethical considerations. Future systems must integrate multimodal sensing and undergo robust in-flight validation.

AI-integrated wearables represent a transformative step toward autonomous MSK health monitoring in deep space. Continued innovation and in-flight validation are essential to realise resilient, AI-driven, closed-loop health systems for future exploration beyond low Earth orbit.

Keywords: Wearable Technology, Artificial Intelligence, Musculoskeletal Health, Spaceflight, Astronaut monitoring

SESSION 2A: AEROMEDICAL TRANSPORTATION

ABS:205

Impact of Medical Volunteers during In-Flight Medical Events.

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Introduction
During in-flight medical events (IFMEs), flight attendants (FAs) seek assistance from medical volunteers (MVs) among passengers, even when ground-based support (GBS) services are contracted. The availability and impact of these MVs is not fully understood.

Objective
This study aims to estimate the percentage of IFMEs in which MVs respond and the outcomes of various medical events based on the presence of Mvs.

Methods
Data from a major US-based GBS provider were analyzed for the period from January 2024 to May 2025. Records included the presence and training level of MVs, medical category and impression and flight diversion status. Epi-Info 7.2.7.0 was used for statistical analysis.

Results
85,669 cases were analyzed. MVs were present in 32,728 (38%). The presence of MVs varied by diagnostic category, 53% in cardiovascular cases to 12% in dental cases. In 86% of cardiac arrests an MV helped. MV presence was significantly associated with flight diversions (OR 5.35; 4.76-6.00; p<0.0001). This association persisted when controlling for specific conditions such as chest pain (OR 3.25; 2.23-4.55; p<0.0001) and seizures (OR 4.01; 2.71-6.20; p<0.0001). Diversion frequency was higher for doctors (4.6%) compared to nurses or paramedics/EMTs (3.4%) in all cases, but lower in cardiac arrest cases (29% doctors, 43.4% nurses and 46.2% paramedics/EMTs).

Discussion
The most accurate estimate of MV presence during IFMEs is around 86%. MVs do not always respond to FA calls. The association between MVs and flight diversions can be attributed to the severity of the medical issue and the MV's comfort level in managing the event and fear of liability. The varying diversion rates by training level suggest that MVs may feel more reassured and collaborate more effectively with GBMS as air-to-ground communication improves.

Conclusion
MV presence onboard is associated with more diversions. MV help varied according to backgrounds and nature of the IFME.

Keywords: in-flight emergencies; medical volunteer; flight diversion

ABS:26

Australian Bush Pilots: From helicopter mustering to long distance mail runs these unique pilots need a tailored approach to human factor and aeromedical risk management, and an aeromedical examiner who doubles as their family doctor.

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The Australian Outback is a vast, remote region characterised by its rugged landscapes, unique wildlife, and rich cultural heritage. Spanning across the interior of Australia, it features arid deserts, ancient rock formations, and sparse vegetation with some private properties covering land far greater than many European countries. This wonderful but dangerous countryside is also the workplace for many pilots conducting a variety of roles providing critical services to keep the bush operational.

Flight operations vary from the well-known Royal Flying Doctors aeromedical services to the helicopter mustering of cattle, crocodile egg retrieval to aerial culling operations. These pilots are often working in isolation from normal regulatory monitoring systems and have poorer access to acute and preventative health care with flying only being one small part of their overall working role.

The presentation will explore the variety of aviation operations that occur in the Australian Outback and the kinds of pilots who engage in these flying roles. We will explore the limits of traditional regulatory monitoring models that are typically designed in urban contexts and how human factor recommendations such as fatigue management systems can be difficult to apply in these areas.

This presentation will reveal the important role that aviation medical examiners have in supporting aviation safety and the general health of the pilots in the outback. There is a balance to be found for the examiner when acting on behalf of the aviation regulator and in reducing the rates of preventable and chronic disease in pilots who rarely engage in other forms of health prevention and this makes caring for bush pilots both incredibly rewarding and important.

Keywords: Preventative health, helicopter mustering, rural pilots, Australian outback

ABS:170

Experience in the construction of emergency medical aviation rescue service system about mountainous areas in China: An analysis of the Lishui model

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Objective
To explore the effectiveness of establishing an emergency medical air rescue system to enhance medical emergency efficiency in mountainous areas with complex terrain and inconvenient transportation.

Methods
Taking Lishui City in Zhejiang Province as an example, this study analyzes measures such as renting helicopters, building emergency infrastructure, promoting digital technology, training professional rescue teams, improving institutional mechanisms, and exploring inclusive insurance models to construct a four-tier emergency medical air rescue model covering city, county, township, and village levels.

Results
The construction of Lishui City's air medical rescue system significantly reduced emergency transfer times and improved treatment success rates. Since the system's inception, multiple successful emergency rescues have been carried out, including cases of cardiac arrest, multiple injuries, snake bites, and obstetric emergencies, all of which achieved rapid transfer and effective treatment through air rescue.

Conclusion
Establishing an emergency medical air rescue system in mountainous areas is a crucial measure to enhance emergency response capabilities. Lishui City's practice demonstrates that through infrastructure development, professional team training, institutional improvement, and insurance model innovation, its experience provides a reference model for other mountainous regions. This approach can effectively improve emergency efficiency and service levels in mountainous areas. Future efforts should focus on further improving the insurance mechanism, strengthening multi-department collaboration, and enhancing public awareness of emergency response to achieve the widespread and sustainable development of air medical rescue.

Keywords: Inclusive Insurance Model; Air Medical Rescue; Mountainous Emergency Medical Rescue; Helicopters and Drones

SESSION 2B: SPACE MEDICINE 2

ABS: 162

Novel Platform for Radiation Measurements for Crew Health

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Introduction
Radiation monitoring and protection is essential to crew health in commercial space flight and deep space exploration. The Near-Earth Radiation and Plasma Environment of the 'Coupled Geospace System' are recognized under the COSPAR (Committee On Space Research) / International Space Weather Action Teams (SWAT) initiative as threats to astronauts and space travelers. The varied and dynamic particle populations in space pose continuing crew health challenges.

Objective
This abstract will describe new methodologies for radiation measurements, monitoring, and protection of crew in space environments.

Methods
A prototype system has been developed, tested and evaluated in terrestrial environments and will be extended to the particle radiation spectrum in the orbital environment.

Results
A new breed of radiation detector capable of providing a permanent record of the charged particle flux experienced during air cruise and space cruise. The actual charged particle tracks and neutron-induced tracks are captured in these plastic particle track detectors, and analyzed using both optical and electron microscopic imaging, and analyzed using artificial intelligence (AI) tools. This technology, developed at Texas Tech University, have been recently licensed and commercialized by BlankSlate Innovation, LLC (BSI). See https://blankslateinnovation.com and the links to nuclear radiation detection and new product development. The results of test and evaluation will be presented, and the extrapolation through simulation to space environments will be reviewed.

Discussion
This system will augment currently available systems in monitoring space health. Preliminary research in the use of artificial intelligence algorithms is described/extended to space health.

Conclusion
Radiation monitoring and protection of space travelers is essential to crew health and safety. A novel radiation measurement/monitoring/protection system is commercially available for use in space flight. This presentation will discuss the extension of this system to aerospace and flight cruise applications. Further analysis in space environments such as extra vehicular activities is suggested to add to system robustness.

Keywords: Space Health, Radiation, Crew Health, Artificial Intelligence, Space Weath

ABS:62

Cardiopulmonary Resuscitation During Spaceflight: Challenges, Techniques, and Future Directions

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As human spaceflight extends beyond Earth, the ability to manage critical medical emergencies like cardiac arrest becomes vital. Performing cardiopulmonary resuscitation (CPR) in microgravity presents significant challenges due to physiological changes induced by spaceflight, including cardiovascular deconditioning, altered chest wall mechanics, and blood flow redistribution, rendering traditional CPR ineffective.

Several adapted CPR techniques for microgravity have been proposed, such as the "handstand," reverse bear hug, and Evetts-Russomano (ER) methods, each with trade-offs in compression quality and rescuer fatigue. Mechanical CPR devices, common on Earth, are also being explored for space, requiring adaptations for mass, volume, and stable anchoring. Integrating these devices with AI and robotic assistants could enable autonomous resuscitation in deep space.

Effective CPR in space demands specialized training utilizing analog environments like parabolic flights and virtual reality to account for unique biomechanics. Ethical and operational considerations are also crucial, encompassing crew safety, termination protocols, management of deceased individuals, informed consent, and psychological impact.

Future advancements in spacecraft design, AI-supported medical systems, robotics, and space-specific guidelines will enhance emergency medical capabilities. Dedicated medical bays, autonomous triage, and predictive health monitoring will contribute to a more robust approach to managing cardiac arrest, ensuring the safety and well-being of space travelers in future long-duration missions.

Keywords: Aerospace

ABS:53

Determining the Best Technique: Methods, Challenges, and Innovations of Performing Microgravity CPR

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Introduction
With the increasing popularity in commercial space tourism, the role of extra-terrestrial healthcare is more important than ever. In microgravity, the risk of unlikely but potentially fatal conditions, such as cardiac arrest, increases. In space, as on Earth, cardiac arrest demands immediate intervention through cardio-pulmonary resuscitation (CPR). However, the weightlessness of microgravity necessitates alternative techniques.

Purpose
This narrative review aims to investigate which microgravity CPR (mCPR) method is most effective, as well as their challenges and innovations.

Methods
A literature search was conducted; initially 240 papers were found from the following databases: OVID (MEDLINE and EMBASE), SCOPUS, Web of Science, NASA Technical Reports Server, and Imperial Library Search. Duplicates were removed and each reviewer assessed the papers for relevance. 24 studies were found, dating from 1990 to 2022, with 15 being primary research.

Results
The five main mCPR techniques are the standard side position (SSP), waist straddle (WS), reverse bear-hug (RBH), handstand (HS), and Evetts-Russomano (ER). Other methods include using various assistive devices, including the Stryker LUCAS 3, which had the greatest external chest compression (ECC) depth of any method (49.9 ± 0.7 mm). Of the non-device methods, the HS had the largest ECC depth (49.3 ± 1.2 mm), while the ER had the greatest rate (105.6 ± 0.8 compressions per minute).

Discussion
CPR is difficult to carry out to acceptable standards (according to International 2020/2021 guidelines) even on Earth, where gravity allows body weight to provide the force needed for ECC. Despite a device providing the most effective ECC, it may not be feasible to bring to space due to size and weight constraints.

Conclusion
The HS and ER are generally accepted as the most effective and least fatiguing mCPR methods. In future, primary research testing these techniques in the microgravity of space would allow a more robust comparison.

Keywords: microgravity, cardiopulmonary resuscitation, spaceflight, emergency medicine, simulation techniques, chest compression

ABS:89

Effectiveness of Chest Compressions during Cardiopulmonary Resuscitation in Artificial Microgravity: Testing the Atmed Restraint System in a Human Training Centrifuge

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Background
In microgravity, the absence of perceived gravitational force prevents the application of chest compressions using Earth-based techniques due to the lack of a stable rescuer position relative to the patient. Mobile Medical Module (MMM) is the new concept of the Crew Medical Restraint System (CMRS) equipped with an innovative rescuer stabilization system (Atmed Restraint System – ARS), based on the lever mechanism made by lower limbs.

Aim
The study was aimed at assessing the effectiveness of the ARS in performing chest compressions in artificial microgravity.

Materials and methods
A special construction of MMM with the ARS was prepared for this study. A simulator torso imitating a patient's chest and fitted with a measurement system to monitor chest compressions was used, too. Ten participants were selected based on specific selection criteria. Each of them performed two trials, in turn, each consisting of two series of chest compressions for one minuteThe first one was performed with the centrifuge stopped (control test), the second one was performed during centrifugation (main test). During these trials, the participants performed chest compressions sitting in front of the simulator's torso.

Results
The study demonstrated an increase in chest compression effectiveness using the ARS during centrifugation compared to the control trials. All participants achieved a steady compression force, a higher compression frequency and a correct compression rate by each main test, a greater average compression depth and a better chest relaxation compared to the control tests.

Discussing
ARS produced a lever effect, enabling the rescuer to maintain a stable position relative to the patient's simulator and generate additional compression force compared to the control trials.

Conclusion
ARS appears to be a promising solution for stabilising astronaut's position next to the patient in microgravity, especially when additional force support are needed to offer more complex medical assistance.

Keywords: Cardiopulmonary resuscitation, CPR, Atmed Restraint System, Crew Medical Restraint System, Mobile Medical Module, MMM

ABS:194

The Effect Of Bisphosphonates On Bone Metabolism In Spaceflight And Bed Rest Studies

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Bone loss and associated risks are among the major concerns related to spaceflights. Anti-osteoporotic treatments, like bisphosphonates, are considered preventive countermeasures. Our aim was to assess the effects of bisphosphonates on bone mineral density and bone turnover markers in space and bed rest.
In this present systematic review and meta-analysis, we followed the PRISMA 2020 guidelines. Literature research was performed in MEDLINE, Embase, CENTRAL, Web of Science, and Scopus in November 2023. Out of 16,829 records, 16 studies were included that investigated bisphosphonate treatment compared to a control group in space (n=6) and bed rest (n=10).

Bisphosphonates increased bone mineral density (BMD) compared to control group values at both the lumbar spine (mean difference [MD]: 3.91%, 95% CI: 2.70 to 5.13, p= 0.002) and the femoral neck (MD: 3.07%, 95% CI: 1.37 to 4.78, p= 0.010) in space and bed rest studies. In the control group, BMD decreased in space and bed rest (mean raw % change at lumbar spine: -0.96%, 95% CI: -2.42 to 0.50; and at femoral neck -2.40%, 95% CI: -4.17 to -0.64). Bisphosphonates decreased N-terminal telopeptide (NTX) level compared to the control group values (MD: -287.95, 95% CI: -436.94 to -138.96, p= 0.009). In the control group, NTX increased in space and bed rest studies (mean raw change: 195.25, 95% CI: -38.75 to 429.25). There was no change in alkaline phosphatase, bone-specific alkaline phosphatase, or parathyroid hormone in either group compared to the baseline.
Bisphosphonates increased BMD at the lumbar spine and femoral neck and reduced NTX in space and bed rest studies, underlying bisphosphonates' role in alleviating bone loss in space and bed rest. Therefore, the administration of bisphosphonates may be considered for space missions, although further research is needed to set their role in preventive space medicine guidelines.

Keywords: Bisphosphonates, Spaceflight, Microgravity, Bed Rest, Bone Metabolism

SESSION 3: AVIATION CARDIOLOGY

ABS: 04

Heart Health and Peak Performance: Optimizing Cardiovascular Risks for Pilots, Soldiers, and Sailors

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Background
Maintaining optimal cardiovascular health is crucial for occupations operating under demanding physical and cognitive conditions. High risk occupations such as pilots, soldiers, and sailors face unique cardiovascular risks due to environmental stressors, operational demands, and intense physical exertion. Strategies for mitigating these risks, enhancing mission readiness, and improving overall performance is essential.

Overview
A comprehensive overview of cardiovascular health challenges specific to high risk occupations, emphasizing the interplay of environmental, physical, and operational stressors will be discussed. Evidence-based prevention strategies, including tailored fitness programs, stress management techniques, and nutritional interventions, will be presented. Cutting-edge insights from aerospace cardiology will highlight how advancements in cardiovascular monitoring and intervention can be applied to high-performance environments. By addressing cardiovascular health at every level of care—from routine health screenings to point-of-injury response—the proposed strategies enhance both individual and unit readiness.

Discussion
Cardiovascular health optimization directly impacts performance, resilience, and longevity. By reducing cardiovascular risk factors, occupational units can maintain peak performance in high-stress, high-demand environments. This lecture will equip attendees with actionable insights and tools to implement cardiovascular health strategies, fostering a culture of prevention and resilience. Ongoing research and technological advancements in aerospace medicine continue to refine our understanding of cardiovascular challenges, paving the way for innovative solutions that benefit personnel across all domains.

Keywords: cardiology, cardiovascular, human performance, health optimization, ECG, stress test, echocardiogram, exercise

ABS:52

Routine Use of Echocardiography in Initial Aeromedical Class 1 and Class 3 Evaluations: Experience from 231 Cases at a single Aeromedical Center

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Introduction
The introduction of ultrasound into clinical practice is part of modern medicine. The usefulness of the routine use of echocardiography in fitness aeromedical assessments has been a focus of scientific debate in recent years.

Objectives
To assess the utility of cardiac echoscopy during initial Class 1 and Class 3 aeromedical evaluations. The primary outcome was the increased detection of disqualifying conditions not evident on routine examination. Secondary outcomes included minor non-disqualifying findings requiring follow-up.

Methods
We analyzed initial EASA Class 1 and Class 3 achievement examinations performed in one year. All candidates underwent cardiology examination complete with ECG and cardiac echoscopy, performed with "Esaote MyLabX75" in order to identify congenital and/or acquired pathologies, excluding patency of the Botallo's duct, interventricular septum and foramen ovale, as well as exclusion of cardiomyopathies.

Results
226 Class 1 and 5 EASA Class 3 visits were conducted at Cavok Medical Center from August 2023 to August 2024. The average age of the candidates was 24.4 years, 87.88% male and 12.12% female. The average BMI was 22.89. 16.88% were smokers and 21.21% had family history of cardiovascular disease. There were 58 cases of minimal valvular defects, clinically negative, not contraindicating flight activity, who were initiated to cardiological follow-up. One case of aortic root dilatation was found, resulting in denial of the certificate and indication for surgery. Subsequently, the candidate was able to obtain flight fitness with dual command limitation (OML).

Conclusions
Cardiac echoscopy during initial aeromedical evaluations enabled the prompt identification and management of a severe cardiac condition, as well as the early detection of several minor abnormalities requiring follow-up—findings that would have likely gone unnoticed with standard assessment alone. Given its low cost, speed, and non-invasive nature, cardiac echoscopy proves to be a highly valuable tool in routine cardiologic screening for flight fitness.

Keywords: ecocardiography, prevention, heart disease, aviation medicine

ABS:186

The Effects of G-force on Echocardiographic Parameters: Two Decades of Echocardiographic Follow-Up in Air Force Pilots

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Background
Chronic exposure to high G-forces (>3 G) during high-performance flight may impact cardiac structure or valvular function. However, data on long-term effects in military aircrew are limited.

Objective
To evaluate long-term valvular changes in Israeli Air Force pilots exposed to different G-force profiles.

Methods
This retrospective cohort study included serial echocardiographic follow-up from 1990 to 2025. Pilots were categorized into High-Performance (HP, G > 3; n = 137) and Low-Performance (LP, G < 3; n = 81) groups. Echocardiographic parameters assessed included mitral regurgitation (MR), aortic regurgitation (AR), aortic stenosis (AS), and pulmonary artery pressure (PAP). Statistical comparisons were performed between HP and LP groups.

Results
Among 218 Israeli Air Force pilots (median age 51 years (IQR 51-52)) who underwent serial echocardiographic evaluations. Pilots were categorized into High-Performance (HP, G > 3; n = 137) and Low-Performance (LP, G < 3; n = 81) groups. Over a follow-up period of up to 35 years, MR was observed in 13 HP pilots (9%) and 5 LP pilots (6%) with p = 0.41; AR was observed in 5 HP pilots (4%) and 2 LP pilots (2%) with p = 0.71; and AS was rare, present in 1 pilot in each group (1%), p = 0.94. Pulmonary pressures remained within normal limits and were comparable between groups.

Conclusion
Despite prolonged exposure to high G-forces, pilots in the HP group showed no significant increase in valvular abnormalities or pulmonary pressure compared to those in the LP group. These findings support the cardiac safety of sustained high-performance flight among well-trained military personnel.

Keywords: G forces, cardiovascular function, cardiac structure, military aircrew, military pilots, jet pilots, high performance pilots, valvular function

ABS:160

Utility of Transthoracic Echocardiography in the Investigation of Applicants with Isolated RSR in the Republic of Singapore Air Force

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Introduction
An RSR pattern in precordial electrocardiogram (ECG) leads may indicate a range of conditions with potential flight-safety implications. In the Republic of Singapore Air Force (RSAF), applicants with isolated RSR pattern during Pre-Employment Medical Screening (PEMS) undergo transthoracic echocardiography (TTE) for further evaluation. Although the underlying causes of isolated RSR are generally benign, insufficient evidence exists to eliminate echocardiographic assessment for disqualifying cardiac conditions.

Objective
This retrospective cohort study investigated the utility of TTE in screening PEMS applicants with isolated RSR.

Methods
RSAF PEMS applicants from 31 Dec 2014 to 31 Dec 2024 with isolated RSR, and underwent TTE were included. Data pertaining to baseline demographics, cardiovascular risk factors, ECG and TTE findings, additional cardiac investigations, and PEMS outcomes were extracted.

Results
Amongst 102 eligible applicants, 95 were deemed fit for all vocations, whereas 7 were disqualified from at least one. Abnormal TTE findings were significantly higher amongst the unfit cohort than the fit cohort (85.7% vs. 13.7%, $P < 0.00001$). Regression analysis demonstrated significant correlation between RSR' pattern and abnormal TTE findings (OR = 4.20; CI = 1.04,17.1; $P < 0.05$), and between QRS duration and abnormal TTE findings (OR = 1.12; CI = 1.03,1.20; $P < 0.01$).

Discussion
ECG characteristics, particularly RSR' pattern and prolonged QRS duration, may aid in identifying abnormal TTE findings and disqualifying conditions.Apart from RSR pattern and QRS duration, other ECG characteristics have been suggested to help delineate the causes of RSR pattern.

Conclusion
Notwithstanding, given the higher prevalence of abnormal TTE findings in rejected applicants, not insignificant size of the rejected cohort, and associated aeromedical, continued echocardiographic assessment of isolated RSR remains justified. Future research may focus on standardizing ECG and echocardiographic assessment protocols, incorporating longitudinal follow-up and other ECG characteristics to enhance characterization of pathology.

Keywords: Cardiovascular risk assessment, Medical screening, Flight safety, Fitness to fly

ABS:181

Is There Any Use Of Echocardiography Screening In Military Pilot Applicants?

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Introduction
Pre-employment screening is crucial for military pilot applicants. Recommendations for echocardiography screening, however, are contradictory. In some countries including the United States Air Force (USAF) echocardiography screening is deemed not to be efficacious because of the low number of abnormal findings. In other countries including Germany, it is routinely performed, assuming that certain findings are important for aeromedical assessment and justify screening.

Objective
Echocardiography screening policies of seven nations participating in a North Atlantic Treaty Organization (NATO) cardiology working group will be compared. German echocardiography findings will be reported.

Methods
6,110 screening echocardiographies of German military pilot applicants, examined between 2007 and 2020, were retrospectively analyzed for findings and their impact on aeromedical decisions.

Results
During a 14.5-year period, 4,477 out of 6,110 screening echocardiographies were normal. The remaining 1,633 applicants revealed 1,962 abnormalities, mainly minor tricuspid and mitral valve regurgitations (81.9%). Due to echocardiography findings, 80 applicants (1.3%) were unfit for flying, 9 (0.1%) were fit with limitations, and 1,544 had to be monitored over time. The most common diagnoses leading to disqualification or limitations were bicuspid aortic valve (BAV) (84.9%) and mitral valve prolapse (9.3%).

Discussion
Studies by other armed forces revealed similar findings but partially lower disqualification rates. Due to the estimated lifetime risk of 50% in BAV requiring valve replacement, pilot applicants with BAV are not accepted in Germany. In the USAF, uncomplicated BAV, if detected, can be waivered. A NATO group is analyzing different screening policies with the aim of harmonizing them. Echocardiography screening is currently done by Canada, Germany, the Netherlands and Switzerland, whereas it is not performed by France, the United Kingdom and USA.

Conclusion
The percentage of echocardiography findings was similar to other studies. Aeromedical assessment, however, depends on national policies. Harmonization of those policies might improve interoperability between allied nations.

Keywords: echocardiography, screening, pilot applicant, screening

ABS:220

The Proportion of Metabolic Syndrome Among Airline Pilots in Indonesia Before and During The COVID-19 Pandemic

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Background
Metabolic syndrome (MetS) affects 20–25% of adults globally, doubling heart attack mortality risk and tripling stroke mortality risk. Among Indonesian short-haul airline pilots, MetS prevalence was 18.28% pre-COVID-19. MetS in pilots poses significant safety risks if unmanaged. The COVID-19 pandemic reduced air traffic, potentially affecting pilots' exposure to hypobaric hypoxia and lifestyle factors. This retrospective cohort study evaluates MetS prevalence among Indonesian airline pilots before and during the pandemic.

Purpose
To determine the proportion of MetS among Indonesian airline pilots from early 2019 to mid-2021 by analyzing medical records for frequency and trends.

Methods
Medical records of pilots undergoing check-ups at the Aviation Medical Centre were reviewed. Data included pilot identification, age, blood pressure, antihypertensive medication use, blood tests (triglycerides, cholesterol, glucose), and flight hours over 6-month intervals. Data were analyzed using SPSS 20.0 with univariate and bivariate analyses to assess MetS prevalence and associations with flight hours and age.

Results
Among 76 pilots studied from 2019 to mid-2021, MetS prevalence peaked at 31.58% in mid-2021, surpassing the 18.28% baseline and global adult estimates. MetS development was independent of flight hours, with increased risks for hypertension (3.21x), fasting plasma glucose (2.89x), and triglycerides (1.18x). However, the trend of high-density lipoprotein levels were not able to be determined. BMI remained stable, but 35% of pilots became obese. Pilots with MetS were older than those without.

Discussion
MetS prevalence among Indonesian pilots rose over three years, unaffected by flight hours. The pandemic likely worsened outcomes due to reduced flights, economic stress, and psychological strain, elevating hypertension, glucose, and triglyceride levels. Age was a consistent MetS risk factor, suggesting age-targeted interventions.

Conclusion
MetS prevalence increased among pilots, independent of flight hours. Interventions targeting obesity and inactivity could mitigate MetS, hypertension, and related risk factors, with weight loss improving outcomes.

Keywords: Metabolic syndrome, Airline pilots, Indonesia, COVID-19

SESSION 4: WOMEN IN AVIATION

ABS:45

Addressing the Gender Gap: Female-Inclusive Flight Suits in the Irish Air Corps.

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Introduction/Context
Female aviators in the Irish Air Corps are required to wear flight suits designed primarily for male body proportions. This practice presents significant challenges related to fit, comfort, and functionality, particularly concerning ease of urination and menstrual management. Such issues can adversely affect operational performance, safety, and overall well-being (Losey, 2019; Pawlyk, 2020).
Irish employment and equality legislation obliges employers to provide equipment appropriate for all users, regardless of gender (Health and Safety Authority, 2005; Government of Ireland, 1998).

Purpose
This report examines the experiences of female pilots in the Irish Air Corps regarding the suitability of their issued flight suits. By analyzing these cases, we aim to highlight the necessity for gender-specific flight suits as has been recognised internationally (Darbasie, 2019a).

Methods
Aviation medicine assessments were conducted with female pilots in the Irish Air Corps to evaluate flight suit fit and usability. Observations were made during pre-flight dressing, cockpit ingress/egress, and in-flight operations, focusing on fit, comfort, and accessibility. Subjective feedback was collected through structured interviews.

Results
Findings revealed that:

- Poor Fit: The standard-issue flight suits led to discomfort and restricted movement due to improper fit.
- Safety Concerns: Ill-fitting suits compromised the proper securing of safety harnesses, increasing risks during high-G maneuvers.
- Bulky Immersion Suits: The immersion suits were excessively bulky and challenging to don and doff, especially when appropriately sized.
- Physiological Management: Female pilots reported resorting to dehydration strategies to avoid the challenges associated with restroom use during flights.

Discussion
These findings align with broader literature on gender-specific aviation gear. The U.S. Air Force has acknowledged similar issues and initiated efforts to redesign flight equipment for female pilots, including flight suits and G-suits, to enhance fit and functionality (Darbasie, 2019a; Cohen, 2019; Darbasie, 2019b).

Conclusion
Gender-specific flight suits are essential for female aviators' safety, operational efficiency, and health.

Keywords: Female aviators, Flight suits, Personal protective equipment (PPE), Gender-specific design, Irish Air Corps, Aviation medicine, Occupational safety

ABS:209

Space Flight, Sex Differences, and Clinical Considerations in Women Health

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Introduction

In order to provide information to medical team that perform medical risk assessment of Commercial Spaceflight (CSF) women passengers. A scoping review (ScR) was conducted to assess available literature regarding conditions pertaining to Women's health and to highlight gaps in knowledge and evidence.

Methods

Peer-reviewed literature published in English from 2000 to 2024 from five databases (PubMed, EMBASE, CINAHL, PSYCINFO, Web of Science) were retrieved. Title/abstract screening and full text reviews were facilitated using Covidence software. The focal points of our investigation included areas of reproductive health, hormonal dynamics, and prevalent gynecological conditions such as abnormal uterine bleeding, ovarian torsion, ectopic pregnancy as well other concerns the effect of radiation in space.

Results

The final list of women's health-related search terms totalized 133, the data base search had 4416 results with only 355 articles (8%) qualifying for full-text review. Most studies relied on animal models and included minimal human data showing sex-based differences, suggesting possible impacts of spaceflight on reproductive health but remaining inconclusive due to the lack of direct human research. Majority of the studies did not stratify and compare participants in terms of sex differences in hormone sensitive tissues. Nonetheless, based on animal models spaceflight may impact reproductive health. Literature on professional career astronauts was excluded, although it could offer insights; the small number of female astronauts limits its applicability.

Discussion

This review strengthen the need for targeted women's health research in space as commercial spaceflight demographics change. It stresses developing tailored medical screenings for female space travelers to mitigate health and reproductive risks. Future research should focus on closing these gaps with sex-specific studies for safer, inclusive space travel, and informing CSF medical standards, safety regulations, and priorities for a diverse group of spacefarers.

Keywords: Space Medecine, Women Health, Reproductive Health

SESSION 5:
CIVIL AVIATION MEDICINE & REGULATORY MEDICINE

ABS:41

Healthy Life Style And Prediction Of Non-Communicable Disease (Ncd) Among Civil Pilots In India

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Background
Non-communicable diseases (NCDs) are a leading cause of morbidity and mortality worldwide, requiring lifelong management and posing significant health risks. While airline pilots are generally considered healthier than the general population due to their disciplined lifestyle, occupational stressors, circadian disruptions, and environmental factors may contribute to NCD risk. This study aims to assess the biological age of Indian commercial pilots, evaluate its association with NCDs, and develop a validated risk prediction tool for NCD assessment.

Methods
A cross-sectional observational study was conducted among Indian commercial pilots. Biological age was determined using an online tool, validated in an initial cohort of 50 pilots. Participants were classified as "SMART" (if Biological Age < Actual Age) or non-SMART (if Biological Age > Actual Age). Appropriate statistical tests were used to check the possible associations between various demographic and occupational factors with healthy lifestyle practices and also to predict NCD risk.

Results
No significant association was found between demographic or occupational variables and healthy lifestyle adoption. However, a significant negative association was observed between SMART pilot and NCD occurrence. The logistic regression model identified age, biological age, and SMART status as significant predictors of NCD risk, leading to the derivation of the Healthy Lifestyle Score (HLS). ROC analysis (AUC = 0.725) confirmed the utility of HLS as an NCD risk predictor, categorizing risk levels as insignificant/negligible, moderate, or definite.

Conclusion
The NCD risk prediction tool can be utilized to monitor pilot health and implement targeted interventions.

Recommendations
Pilots should adopt a structured healthy lifestyle and monitor their biological age. Airline medical personnel should integrate HLS assessment and NCD risk prediction into routine health check-ups. The aviation industry should formulate policies to promote HLS, utilize the NCD risk equation for monitoring, and conduct further research to enhance the tool's efficacy.

Keywords: Biological Age, NCD Risk, Healthy Lifestyle Score (HLS)

ABS:174

The case for new standards of medical certification for low risk sport aviation.Osinga M, McCarthy G.W., Knueppel J, Bareford D. From the Comission Internationale Medico-Physiologique of the Federation Aéronautique Internationale.

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Introduction
The current standards for medical examinations are proportionate to the level of flight safety required. In most countries a formal aeromedical examination is required to participate in very low risk flying. We show that there is evidence to prove that flight safety would not be compromised by new, less extensive medical assessments. Drivers' licence equivalent medical exams for some forms of recreational flying proves that risks to passengers and public are acceptable.

Methods
A risk benefit assessment has been carried out against current medical standards. Accident statistics for sport aviation are compared to their medical standards to support the theoretical calculation.

Results
ICAO proposed that a 1% level is the acceptable risk for a Class 2 private pilot's medical. Based on a theoretical European sport pilot population of 100,000, an ICAO Class 2 would have an annual cost of €8,476,083. There would be 1.00 passengers killed a year with no significant ground casualties. For a medical standard equivalent to a 2% risk the cost could reduce to €840,000. An additional passenger would be killed every 4 years. For a medical standard equivalent to a 20% risk (self-certification) the cost would reduce to zero. 2.75passengers may be killed. ICAO Class 2 represents an expenditure of € 3,082,212 per life saved over self-certification. Twenty percent of pilots would be grounded. Accident statistics obtained indicate that this risk benefit model is correct.

Conclusion and Recommendation
National aeromedical authorities should adopt newer medical standards based on a 2% predicted risk of sudden incapacity in the next year (Class 4) and a 20% risk (Class 5) for some lower risk air sports. This will reduce overall costs of flying and increase participation without significantly increasing the risk of fatalities or harm to aerial athletes, recreational pilots, spectators, or third parties due to medical events in flight.

Keywords: Aeromedical exam, incapacitation, 1% rule

ABS:168

Establishing Safe Standards in a Rapidly Emerging Aerospace Frontier: A Call to Define Medical Requirements for Operating Vertical Takeoff and Landing Aircraft

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INTRODUCTION

The future of transport is poised for a new era facilitating technological advancement in vertical takeoff and landing (VTOL) aircraft, likely entering the market for public use in the 2030s. Regulatory governing bodies have begun certifying VTOL under broad, pre-existing guidelines. However, the standards for medical assessments of aircrew operating VTOL remain unclear for public operations.

METHODS

We conducted a targeted policy and literature review using the following key terms as guidance: medical requirements, licensing, VTOL aircraft, advanced air mobility, powered-lift, pilot health, aviation/aerospace medicine, urban air mobility, aeromedical standards/regulations. Terms were searched utilizing OVID, PubMed, Google Scholar, the ICAO, FAA, EASA and other national aviation regulatory bodies' websites. Peer-reviewed studies specific to VTOL medical requirements remained scarce, hence a narrative synthesis was conducted focused on policy analysis and gap identification.

RESULTS

No medical certification standards for operating VTOL aircraft were identified across the major aviation regulatory bodies. Current regulations refer to the pre-established medical certificate classification system, which were originally designed for fixed-wing and rotary-wing aircraft. FAA and EASA documentation lacks defined medical standards for low-altitude, frequent flight operations and pilot workload for VTOL aircraft. Other literature on short-haul operations identifies risks of fatigue, cognitive overload and spatial disorientation, all of which are applicable to VTOL flight yet not well addressed.

CONCLUSION

In light of the anticipated rollout date, the absence of medical licensing requirements for VTOL pilots is a significant oversight. Current licensing frameworks fit under a larger umbrella of fixed-wing and larger rotorcraft operations, shadowing nuances of VTOL flight. As advanced air mobility proliferates to serve the wider public, regulating bodies should consider redefining medical certification standards to reflect the physiological, cognitive and safety challenges of powered-lift aircraft.

Keywords: Aviation safety, medical licensing, pilot health, powered-lift, vertical takeoff and landing, VTOL, advanced air mobility, AAM, guidelines

ABS:217

Bridging Healthcare Disparities In Indonesia: The Role Of Aeromedical Evacuation And Comparative Regulatory Insights

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Background
Indonesia's unique archipelagic geography has contributed to persistent disparities in access to advanced medical facilities, particularly between urban centers and remote or rural regions. Aeromedical evacuation emerges as a critical solution to bridge these gaps, enabling rapid transfer of patients from underserved areas to higher-level care centers. However, the current implementation of aeromedical evacuation in Indonesia is hampered by fragmented regulations, inconsistent standards, and limited integration among stakeholders. Drawing on national and international sources, this review underscores the importance of developing standardized protocols for aeromedical evacuation to ensure patient safety, quality of care, and operational efficiency. The objective of this review is to examine regulatory frameworks for aeromedical evacuation in selected countries and propose policy directions for Indonesia.

Overview
Aeromedical evacuation is governed by distinct regulatory frameworks in the United States, Australia, Saudi Arabia, and Indonesia, reflecting each country's healthcare and aviation systems. In the United States, the Commission on Accreditation of Medical Transport Systems (CAMTS) sets clinical and operational standards, while the Federal Aviation Administration (FAA) governs aviation safety. Australia's Royal Flying Doctor Service (RFDS) operates under a federated structure with regulations from both state health authorities and the Civil Aviation Safety Authority (CASA). In Saudi Arabia, the Ministry of Health's Inter-facility Critical Care Transportation Policy guides air transport decisions, with operational coordination involving the Ministry of Defense's Medical Evacuation Air Management. Currently, Indonesia has regulations in place for air ambulances in disaster settings. However, the increasing demand and geographic challenges highlight the urgent need for integrated regulations.

Discussion
This review will address the potential establishment of comprehensive aeromedical evacuation procedures. The proposed procedures would be aligned with international practices, adapted to align with the needs of the Indonesian context, aimed at achieving enhancements in healthcare equity and emergency response capacity in Indonesia.

Keywords: aeromedical evacuation, aeromedical evacuation regulation, aerospace medicine, air medical evacuation, healthcare disparities

ABS:67

Factors Associated with Fatal and Non-Fatal Commercial Aviation Accidents in Indonesia (2007-2018)

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Introduction
Fatal commercial aviation (CA) accidents continue to occur in Indonesia, yet statistical research on the factors contributing to these accidents remains limited. Understanding these factors is essential for improving aviation safety and guiding future research efforts.

Objective
This research aims to determine factors associated with fatal and non-fatal CA fixed-wing aircraft accidents in Indonesia and provide a reference for future aviation safety research.

Methods
A cross-sectional study was conducted in July 2023, utilizing all final reports on fixed-wing aircraft accidents published by the Indonesian National Transportation Safety Committee (KNKT). Statistical analysis was performed using chi-square and Fisher's exact tests with IBM SPSS software version 29.0.

Results
Among 52 accident reports, 25 (48,1%) were fatal. Factors significantly associated ($p < 0,05$) with an increased risk of fatal accidents included pilots in command (PIC) holding a Commercial Pilot License (CPL), unpressurized aircraft, single-engine aircraft, aircraft with a maximum takeoff weight (MTOW) of ≤5,700 kg, accidents occurring on weekends, accidents occurring outside airport premises, controlled flight into terrain (CFIT) events, and accidents during the cruise phase. In contrast, accidents during the landing phase were associated with a lower risk of fatal accidents.

Conclusion
These findings emphasize the need to enhance terrain awareness, IFR infrastructure, and pilot preparedness, especially for operations involving small, unpressurized aircraft in remote regions. Targeted safety interventions based on these risk factors can significantly improve aviation safety across Indonesia.

Keywords: fatal accident; fixed-wing aircraft; commercial aviation

ABS:114

Barotraumatic Otitis in Commercial Aircrew: Impact of Cabin Pressure Altitude Over a 10-Year Observational Study

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Introduction
Barotraumatic otitis is a frequent occupational pathology among commercial aircrew, with significant consequences for medical fitness and flight operations. While individual risk factors are well-described, the influence of cabin pressure altitude remains under-investigated in real-world airline settings.

Objective
To compare the incidence of barotraumatic otitis in aircraft pressurized to 8000 feet versus 6000 feet, based on a 10-year dataset from a major European airline. A secondary objective was to assess incidence by flight range.

Methods
A retrospective review was performed on all medically confirmed cases of barotraumatic otitis between January 1, 2015, and December 31, 2024. Each case was categorized by aircraft type, cabin pressurization level (8000 ft vs 6000 ft), and flight range: medium-haul (MC, <4h) or long-haul (LC, ≥4h). Aircraft with lower cabin altitude (6000 ft) included the Airbus A350 and Boeing 787. Incidence rates were calculated per 1000 flights. Chi-square tests and odds ratios (OR) with 95% confidence intervals (CI) were used for analysis.

Results
Of 9432 total cases, 8657 (91.8%) occurred on aircraft pressurized to 8000 ft, and 411 (4.4%) on 6000 ft aircraft. All cases at 6000 ft occurred exclusively on long-haul flights. The incidence rate was significantly lower in 6000 ft aircraft (0.8/1000 flights) versus 8000 ft (2.9/1000; OR 3.72, 95% CI 2.68–5.16, $p < 0.001$). Among 8000 ft aircraft, short-haul flights had a higher incidence (3.1/1000) than long-haul flights (2.1/1000; OR 1.48, 95% CI 1.34–1.63, $p < 0.01$).

Discussion
Lower cabin altitude appears to provide a protective effect. However, since all 6000 ft cases were also long-haul, further studies are needed to isolate the independent impact of flight duration.

Conclusion
Operating aircraft at 6000 ft cabin altitude may significantly reduce the risk of barotraumatic otitis. This finding may inform future design and fleet decisions.

Relevance
These results support adopting lower cabin pressure altitudes as a concrete measure to improve occupational ENT health in commercial aviation.

Keywords: Barotraumatic otitis, Cabin altitude, Flight crew, Pressurization, Aviation medicine

ABS:24

Research on Medical Events of In-Flight Incapacitation in Civil Transport Air Crew,2017-2024

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Introduction

Several studies have been conducted globally on the in-flight incapacitation in civil air crew (referred to as "events"). So far, there has been no in-depth analysis of such events within China's civil aviation industry, with little data research based on medical events during flights. This paper aims to analyze medical events of in-flight incapacitation in China's civil aviation transport air crew from 2017 to 2024, to determine the occurrence probability and identify the disease categories involved.

Method

Datas are sourced from the Civil Aviation Safety Information System of China. According to the Advisory Circulars(AC) of CAAC, the occurrence stages of air crewincapacitation are classified, and the probability and the categories of crew members are statistically analyzed. Additionally, such events are classified according to the ICD-11. Statistical analysis is conducted using GraphPad Prism 9.3 software. For the comparison of count data among groups, non-parametric tests are used, with $P < 0.05$ indicating statistical significance.

Results

A total of 188 medical events of in-flight incapacitation in civil transport air crew were recorded among China's civil aviation transport crew in the past eight years, with an overall probability of 0.179/100,000, and 0.042/100,000 for flight crew. There is a statistically significant difference in categories of crew members ($P< 0.01$). Such events occurred with the highest occurrence in 2023 ($P<0.05$). The most common events are related to digestive diseases ($P<0.05$), and there is a statistically significant difference in disease classification among categories of crew members ($P< 0.01$).

Conclusion

The health management of China's civil aviation crew members should prioritize the analysis and summary of medical events during flights, and develop targeted health management measures based on the different types of members.

Relevance

By analyzing medical events caused by in-flight incapacitation, this paper provides evidence-based medical support for aviation health management efforts and promotes progress in aviation safety regulation.

Keywords: Medical Events,In-Flight Incapacitation,Civil Transport Air Crew

SESSION 6A: MILITARY AVIATION MEDICINE

ABS:232

USAF Medical Waivers and Pilot Training Outcomes: A Retrospective Analysis

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Introduction

This study analyzed the impact of medical waivers on training outcomes for U.S. Air Force (USAF) pilot candidates, specifically during Phase 2 of Undergraduate Pilot Training (UPT), which involves flying the T-6 aircraft. The research aimed to determine if individuals granted medical waivers performed comparably to those who met full medical standards, and to identify attrition patterns within specific diagnostic categories of waivered individuals.

Methods

Data was gathered from all traditional USAF UPT participants between January 2011 and August 2023. Waivered individuals were categorized into 21 blinded diagnostic subgroups using ICD-10. The study measured completion versus attrition rates during the T-6 phase, where the overall attrition rate was 8.25%. Medical disqualification accounted for a small portion of this attrition (0.5%). Chi-square testing was employed to compare attrition rates across groups.

Results

Results revealed that while most medical waiver categories showed performance comparable to fully qualified trainees, five specific clinical subgroups experienced statistically significant increases in attrition. Notably, a large subgroup labeled “abnormal findings,” primarily comprising individuals with body dimension (anthropometric) waivers (80% of nearly 200 individuals), exhibited significantly higher attrition. Another high-attrition subgroup included musculoskeletal diagnoses, with approximately 40% involving spinal or back conditions. The remaining three high-attrition categories had very small sample sizes, limiting strong statistical interpretation.

Discussion

The study concluded that, overall, individuals granted medical waivers generally demonstrate comparable performance to their fully medically qualified peers. However, a significant exception was highlighted: individuals with anthropometric waivers faced up to a 60% higher risk of attrition during Phase 2 training. These findings largely support the general effectiveness of the medical waiver process but emphasize the need for further detailed analysis of specific clinical subgroups, particularly those related to body dimensions and musculoskeletal issues.

Keywords: Pilot training, medical certification, medical waiver, outcomes, attrition, medical standards, military pilot

ABS:99

Incidence of clinically-diagnosed overweight obesity among the US military as a whole and among US military aviators, 2006-2023

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Introduction: This study examined the trends in medical diagnoses of overweight and obesity among members of the United States (US) military as a whole and among US military aviators as a subgroup.

Methods: Data on the numbers of International Classification of Disease-coded disorders for excess body weight (overweight or obesity) were obtained from the Defense Medical Epidemiological Database in years from 2006 through 2023. Rates (cases/1000 person-years) were analyzed via mixed-factorial analysis of variance.

Results: An examination of the prevalence rates where overweight or obesity were the primary diagnoses indicated significant year-to-year differences ($p<0.05$). Rates were essentially flat from 2006 until 2020, but from 2020 through 2023, there was a pronounced increase. The rates among the aviator subgroup were generally lower than those of the military taken as a whole ($p<0.05$), but there were no differences among the four military services. In contrast, examination of the rates where overweight/obesity diagnoses were included as part of any diagnoses revealed a steady increase from 2006 through 2015, and then a steady decrease from 2016 to 2023 ($p<0.05$). Again, the overall rates of overweight/obesity were higher in the group containing all military personnel than in the group containing only aviators. Rates also were generally higher among Army soldiers than among Marines ($p<0.05$).

Conclusion: The patterns observed in the present study deviated from expectations based on previously published reports. The decline in any overweight/obesity diagnoses between 2016 and 2023 was especially unanticipated. Several administrative and cultural factors may have disincentivized military healthcare providers from diagnosing personnel with body weight problems. However, since excess body weight poses numerous health risks, it should be tracked systematically throughout the US military services.

Keywords: Overweight, Obesity, Military

ABS:158

Sports Therapists for RSAF Aircrew: A Single-Centre Pilot Interventional Study

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Introduction

The Republic of Singapore Air Force (RSAF) fighter aircrew population has the highest prevalence of prolonged restriction (≥3 months) from vocational duties due to musculoskeletal (MSK) conditions. To address this, the RSAF Human Performance Maximisation Working Group initiated a pilot interventional study. Sports therapists were forward-deployed to reduce barriers to initial assessment and care, shape positive health-seeking behaviors, and minimise the need for downchits for mild MSK conditions.

Methods

One commercial sports therapist was forward-deployed to a fighter air base from 2 January 2025. This provided early access to pre- and rehabilitative services to two operational flying squadrons. A six-month post-implementation review will be conducted in June 2025 to assess the effectiveness of this intervention. This will be performed by analysing the incidence of MSK conditions requiring medical review as documented within an in-house electronic medical records database, and data from a data collection sheet completed by medical officers following each consultation. A qualitative survey will also be administered to the aircrew six months post-intervention to assess perceived outcomes and facilitators/barriers to this initiative.

Results

From 2 January 2025 to 31 March 2025, 104 MSK therapy sessions were administered over 120 working hours, with 49 unique participants treated. Seven fighter aircrew underwent medical review for mild MSK conditions, including neck (n=3) and lower back (n=2) conditions. One fighter aircrew was issued a prolonged downchit of six months for lower back injury.

Conclusions

Preliminary results demonstrate high utilisation rate. Data analysed during the six-month post-implementation review will be critical to assess the effectiveness of sports therapy in reducing incidence of MSK conditions.

Relevance

The preliminary results from this ongoing pilot trial will inform the subsequent expansion of sport therapy services to other flying squadrons within the RSAF. This intervention is part of a broader strategy to improve aircrew health and performance, and extend career longevity.

Keywords: sports therapist, musculoskeletal

ABS:233

Medical Waivers and Attrition in USAF Pilot Training: A Focus on Diagnostic Categories During T-6 PhaseA diagnosis-based sub-analysis of USAF Medical Waivers and Pilot Training Outcomes

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Introduction

We studied waiver outcomes in United States Air Force (USAF) Undergraduate Pilot Training (UPT) candidates from January 2011 through August 2023. The goal was to determine whether specific categories of pre-existing medical conditions were associated with higher attrition during the initial T-6 training phase.

Methods

All individuals who participated in traditional USAF UPT during the study period were identified. Those who entered training with a medical waiver were assigned to blinded clinical groups based on the highest-level International Classification of Diseases, 10th Revision (ICD-10) diagnostic categories. A total of 21 clinical subgroups were established and compared against other UPT participants for their T-6 training outcomes, specifically successful completion versus attrition. The overall attrition rate during Phase 2 (T-6 training) was 8.25%. Attrition was categorized into five major causes, with medical disqualifications accounting for 0.5% overall, or 6% of total attrition. Statistical analysis of subgroup differences in attrition rates was performed using chi-square testing.

Results

Five clinical subgroups demonstrated statistically significant increases in attrition compared to other trainees, including both fully medically qualified students and those with various medical waivers. Although some groups had small sample sizes, two notable subgroups emerged. The "abnormal findings" category—comprising nearly 200 individuals, 80% of whom had body dimension (anthropometric) waivers approved by a training authority—showed elevated attrition rates. The musculoskeletal category included a substantial proportion (40%) with spinal or back-related diagnoses, and also demonstrated increased attrition. Three subgroups had 10 or fewer individuals, limiting meaningful interpretation.

Discussion

The majority of medically waived candidates performed comparably to fully qualified peers in USAF pilot training. Attrition rates across most clinical subgroups were consistent, with few outliers. Individuals with anthropometric deviations faced up to a 60% higher risk of non-completion during Phase 2 training. These findings support the general viability of medical waivers but highlight the need for targeted evaluation of specific diagnostic categories.

Keywords: Pilot training, medical certification, medical waiver, outcomes, attrition, medical standards, military pilot

ABS:31

A comparison of subjective and objective measures of Vestibular Adaptation in Rotary Chair among Indian Military Aircrew

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Objectives

Vestibular Adaptation Time (VAT) refers to subjective assessment of vestibular stimulation in a motion environment. While simple, the method is subjective and hence is naturally deemed inferior to the objective methods of assessment. Vestibulo-Ocular Reflex (VOR) induced nystagmus, however, can well be used as a quantified measure in a Rotary Chair. Time constant (TC) has conventionally been defined as the time taken for nystagmus to dissipate to 37% of its peak value. Hence, TC becomes an obvious, objective, and more reliable measure for vestibular adaptation. The objective of this study is to compare the VAT and TC in aircrew and determine differences in outcome while using these two different methods.

Materials & Methods

52 healthy military aircrew were enrolled in this study. In the Rotary Chair, Velocity Step Test (VST) was performed, in which the subjects were rotated at an angular velocity of 100°/s. As subjective and objective measures of vestibular adaptation, respectively, VAT and TC were measured during the per-rotatory and post-rotatory phases in both left and right directions. They were statistically analysed to assess any differences in the outcomes.

Results

Mean VAT was found to be 27.98±6.74s and mean TC was found to be 19.05±4.54s. Bland-Altman graph found 95% of the data points within the upper & lower limits of agreement.

Conclusion

In our study, results indicate an offset of 8.925s between values of VAT & TC. However, Bland-Altman Plots indicate good agreement & ICC indicates mild reliability between the two tests.

Relevance

Our study suggests that although there is good agreement between the values of the two tests, further studies may be required to ascertain whether the two parameters may be used interchangeably as a measure of vestibular adaptation.

Keywords: Military Aircrew, Vestibular Adaptation Time, Time Constant

ABS:159

Republic of Singapore Air Force (RSAF) Helicopter Search-And-Rescue (SAR) Medical Evacuation: A 10-year study.

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Introduction
The RSAF SAR capability supports an 840,000 km² Aeronautical Search and Rescue Region (ASRR), enabling evacuations of critically ill casualties to Singapore for advanced medical care.

Objective
This study aims to describe medical outcomes for civilian casualties evacuated as part of the RSAF SAR operations.

Methods
A retrospective descriptive study on SAR activations from January 2016 to April 2025. Mission reports were compiled and analysed. Patients' age, sex, and stability (defined as stable haemodynamics and respiratory status or ongoing resuscitation) at handover to receiving hospital were compiled. The casualties were subclassified into systems in accordance with the 10th revision of the International Classification of Diseases (ICD-10).

Results
Over the period, 83 civilian casualties were evacuated. The average age was 47.8 years (SD±13.3), and majority male (95.2%). All casualties were successfully evacuated to tertiary care, with 91.6% handed over with stable cardiorespiratory status. Seven cases (8.4%) required ongoing resuscitation for cardiac arrest – acute coronary syndrome (n=3), severe burns (n=1), electrocution (n=1) and pending evaluation (n=2). Cardiovascular cases were the most prevalent (n=28), followed by trauma (n=22). Key treatments included intravenous (IV) cannulation/fluid resuscitation (n=76), oxygen supplementation (n=72), electrocardiogram (ECG) (n=36), Advanced Cardiac Life Support with Cardiopulmonary Resuscitation (CPR) (n=7) – mechanical CPR (n=3), manual CPR (n=4).

Discussion:
IV access was obtained in all cases but seven cases – well patient with more severe casualties on the same flight (n=4), declined intervention (n=1), challenging access due to burns with resultant limb oedema (n=1), altered mental status to minimise agitation (n=1).
An automated CPR machine significantly improves resuscitation quality and provider safety during heli-medevac missions by delivering consistent compressions in challenging environments. Our findings support their integration in enhancing aeromedical care outcomes.

Conclusion:
The RSAF SAR operations will continue to be a vital lifeline for all transiting the Singapore ASRR.

Keywords: Search and Rescue medical operations, Prehospital Emergency Care, Cardiopulmonary Resuscitation, Critical Care

ABS:183

Asthma in Active Military Aircrew: Long-Term Health and Flight Performance

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Background
Asthma poses unique challenges in aviation medicine. While strict criteria typically dictate waiver approvals in military aviation, the IAF (Israeli Air Force) applies a more individualized approach. Emerging evidence suggests that asthmatic aviators can maintain pulmonary health, operational readiness, and flight safety over time.

Objective
This study aimed to characterize asthma management among IAF aircrew, evaluate long-term pulmonary function trends, and assess the impact of asthma on flight performance.

Methods
This retrospective cohort study included 32 active and reserve aircrew diagnosed with asthma undergoing annual assessments at the IAF Aeromedical Center between 1998 to 2024. Data collected included demographics, pulmonary function tests, treatment regimens, and flight performance metrics.

Results
Over an average follow-up period of 18.5 years, participants' pulmonary function remained stable. Mean Forced Expiratory Volume in one second (FEV) was 89.3%, with no clinically significant change in the FEV /FVC ratio (82.2% to 78.1%). Stability was observed across both low and high-performance aircrew, including those managed at higher treatment steps. Exacerbations were rare, with only 7 events occurring over 174 patient-years. No major flight safety incidents were reported.

Discussion
Findings suggest that with individualized management and regular monitoring, asthmatic aircrew can maintain stable pulmonary function over decades without compromising flight performance or safety. Pulmonary function trends align with those observed in the broader asthmatic population.

Conclusion
Our study supports a flexible, individualized approach to aeromedical management of aircrew with asthma. With appropriate follow-up and treatment, asthmatic aircrew maintain excellent pulmonary function over extended periods of time and continue to serve safely and effectively. These findings may be applicable to the broader aeromedical community, including civilian aviators.

Keywords: asthma, military aviators, military pilots, aircrew, flight performance

ABS:204

A Study of Dehydration in Navy Student Pilots

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Introduction
Dehydration Of 2% Body Mass Or Greater Is Associated With Deleterious Physical And Mental Effects That, In Aviation, Could Potentially Impact Negatively Upon Flight Safety. The Aim Of This Study Was To Ascertain If Flying Unpressurised Light Aircraft In British Meteorological Conditions, As Undertaken On The UK Royal Navy Pilot Flying Grading Course (AIR 503), Leads To Measurable Fluid Loss, And Whether The Magnitude Of That Loss Is Physiologically Significant (I.E. ≥2% Body Mass).

Methods
A Prospective, Observational Study Was Undertaken. Student Pilots Undertaking AIR 503 Were Weighed And Underwent Bioelectrical Impedance Measurement Of Body Water, Shortly Before And After They Undertook A Sortie Of Spinning And Aerobatics In A Grob 115E Tutor Aircraft. No Consumption Or Voluntary Loss Of Fluids Occurred Between Measurements. Contemporaneous Meteorological Data Was Recorded. Ethical Approval Was Granted By MODREC.

Results
16 Volunteers (Median Body Mass 77.18kg, IQR 70.60kg, 82.28kg) Participated In The Study. Median Body Mass Loss/Hour Was 0.17%, IQR 0.26%, 0.13% ($Z=3.522$, $P<0.001$). Median Total Body Water Gain/Hour (As Measured By Bioelectrical Impedance) Was 0.35% Of Body Mass, IQR 0.3%, 0.57% ($Z=-2.458$, $P<0.05$).

Airfield Dry Bulb Temperature Correlated With Body Mass Loss/Hour ($\rho=0.64$, $P<0.01$).

Discussion/Conclusions
Mass Loss During The Sortie Was Not Physiologically Significant, But The Fact That A Change Was Observable Means The Technique Has Wide Application In Occupational Studies. The Observed Increase In Impedance-Derived Median Total Body Water, Despite Loss Of Body Mass Over The Same Period, Calls The Use Of This Method In Such Studies Into Question. The Positive Correlation Between Ground Air Temperature And Mass Loss Can Inform Future Occupational Recommendations: In Conditions Of High Airfield Dry Bulb Temperatures, Pilots Should Take Care To Minimise Dehydration By Consuming Adequate Food And Fluids Before And After Sorties, And Minimising Time Spent On The Ground, In And Around The Aircraft.

Keywords: Flight safety, Student aircrew, Dehydration

SESSION 6B: AVIATION PSYCHOLOGY AND TRAINING

ABS:180

Does Pre-Training Heart Rate Variability Predict Completion of The Israeli Air Force Pilot Training?

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Introduction

Operational pilots are required to perform complex tasks under high stress and uncertainty. One major challenge of military and civilian aviation medicine is selecting suitable candidates to serve as pilots. The vagal nerve is a crucial moderator of stress responses, and its activity (indexed by heart rate variability, HRV) has been shown to predict performance and psycho-physiological resilience in various settings. However, its predictive value in pilot training has not been examined. This study examined the relationship between HRV and success in an intensive selection procedure.

Methods

In a historical prospective study, we derived an HRV parameter (RMSSD) from a 10-second ECG of 169 male and 16 female candidates for the pilot's course. ECGs were performed 2-3 months before the courses. The predictive validity of other routinely obtained measures was also considered. We used a two-stage approach to analyze study data. First, we analyzed the entire sample using t-tests. Then, significant predictors of success and HRV were entered in a multivariate logistic regression. Second, we focused on a smaller sample of paired candidates (passed the entire course versus failed), matched on significant predictors, and examined differences in HRV between these groups with a paired t-test.

Results

High RMSSD significantly predicted completion of the pilot course in logistic regression. RMSSD and intelligence score were the only significant predictors. In the paired matched sample, candidates who passed had significantly higher HRV compared to those who failed (M=121.30ms, s.d=61.48ms vs. M=84.31ms, s.d=12.05ms), $t(25) = -1.78$, $p<0.05$.

Discussion

The results support the predictive value of HRV for aviation selection. Given the high cost of training pilots and the burden they undergo, improving selection accuracy may reduce the burden on candidates and air forces.

Keywords: Heart Rate Variability, HRV, Pilot training, Pilot selection, resilience, vagal nerve, pilot performance

ABS:91

Sensor-Based Tracking In Aviation Pilot Training

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Introduction

Physiological monitoring during aviation pilot training enhances understanding of human performance and safety. Advanced flight simulators integrate physiological sensors to track pilot responses, offering objective insights into workload, physical- and cognitive states. Similar applications are observed in professional motorsport training, providing valuable parallels for simulation fidelity and performance optimization.

Objectives

This study reviews current state of the art physiological monitoring technologies in aviation simulator training and draws comparisons with motorsport simulation. It also summarizes possible future advancements in sensor integration within next-generation simulators.

Methods

Key technologies (including eye-tracking systems for visual scanning analysis, cardiovascular monitoring (HRV), respiratory sensors, electrodermal activity (EDA) and advanced neurological tools like functional near-infrared spectroscopy (fNIRS) and electroencephalography (EEG) will be defined and described, providing practical examples which best illustrate the principle goals of these technologies that is, to assess spatial disorientation, workload management, instrument scanning patterns, and upset recovery techniques. Comparative data from racing simulation settings will also be included to highlight differences in physiological strain between authentic and simulated environments.

Discussion

Physiological monitoring enhances pilot training by identifying stress responses and optimizing workload management. Eye-tracking systems improve situational awareness through systematic scan pattern analysis. Advanced simulators are already providing realistic spatial disorientation scenarios that provide great opportunity to use integrated physiological feedback. Future developments should focus on precise time synchronization of multi-sensor data streams, adaptive training modules based on real-time physiological feedback from non-obtrusive monitoring technologies. Enhanced cueing algorithms in simulators will enable for valuable training scenarios that bridge the gap between simulation and real-world operations.

Keywords: Training, Sensors, Physiology, Simulators, Performance

ABS:152

Transforming the Republic of Singapore Air Force (RSAF) heli-medevac search-and-rescue (SAR) Combat Medic Training: A Comparative Analysis of Traditional Didactic Training vs. a Novel E-Learning Module.

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Introduction
SAR Medic Training equips medics with essential operational and medical skills for missions. However, the steep learning curve from condensed didactic lectures hindered retention. An interactive online iLearn module was introduced to enhance engagement, personalise learning, and optimise hands-on training time.

Objective
The objectives of this study were to evaluate the outcomes of the newly adopted Singapore Armed Forces (SAF) iLearn against traditional pedagogies.

Methods
A case-control comparative study between traditional pedagogy (i.e., commencing with 2 full days of lecture) and the SAF's iLearn platform, involving medics trained between August 2023 and April 2025. A post-evaluation test was administered after each training period, and scores were compiled and analysed.

Results
A total of 35 SAR medics trained between 2023 and 2025 were included in the study – traditional pedagogy group (n=24), iLearn group (n=11). The median score of the traditionally trained group was 18.0 (72.0%), and its interquartile range (IQR) was 4.5. The median score of the iLearn trained group was 21 (84.0%), and its IQR was 2.25. A Mann-Whitney test was performed, and a p-value of 0.02 ($p<0.05$), suggesting statistical significance.

Discussion
Medics trained via iLearn demonstrated higher post-evaluation test scores compared to those trained through traditional methods, with statistical analysis confirming improved knowledge retention ($p < 0.05$). Integration of interactive multimedia and self-paced learning enhanced engagement, while data-driven insights enabled trainers to optimize practical training. These findings suggest the flipped classroom model mitigates information overload, improves training efficiency, and better prepares medics for operational readiness.

Conclusion
These findings support the continued use of digital learning to improve efficiency and preparedness in high-stakes medical training environments.
Future research could explore its applicability in other military medical training contexts. The results of this study support continued implementation and refinement of digital learning methodologies to enhance training outcomes in high-stakes operational environments.

Keywords: Flipped Classroom, Medical Education, Combat Medic, Heli-Medevac

ABS:188

Development of A Game-Based Personality Tool

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Personality assessment has always been intuitively relevant and important in fitting a person to a job or selecting for likelihood of success in job performance. However, there are many existing challenges in personality testing such as tools are transparent and easy to fake, measuring intra-individual variance in personality-linked behaviours across different situational contexts and aspects of personality that do not easily lend themselves to self-report survey type tools such as integrity. All these challenges limit the validity and usefulness of many current personality tools in the market. This presentation covers the development of a game-based personality tool designed to 1) reduce faking, 2) tap personality nuances in different work contexts to increase the richness of the assessment and 3) measure aspects of personality that have been more difficult to assess thus far. Combining robust psychological design and data-science capability, this tool aims to generate a unique personality profile tailored to each individual and an assessment of match to specific job roles.

Keywords: Personality, personality tool, personality measurement, game-based assessment

ABS:46

Research on Multidimensional Influencing Factors and Intervention Strategies for Psychological Resilience in Aviation Professionals

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Background

Psychological resilience in aviation professionals critically impacts flight safety, yet research remains scarce despite resilience models established since the 1990s. Current literature contains <5 international and <10 domestic studies, all samples <100. Analysing an airline data (N=36,194 employees, including 10,959 flight crew members), this study identifies correlations between resilience and emotional stress/coping strategies/attentional states, with extended links to exercise/sleep/work-life satisfaction. As the first global aviation resilience framework at scale, it proposes preventive strategies to shift mental health policies from 'reactive intervention' to 'proactive prevention'.

Overview

This study employs multidimensional psychological assessment tools with three objectives:
·Evaluate psychological resilience levels: to identify vulnerabilities and enable timely interventions.
·Identify positive/negative resilience factors: to guide mental health promotion initiatives.
·Strengthen mutual trust and commitment: between flight crews and airlines, fostering stable labor relations.

Key Findings

Exercise: High-intensity, frequent exercise (e.g., running, structured training) correlated with higher resilience, lower stress, and better attention. Sedentary individuals showed reduced resilience.

·Sleep: Sleep quality positively predicted resilience. Excellent sleepers demonstrated superior optimism, confidence, and recovery capacity.

·Work-Life Satisfaction: Career development and skill enhancement significantly boosted resilience. Salary/benefits, while prioritized by employees, showed limited resilience-building effects. Moderate workload, interpersonal relationships, non-work time, and social recognition exerted varying influences. Life satisfaction factors (e.g., physical/mental health, parenting, income, housing, relationships) collectively promoted psychological resilience through balanced development.

Proposed Intervention Pathways

·Work Management Systems: Optimize institutional design; strengthen organizational culture; establish cross-departmental EAP collaboration.

·Training and Digital Services: Develop systematic training programs; compile practical manuals; build AI-driven mental health platforms; deploy professional psychological support teams.

·Enhance welfare & work-life balance: Tailored welfare optimization; workload-environment management; health-sleep initiatives.

Conclusions

Flight crews showed superior resilience versus ground staff. Adaptive training converted stressors (e.g., high-risk roles/family burdens) into psychological resources, while apparent stability factors (e.g., high salaries/long-term employment) had minimal resilience impact.

Discussion

Global Applicability: Are findings generalizable across nations?

Organizational Culture Integration: Systematically boost resilience via workload optimization & EAP enhancement?

Keywords: Aviation professionals, psychological resilience, proactive prevention, adaptive training, global applicability, organizational culture integration

ABS:48

Utilizing an Escape Room Style Simulation to Evaluate Human Behavior and Performance Competencies

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In NASA's International Space Station Human Behavior & Performance Competency Model, eight non-technical skills were identified as key operational requirements for astronaut engagement in long duration missions. The competencies include self-care/self-management, communication, cross cultural, teamwork and group living, leadership, conflict management, situational awareness, and decision making/problem solving. There is currently no standard modality to observe and assess the performance of these non-technical skills. In roles that demand superior performance in novel, ambiguous, and safety-critical settings, the ability to make real-time decisions within a team environment is essential. Objective evaluation of these skills is highly valuable when selecting top candidates from a large pool of exceptional applicants.

Purpose
Our goal was to design a nonobtrusive, performance-based modality to elicit demonstration of NASA's non-technical skills. We developed a problem-solving, team-oriented, and time-limited environment Escape Room-style simulation and evaluated the findings.

Methods
Utilizing a previously presented point-of-care interface to capture behaviors utilizing a Likert scale, we observed 6 groups of 3 participants interact to solve 13 puzzles in 90 minutes.

Results
The tool successfully captured and scored the eight competencies on a scale that allowed for differentiation amongst candidates based on their performance.

Discussion
Our point of care interface was able to assess non-technical competencies using an escape room-style simulation. Real time and video review were enabled for careful evaluation. This task-performance modality was then operationalized to make hiring decisions for a highly competivie surgical residency, with an annual selection rate of 4%.

Conclusion
Behavioral assessment is crucial for highly competitive selection processes. While cognitive and technical skills may be revealed through training history, qualifications, and certifications, personal and professional references do not always differentiate highly desirable candidates from their peers. An escape room style simulation provides a novel modality to assess the performance of behavioral competencies.

Keywords: simulation, selection, behavior

ABS:225

Development of a Competency Framework for Thai Aviation Medicine Instructor Physicians: Documentary Research

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Introduction

The growth of aviation throughout Southeast Asia has produced an immediate need for Aviation Medicine Instructor Physicians (IPs) who develop and deliver aviation-safety curricula; however, there exists no contextualised, evidence-based competency framework to guide the preparation of Thai Ips.

Objectives

To develop an evidence-based Competency Framework for Aviation Medicine IPs in Thailand.

Methods

A documentary research approach screened English and Thai literature (1957-2024) from ThaiJO, PubMed/MEDLINE, Google Scholar, and grey literature from ICAO, FAA, EASA, ACGME, and CAAT. After de-duplication, studies were rated for methodological quality and relevance, coded for Knowledge, Skills, Attributes (KSA) KSA components and narrative synthesis conducted alongside the Human Factors Analysis and Classification System (HFACS) to capture multiple safety layers, for individuals, organization and external environment.

Results

A total of twenty-four competencies were identified. The knowledge competencies were: aeromedical physiology, regulatory and operational medicine, theory of adult learning, curriculum design, assessment of learners, and research methodologies. The skill competencies were: classroom and simulation-based teaching, clinical fitness-to-fly testing, operational risk analysis, quality improvement, scientific writing, teamwork and program leadership. The attribute competencies incorporated professionalism, ethics, commitment to safety, passion for teaching and learning, interpersonal skills, cultural competence, ability to be flexible, and communication skills. These competencies together created a competency framework with clinical, pedagogical and safety lenses reflecting intrapersonal, organizational, and external contexts.

Conclusion

The competency framework represents a model for curriculum design, instructor certification and enhancement of safety in Thai aviation medicine. Further validation through a Delphi study and piloting is recommended to unify IP training and improve aviation safety at the Southeast Asia.

Keywords: competency framework, instructor physicians, medical education, aviation safety

SESSION 7A: HUMAN FACTORS, SURVIVABILITY & ACCIDENT INVESTIGATION

ABS:43

Human Systems Integration: What It Is And How It Can Save Aircrew Lives

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Introduction

The term 'Human System Integration' (hereafter, HSI) is frequently employed during discussions of various aspects of aerospace medicine and human performance. However, much of the discourse regarding HSI often fails to address its true nature as a human- centered approach to system design, an operational risk management-based mishap prevention strategy and as an invaluable tool for flight mishap investigation and analysis.

Purpose

This presentation is designed to introduce HSI, defining and describing in some detail its overarching principles, approaches and goals. It will illustrate how aeromedical and human performance specialists can help ensure that a human-centric total-system approach to aircraft system safety can not only mitigate design and operations-related risks, but as such can be used to better understand the causal and contributing factors associated with flight mishaps.

Methods

HSI will be defined and described, using case studies to illustrate its applications in aircraft systems design, acquisition and operations. The impacts of aeromedical and human performance specialists on the use of HSI will be discussed, citing specific examples of how doing so has resulted in improved human-system performance and overall system safety. The discussion will include an example of how HSI can prove to be a powerful mission/mishap human performance analysis tool.

Discussion

The use of HSI has already resulted in air and spacecraft systems being designed for rather than despite their crews and maintainers. By focusing on human aeromedical, cognitive and performance-based limits and capabilities, system engineering teams (including aeromedical specialists) have created and fielded systems that are decidedly more effective and safer to use and maintain. It is therefore critical for practitioners of the many specialties of aerospace medical to be actively involved in the promotion and use of HSI in the creation of aviation systems, providing strict oversight and ensuring adherence to its critical human-centric mindset.

Keywords: Human Systems Integration (HSI), Human Performance, Systems Engineering, Human-Machine Interface, Flight Safety, Mishap Investigation and Analysis

ABS:236

OBVA Eye Tracking Research for Performance Improvement, Assessing Daily Fatigue for Risk Mitigation and Long Duration Flight Workload and Fatigue Assessment

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Smooth Pursuit: Assessing Eye Movement to Predict Operational Performance

Introduction

Smooth pursuit eye movements, used to track moving targets, are controlled by widespread neural circuits with extensive feedback pathways. Measuring smooth pursuit offers insight into brain health and may predict operational performance. The Operational Based Vision Assessment (OBVA) Lab has been evaluating the operational utility of smooth pursuit biomarkers using a commercially available neurological-health monitor, the neuroFit.

Methods

The neuroFit was developed by the OBVA Lab in collaboration with a former NASA Ames Research Center engineer. This proprietary eye tracker records minute, rapid eye movements, including smooth pursuit, in response to moving stimuli to reveal aspects of neurological health and performance in real time. It reports 11 distinct biomarkers reflecting specific components of smooth pursuit circuitry. We assessed intra- and intersession test-retest reliability of each biomarker and correlations with operational tasks, such as manipulating a virtual telerobotic arm.

Results

Biomarkers related to initial response and dynamic pursuit demonstrated acceptable intra- and intersession test-retest reliability (Cronbach's alpha ≥ 0.7). Metrics such as gain were significantly correlated with telerobotic performance ($r = 0.522$, $p = 0.007$) and with physiological workload and stress measures ($r = -0.523$, $p = 0.006$). These results suggest smooth pursuit biomarkers may predict operator success in complex tasks.

Discussion

A reliable, self-administered tool such as the neuroFit could enable prediction of aircrew performance by monitoring smooth pursuit biomarkers. Because smooth pursuit engages broad brain networks, it may reveal characteristics relevant to fitness-for-duty, including fatigue, neural health, and brain injury detection. The neuroFit has already been applied in contexts such as long-duration fighter pilot flights, college and professional athletes, and military operations to detect injury, assess readiness, and monitor fatigue.

Keywords: NeuroFit, eye tracking, fatigue assessment, performance improvement, long duration flight workload

ABS:187

Drivers of Safety Behaviours in Organisations and the Measurement of Organisational Drift

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The safety climate of an organisation gives a snapshot of how an organisation is managing its safety goals and executing its safety programmes. This presentation covers the development of a safety climate tool which moves away from the traditional measurement of safety attitudes towards directly measuring safety behaviours at all levels of the organisation, which provides a more accurate picture of how an organisation is practising safety. This tool was designed based on current literature about safety culture measurement, incorporating both insights from academia and practitioners. Statistical analysis has shown strong internal reliability and factor structure. Additionally, it has a strong focus on practical implementation and actionable insights. When implemented in an organisation on a regular basis, it can serve as a lead indicator of important safety outcomes.

Keywords: Safety culture, safety climate, measurement, safety behaviours

ABS:2

Pilot preconditions and errors affect flight accidents in Indonesia: analysis based on 245 accident investigation reports from 2007 to 2024

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Introduction
Pilot error is a major contributor that responsible for 80% of accidents and 50% of serious incidents. The Human Factor Analysis and Classification System (HFACS) allows the identification of contributing human factor to aviation incident, including pilot precondition as the imminent layer prior to errors. The study aimed to investigate the association of pilot precondition and errors to accidents and serious incidents from 2007 until 2024 in Indonesia.

Methods
This was a retrospective cross-sectional study design of secondary data from the investigation reports published by the National Transport Safety Committee (NTSC) from 2007 until 2024 in Indonesia, downloaded from https://knkt.go.id/investigasibetween August 12–31, 2024. The study focused on pilot-error-related accidents and serious incidents, analysing preconditions and errors through HFACS, with internal validation conducted by NTSC investigators. Statistical analysis using a non-parametric tests was carried out to assess the association between preconditions, errors, and incident severity (Accidents and Serious Incidents).

Results
A total of 245 investigation reports were downloaded, amounting to 253 aircrafts with eight aircrafts involved in near collisions, and 186 pilot error related investigation were selected as subject analysis. The study found that pilots with Adverse Mental States had a 3.87 times higher risk (95%CI 1.77 – 8.47) for accidents while those with Physical Mental Limitation had a 3.35 higher risk (95%CI 1.50 – 7.45). In addition, pilots with Skill-based Errors had a 3.07 times higher risk (95%CI 1.38 – 6.83) for accidents.

Conclusion
The preconditions that were associated with accidents and serious incidents were Adverse Mental States and Physical Mental Limitations. In terms of errors, Skill-based Errors was associated with accidents and serious incidents.

Relevance
The study contributes to understanding how pilot preconditions and errors influence aviation safety, highlighting the complexity of human factors in aviation accidents, and underscoring the need for a multifaceted approach to mitigating pilot error.

Keywords: human factor, pilot error, investigation report, preconditions, Indonesia

ABS:231

Occupant Survival in Helicopter Accidents: The Effect of Crashworthy Design Features in Utility and Attack Helicopters

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Introduction

It is widely acknowledged that crashworthy design features and personal protective equipment improve occupant survival in helicopter accidents. However, these systems and state-of-the-art safety equipment are expensive and add weight—questions regularly arise regarding the continuing need for these safety-related requirements. To provide the helicopter aviation community with an updated perspective, data from rotary-wing accidents with and without crashworthy design features and/or aircrew protective equipment were analyzed and discussed in terms of current injury risk factors.

Methods

Survival rates from previous analyses comparing U.S. Army utility helicopters with and without crashworthy features (UH-1 vs UH-60) were combined with similar data from U.S. Army attack helicopters (AH-1 vs AH-64) and analyzed with inferential statistics. Evidence supporting the use of personal protective gear (e.g., helmets, clothing, gloves) was collected and subjected to additional analyses.

Results

Analysis of survival in utility helicopter crashes confirmed a lower fatality rate in the 40-60 ft/sec vertical velocity range for the UH-60 vs. the UH-1 (25% vs. 97%); the same pattern was seen in attack helicopter crashes in the 30-50 ft/sec range for the AH-64 vs. the AH-1 (5% vs. 75%), and in the combined analysis. Review of head injury data showed a clear benefit of helmet use in the more severe helicopter impacts (RR = 7.5).

Discussion

The benefit of these safety measures is clear and they should be included in all future helicopter designs and safety programs—military and civilian. One area in which the injury probability has changed, however, is related to the reduction of post-crash fire in recent years—the requirement for fire protective clothing and gloves has become a debated topic in the aviation safety community.

Conclusion

The evidence supporting the benefit of safety aircraft features and equipment is overwhelmingly positive.

Keywords: helicopter, crash survival, injury, crashworthiness, helmet

ABS:47

Measuring What Matters: Assessing the Real-World Impact of Flight and Duty Time Limits on Crew Fatigue

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This presentation explores the effectiveness of Flight and Duty Time Limits (FTL) as a regulatory approach to managing crew fatigue and enhancing operational safety. While FTL regulations provide a structured framework to limit fatigue risk, their real-world impact varies significantly across operational contexts. Through a comprehensive analysis of operational data, fatigue metrics, and scheduling practices, this research highlights both the strengths and limitations of current FTL implementation.

A key focus is on the development and application of sound fatigue-related metrics—more in detail reflecting the progression of risk of human error in relation to sleepiness and fatigue levels - quantifying the overall fatigue risk exposure of planned crew rosters. These metrics provide actionable insights into where fatigue risks concentrate and how they can be mitigated more effectively.

Findings, from a detailed analysis of the current vs. the former EASA FTLs, reveal that compliance with FTL regulations does not always equate to effective fatigue risk management. Operational complexity, flight schedule, and scheduling practices can limit the protective value of the rules. However, the study also showcases promising developments where data-driven fatigue risk management systems (FRMS) are used to identify hidden vulnerabilities and inform more adaptive rostering and rest strategies while conserving crew efficiency.

Ultimately, this research underscores the need to move beyond a compliance-based mindset. While FTL regulations remain a necessary foundation, they must be embedded within a broader safety management system that embraces continuous learning, data integration, and organizational commitment to managing fatigue as a dynamic and multifaceted risk.

Keywords: Fatigue, FTL, BMM, bio-mathamtical modelling, human performance, human error, crew efficiency

SESSION 7B: AVIATION PSYCHIATRY AND MENTAL HEALTH

ABS:146

Impact of COVID-19 on military aircrew mental health

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Background

Few studies have investigated the effect of the COVID-19 pandemic on aircrew mental health. Since 2015, the Republic of Singapore Air Force (RSAF) has used the Patient Health Questionnaire-9 (PHQ-9) and General Anxiety Disorder-7 (GAD-7) self-rated questionnaires in annual aircrew health screening to identify individuals with depressive and anxiety symptoms. It was hypothesised that such routine mental health screening tools could be useful in identifying trends in aircrew mental health during the COVID-19 pandemic.

Methods

A repeated cross-sectional study was conducted from 2019 to 2022 to assess the prevalence of depressive and anxiety symptoms among RSAF aircrew in three one-year intervals: pre-pandemic (Apr 2019–Mar 2020), during the first two waves of the pandemic when isolation measures were instituted (Apr 2020–Mar 2021), and after vaccination programs in Singapore (Apr 2021–Mar 2022).

Results

Between April 19 and March 22, most aircrew and ground-based vocationalists reported scores of 0 or 1 (90.1% on PHQ-9, 93.7% on GAD-7). Isolation measures did not significantly increase either score.

Conclusion

This study is the first to assess the impact of the COVID-19 pandemic on military aircrew mental health using mental health screening tools as part of routine aircrew medicals. The COVID-19 pandemic had a small impact on aircrews' PHQ-9 and GAD-7 scores. The authors hypothesise that this is likely a consequence of the healthy worker effect, secondary to stringent mental health selection and retention standards in military aircrew.

Keywords: COVID-19, military aircrew, mental health

ABS:87

The aviation psychiatrist: a major role in diagnosis and follow-up

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Introduction
Military flight surgeons are sometimes required to refer aircrew members to an aviation psychiatrist. This study examines the contributions of the aviation psychiatrist to the flight surgeon, the aircrews, and the command.

Methods
We conducted a retrospective study of aircrew referred for the first time to an aviation psychiatrist at our AeMC between January 2022 and September 2024. We analyzed the characteristics of the referred population, reasons for referral, established diagnoses, fitness decisions, and indications for referral to a local concertation panel (CP) or the French Military Aeromedical Board (FMAB).

Results
The study population included 105 aircrew members (81% male, 69% officers, 58% pilots, mean age 35.9 ± 8.5 years). Referrals were made by flight surgeons in 63% of cases and by the AeMC in 37%, primarily for symptoms (59%), prolonged sick leave (7.6%), or behavioral issues such as positive drug tests (5.7%). Prior to the assessment, 68% had no psychiatric history, and the aviation psychiatrist established 73% of the diagnoses. Adjustment disorders were more frequently diagnosed by the psychiatrist ($p<0.001$), whereas behavioral disorders were less frequent ($p<0.01$). A specific psychiatric follow-up was initiated for 69% of the cases. Regarding fitness for flight, 59% of cases were discussed at a CP, and 42% were referred to the FMAB. Overall, 54% of aircrew were declared fit to fly. Adjustment disorders ($p=0.01$), neurodevelopmental disorders ($p=0.041$), personality disorders ($p=0.041$), and psychoses were associated with a higher risk of unfitness.

Discussion
Aviation psychiatrists play a crucial role in diagnosing psychiatric conditions within a population mostly without prior psychiatric history. They are key contributors to aeromedical decision-making and the provision of psychiatric follow-up, which is essential in a group often described as reluctant due to fear of disqualification. Psychiatric follow-up does not imply unfitness except in the presence of severe psychiatric disorders.

Keywords: psychiatric disorders, fitness assessment, military aircrew member

ABS:161

Mental Health Support in the Republic of Singapore Air Force (RSAF)

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Background
The COVID-19 pandemic brought the spotlight on mental health to the fore and globally, we're seeing a decline in mental health across populations. in 2022, Singapore's projected mental health spending increased to $434.6 million (which was 3% of total health care expenditure). In October 2023, then Senior Minister of State for Health Janil Puthucheary launched Singapore's National Mental Health and Well-being Strategy, signalling recognition that mental health has become a significant health and social issue.

Overview
In the Ministry of Defence (MINDEF)/ Singapore Armed Forces (SAF), we developed the MINDEF/ SAF Mental Health Framework to proactively clarify mental health outcomes, target audience, key strategies and responsible stakeholders. Our strategies outline efforts that are upstream and proactive, partnering service personnel, commanders/ supervisors and peers to care for one another's mental health. These include monitoring national trends, differentiated care, enhancement of mental health literacy in development of coping and helping skills and fostering an inclusive and resilience culture.
In recent years, there has been an increasing focus on workplace well-being efforts as we recognise that investing in employee mental health is crucial as research found that these efforts contribute to better productivity, decreased attrition and create a more positive work culture.
In RSAF, we have a dedicated team of psychologists providing mental health support for our airmen and airwomen. We invest resources into outreach efforts such as our annual Mental Health Month in October with activities to increase mental health literacy and promote mental health discussions.

Discussion
This presentation will highlight our lines of efforts factoring in prevailing and prospective phenomenon and underlines the RSAF's sensitivity of the prevailing mental health climate as well as proactively addressing the needs of our service personnel.

Keywords: Mental Health

ABS:100

Understanding Cultural Rituals in Aviation Medicine: A Case of Annual Self-Flagellation and Mental Health Clearance

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Introduction

Cultural or religious practices with physical manifestations may raise concerns during pilot medical certification, particularly when misinterpreted as self-harm or mental illness. Understanding such behaviours in context is essential to support fair, evidence-based decision-making in aviation medicine.

Purpose

This case explores how an annual act of religious self-flagellation was distinguished from pathological self-harm during a Class 1 initial medical assessment for a pilot applicant.

Case

A 20-year-old male applicant undergoing a Class 1 initial medical assessment disclosed participating annually in Zanjeer Zani, a Shia Muslim ritual involving supervised self-flagellation with chains. This had caused minor scarring but no medical complications. There was no history of self-harm, psychiatric illness, substance misuse, or trauma. He reported excellent family support, positive academic and occupational history, and was progressing well through pilot training. To clarify mental health fitness, the applicant agreed to a voluntary psychiatric assessment. A comprehensive evaluation, including mental state examination and rating scales, confirmed no evidence of mental illness or disorder. The act was interpreted as religious expression, not psychological distress.

Results

The psychiatric review concluded the applicant posed no mental health risk and was fully capable of operating safely in a flight deck environment. He expressed willingness to discontinue the ritual if necessary for career progression.

Discussion

This case highlights the importance of nuanced assessment of cultural or religious practices during aviation medical evaluations. Rituals involving physical acts of devotion are not unique to one faith; self-discipline, fasting, and acts of penance occur in various traditions, including Christianity, Hinduism, and Buddhism. Mislabeling such practices as pathological may risk unfair exclusion from flight duties. Sensitive engagement and timely specialist review can clarify intent, risk, and functional impact without compromising safety.

Conclusion

Culturally contextualised behaviours must be interpreted carefully in aeromedical settings. Structured psychiatric evaluation can support informed certification while respecting individual background.

Keywords: Self Flagellation, Mental Health, Skin Marks

ABS:40

Dissociative Amnesia in a Pilot and The Role of Psychometric Assessment in Aeromedical Decision Making - A Case Report

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Background

While the consequences of severe stress could be many, about 0.2% of population may present with dissociative amnesia, a neuropsychiatric sequelae characterized by deficit in autobiographical memory with impairment in important areas of functioning. It is vital to differentiate it from malingered amnesia as pilots with dissociative amnesia are at a higher risk of recurrence if exposed to stress, thus affecting their fitness to fly.

Overview

A 37 years old ATR-72 pilot, flying for the past 17 years was undergoing transition training to Boeing 737-800. About a month in training, he complained of feeling extremely stressful. Unfortunately, while on his way to his training session one day, he had unintentionally wondered to a different town and was found by the roadside, being unable to recall his personal identity, his occupation and his family members. After undergoing extensive neurological and radiological assessments which were normal, he was referred to the psychiatrist. As clinical history alone could not confirm a diagnosis of dissociative amnesia or rule out malingering, objective psychometric assessment using Dissociative Experiences Scale-II and Multidimensional Inventory of Dissociation showed positive results, and the Personality Assessment Inventory on the other hand was not suggestive of malingering. Thus, a diagnosis of dissociative amnesia was made and he responded well to psychotherapy. Despite regaining back most of his memory, the risk of developing another dissociative episode in a stressful situation is high.

Discussion

Depending on the patient's subjective history alone may be inadequate to establish a diagnosis of dissociative amnesia which has important aeromedical implications. Objective psychometric assessments has high clinical value when correlated with clinical examination. This case further discusses the aeromedical aspect of this rare neuropsychiatric condition.

Conclusion

As there is no definitive treatment for dissociative amnesia, prevention, early detection and intervention of stress is vital in enhancing aviation safety.

Keywords: aviation mental health, dissociative amnesia, psychometric assessment

ABS:141

Andropause and Aeromedical Risk: A Systematic Review of Testosterone Deficiency in Male Pilots' Performance and Mental Health

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Introduction

Age-associated testosterone decline, or andropause, has been increasingly recognized as a contributor to cognitive slowing, affective instability, and reduced physiological resilience in aging males. In aviation medicine, where sustained mental performance and stress tolerance are essential for flight safety, these subtle deficits may present clinically as fatigue, inattention, or low mood. This systematic review and meta-analysis evaluates how testosterone deficiency may affect pilot functioning and considers its potential role in guiding supportive, preventive strategies during aeromedical assessments.

Methods

A structured literature search was conducted across PubMed, Web of Science, and aerospace medicine databases, without restriction on language or publication date. Eligible studies included civilian or military male pilots with documented testosterone status and validated cognitive or psychological outcome measures. Data were synthesized using a random-effects model. Standardized effect sizes (Hedges' *g*) were calculated for cognitive outcomes (e.g., reaction time, executive function) and mental health indicators (e.g., depressive symptoms, fatigue, stress). Subgroup analyses were conducted by age and flight environment. Methodological quality and heterogeneity were assessed.

Results

Fifteen studies met inclusion criteria, of which nine reported quantitative sample sizes, totaling N = 346 male pilots. Testosterone deficiency—whether due to aging, sustained operational stress, or clinical hypogonadism—was associated with reduced cognitive performance ($g = 0.65$) and greater mood disturbance ($g = 0.60$). These effects were more frequently observed in older pilots and those exposed to long-haul duty, circadian disruption, or hypobaric stress. Several studies noted compensatory effects of flight experience, highlighting the resilience of well-trained aviators despite physiological changes.

Conclusion

Testosterone deficiency may be an underrecognized factor affecting pilot performance and well-being. A **systematic yet supportive approach** to hormonal screening may promote early detection and personalized care—helping experienced pilots remain safe, confident, and operationally ready across all stages of their careers.

Keywords: Testosterone deficiency, Andropause, Male pilots, Cognitive performance, Mental health, Aviation medicine

SESSION 8A: HIGH PERFORMANCE AVIATION & ACCELERATION

ABS:105

Biometric Monitoring and AI Algorithms to Predict Physiologic Stress in High Performance Flight

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Introduction

Reliable biometric monitoring in extreme austere high risk, low resource environments presents a unique challenge. Rapid, non-invasive tools to detect threats to physiologic equilibrium are critically important where standard diagnostic tools are not readily available. Continuous secure autonomous and ambient physiologic monitoring and reporting will be essential for safe aerospace and commercial spaceflight operations.

Objective or hypothesis

The goal of this study is to assess feasibility and reliability of a secure, low size, weight, and power and cost (SWAP-C) remote monitor.

Methods

A pilot study was conducted to evaluate monitoring performance during extreme G-force flight environments. The device was configured to detect full-wave single lead pair ECG, full-wave photoplethysmography, motion with single tri-axial accelerometer (high-g, dual inertial measurement units), and barometric pressure. The flight profiles included aerodynamic flights up to +6g, both with and without G-suit application.

Results

The pilot study demonstrated biometric monitoring feasibility with excellent data capture in standard and high-G conditions.

Discussion

High precision, high-resolution ECG and PPG waveforms allow for machine learning applications in remote monitoring. Currently, convolutional neural network-based algorithms predict age, gender, and pathology such as hypertrophic cardiomyopathy, aortic stenosis, and low ejection fraction. Novel algorithms under development, as well as standard ECG and PPG algorithms, may be applied to nominal and altered G-force conditions creating individualized biometric signatures under such conditions. Alterations in individual signatures may be used in the future to predict off-nominal physiological states to optimize performance in extreme austere environments.

Conclusion

Reliable biometric monitoring under conditions of extreme austere environments may provide opportunities for new insights into physiological disturbances and risk-to-mission phenotypes. Future research hopes to answerwhether exposure to extreme environments will reveal a clinically meaningful change in AI-enhanced algorithms that could be used for future risk profiling.

Keywords: biometric monitoring, G-force, machine learning, predicting physiologic states

ABS:115

Sudden Inflight Incapacitation During a High-G-Maneuver Due to a Cerebellar Arteriovenous Malformation: A Case Report

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Introduction

This case report describes a 41-year old German Eurofighter pilot who experienced a sudden inflight incapacitation during a tactical high-g-maneuver.

Purpose

Military jets are increasingly agile and capable of producing significant +Gz loads. Neuroanatomically the cerebellum and the vestibulocochlear system localizes the essential functions of fine motor skills and sense of balance.

Methods

The incident occurred during a tactical flight in which the pilot performed a simulated evasive maneuver in the supersonic range with a G-load of 9G+. He suffered a sudden massive vertigo attack. Only after the pilot was able to bring his jet into a stable flight position the clinical symptoms gradually stabilized, with the dizziness receding. The pilot was subsequently able to land the jet safely.

Results

We performed a complete neuroimaging check and found a cerebellar arteriovenous malformation that was primary fed over the PICA. The high-G-maneuver exerted considerable pressure on the vertebral artery, resulting in a reduction in vascular supply which subsequently triggered the massive vertigo. The pilot underwent sucessfull neurointerventional treatment. After passing all necessary examinations, including high G-loads in the centrifuge, he is considered cured and can return to active flying duties.

Discussion

This case highlights the need for neuroanatomical screening of military pilots, as they are regularly exposed to high G-loads in contrast to civil aviation. Arteriovenous malformations belong to the congenital malformations of the neurocranium. The arterial system is directly connected to the venous system without the capillary system. They have the risk of bleeding and causing local symptoms. Therefore, the German Air Force screens all pilot candidates by 3-TESLA-MRI including an intracranial TOF-angiography.

Conclusion

Loss of conscious, vertigo and visual symptoms are reported during high-g-maneuvers. No available countermeasure will be suitable in this situation. This case clearly demonstrates the urgent need for neuroimaging screening in military pilots.

Keywords: Neuroimaging screening, MRI, high-g-maneuver, arteriovenous malformation

ABS:154

10-Year Analysis of Medical Events Following Human Training Centrifuge Training in Republic of Singapore Air Force Aircrew

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Introduction

The Republic of Singapore Air Force (RSAF) utilises the Human Training Centrifuge (HTC) to train aircrew in effective anti-G straining manoeuvres (AGSM) and improve G tolerance. Training comprises computer-controlled (open-loop) profiles for trainees and Dynamic Flight Simulation (DFS) (closed-loop) profiles for trained aircrew, where simulated aerial combat manoeuvres allow for pilot-controlled G onset rates. This study investigated medical incidents related to HTC usage in aviation physiology training.

Methods

8,013 HTC runs over 10 years (2014-2023) were audited, during which 103 medical incident reports were documented. Data was collected through incident report forms and analysed using descriptive statistics and statistical tests to compare training profile outcomes.

Results

Musculoskeletal injuries were the most prevalent (76.70%), with back pain being the predominant condition within this category (41.77%). Other conditions included cardiovascular (13.59%) and ophthalmological (3.88%) events. DFS (closed-loop) profiles resulted in 3 medical incidents out of 955, compared to 100 in 7,058 computer-controlled (open-loop) profiles (p=0.011). Among reported incidents, 35 aircrew (33.98%) had significant related past medical history. Post-incident, 73 aircrew (70.87%) completed centrifuge training eventually and returned to flying.

Discussion

HTC training demonstrates a favourable safety profile with low complication rates. A decline in the trend of medical events has been noted since 2019, which coincides with the implementation of DFS (closed-loop) training. DFS (closed-loop) training provides dual benefits: offering realistic scenarios while allowing aircrew to control G exposure parameters, resulting in significantly lower medical complications while achieving training objectives. Most affected aircrew successfully complete their training requirements.

Keywords: G-force training, musculoskeletal injuries, closed-loop centrifuge, RSAF, open-loop centrifuge, complication rates

ABS:33

Comparison of Intermittent Hypoxia Exposure at high altitude and routine acclimatisation-A pilot study

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Introduction
Rapid ascent of individuals to high altitude (HA) can lead to acute HA illnesses like Acute Mountain Sickness (AMS), High Altitude Pulmonary Edema (HAPE) and High Altitude Cerebral Edema(HACE). The preventive strategies of staged ascent and pre-acclimatisation are time consuming and logistically challenging. The present study compared routine acclimatization at 4500 meters with Intermittent Hypoxic Exposure (IHE) at 3100 meters, with/without chemo-prophylaxis.

Methods
Forty-five healthy males residing at 3100 meters for >/=01 month were randomized into three groups-IHE with chemoprophylaxis (Cap Acetazolamide 250mg SR OD prior to IHE for 72 hours):IHE-A, IHE with Placebo OD:IHE-P & control group (STG) undergoing routine acclimatization in the form of staged ascent at 4500m. Baseline heart rate, blood pressure, respiratory rate, SpO2(vital parameters) and cycle ergometer time trial (TT) test for 6km against fixed 75 watt load at altitude of 3100m was recorded. IHE-A & IHE-P groups were administered seven-day IHE at 3100m-2 hours/day at rest at PO2 equivalent of 4500m followed by two 25-min bouts of cycle exercise at 60 ± 5% of peak heart rate at PO2 equivalent of 3500m. After IHE, vital parameters, Lake Louise Score and TT at an altitude of 4500m was recorded. STG group were taken to 4500m for routine acclimatization. On 5th day morning vital parameters and TT was recorded.

Results
There was no difference between groups except exercise (IHE-A:10.57(1.5),IHE-P:9.67(0.96),STG:12.69(1.41) p<0.000) and SpO2(IHE-A:89.73(1.44),IHE-P:90.40(2.56),STG-83.47(5.34) p<0.000). Participants with IHE showed better exercise capacity and SpO2compared to routine acclimatization.

Conclusion
IHE at HA could serve as a strategy for performance enhancement at HA.

Relevance
IHE at HA could enable optimization of performance at greater heights and could serve as an alternative to the time consuming and resource intensive strategy of staging at HA.

Keywords: Intermittent Hypoxia Exposure, High Altitude, Exercise

ABS:212

Enhancing Hypoxia Recognition and Visual Performance in Rotary Wing Aircrew Through Simulated High-Altitude Training

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Introduction
Hypobaric hypoxia at high altitudes (>10,000 feet) poses significant risks to aircrew, especially helicopter crews which lack cabin pressurization and supplemental oxygen systems. The physiological effects, including impaired night vision, can jeopardize safety. This study aimed to assess the training's effectiveness in enabling participants to recognize hypoxia symptoms, improve night vision, identify training gaps, and suggest enhancements.

Methods
Retrospective analysis was conducted on data from Rotary Wing Hypobaric Chamber (RWHC) training sessions at the Institute of Aviation Medicine (IAM), Royal Malaysian Air Force (RMAF), from January to December 2023, involving 91 aircrew members. The training simulated an altitude of 14,000 feet under dim light for 40 minutes, assessing symptom recognition, visual performance, and physiological responses.

Results
Approximately 47.3% of participants reported hypoxia symptoms, predominantly drowsiness (43.3%), followed by dizziness (14.9%) and blurred vision (9.0%). Visual improvements upon oxygen administration were noted by 72.5%, although only 14.3% experienced dark adaptation. Oxygen saturation levels dropped to an average of 77.4% at 34 minutes and recovered to 99.6% post-oxygen.

Conclusion
The subtlety of hypoxia symptoms at 14,000 feet suggests a need for enhanced training. Accordingly, in 2024, the protocol was revised to expose aircrew to mild hypoxia at 18,000 feet for 10 minutes. Preliminary results show improved symptom recognition (70.8%) and a high rate of reported night vision enhancement (91.7%) following oxygen therapy. This underscores the importance of ongoing RWHC training to ensure effective hypoxia management in operational environments.

Relevancy
This study highlights the critical role of simulation-based training in improving hypoxia awareness and response, thereby enhancing flight safety for rotary wing aircrew.

Keywords: altitude chamber training, helicopter aircrew

ABS:50

Hypoxia Hangover Following Exposure to Simulated Hypobaric Hypoxia

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Introduction
The term "hypoxia hangover" refers to the effects of hypoxia that may persist and linger even after exposure to hypoxia has ended and oxygen saturation levels have returned to normal. This study assesses the duration of hypoxia hangover after exposure to simulated hypobaric hypoxia.

Methods
A total of 30 healthy volunteers (25 male and 05 female) aged between 20 to 40 years participated in this study. The baseline Psychomotor Vigilance Task (PVT) was recorded. Subjects were exposed to simulated hypobaric hypoxia at 25,000 ft. for 05 mins, and PVT was administered during exposure to hypoxia, after reaching the ground altitude, and thereafter every hour for the next 05 hrs. Along with PVT, hypoxia symptoms were also monitored at fixed intervals using a hypoxia symptoms questionnaire.

Results
The median reaction time (RT) recorded maximum during exposure (DE) to hypoxia from the baseline and then declined at DE+09. Later, minimal variation is observed at different time points. The total error and lapses recorded maximum during exposure to hypoxia and started declining in subsequent time points. Minimal variation is observed at different time points. Hypoxia symptoms also followed a similar trend.

Discussion
The reaction time measured in fixed intervals by PVT was found to be impaired until 04 hours of exposure. There is an unexplainable peak of total errors and lapses >500ms at 4h of post-exposure. In this study lingering effect of hypoxia was found to be present until 04 hours post-exposure to hypobaric hypoxia for 05 minutes at 25,000 ft.

Conclusion
This study has objectively demonstrated the lingering effects of hypoxia after cessation of hypoxia and restoration of oxygen saturation to normal.

Relevance
Recommendations can be made for the grounding of aircrew post-exposure to hypoxia and ensuring flight safety.

Keywords: Hypoxia, Hypoxia Hangover, Hypobaric Hypoxia, Psychomotor Vigilance Task (PVT), Response time (RT)

SESSION 8B: AVIATION OPHTHALMOLOGY

ABS:179

An Efficient, Two-step Approach To Color Assessment

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Introduction
Advances in color vision assessment make it possible to describe in detail the applicant's class of color vision (i.e., normal trichromacy, dichromacy and anomalous trichromacy, acquired deficiency and the less common class of acquired loss on top of congenital). Improved understanding of the effects of healthy normal aging also makes it possible to separate normal trichromats from those with colour deficiency with close to 100% sensitivity and specificity and to quantify accurately the severity of both red / green (RG) and yellow / blue (YB) loss. Existing tests can take as long as 15 minutes to complete and require the use of expensive, fully calibrated visual displays. To avoid these disadvantages, we developed an affordable Color Vision Screener (CVS) that detects both congenital and acquired deficiencies, takes just over two minutes to complete, is easy to perform and has close to 100% sensitivity and specificity. The screener design and results from a multicentre, international study carried out to validate the CVS test will be presented.

Methods
The CVS employs normal aging results from previous studies using the Colour Assessment and Diagnosis (CAD) test. The study was carried out in nine international medical centres who provide routine color assessments in aviation. 180 normal trichromats, 181 with deutan-like and 69 with protan-like deficiency participated in the study. Every participant carried out a full CAD test.

Results
The screener fails all RG colour deficient subjects and passes all but one normal trichromats yielding 100% sensitivity and 99% specificity. Only ~6% of randomly selected participants are expected to fail the screener and will need a full CAD test.

Conclusions
A two-step approach based on CVS followed by CAD in those who fail the screener provides an accurate and efficient colour assessment protocol suitable for use in visually demanding occupations and in the clinic.

Keywords: Color assessment, CAD test, color screener, color requirements

ABS:49

Prevalence and Influencing Factors of Dry Eye Syndrome Among Pilots: A Survey Study

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Background
Dry eye syndrome (DES) is a prevalent ocular condition that significantly impacts affected individuals' quality of life and occupational performance. This study investigates the prevalence and contributing factors of DES among pilots, which is a group particularly susceptible to environmental and occupational stressors.

Methods
A descriptive, observational study was conducted, which involved794 pilots. Based on the severity of DES, these pilots were assigned into mild,moderate and severe groups. Data was collected through surveys, and analyzed using multiple linear regression, in order to determine the relationship between the DES scores and potential influencing factors.

Results
The study revealed that all pilots included in the present study were affected by DES, in which 88.40% of pilots experienced moderate DES and 11.60% of pilots reported severe DES. After adjusting for other covariates in the model, the multivariate analysis revealed that eyelid diseases, ocular surface disease, poor sleep quality, and fatigue were statistically significant and positively correlated to higher DES scores($p<0.05$), while residing inthesouthern region and engaging in physical activities were statistically significant and negatively correlated to the DES scores ($p<0.05$).

Conclusion
The high prevalence of DES in pilots highlights the urgent need for tailored occupational health interventions. Strategies to mitigate DES risk should include promoting regular physical exercise, improving sleep quality, and addressing fatigue. Future research should prioritize longitudinal studies to establish causal relationships and develop targeted management approaches for this high-risk occupational group.

Keywords: Dry Eye Syndrome, Fatigue, Sleep, Pilots, Survey

ABS:51

Prevalence of Dry Eye Syndrome Among Flight Crews: A Comparative Study Between Airline and General Aviation Operators

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Introduction
Dry Eye Syndrome (DES) is a frequent condition among aviation personnel due to environmental factors such as low humidity and prolonged screen fixation. This study compares the prevalence of DES in flight crews operating long/medium-haul airline routes with those in general/executive aviation, assessing the role of flight hours and occupational exposure.

Methods
A total of 306 flight crew members (pilots and flight attendants) were enrolled in this observational study.
Group 1 (Airline operators): 150 subjects, average 700 flight hours/year.
Group 2 (General aviation): 156 subjects, average 300 flight hours/year.
Each participant underwent an ophthalmological evaluation, including:
Symptom assessment using the validated SPEED™ questionnaire (Standard Patient Evaluation of Eye Dryness).

Objective Testing
Schirmer test for tear production.
Tear Break-Up Time (BUT) for tear film stability.
Statistical comparison was performed using the chi-square test ($p<0.05$).

Results
DES prevalence in Group 1: 33.3% (50/150).
DES prevalence in Group 2: 16.7% (26/156), with a statistically significant difference ($p = 0.0012$).
Gender analysis: Women accounted for 26.3% of Group 2 but represented 53% of DES cases in that group.

Discussion
Flight crews engaged in long/medium-haul airline operations show a significantly higher prevalence of DES than those in general aviation. This is likely related to longer exposure to low-humidity cabin environments and greater visual strain. The increased prevalence among women supports existing evidence of sex-related differences in tear physiology.

Conclusion
Routine screening for DES should be considered in aeromedical assessments, especially for airline personnel. Preventive strategies, including artificial tears and visual ergonomics, are recommended to enhance ocular comfort and flight safety.

Keywords: Dry Eye Syndrome, aviation medicine, flight attendants, airline operations, general aviation, ocular health

ABS:182

Helmet-Mounted Displays Reshape Ocular Dominance and Refractive Symmetry in AH-64 Apache Helicopter Pilots

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Introduction
Apache pilots view most flight-critical symbology monocularly through a right-eye integrated helmet and display sight system (IHADSS). Sustained binocular rivalry may inhibit the left eye, altering ocular dominance and refraction. Quantifying this effect is crucial for pilot screening, visual training protocols, and HMD ergonomics.

Objective
To compare inter-ocular refractive differences in IHADSS-equipped Apache pilots with Black-Hawk pilots (no IHADSS) and examine adaptation within right- (OD) and left-dominant (OS) subgroups.
Methods
A retrospective review (2015-2024) of Israeli Air Force optometric records included AH-64 Apache (n=105) and UH-60 Black Hawk (n=158) aircrews. Dominance was determined by the Miles test (Apache: 73 OD, 32 OS; Black-Hawk: 110 OD, 48 OS). Paired t-tests compared sphere (Sph), cylinder (Cyl), and axis between eyes within each subgroup.

Results
Among AH-64 Apache pilots with right-eye dominance (OD), statistically significant inter-ocular differences were observed across all refractive parameters: the right eye exhibited higher spherical power (Sph=+0.113 D), lower cylindrical power (Cyl=-0.068 D), and a markedly different cylinder axis (Axis=+27.3°), all with p-values <0.05. In contrast, Apache pilots with left-eye dominance (OS) demonstrated no significant differences between eyes across any measure (p>0.10), indicating refractive symmetry. Among UH-60 Black Hawk pilots, both OD and OS subgroups showed no significant inter-ocular refractive differences (p>0.05), further supporting the specificity of the effect to prolonged IHADSS use in Apache aircrews.

Discussion
The pronounced right-eye advantage in OD Apache pilots and its absence in OS Apache or any Black Hawk subgroup suggest HMD-driven neurovisual plasticity that overrides native dominance only when the right eye is already preferential. Black Hawk symmetry confirms that the effect is IHADSS-specific, not inherent to military aviators.

Conclusion
Prolonged monocular IHADSS exposure induces functional dominance shifts and refractive asymmetry in Apache pilots, potentially compromising binocular balance and depth perception.

Relevance
Findings suggest the need for HMD-aware vision screening, targeted binocular balance training, and display design refinements to ensure flight performance and safety.

Keywords: IHADSS helmet-mounted display (HMD), ocular dominance, refractive asymmetry, AH-64 Apache pilots, aviation neuro-ophthalmology

ABS:223

Ophthalmic Evaluation Following Corneal Cross-Linking Procedures and Implications for Aircrew Return to Flight

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Introduction

Keratoconus is a progressive corneal disorder characterized by thinning and cone-like protrusion of the cornea, leading to visual distortion and decreased visual acuity (VA). This condition poses a significant challenge for military aviators, where high-level visual performance is essential.This study presents two cases of Israeli Air Force aircrew members diagnosed with keratoconus who successfully underwent the corneal cross-linking (CXL) procedure and returned to flight duty following comprehensive evaluation.

Case 1 - Major Y.

A 25-year-old Gulfstream squadron pilot presented with stable VA of 20/20 between 2012 and 2014. In 2015, minor refractive changes were noted, followed by progressive visual deterioration from 2015 to 2018. By 2019, uncorrected VA had decreased (RE: 20/40), and keratoconus was diagnosed. Major Y. underwent the CXL procedure in the right eye using the Dresden protocol, followed by a grounding period of 2 months. Subsequently, he resumed flying with spectacle correction, achieving 20/20 VA bilaterally. A 6-year follow-up confirmed stable corneal structure and VA.

Case 2 - Major I.

A 28-year-old combat pilot presented with stable VA of 20/20 between 2015 and 2017. In 2018–2019, mild myopic changes with astigmatism emerged. In 2020, an increase of 0.50D cylinder was observed in the right eye. Corneal topography confirmed a keratoconus pattern, and CXL was performed in 2021. CXL was followed by 2.5 months of grounding. A 5-year follow-up confirmed stable corneal structure and VA.

Conclusion

These two cases demonstrate that aircrew members diagnosed with keratoconus can maintain flight eligibility due to early detection, close monitoring, and individualized treatment. While visual stability and safety remain paramount in aviation medicine, CXL offers a viable intervention that supports operational readiness.

Keywords: corneal cross linking, cxr, aircrew, pilots, aviators, flight disqualification, ophthalmic evaluation, cornea

ABS:221

Impact of the COVID-19 Pandemic on Myopia Progression Among Israeli Air Force Flight Academy Candidates

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Background
Myopia is a leading global cause of visual impairment, with risk factors including prolonged near-work, increased screen exposure, and limited outdoor activity. The COVID-19 pandemic led to lifestyle changes that may have exacerbated myopia, particularly in younger populations. This study aimed to assess the pandemic's impact on myopia progression in young adults applying to the Israeli Air Force (IAF) flight academy and to evaluate whether current visual admission standards require adjustment.

Methods
A retrospective cohort study analyzed 7,491 candidates evaluated for the IAF aviator training program between 2019 and 2023. All participants underwent standardized non-cycloplegic refraction. Refractive status was categorized as myopia, emmetropia, or hyperopia. Candidates were stratified by assessment period: pre-lockdown, during lockdown, and post-lockdown. Statistical comparisons were made between groups, and multivariate regression assessed associations between spherical equivalent (SE) and demographic/timing variables.

Results
The mean age of participants was 17.36±0.48 years. A statistically significant shift in refractive error distribution was observed across time periods ($p<0.0001$). Hyperopia prevalence rose during lockdowns (18.81%) compared to pre-lockdown (13.62%, $p<0.0001$) and post-lockdown periods (14.37%, $p<0.0016$). Mean SE was less myopic during (-0.44 D) and after (-0.42 D) lockdowns than before (−0.54 D), suggesting reduced myopia progression ($p<0.01$). Multivariate regression confirmed increased SE during and post-lockdowns relative to pre-lockdowns ($p<0.01$) and showed males had significantly higher SE ($p<0.001$).

Conclusions
Contrary to trends reported in children, young adult candidates for the IAF flight academy exhibited reduced myopia progression during and after the COVID-19 lockdowns. This highly motivated population possibly maintained its outdoor physical activity patterns regardless of lockdowns. These findings support the continued use of current visual standards for flight academy admission.

Keywords: myopia, pilots, aviators, flight academy candidates, covid-19, admission standards

SESSION 9A: SPACE MEDICINE 3

ABS:234

The Practice of Domains of Aerospace Psychiatry and Future Challenges for Commercial Spaceflight

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The evolution of aerospace psychiatry reflects the increasing complexity of human performance in aviation and spaceflight. This presentation will outline the scope of aerospace psychiatry today, focusing on its applications in both professional astronaut and commercial spaceflight participant contexts.
We will describe the role of the aerospace psychiatrist in civil aviation, military aviation, and human spaceflight, with an emphasis on psychiatric risk mitigation strategies. For professional astronauts, we will review the behavioural health considerations central to astronaut selection, training, and support, including competencies critical for long-duration missions, rigorous psychological and psychiatric screening processes, and in-flight and post-flight support programmes.
The presentation will then address the emerging challenges associated with the commercial spaceflight era, where participants differ significantly from professional astronauts in terms of background, motivation, and operational exposure. These differences necessitate adapted approaches to psychological screening and support tailored to shorter-duration missions and non-career astronauts.
Finally, we will discuss future behavioural health challenges as human missions extend farther into deep space, where typical pharmacotherapeutic approaches may be impractical due to altered pharmacokinetics, mission constraints, and resupply limitations. We will highlight the potential role of non-pharmacological interventions, including novel neuromodulation techniques, as part of a behavioural health toolkit for future missions.
This presentation underscores the continued importance of aerospace psychiatry in optimising human performance, mitigating psychological and psychiatric risks, and ensuring mission success, whether in commercial suborbital flights or deep space exploration.

Keywords: Space psychiatry commercial spaceflight civil aviation military aviation neuromodulation

ABS:61

Challenges to developing Astropharmacy: A qualitative study using the Theoretical Domains Framework

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Introduction
In space, human physiology undergoes extensive change, potentially impacting how medications perform. Medication also changes, with shortening of stability, and the potential of altered degradation pathways due to the spaceflight environment. The development of pharmacy in the space sector, often referred to as "Astropharmacy", will come with inherent barriers, and identifying these components will enable guided evidence generation and policy solutions for Astropharmacists within the field.

Objective
To investigate the challenges associated with developing astropharmacy.

Methods:
Semi-structured interviews and focus groups were conducted with pharmacy human health-related space sector stakeholders. Purposive and snowball sampling were used to identify stakeholders. Interviews and focus groups were audio recorded, transcribed verbatim and thematically analysed (sequential data-driven and theory-driven; the latter guided by the Theoretical Domains Framework (TDF)).

Results
Interviews and focus groups were conducted with 31 people from pharmacy and 26 human health-related space sector stakeholders across the globe from governmental, commercial, industrial, and academic sectors. Through an in-depth and sequentially produced approach, a clear TDF was produced to highlight areas requiring attention before the pharmacy field can address the challenges in the space sector. This includes a lack of knowledge and regulations, shortage in skills, unclear professional boundaries, competencies, incentives, and goals. Resources constraint, lack of transparency, and industry traditions were also highlighted as challenges.

Conclusion
Despite there being challenges and uncertainties, the inclusion of astropharmacy within both European Space Agency and National Aeronautical and Space Administration white papers/reports highlights its underlying necessity. This study presents the need for developing the astropharmacy concept to support safe and effective spaceflight medication practices, highlighting areas for future research, solutions and policy development in this burgeoning field

Keywords: Space Pharmacology, Astropharmacy, Medication

ABS:104

Spaceflight Immune Signatures: Can Routine CBC Data Reflect Omics Findings?

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Introduction

Spaceflight induces significant physiological stress, particularly on immune function, but methods to monitor these changes are limited. The recent Space Omics and Medical Atlas (SOMA) study by Overbey et al.(2024) profiled immune responses during the SpaceX Inspiration4 mission using snRNA-seq of peripheral blood mononuclear cells (PBMCs). Their findings revealed a spaceflight-specific immune "stress-signature" in immune cell types, with gene expression changes post-flight largely resolving during recovery. However, the study did not report corresponding complete blood count (CBC) metrics, despite collection. This study investigates whether CBCs reveal similar immune perturbations, offering a more accessible method for astronaut health monitoring. We propose that individuals have a baseline to which their blood parameters return post-spaceflight.

Hypothesis

We hypothesise that immune activation and recovery patterns observed in PBMC transcriptomics are reflected in CBC parameters, offering a clinically accessible alternative to omics-based findings. We further suggest that each individual has a baseline to which their blood parameters return post-spaceflight, enabling personalised monitoring.

Methods

CBC data from four participants in the SpaceX Inspiration4 mission were collected across seven timepoints. WBC and RBC were selected based on relevance to PBMC profiles. Longitudinal trends were assessed using weighted moving average (WMA) and locally weighted scatterplot smoothing (LOWESS). A linear mixed effects model evaluated fixed and random effects. High-expression DEGs from Overbey et al. were correlated with CBC subtypes to assess whether CBC metrics were comparable to PBMC-derived immune responses.

Results

WBC counts exhibited pre-flight elevation, post-flight decline, and recovery toward baseline, mirroring DEG dynamics in PBMCs. RBC counts remained stable, though variability suggested spaceflight-associated anaemia. Correlation analyses identified significant associations between PBMC-derived DEGs and CBC subtypes, particularly WBC subtypes. Mixed effects modelling confirmed substantial inter-individual variability, supporting personalised physiological baselines in spaceflight research.

Conclusion

CBC metrics reflect immune changes similar to PBMC transcriptomics and offer a practical, individual-specific baseline for monitoring astronaut health during spaceflight.

Keywords: immune function, space blood testing, CBC, PMBC, SOMA, astronaut health, immune monitoring, space omics, immune recovery, blood tests, haematology, personalised medicine, precision medicine, transcriptomics, omics, biomarkers, space health

ABS:211

Impact of microgravity and radiation on immune cellular and cytokine regulation

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Introduction
Exposure to microgravity and radiation during spaceflight disrupts immune system regulation. These immune alterations suggest increased susceptibility to infections, impaired healing, cancer and inflammatory impact on cardiovascular and neurological systems.

Purpose
This literature review examines the impact of microgravity and ionising radiation on immune cell function, cytokine expression, duration effects and countermeasure efficacy, highlighting health risks for long-duration missions.

Methods
A systematic literature search across PubMed, SCOPUS, and Embase was conducted, screening 788 papers. 60 met inclusion criteria. Studies focused only on cytogenic or metabolic analysis were excluded. Included studies involved human (n=21), animals (n=38), and organ-on-chip models (n=1) in spaceflight (n= 10), analogue (n=49) or combined environments (n=1). Research was categorised as short-duration (<30 days, n=27) and long-duration (>30 days, n=33), and analysed for cellular and cytokine changes and interventions.

Results
Findings identified altered leukocyte distribution, reduced T cell activation (n=16), lower NK cell cytotoxicity (n= 10), and shifts towards pro-inflammatory states (n= 34). Duration effects were significant: short missions caused transient leukocyte reductions and mixed cytokine responses, while long missions led to persistent immune dysregulation. Combined microgravity and radiation produced stronger effects. One study noted sex-specific differences, with higher neutrophil-to-lymphocyte ratios in females. Most interventions, from herbal treatments to growth factors, showed limited efficacy. Only one study fully restored immune cell counts using granulocyte-colony stimulating factor with enrofloxacin.

Discussion
Most studies focussed on cellular changes, with limited direct evidence linking immune alterations to clinical health outcomes. Limitations include reliance on animal models and analogue environments over human spaceflight data. Nonetheless, the evidence highlights significant risks during long-duration missions and the urgent need for countermeasures.

Conclusion
Long-term spaceflight causes persistent immune dysfunction, while short-term changes are largely transient. Future research should prioritise sex-specific differences, clinical impact to astronaut health, and developing effective interventions, crucial for safe Lunar and Martian missions.

Keywords: Space, Immunology, Microgravity, Radiation

ABS:171

Determining the Safe Staging Distance for Medical Rescue Forces during Launch Operations at the Kennedy Space Center

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Introduction

Launch of the Artemis spacecraft poses hazards due to the potential release of toxic hypergolic propellants during a prelaunch contingency. This is a concern for Triage Medical support personnel who are standing by in case of a launch contingency to provide medical support to the Astronaut Crew and any other potentially exposed personnel at the launch site. The fuel is monomethylhydrazine (MMH). The oxidizer is mixed oxides of nitrogen (MON-3, 97% nitrogen tetroxide). Objective:
We examined the safety of deploying medical support personnel to a site 3.5 km from the launch pad during the prelaunch period.

Method

Three cases were considered, release of MMH alone, release of MON-3 alone, or a combined release resulting in fire or explosion. Maximum credible release rates were estimated based on propellant loading and system design.

Results

Release of MON-3 alone was found to be the worst case. Concentration of nitrogen dioxide in the plume was estimated using a standard gaussian diffusion model and the EPA ALOHA computational fluid dynamics model. It was assumed that wind direction places the deployment location downwind of the launch pad. Our models predict maximum NO2 concentration at the deployment site to be below 0.5 ppm. This is below the permissible OSHA exposure limit for this chemical. MMH release was determined/ estimated by the models to be undetectable at the staging location and not a concern to forces stages there in both the single MMH release and the combined release scenarios.

Conclusion

Our current models indicate that emergency operations can safely be carried out at a planned deployment site 3.5 km from the launch pad.

Keywords: N2O4, Space vehicle launch ground operations

ABS:107

The A.R.T.E.M.I.S. Primer for Potential Osteopathic Manipulative Treatment in Spaceflight

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In the United States, two medical disciplines are responsible for training the physician workforce: the allopathic tradition (MD) and the osteopathic tradition (DO). DOs make rich contributions to medicine, employing hands-on treatments to address a variety of medical issues ranging from musculoskeletal ailments to lymphatic obstruction. This hands-on approach, termed osteopathic manipulative treatment (OMT), is a distinguishing feature between allopathic and osteopathic medical training. However, to date, there is a scarcity of discussion related to OMT human spaceflight applications.

As an adjunct to established medical and countermeasure protocols, OMT's potential use before, during, and after spaceflight carries numerous advantages. First, OMT is a cheap modality. Second, OMT can be easily taught. Third, OMT is time efficient. Finally, OMT is an unlimited medical resource independent of cargo resupply timelines, payload capacity, weight constraints, and active ingredient expiration dates.

In this primer, we introduce A.R.T.E.M.I.S, seven osteopathic tenets that form the basis of easily teachable and deployable OMT: Articulatory, Respiratory Action, Tenderpoints, Extension/Flexion, Muscle Energy, Indirect/Direct, Sympathetic Innervation. These tenets are major focal points of osteopathic training which can be taught to non-osteopathic physicians, physician assistants, physical therapists, and nurses. We contend that astronauts can learn these techniques as part of their medical training for mission preparation. We also provide example techniques that could be used in spaceflight. We broach possible limitations, including barriers to performing OMT in microgravity, the impact of spaceflight-induced muscle atrophy on the ability to perform OMT, and the impact of spaceflight-induced bone mineral loss on OMT efficacy. We argue that astronauts can be taught OMT as part of their medical training, and we offer the A.R.T.E.M.I.S. primer as a foundation to their use of OMT in successful spaceflight missions.

Keywords: Space Medicine, Exploration Medicine, Moon, Mars, Osteopathic

SESSION 9B: CLINICAL AVIATION MEDICINE 1

ABS:39

Shoulder Surgery in Pilots and Cabin Crew: Accelerating Return to Work through Aviation-Focused Surgical Practice and Musculoskeletal Rehabilitation Unit.

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Introduction
Over 30% of temporary incapacitations in pilots and cabin crew are due to musculoskeletal conditions, with shoulder injuries representing 20%. Previous research demonstrated that return-to-work (RTW) times range from 22 days for simple fractures up to 300 days after rotator cuff surgery.

Objective
To analyse RTW times following shoulder injuries within an aviation-focused surgical practice, specifically targeting cabin crew and pilots employed by a major airline.

Methods
This retrospective case series reviewed shoulder injury surgeries from a surgical specialty practice in 2023-2024. Excluding second opinions, conservative treatments, and follow-up cases from other surgeries. RTW was defined as the days from surgery to the first day of work resumption.

Results
30 patients underwent surgical treatment, including 19 male pilots (mean age 50.3 ± 11.3 years) and 11 cabin crew members (7 females, mean age 36.3 ± 6.6 years; 4 males, mean age 30 ± 14.5 years), with an overall mean age of 35.1 ± 6.6 years for cabin crew. The mean RTW time was 59.2 days. Four patients with shoulder dislocation had a mean RTW of 75.7 days. Two patients with impingement and AC joint osteoarthritis had a mean RTW of 55.1 days. Other conditions, such as impingement, rotator cuff tear, clavicle fractures, and SLAP lesions, had mean RTW times ranging from 15 to 70 days. Notably, one patient with a complex proximal humerus fracture had an RTW of 103 days, while two patients with frozen shoulder returned to work after 15 days.

Discussion/Conclusions
This study indicates that most surgically treated shoulder conditions have a mean RTW time of 50-60 days. Shoulder stabilization after dislocation takes 14 days longer, while complex proximal humerus fractures take twice as long. Aviation-focused surgical practices coupled with an aviation-specific musculoskeletal rehabilitation unit, facilitates a faster RTW when compared to local regulatory data.

Keywords: Musculoskeletal Conditions; Shoulder Surgery; Pilots; Cabin Crew; Return to Work

ABS:184

Correlations Between Clinical Spinal Features and MRI Findings in Aircrew Members

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Introduction
Spinal pain presents a significant aeromedical challenge, as cervical and lumbar pathologies may compromise operational performance among aircrew. Although numerous investigations in civilian populations have examined correlations between MRI findings and spinal symptomatology, this relationship remains incompletely characterized. Military aircrew specific data remain particularly sparse. This study aimed to evaluate associations between clinical manifestations and MRI findings among aircrew with spinal complaints.

Methods
A retrospective analysis of Israeli Air Force aircrew members presenting cervical or lumbar pain who underwent MRI between 2019-2025 was conducted. Data acquisition encompassed demographics, anthropometrics, occupational parameters, clinical evaluations performed by physicians/physiotherapists, and MRI. Pathological severity on MRI was quantitatively assessed by a blinded, experienced orthopedic surgeon.

Results
The study population comprised 64 cases, 95% male, mostly jet pilots. Subjects with neurological findings demonstrated significantly elevated MRI severity. Restricted range of motion was also associated with increased MRI severity. No significant differences in MRI severity were observed between subjects with vs. without any kind of tenderness. Duration of aeromedical disqualification exhibited significant positive correlation with MRI-determined pathology severity. Subgroup analysis revealed differential findings between cervical and lumbar cohorts.

Discussion
In symptomatic aircrew, intervertebral disc pathology demonstrates association with neurological deficits and ROM restrictions. In contrast, clinical tenderness demonstrated no correlation with imaging findings, emphasizing the diagnostic value of specific physical examination components. The observed differences between cervical and lumbar presentations warrant further characterization and investigation of each entity as well as a comparison to the general population. Regarding disqualification decisions, MRI constitutes one decision-making parameter, potentially introducing a confounding variable, in addition to other research limitations such as small cohort and variable clinical assessments.

Relevance
This study implies questions onto clinical practice: Is the quick and extensive processing for aircrews excessive? Can physical examination alone justify disqualification?

Keywords: Spinal Pain, Lumbar Pain, Cervical Pain, Neck Pain, Back Pain, Aircrew, Pilots, Aviators, MRI, Imaging, Performance, Aeromedical Disqualification

ABS:155

Prevalence of Musculoskeletal Conditions in RSAF Aircrew: A Single-Centre, Six-Year Retrospective Review from 2019 to 2024

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Introduction
Occupational exposures such as high +Gz forces, vibration, heavy helmet/optical devices weights, unnatural non-ergonomic body postures/movements constitute risk factors for the development and exacerbation of musculoskeletal (MSK) conditions in the military aviation environment. Chronic MSK conditions typically require an extended period of treatment and rehabilitation before return to flying duties is possible. Prolonged downchits also incur significant organisational costs from the manpower, operational and re-training perspectives.

Methods
A six-year retrospective analysis of all cases of prolonged downchits (≥ 3 months) among military aircrew in the Republic of Singapore Air Force (RSAF) between January 2019 and December 2024 was conducted to ascertain the prevalence of MSK conditions in this population and identify vocational risk factors for targeted intervention. Anonymised patient demographics, medical data and flying restriction information were extracted from an in-house electronic medical records database for data analysis.

Results
MSK conditions accounted for 37.0% (n=113 or 305) of prolonged downchit cases. The three most affected body regions were the lower back (44.2%), neck (19.5%) and knee (18.6%). When stratified by vocation, fighter aircrew (n=49; 43.4%) comprising pilots and weapon systems officers accounted for the majority of the population with MSK conditions, followed by helicopter aircrew (n=42; 37.2%) comprising pilots, aircrew specialists and flight engineers, and transport aircrew (n=19; 16.8%) comprising pilots and rear cabin crew. Among fighter aircrew, 57.1% had lower back conditions and 26.5% had neck conditions. Similar patterns were observed in helicopter aircrew, where lower back and neck conditions accounted for 45.2% and 11.9% respectively.

Conclusions
MSK conditions involving the lower back and neck are more prevalent in the RSAF's fighter and helicopter aircrew population.

Relevance
Our study underscores the need for targeted interventions such as prehabilitation and rehabilitation to reduce the prevalence of MSK conditions in identified population sub-groups.
Keywords: Musculoskeletal, Lower Back Pain, Neck Pain

ABS:123

Vestibular and Stabilometric Findings in Neck Pain and Vertebral Injuries in Pilots

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Introduction
Pilots who fly jet fighters or helicopters frequently experience vertebral problems due to acceleration and vibration, wearing helmets and other headgear, and sitting in suboptimal postures. Vertigo and postural instability following neck pain and/or vertebral problems is often related to real injury to vestibular structures. Many of the balance disorders reported can be justified by post-traumatic modification to the cervical proprioceptive input, with consequent damage to the vestibular spinal reflex.

Methods
We evaluate the vestibular condition and postural status in a group of patients (Group A, n = 15, mean age 45,9) affected with balance disorders following neck pain, and in a second group (Group B, n = 14, mean age 52,2) with balance disorders after vertebral injury.Both groups were submitted to audio-impedenzometry, investigation for spontaneous nystagmus, Head Shaking Test (HST), vestibular bithermal caloric balance test and videonystagmographic investigation. In addition to the above tests for the presence of vestibulopathy and damage to the vestibular-oculomotor reflex (VOR) was investigated with Video Head Impulse Test (vHIT) and the vestibular-spinal reflex (VSR) was investigated with static stabilometry (open eyes – OE, closed eyes – CE, closed eyes with head retroflexed – CER) and elettromiography.

Results
Our study confirms that only in a minority of cases can neck pain cause central or peripheral vestibulopathy, and that this is more probable after vertebral injury. Our data confirm that static stabilometry is fundamental for assessing postural deficits following a cervical proprioceptive disorder. In these cases, in fact,

Conclusions
The analysis of the different parameters and the indices referring to cervical interference not only permits evaluation of altered postural performance, but also detects and quantifies destabilisation activity within the cervical proprioceptive component.
Stabilometry can also show improvement in postural performance achieved throught the functional rehabilitation of skeletal and cervical neuromuscular culture

Keywords: Pilots, Neck Pain, Vertebral Problems, Vestibular System, Vestibular Oculomotor Reflex

ABS:176

Case Report of Decompression Illness Following Altitude Chamber Training in 2024 at the RMAFS Institute of Aviation Medicine

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Decompression illness (DCI) can occur in various scenarios, including scuba diving and flights in unpressurized aircraft. It is characterized by joint pain, neurological symptoms, and respiratory or systemic manifestations. To enhance awareness among aircrew and paratroopers regarding in-flight hypoxia, the Institute of Aviation Medicine (IAM) of the Royal Malaysian Air Force (RMAF) routinely conducts controlled hypoxia exercises within hypobaric chambers. In 2024, we conducted 23 sessions of Hypoxia Indoctrination training. During this period, a total of 395 individuals—including 349 trainees and 46 observers (IO)—were exposed to hypobaric conditions. Of these, four individuals were diagnosed with Type I DCI. Consequently, the overall incidence rate of DCI in 2024 was 1.01%, with an incidence rate per exposure of 0.04%. Our reportwas based on a field epidemiological study, which identified dehydration as a common predisposing factor among all cases. Therefore, enhanced medical assessments prior to training are essential to prevent recurrence of this incident. Although relatively rare, healthcare practitioners should remain vigilant regarding the risk factors, clinical presentation, and management of DCI, as they may encounter such cases in clinical practice.

Keywords: Decompression Illness, Hyobaric Chamber

SESSION 10: CLINICAL AVIATION MEDICINE 2

ABS:23

Internal and external risk factors analysis on pilot precondition in Indonesia

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Introduction
Pilot errors account for 80% of accidents and 50% of serious incident. The Human Factor Analysis and Classification System (HFACS) allows identification of pilot preconditions as the imminent layer to error. The study aimed to analyse the correlation between internal and external risk factors and pilot preconditions in Indonesia.

Methods
A cross sectional study designwith purposive sampling, directed to male pilots who had flight duty in the past seven days, underwent medical examination at Aviation Medical Centre, Jakarta, August 12–16 2024. The data was collected through self-reporting-questionnaire; Trail Making Test A and B; laboratory test (plasma lipid, fasting blood glucose); and physical measurement (height, weight, waist circumference, blood pressure). The independent variables included internal (Age, Burnout, Metabolic Syndrome parameters) and external (Flight Time, Duty Time, Unscheduled Flight Duty, Number of Sectors, Sleep Duration) factors. The dependent variables were pilot preconditions based on HFACS.

Results
A total of 122 subjects participated. Among them, 28.7% subjects had unscheduled flight duty in the last 30 days. Significant correlation were found between Adverse Mental State and HDL-cholesterol (95%CI=1.52 – 5.80); Adverse Physiological State and Burnout [Personal (95%CI=0.005–0,04), Work-Related (95%CI=0.009–0.042)]; Physical Mental Limitation and Fasting Blood Glucose (95%CI=(-0.479)–(-0.071)), Number of Sectors (95%CI=0.022–3.001). While for Personal Readiness (PR), significant correlation found between PR-Psychological demand and Flight-Time One Year (95%CI=(0.000 – 0.001), Sleep Duration (95%CI=(-0.137)–(-0.013)), Waist Circumference (95%CI=(-0.014)–(-0.002)); PR-Social Support and Sleep Duration (95%IK=0.018–0.207), Client-Related Burnout (95%IK=(-0.011)–(-0.002)).

Conclusion
The internal factors that correlated with pilot preconditions in Indonesia were Waist Circumference, HDL-cholesterol, Fasting Blood Glucose, Personal Burnout, Work and Client-Related Burnout. External factors that correlated with pilot preconditions were Number of Sectors, Flight-Time One Year and Sleep Duration.

Relevance
These findings emphasize the need for addressing both physical and mental health aspects in pilots to enhance aviation safety.

Keywords: Pilot, Error, Precondition, Internal and External Factors, HFACS

ABS:78

Clinical Characteristics and 24-Hour Urinary Risk Factors in Asymptomatic Urolithiasis Patients

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Clinical Characteristics and 24-Hour Urinary Risk Factors in Asymptomatic Urolithiasis Patients Background

With the increasing application of imaging techniques in physical examinations, a growing number of asymptomatic urinary stones have been detected, with an estimated prevalence ranging from 8.5% to 32.6%. Asymptomatic urinary stones also represent one of the leading causes of medical disqualification among civil aviation pilots. Currently, there is limited research on metabolic evaluation in patients with asymptomatic urinary calculi.

Objective
To comprehensively analyze clinical characteristics and evaluate 24-hour urinary risk factors in asymptomatic urolithiasis patients.

Methods
This retrospective study analyzed 301 asymptomatic urolithiasis patients undergoing retrograde intrarenal surgery (RIRS) between June 2015 and December 2022. Clinical parameters were compared among three cohorts: asymptomatic stone group, healthy controls (n=75), and symptomatic stone group (n=80). Metabolic risk factors were assessed using 24-hour urine profiles.

Results
Most asymptomatic stones were renal calculi, with rare ureteral or bladder stones. Stone composition analysis revealed calcium oxalate dominance (243 cases, 80.7%), followed by carbonate apatite (46 cases, 15.3%), struvite (4 cases, 1.3%), uric acid (4 cases, 1.3%), calcium hydrogen phosphate dihydrate (3 cases, 1.0%), and one L-cystine case. Serum biochemistry showed hyperuricemia (44.52%) and hypercholesterolemia (30.45%). Metabolic abnormalities were detected in 91.4% of patients via 24-hour urinalysis, with hypocitraturia being most prevalent (75.3%), followed by hypernatriuria (62.1%), hypomagnesuria (34.6%), hyperoxaluria (32.5%), low urine volume (26.6%), hyperuricosuria (20.9%), hypercalciuria (13.0%), hypokaluria (10.6%), and hyperphosphaturia (3.0%). Multivariate analysis identified 24-hour urinary calcium (OR=1.197) and oxalate (OR=1.039) as risk factors, while citrate showed protective effects (OR=0.550). Significant intergroup differences were observed between asymptomatic and healthy controls for urinary calcium (P=0.001), oxalate (P=0.001), and citrate (P=0.012). No significant metabolic differences emerged between asymptomatic and symptomatic stone groups (all P>0.05).

Conclusions
24h urinary metabolic monitoring may facilitate early detection of asymptomatic urolithiasis

Keywords: Urolithiasis; Asymptomatic; Stone composition analysis; Metabolic evaluation; Citrate; Oxalate

ABS:92

OSA RELATED INCAPACITATION

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Obstructive sleep apnea (OSA) is a significant risk factor for aviation safety and there is a report that mentioned a six fold increases in the risk of aviation crashes for pilots diagnosed with OSA. We reported a case of unstable approach because the pilot in command (PIC) fell asleep. Following the incident, the airline submitted a report of decrease in medical fitness to the Civil Aviation Authority and pilot is assessed as unfit to fly. A follow up medical examination is conducted by the Aviation Medical Examiner (AME).

Objective
The case report purpose is to learn the medical certification process for a pilot who experienced a decreased in medical fitness during flight that leaded to unstable approach.

Method
Initial clinical assessment is conducted by the airline's Aviation Medicine Specialist such as history taking/ physical examination and clinical investigations including Epworth Sleepiness Scale, STOP Bang and Fatigue Severity Scale. After the follow up medical examination by the AME, pilot was found to have intermediate risk factor for OSA and referred to the Sleep Physician for sleep study.

Results
The risk factors for OSA in this pilot are obesity (BMI 46,31), neck circumference 52 cm, and type 2 diabetes (HbA1C 7,5%). Pilot is diagnosed with OSA by the Sleep Physician based on the polysomnography (PSG). Apnea Hypopnea Index (AHI) from the PSG is used as objective measure of sleep apnea control. AHI from the first PSG in February 2024 was 110,4. Pilot is prescribed with CPAP treatment for minimum 4 hours daily. AHI from PSG in June 2024 is 6,8. The pilot has achieved favorable outcome with weight loss for health risk factor management from 137kg to 112 kg and assessed fit to fly again.

Keywords: OSA, Incapacitation, Sleep Study

ABS:86

Role of the AeMC in diagnosis and assessment of obstructive sleep apnea syndrome

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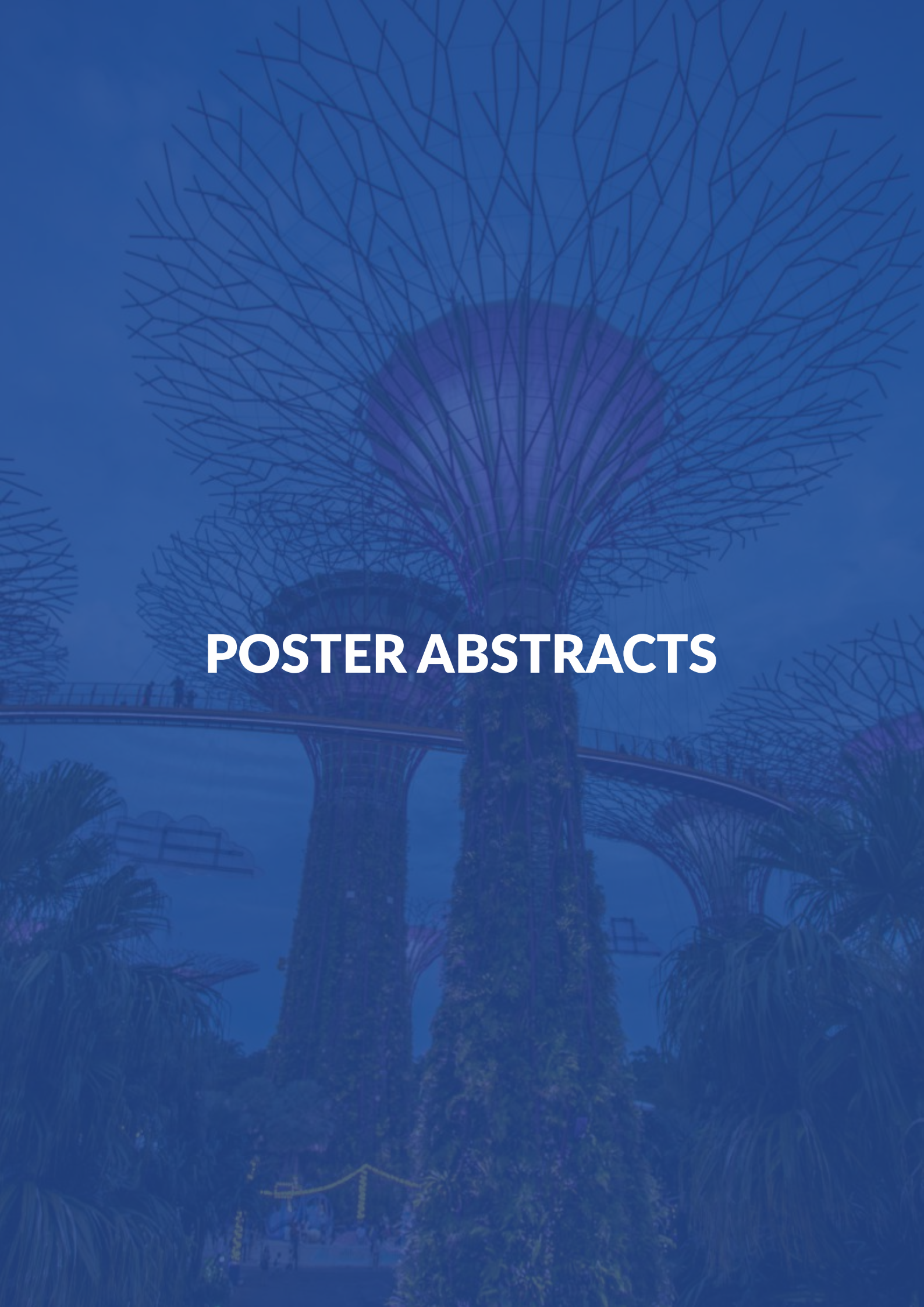
Introduction
Obstructive sleep apnea syndrome (OSAS) is a major issue in aviation medicine because it is responsible for sleepiness and higher cardiovascular risk, which could jeopardize flight safety. The aim of this study is to describe the management of OSAS in our AeMC.

Methods
This is a monocentric retrospective study. The population included was all aircrew members (AM) (civilian and military, pilots and others specialties) who underwent an examination in our AeMC between 2011 and 2024, with a history of treated OSAS.

Results
Our population consisted of 206 AM with OSAS, 99% males, 72% civilians, 77% pilots, mean age 50,6 +/- 9yo. The AeMC prescribed the investigations which led to the diagnosis of OSAS in 42% of cases, especially in atypical situations: when there was no symptom ($p=0.023$) or only rare ones like nycturia ($p=0.014$) in comparison to those diagnosed elsewhere. Cardiovascular assessment was performed in 87% of cases, and maintenance of wakefulness tests (MWT) in 66% of cases, particularly in the last 5 years ($p<0.01$), and when the AM were not already unfit for another disease ($p<0.01$). MWT were <40min in 15 AM (11%) despite a normal Epworth score in 10 AM and an AHI<10/h in 14 AM. Finally, 86% of them were declared fit with limitations. The main predictive factors of unfitness were residual sleepiness ($p<0.001$) and psychiatric disease ($p<0.001$). Having been diagnosed by the AeMC appeared to be a protective factor ($p=0.036$).

Discussion
It is important for AeMCs to be involved in the diagnosis of OSAS. Indeed, this diagnosis can be performed before the onset of symptoms or complications, which can lead to more fit decisions. In accordance with the French Sleep Society guidelines, systematic MWT should be prescribed as the rate of residual sleepiness in AM is comparable to the general population.

Keywords: Obstructive Sleep Apnea Syndrome, Diagnosis, Aircrew Member



POSTER ABSTRACTS

POSTER SESSION 1

ABS:59

Occupational Safety And Health In Commercial Space Travel

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Question
Nowhere else you will have to expect a visit from a labor inspector as rarely as on board the ISS or a spaceship. On the other hand, one would assume that nowhere else safety and health will be given as much consideration as there. But does this also apply to commercial space travel?

Challenge
Commercial space travel is becoming a normal part of living and working in space. It's about tourism, adventurism, but also privately financed science or classic earthly professions. The necessary risk assessment often takes place outside the responsibility of the space agencies. This applies to the equipment of the spacecraft, but also to the selection of space travelers. Aptitude assessment and qualification differ considerably from agency astronauts.

Method
The aim is to determine what priorities need to be set for safety and health in commercial space travel, what standards or recommendations are required and what legal consequences an accident at work during a commercial space flight could have, depending on the law of the sending state. Diseases such as SANS, although clearly a result from working in space, are not yet included in any occupational disease list worldwide. For this purpose, interviews and public scientific sources have been used to obtain an overview of potential accidents and illnesses and to derive prevention recommendations for commercial space travel.

Prospectus
Commercial space travel is emerging from the experimental stage. It is time to regard space as a normal workplace and to apply the rules designed for it.

Keywords: Space Medicine, Commercial Space Travel, Occupational Safety And Health

ABS:60

Electrical Signal Migration Across Human Cardiomyocytes in Microgravity: Implications for Expedition Class Missions

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Human cardiac health is compromised in microgravity and accompanied by significant morphological changes. Clinically measurable effects include orthostatic intolerance, increased stroke volume, reduced ejection fraction, decreased heart rate, cardiac atrophy with reduced left ventricular mass, shortened ejection time, and increased venous return. These functional changes align with those seen in other organ systems after time in microgravity. However, the underlying mechanism driving tissue, organ, and molecular changes remains unclear. Current medical practices focus on extensive pre-flight preparation, in-flight support, and post-flight care. These end-organ changes are evident even in Low Earth Orbit (LEO), and are expected to be more pronounced during prolonged exposure to microgravity, such as in deep space travel or life on the Moon, Mars, or other low-gravity environments. Simulated microgravity studies suggest that cardiomyocyte size, shape, and function are directly affected, leading to the cardiovascular decline well documented in existing literature. The authors propose an evolving hypothesis: microgravity alters three-dimensional cellular structures and shapes, disrupting intra- and extra-cellular communication. This disruption triggers a cascade of biological responses that result in functional changes. As humanity moves toward becoming a spacefaring species, a deeper understanding of how human cellular structures and physiology are intrinsically linked to Earth's gravity becomes critical, both scientifically and clinically. Our current experience in microgravity is limited to short-term stays in LEO. While the provocateur behind cellular and physiological cardiac changes is not yet fully identified, the hypothesis integrates structural changes in the heart with electrical, biomechanical, and biochemical dysfunction. This holistic view suggests that altered cellular communication under microgravity stress may underlie the adaptive yet ultimately detrimental behavior of cardiac cells in space.

Keywords: Microgravity, Cardiac, Cardiomyocyte, Low Earth Orbit (LEO)

ABS:85

Use Of C60-Serinol To Prevent Radiation-Induced Cataracts In Astronauts

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Introduction
Radiation-induced cataracts are a known risk for astronauts due to prolonged exposure to space radiation (Waisberg et al., 2023). Studies suggest that oxidative stress is a key mechanism in lens damage and opacification (Ainsbury et al., 2016). C60 fullerene derivatives have promising antioxidant properties, including the ability to scavenge free radicals and reduce oxidative stress in cells (Beuerle et al., 2008). This study uses human lens epithelial cells as a test model to evaluate whether C60-serinol, a water-soluble fullerene derivative, can prevent radiation-induced oxidative damage in spaceflight-relevant conditions.

Hypothesis
We hypothesize that C60-serinol will reduce radiation-induced oxidative stress in human lens epithelial cells by scavenging reactive oxygen species under radiation conditions relevant to spaceflight.

Methods
C60-serinol was synthesized via Bingel cyclopropanation then deacetylation. Human lens epithelial cells will be used as an in vitro model. Cells will be treated with 0, 25, 50, or 100 μM of C60-serinol 24 hours before exposure to X-rays from a 320 kVp source. Cell viability and DNA damage will be assessed post-irradiation via an MTS assay and -H2AX foci formation, respectively.

Results
C60-serinol has been synthesized and characterized with confirmed size and water solubility. Prior work from our lab shows it protects epithelial and endothelial cells from radiation injury, supporting its potential efficacy in lens cells. Results on cell viability and DNA damage will be reported upon study completion.

Discussion
C60-serinol holds strong potential as a radioprotective agent due to its antioxidant activity, biocompatibility, and cellular uptake. By evaluating its effect in an in vitro model, this study proposes a possible method to prevent radiation-induced cataracts for astronaut health protocols.

Conclusion
C60-serinol may provide a viable strategy to mitigate radiation-induced cataracts. Future studies will include in vivo studies to evaluate its safety, bioavailability, and efficacy under relevant space radiation conditions.

Keywords: Radioprotection, Cataracts, Radiobiology, Antioxidant

ABS:219

Pre-Flight Assessment of Aeromedical Evacuation in Lung Malignancy Cases

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Background
Lung cancer is a serious global health problem including in Indonesia. The limited availability of health services in Indonesia that are equipped to manage lung cancer patients in an adequate manner has led to significant challenges in accessing subsequent treatment. Aeromedical evacuation is a solution that enables individuals to seek treatment at a referral center hospital. Pre-flight assessment in lung cancer patients is crucial to ensure safety during flight and prevent complications due to exposure to the flight environment.

Overview
A comprehensive evaluation for lung cancer patients involves a detailed history, a physical examination, and an assessment of respiratory function. The evaluation also considers previous therapy history and flying experience. The risk of hypoxemia is a primary concern, as this might exacerbate the condition of patients with impaired ventilation or oxygenation. A variety of diagnostic procedures are employed to evaluate in-flight oxygen demand, including physical examination, spirometry, the 6-minute walk test (6MWT), blood gas analysis (BGA), and the hypoxic challenge test (HCT). Risk assessment for pneumothorax, venous thromboembolism (VTE), and infection is also essential. The preparation of medical equipment, oxygen provision, and adherence to flight regulations are integral components of an aeromedical evacuation plan.

Discussion
Indonesia has certain limitations when it comes to assessing the risk of hypoxemia during flight in lung cancer patients. Despite the limited accessibility of HCT in Indonesia, other examinations, such as spirometry, the six-minute walk test (6MWT), and blood gas analysis (BGA), may contribute to the evaluation of the risk of hypoxemia. Radiological examination also helped assess the risk of pneumothorax. It is also possible to perform VTE and infection risk assessments in Indonesia. Close monitoring, communication and multidisciplinary collaboration are effective strategies for managing the patient's condition.

Keywords: aeromedical evacuation, aerospace medicine, air medical evacuation, lung cancer

ABS:207

Design of Aeromedical Evacuation Decision Support Simulation System Based on Discrete Event Simulation

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Background
Aeromedical evacuation, valued for its mobility, agility, and timeliness, is ideal for rapid and long-distance transport of critically injured patients. While evacuating small groups is straightforward, organizing mass casualty air evacuations involves complex planning, including route - based location selection, capacity - driven route design, injury - severity classification, and resource requests.

Objective
To design a simulation system for aeromedical evacuation of mass casualties in wartime or peacetime to support decision-making, and to realize the informationization of aeromedical evacuation management.

Methods
The models of the system were established using methods such as Poisson distribution, Weibull distribution, and discrete event simulation.

Results
The simulation process began with constructing a script that defined task timelines, casualty flows, treatment chain models, and resource allocations. The system then simulated the sequential arrival, treatment, and evacuation of casualties, tracking outcomes at each stage, treatment chain operations, and resource consumption to generate decision - supporting reports. Applicable in earthquake relief and combat scenarios, the system enables scientific deployment of medical resources.

Conclusion
As medical evacuation aircraft advance and timeliness demands grow, aeromedical evacuation will be the primary evacuation method. Optimizing this process requires data - driven resource allocation and strategic planning. The proposed decision support system effectively simulates evacuation scenarios, refines treatment chains, and enhances aeromedical evacuation capabilities, contributing to improved emergency response and air medical informatics.

Keywords: Aeromedical evacuation; Air medical evacuation; Medical decision-making; Discrete event simulation

ABS:79

Comparison study of diagnostic techniques for dyschromatopsia currently employed for flight fitness assessment.

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Introduction/Context
Although color vision deficiency (dyschromatopsia) does not severely affect daily life, it poses significant limitations on certain professions, such as aviation. The diagnosis, using pseudoisochromatic plates, has been refined over the last years with the introduction of digital tools.

Purpose
To evaluate and compare the diagnostic tools currently available in order to utilize the most reliable instruments for assessing the fitness of flight personnel in daily clinical practice.

Methods
A comparative study was conducted at the Aerospace Medicine Institute of the Italian Air Force in Rome. Two groups were examined: 36 patients with color vision deficiency (CVD) and 40 age- and gender- matched controls with normal color vision (CVN). All participants underwent a preliminary eye examination to exclude ocular pathologies limiting color perception. Each subject subsequently underwent color vision testing using Ishihara plates, anomaloscope in automatic and manual mode, and CAD. Subjects failing at least two of these tests wereclassified as colorblind.

Results
Among the 36 CVD patients, 25 were deuteranopes (69.5%), 10 protanopes (27.8%), and 6 tritanopes (16.6%). Five tritanopes were also deuteranopes, and one was a protanope. One patient showed different classifications: protanope at the Nagel anomaloscope and deuteranope at the CAD. Both female patients were deuteranopes. Two deuteranopes at the anomaloscope and CAD test passed the Ishihara plates. In total, 34 patients failed the Ishihara and automatic anomaloscope tests; the other 2 passed both. No subject passed the manual anomaloscope test, and only one passed the CAD test.

Conclusion
Ishihara plates are insufficiently sensitive and specific, and results may be affected by memorization, lighting condition and plate wear. The automatic anomaloscope is not sufficiently reliable, while the manual mode remains the gold standard to diagnose dyschromatopsia, although it is operator-dependent. The CAD test is not operator-dependent but is less sensitive than the manual anomaloscope.

Keywords: Flight suitability, dyschromatopsia, diagnosis

POSTER SESSION 2

ABS:64

Dengue risk assessment in Italian Air Force personnel: current practice and prospects.

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Introduction
Dengue is caused by one of four types of viruses DENV and is transmitted by mosquito bites.Reinfection with another serotype increases the risk of severe disease.DENV infection is one of the main public health problems in subtropical and tropical areas. Military pilots carry out missions outside national borders and in areas at risk for Dengue.

Methods
To reduce the risk of reinfection, we used the protocol of the Italian Ministry of Defence.We asked military personnel who had to operate in risk areas if they had contracted the virus and if they had stayed in one of the endemic countries for Dengue.If the answer to either question was positive, the blood was analyzed to look for antibodies for Dengue.We analyzed sample blood of 23 military pilots with three different methods: EUROIMMUN Anti-Dengue Virus ELISA IgG;STANDARD F Dengue IgG FIA;Dengue VirClia IgG monotest. Statistical analyses performed using MedCalc version 22.017 (MedCalc, Ostend, Belgium).We calculated Cohen's kappa coefficients ( ) and we used Bland-Altman (B&A) plot.

Results
All 23 military pilots were deployed in Djibouti, while 70% also in Somalia (15/23) and 35% also in Niger (8/23). Between VirClia IgG and STANDARD F Dengue IgG we found a good agreement with Cohen's kappa coefficients (=0.7) and with Bland-Altman plot (95%CI 0.60 to 1.62).We found a high significant correlation ($p<0.0001$) between VirClia IgG and STANDARD F Dengue IgG and a correlation ($p= 0.049$) STANDARD F Dengue IgG vs Euroimmun ELISA IgG.

Conclusion
Military personnel deployed outside national borders are exposed to infection and/or reinfection.Vaccination may not be possible.Our study found that FIA and CLIA have a significant correlation with second-level tests and can be used as screening tests.

Relevance
The use of these tests as point-of-care and the continuous review of diagnostic algorithms can help ensure the safety of military and careful epidemiological surveillance, especially in personnel where vaccination is not possible.

Keywords: Dengue, Italian Air Force, deployment

ABS:72

Comparative analysis of vestibular function test results and aeromedical evaluation of pilots in the period of COVID-19 infection

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Introduction
During the period of COVID-19 infection, there has been a significant increase in cases of unilateral vestibular hypofunction (UVH) among pilots examined at the Air Force Medical Center, PLA.

Objective
This study aims to compare vestibular function test results from different periods, analyze potential causes ofUVH, and provide evidence for aeromedicalevaluation.

Methods
Pilot data with newly discovered UVH were included in the study group from January 1, 2020, to December 31, 2023 and control group from January 1, 2016, to December 31, 2019 at the Air Force Medical Center, PLA. All cases underwent comprehensive medical history inquiries, vestibular function tests, auditory function tests, and head MRI scans. The tests to identify UVH included video-nystagmography caloric test, video-head impulse test, ocular vestibular evoked myogenic potentials, and cervical vestibular evoked myogenic potentials.

Results
A total of 60 pilots with UVH were included, with an average age of 28.42 ± 6.54 years, showing no significant difference between groups; the study group had 51 cases, including 47 without vestibular-related symptoms and 4 with symptoms; the control group had 9 cases, including 3 without vestibular-related symptoms and 6 with symptoms. The proportion of pilots with UVH in the study group was significantly higher than that in the control group ($P=0.038$), with a notably higher proportion of asymptomatic cases ($P<0.001$). There was no significant difference in abnormal vestibular test items between the two groups ($P>0.05$). 46 pilots in the study group tested positive for COVID-19 infection after September 2022, while 5 did not test positive ever. All pilots received COVID-19 vaccine in September 2020 and September 2021.

Discussion
The number of asymptomatic cases of UVH detected between January 1, 2020, and December 31, 2023, has significantly increased compared to previous periods.

Conclusion
The infection of SARS-CoV-2 or vaccination were potential causes of UVH among pilots.

Keywords: Unilateral Vestibular Hypofunction, Aeromedical Evaluation, COVID-19 Infection

ABS:122

Management of Malaria prévention and case response among Air France Flight crews

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Introduction
Flight crew operating in malaria-endemic regions face specific occupational health risks, especially during short layovers without the use of chemoprophylaxis. At Air France, a wide-reaching non-pharmacological programme has been developed to address this challenge.

Purpose
To describe the operational and medical measures implemented over the last 10 years to prevent, detect, and manage malaria cases among crew members, in the absence of systematic prophylactic treatment.

Methods
We conducted a retrospective review of malaria cases among flight crew, identifying at-risk destinations and detailing the multilayered prevention strategy. Preventive actions were categorized into primary (education and protection), secondary (early detection), and tertiary (medical follow-up) levels, and continuously updated through internal health committees and operational feedback.

Results
Primary prevention includes SMS alerts before at-risk layovers, planning tools with coded alerts, in-flight briefings, and routine occupational health training. Crew receive educational materials, anti-mosquito kits, thermometers, and access to a malaria information forum. Secondary measures involve identification and triage of symptomatic crew, both at destination and at CDG, using rapid diagnostic tests (TDR). Tertiary actions include systematic follow-up, declaration as occupational disease, and mandatory medical evaluation before returning to duty. Environmental measures include disinsection of aircraft and reinforced mosquito control protocols during layovers. Case-based alerts are sent to exposed crew, and malaria prevention remains a regular topic in CSSCT meetings. A tailored prophylaxis approach using Malarone is currently under evaluation for selected populations.

Discussion
This multi-pronged, non-pharmacological strategy illustrates how operational and medical coordination can manage malaria risk in aircrew.

Conclusion
Air France's approach provides a model of structured malaria prevention in occupational settings without chemoprophylaxis, based on education, environmental control, and rapid response.

Relevance
This experience may inform similar prevention strategies in other airlines and travel-intensive sectors with exposure to endemic areas.

Keywords: Malaria Prevention Case Response Air France Flight Crews Overview

ABS:157

Comparative Analysis of Automated Cardiopulmonary (CPR) Machines for Resuscitation of helicopter medical evacuation (Heli-medevac) Casualties.

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Introduction
Performing high-quality CPR during heli-medevac presents significant challenges due to space constraints, aircraft vibration, and the physical demands on personnel. Manual CPR during transport is not only logistically difficult but potentially dangerous for providers who may sometimes remain unrestrained to deliver compressions. Mechanical chest compression devices can provide consistent, high-quality CPR in challenging environments while allowing personnel to focus on other critical interventions and remain safely secured during flight.

Purpose
This study aimed to evaluate five commercially available automated CPR devices against essential operational requirements specific to heli-medevac missions.

Methods
A review study on various automated CPR machines based on assessment factors required for heli-medevac operations. The machines – Schiller Easy Pulse, Corpuls CPR, Lucas 3 (v3.1), Miniaturise Chest Compressor, Zoll Autopulse – were compared against a set cardinal requirement for heli-medevac operations, namely operation autonomy, environmental resilience, performance metrics and portability.

Results
All devices met the cardinal requirements except the Zoll Autopulse, which delivered a compression rate below the minimum threshold (80 beats per minute). Among the devices, battery life ranged from 30 to 90 minutes, weights spanned 3.1 to 11.6 kg and widths from 15 to 52 cm.

Discussion
The differences among devices underscore critical trade-offs between portability, performance and endurance – factors essential for effective deployment in the space-constrained and time-critical heli-medevac operating environment.

Conclusion
Automated CPR devices provide a practical solution for delivering consistent chest compressions during heli-medevac, address key challenges posted by the flying environment and enhance in-flight patient care. Future research should explore real-world clinical outcomes, user experience, and long-term operational performance to guide device selection and optimization.

Keywords: Aerospace Medicine, Occupational Health, Resuscitation Equipment, Task performance and analysis, Heli-Medevac

ABS:173

Transporting a Critically Ill Elder by The Helicopter Supported by 5G and Beidou Navigation Satellite System - Case Report

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Background
The aviation medical rescue mode that simultaneously applies the 5G+ Beidou satellite navigation system to helicopters can better achieve two-way information transmission, optimize the emergency rescue process and shorten the transfer time, which is expected to improve the rescue rate and the survival rate of patients.

Overview
A 90-year-old female patient was transferred from Puning City, Guangdong Province to Shenzhen University General Hospital for treatment by medical helicopter due to "chest tightness and shortness of breath for 2 weeks, fever with oliguria for 3 days". The entire process stably utilized 5G communication technology to transmit the data from the on-board monitor to the hospital's telemedicine system, ensuring that ground experts could understand the patient's symptoms and vital signs in real time and provide guidance to the medical staff on the crew. Meanwhile, the Beidou Satellite Navigation System precisely tracks the entire route of the helicopter. The 5G signal was stable throughout the flight, and the video and audio were smooth and clear. Experts in the hospital could understand the patient's condition and vital signs in real time through the large screen in the emergency department. Meanwhile, the BeiDou navigation satellite system (BDS) accurately tracks the entire trajectory of the helicopter. The take-off and landing times of the aircraft were accurately predicted, the transfer efficiency was improved, and the life safety of the patients was ensured. The round trip was nearly 600 kilometers, with a total flight time of 136 minutes, which was only one quarter of the time taken by an ambulance. Faster emergency rescue speed often enables patients to receive more efficient treatment.

Discussion
Helicopters based on 5G or 5G+BDS represent a new chapter in air medical rescue, reshape the pre-hospital emergency rescue model, and further enhance rescue rates and patient survival rates.

Keywords: 5G+ Beidou satellite, emergency rescue, aviation, medical rescue, hospital's telemedicine system

POSTER SESSION 3

ABS:151

Evolution of Aviation Physiology Training in the RSAF - Now and in the Future

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Introduction

At the Republic of Singapore Air Force (RSAF) Aeromedical Centre established in 1982, military aircrew undergo Aviation Physiology Training (APT) to bolster their physiological readiness against hypoxia, hypobaria, high G-forces, spatial disorientation and night flying hazards. With the advent of newer aircraft platforms, the human performance limits of our aircrew will be further challenged by sustained flying operations and an information-dominated networked environment. This necessitates evolving and innovative approaches in APT to meet these challenges.

Method

The RSAF conducted regular reviews of her training programme and collected both quantitative and qualitive feedback through online surveys from RSAF aircrew who participated in refresher APT courses.

Results

The RSAF has evolved her APT pedagogy and APT systems to deliver realistic training through the implementation of Dynamic Flying Simulation for High-G training, mask-on/mask-off hypobaric hypoxia training, and scenario-based night-vision training using the Virtual Terrain Board. With a strong partnership between the RSAF and a Public Health Institution to deliver APT, training methods continue to evolve based on evidence (e.g. use of electromyography to aid Anti-G Straining Maneuver feedback during centrifuge training), and aircrew feedback (multi-modal case scenarios and exploring the use of AI). Looking to the future, it is envisioned that APT continue to deliver realistic physiology training, supported by enhanced physiological testing and monitoring equipment to deliver additional human performance training.

Conclusion

The future training and operational environment necessitate that APT transform to embrace innovative approaches to sharpen aircrew's physiological instincts in a realistic mission environment. The product of tomorrow's Aviation Physiology and Human Performance Training will be aircrew who possess superior crew performance and robust physiological awareness, capable of sustaining peak performance in the intense information-dominated battlespace.

Keywords: Aviation Physiology Training, Human Performance

ABS:156

An Overview of Training Strategies to Strengthen Air Base Medical Operational Support in the Republic of Singapore Air Force

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Background

Ground-based medical support is vital for sustaining aircrew operational readiness in the Republic of Singapore Air Force (RSAF). This role is primarily fulfilled by conscript Emergency Medical Technicians (EMT) and military doctors. Ensuring their proficiency in emergency medical response is essential.

Overview

To enhance frontline medical proficiency, the RSAF implemented a comprehensive training framework comprising (1) structured and contextualized medical training syllabus, (2) individualized pre-assessment medical proficiency training, (3) pre-assessment holistic resuscitation drills, (4) high-fidelity simulation scenario training. To date, 308 EMTs have undergone the structured training program. Post-training theoretical assessments showed an average of 1.8 attempts to achieve a perfect score, with 67% of trainees expressing confidence in their skills. Qualitative feedback indicated improved critical thinking, enhanced competency, and a heightened sense of operational preparedness. Notably, 107 personnel were subsequently deployed to key operational roles.

Pre-assessment training yielded measurable improvements: first-attempt pass rates rose from 73% to 84.6%, and resuscitation drill scores showed overall enhancement among participants.

Realistic, high-fidelity simulations were integrated into training to enhance realism and decision-making under pressure. These efforts have been well-received, with qualitative feedback supporting the training's realism.

Discussion

This abstract presents the RSAF's evolving approach to operational medical training. While initial outcomes are promising, ongoing longitudinal studies are required to assess long- term effectiveness. The RSAF's paramedical training adopts an integrated approach that extends beyond standard theoretical and practical instruction. The use of in-house digital learning platforms supports continuous, self-directed learning, empowering trainees to leverage performance data for both individual and unit-level improvement. It also allows trainers to obtain real-time data to analyze learner performance and course effectiveness to implement more targeted training interventions.

Conclusion

The RSAF's training strategies demonstrate a robust, data-driven approach to strengthening ground-based medical readiness. Continued adaptation and evaluation will be key to sustaining this momentum and meeting future operational demands.

Keywords: Airbase, Medical Support

ABS:202

Simulator-based, Machine Learning-modelled, Psychophysiological Measurement-augmented Pilot Screening in the Republic of Singapore Air Force

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Project aimed to leverage simulators, data science and other emerging technology to enhance effectiveness and optimise efficiency for pilot screening in the Republic of Singapore Air Force. The project was based on assessment centre methodology, using simulator-based screeners to assess candidates over ten days, through four standardised simulated training/mission sorties. Primary assessments include standardised task performance and behaviour-based observations by RSAF Qualified Flying Instructors (QFIs) and Aviation Psychologists (AvPsychs), as well as objective mission and task performance parameters measured by the simulator. Psychophysiological measures (PPM), eye trackers, electroencephalograms (EEG), electrocardiograms (ECG), video-based emotion coding, as well as simulator exhaust data were explored as means to augment task and behaviour-based assessments. Initial predictive modelling using machine learning demonstrates a notable level of accuracy in predicting pilot performance.

Keywords: Simulator, Pilot screening

ABS:210

Management of Incidental Findings found on Brain MRI in Military Pilots

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With advances in imaging technology, the number of incidental findings seen on brain MRIs has increased.

In neuroimaging, incidental findings are of particular importance. There are fine lines between a normal variant, an abnormal finding, and a pathological result. While some findings remain asymptomatic throughout life, others can lead to serious clinical conditions. If these incidental findings are encountered during a military fitness-to-fly evaluation, the critical distinction of these lines becomes especially important, both for aviation safety and for career implications for the pilot.

In brain MRIs performed during the selection phase of military pilot candidates or performed as a diagnostic integration of other specialist examinations, in the time frame from 2019 to 2023, the radiologists of the Italian Air Force identified several incidental findings on brain MRI that were grouped into the following categories: white matter hyperintensity, pineal cyst, venous development anomalies, arachnoid cyst, cholesterol granuloma, cavernomas, aneurysms and focal cortical heterotopia/dysplasia.
To date, there is no international standardized approach for the management of incidental neuroradiological findings.

For each finding, the assessment of the risk of sudden incapacitation during flight is essential.
This decision is often complex and is never taken by a single doctor, but is the result of a discussion with various specialists.

The specific characteristics of military piloting always make it necessary to carry out a multidisciplinary evaluation, on a case-by-case basis, of the individual incidental findings found in MRI examinations in order to reduce to a minimum the risk of sudden incapacitation during flight.

Keywords: fitness to fly, military pilots, incidental findings on brain MRI

ABS:198

Understanding cognitive load-performance dynamics in simulated air traffic control training.

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Effective training for air traffic controllers (ATC) involves both the systematic development of operational proficiency and the enhancement of cognitive performance required for managing complex, dynamic environments. Understanding how mental demand and stress interplay with performance is critical for operator safety and efficiency. In the context of aviation, identifying objective measures that predict performance under cognitive load has far-reaching implications for training and real-time monitoring of ATCs. We hypothesized that a challenging, voice-controlled ATC simulation would induce measurable mental demand, with ECG-based indices reflecting shifts in autonomic arousal. Our primary goal was to identify cognitive indices, supported by physiological evidence, that correlate with simulation task performance. Seventeen healthy participants completed an hour-long simulation featuring multiple levels of increased aircraft load and coordination demands. Subjective distress, fatigue, and workload were measured before and after the session. ECG data were collected continuously. A composite performance score integrated pass/fail outcomes, attempts, and completion time. Participants reported the simulation as mentally demanding, with the ECG data supporting this view: on-task intervals showed elevated heart rate and reduced Standard Deviation of Normal-to-Normal (SDNN) intervals, indicating sympathetic arousal. Higher reported distress and fatigue correlated with poorer performance, whereas greater engagement predicted better outcomes. These findings highlight a relationship between subjective and physiological markers of mental load and operational effectiveness in a simulated ATC environment. The convergence of self-report and ECG data confirms that this voice-controlled ATC simulation reliably induces cognitive load. Real-time ECG monitoring may detect overload early, allowing targeted interventions to maintain performance under rising demands in aviation contexts. By revealing how mental demand correlates with ATC performance, this study underscores the value of physiological monitoring for operator health and efficiency. Future research should expand the number of participants, incorporate neural measures, and build predictive models for performance.

Keywords: ATC simulation, Mental demand

POSTER SESSION 4

ABS:22

Pilot Health and Disqualification Trends: A 25-Year Analysis (2000-2024) in South Korea

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This study analyzed 25 years of data (2000-2024) from the Airmen Medical Certificate Management System in South Korea to assess pilot health trends and qualifications. It found a significant increase in aviation medical examinations, growing from 2,366 in 2000 to over 10,000 by 2016, and peaking at 14,652 in 2019, reflecting the rising number of pilots.

Disqualification rates also increased, particularly after 2016, rising from 0.2%-0.4% to 0.5%-1.0%. Notably, commercial pilot certificate issuance more than tripled since 2011, with a peak of 1,688 in 2019. While men's disqualification rates remained steady at about 1%, women's rates experienced a concerning rise, exceeding 3% by 2023. The 50-59 age group had the highest disqualification rate (0.48%). It is important to note the provided highest disqualification rate is lower than rates provided earlier in the summary.

The study also revealed insights into lifestyle factors. Obesity rates among pilots increased from 30% to 35%, while smoking rates remained stable at around 20%. Alcohol consumption remained high, at approximately 60%.

In conclusion, the study underscores the increasing need for aviation medical examinations and highlights a rise in disqualification rates, especially among older pilots and women. It emphasizes the importance of targeted health interventions focusing on obesity, smoking, and alcohol consumption to safeguard the health of aviation professionals and ensure the continued safety and growth of the aviation industry.

Keywords: Aerospace medicine, Pilots, Obesity, Smoking, Alcohol Drinking, Sex Factors, Age Factors

ABS:27

Lufthansa Medical Center FrankfurtPilot referral statistics as an indication of health problems

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Introduction
Referrals of Class 1 pilots to the Federal Aviation Authority in accordance with EASA guidelines were recorded and analyzed. The ratio of the incidence of illness to the German population reveals particular burdens of pilots.

Methods
Only repeat medical exams were recorded at the Frankfurt Medical Center, during the years 2020 to 2024. The data of each referred pilot were analyzed individually. Gender, age and disease complexity, in some subunits hair color, skin type and Body Mass Index (BMI) were notified. Referrals due to refractive errors were not recorded.

Results
8.446 medicals exams were performed on 8.002 pilots. 156 referrals (1,8%) were made. The authority declared in 38 cases unsuitability. 14% of the referrals were cardiovascular diseases (CHD). Sleep apnea caused 7 referrals. The mean BMI was 33, the mean age 50 years.
Migraine led to 9 referrals with an average age of 42. Oncology, with a wide variety of malignancies, represented 25% of the referrals. The subgroup of basal cell carcinomas is conspicuous with 24 cases at the mean age of 51 years. 75% of the pilots had blond hair and a light skin type.

Conclusions
The overall number of referrals was low. The prevalence of CHD in population was significantly higher than in our cohorts. - The EASA screening regime detects symptoms of CHD at an early stage. Sleep Apnea information on risk minimization should be provided early. The average age of onset of basal cell carcinoma was lower and the incidence was 3 times higher than the average of the German population. - Screening and counselling are important.

Relevance
Carefully conducted annual medical exams allow to detect symptoms of illness early. Light-skinned pilots have a premature and increased tendency to develop basal cell carcinoma. Education on behavioral prevention and dermatological screening are important.

Keywords: Statistics of referrals from class 1 medicals, prevalence of CHD in pilots compared to average population, incidence of basal cell carcinoma in pilots

ABS:227

The Effect of Norepinephrine Transporter Inhibitors on Systolic Blood Pressure for Deep Vein Thrombosis Risk Mitigation: A Systematic Review and Meta-Analysis

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Introduction
As one of the major risk factors of cardiovascular disease, hypertension might often coexist with conditions such as deep vein thrombosis. In terms of aviation medicine, this condition can cause several medical consequences that might disturb the in-flight experience. Norepinephrine transporter (NET) inhibitors pose as a medication that is able to reduce systolic blood pressure. However, their effectiveness remains unclear.

Objective
This systematic review and meta-analysis aims to identify the effectiveness of several medications, mainly functioning in the inhibition of the norepinephrine transporter (NET), by analyzing and reviewing past RCTs that focus on the effect of deep vein thrombosis in decreasing the systolic blood pressure (SBP).

Methods
This study was conducted in accordance with the PRISMA 2020 guidelines, involving a thorough search of relevant studies across PubMed, Scopus, and Cochrane. The secondary data was then synthesized using Review Manager 5.4.1, creating a forest plot comprising four RCT studies. Heterogeneity and significance were also assessed by the latter.

Results
Four studies were included in the meta-analysis. The overall result showed a statistically significant effect favoring the NE Inhibitors over the placebo (Std. Mean Difference = -4.25; 95% CI [-6.95, -1.54]; p=0.002). However, the heterogeneity across studies was very high at I^2 = 92%, indicating significant differences in the magnitude of the effect found in the individual studies, which might be caused by the differences in NE Inhibitors used on the intervention target.

Conclusion
The results show that NE Inhibitors have more significant effects compared to the placebos used. NE Inhibitors can be relied on for pre-flight usages to prevent deep vein thrombosis. The high heterogeneity value inferred the differences in NE Inhibitors used in each study. Further studies should use a bigger scope of samples to make applications of NE Inhibitors more valid.

Keywords: NET Inhibitor, Deep Vein Thrombosis, Systolic Blood Pressure

ABS:190

Effectiveness of Lifestyle Interventions on Health Outcomes Among Airline Pilots: A Meta-Analysis

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Background
Airline pilots carry significant responsibility, requiring optimal physical and mental health. However, irregular schedules, disturbed sleep, and high stress levels increase the risk of unhealthy behaviors leading to non-communicable diseases (NCDs). With over 50% airline pilots worldwide affected by obesity, structured lifestyle interventions promoting healthy eating, physical activity, and sleep hygiene are vital.

Purpose
To assess the effectiveness of lifestyle interventions in improving health-related behaviors and outcomes among active airline pilots.

Methods
A systematic review and meta-analysis of data used from PubMed, Scopus, and Cochrane was conducted up to June 2025 following the PRISMA 2020 guidelines. Included studies were clinical trials conducting lifestyle interventions consisting of nutritional and physical activity for active airline pilots. The ROBINS-I tool assessed risk of bias and statistical analysis was conducted using the R{meta} package with effects estimates reported as mean difference and 95% confidence interval. A fixed-effects model was used for Pittsburgh Sleep Quality Index (PSQI), sleep duration, International Physical Activity Questionnaire (IPAQ) Walking and Moderate-to-Vigorous Physical Activity (MVPA) scores, Physical Component Summary (PCS-12), Mental Component Summary (MCS-12), and fruit/vegetable intake.

Results
Three studies involving 276 airline pilots showed significant outcomes in the intervention group. Sleep quality improved (PSQI:−3.2;95%CI:−4.1– −2.3) and sleep duration increased by 42 minutes (95%CI:0.59–0.81). Physical activity rose in both walking (+15.86;95%CI:6.65–25.0) and MVPA (+69.87;95%CI:60.86–78.89). Health-related quality of life (QoL) improved (PCS-12:+6.12;MCS-12:+5.98), and fruit/vegetable intake increased by 3.14 servings/day (95%CI:2.93–3.36).

Discussion
The intervention produced meaningful improvements in sleep, physical activity, diet, and QoL among airline pilots. Reduced PSQI scores and longer sleep indicate better sleep health, while increased physical activity and fruit/vegetable intake reflect positive behavioral change. Enhanced PCS-12 and MCS-12 scores highlight comprehensive well-being benefits. Results support the value of structured programs in high-stress occupations.

Conclusion
Lifestyle interventions significantly improved sleep, physical activity, diet, and QoL among airline pilots, supporting their role in promoting health and well-being in high-demand occupations.

Keywords: Lifestyle interventions, Airline pilots, Nutrition, Physical activity, Sleep hygiene

ABS:213

The Relationship between Physical Activity, Fatigue, and Other Factors with Sleep Quality of Cabin Crew in Indonesia

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Introduction
Sleep is a physiological process characterized by decreased motor activity, reduced response to external stimuli, and changes in brainwave patterns. Cabin crew members have demanding responsibilities due to physical and mental fatigue caused by irregular sleep patterns, insufficient rest periods, and long working hours. This study aims to examine the relationship between physical activity, fatigue, and other factors (age, gender, marital status, caffeine consumption habits, type of flight, duty time, number of sectors, and length of service) and sleep quality among cabin crew in Indonesia.

Methods
This cross-sectional study was conducted at the Balai Kesehatan Penerbangan. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (Indonesian version), physical activity was evaluated using the Global Physical Activity Questionnaire (Indonesian version), and fatigue was measured using the Fatigue Severity Scale (Indonesian version). Demographic and occupational data were collected. The proportion of Indonesian cabin crew experiencing poor sleep quality was calculated, and the relationship between physical activity, fatigue, and other factors was analyzed using Chi-Square tests and multivariate analysis was performed using logistic regression.

Results
Among the 394 study participants, 65% of cabin crew exhibited symptoms of poor sleep quality. Cabin crew with inactive physical activity (84%) were more likely to experience poor sleep quality compared to those with active physical activity (58%), showing a significant association with sleep quality ($p < 0.001$). Age, gender, marital status, caffeine consumption habits, type of flight, duty time, number of sectors, and length of service were not significantly associated with sleep quality. Multivariate analysis showed that physical activity (aOR 3.711, 95% CI = 2.097–6.566) was significantly associated with sleep quality.
Conclusion Most cabin crew members experiencing poor sleep quality were physically inactive. Further research is needed to assess other contributing factors to poor sleep quality among cabin crew.

Keywords: Sleep Quality; Cabin Crew; Physical Activity; Fatigue; Indonesia

POSTER SESSION 5

ABS:73

Clinical Efficacy of Flow Diverter in Treating Intracranial Aneurysms in Military Pilots and Implications for Aviation Medical Certification

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INTRODUCTION
With advanced MRI revealing incidental unruptured intracranial aneurysms (UIAs) in 0.5% of military aviators, this study addresses the critical need to evaluate Flow Diverter (FD) treatment—a minimally invasive option—for this high-risk cohort exposed to unique cerebrovascular stressors.

OBJECTIVE
To evaluate the safety, efficacy, and aviation medical certification outcomes of FD treatment for UIA in military aviators.

METHODS
Clinical data and aviation medical certification outcomes of four UIA patients treated with FD between 2018 and 2024 at our center were retrospectively analyzed. The effectiveness, safety, and aviation medical certification results were discussed combined with relevant domestic and international literature.

RESULTS
The cohort included pilots and aircraft mechanics operating fighter jets, transport aircraft, and helicopters. All aneurysms were located in the internal carotid artery, with sizes ranging from 2.1 mm to 5.3 mm. Following FD implantation, all patients achieved complete aneurysm occlusion. Three aviators received a qualified flight status after the required ground observation period, while one pilot was temporarily deemed unfit for flight due to insufficient follow-up time.

DISCUSSION
For military aviators undergoing FD treatment for UIA, a qualified flight status may be considered after one year of postoperative observation, provided that the UIA meets curative standards and no neurological deficits are present.

CONCLUSIONS
FD is a safe and effective treatment for UIA in military aviators, playing a critical role in ensuring their long-term health and occupational safety.

Keywords: Flow Diverter, Intracranial Aneurysms, Aviation Medical Certification

ABS:77

Assessment of Anthropometric Measurement and Body Composition Features in Female Military Flight Cadets

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Introduction
As more women become military pilots, it is increasingly important to understand female-specific body characteristics and their relevance to flight performance. While most previous research has focused on male aircrew, limited data exist for female counterparts. This preliminary study aims to describe the anthropometric measurements and body composition of female military cadets and compare them with the general female population in Taiwan.

Methods
We retrospectively analyzed data from 70 female Air Force cadets collected between 2021 and 2024. Height, weight, and body mass index (BMI) were measured using the InBody BSM 370. Body composition parameters—including waist-to-hip ratio (WHR), skeletal muscle mass (SMM), skeletal muscle percentage (SMP), body fat mass (BFM), and body fat percentage (BFP)—were obtained using the InBody 270. Data were summarized using means, standard deviations, and percentiles (5th, 25th, 50th, 75th, 95th). Reference data for the general female population were sourced from the Health Promotion Administration, Taiwan.

Results
The mean age of participants was 23.4 ± 1.8 years. Average values were: height 164.2 ± 3.2 cm, weight 57.3 ± 6.1 kg, BMI 21.2 ± 2.2 kg/m^2, and WHR 0.83 ± 0.04. Mean SMM was 23.3 ± 1.9 kg, SMP 40.8 ± 2.8%, BFM 14.8 ± 4.3 kg, and BFP 25.4 ± 5.1%. Compared to the general population, cadets had greater height and weight, and lower BFP. However, at the 75th percentile and above, the general population showed higher values in weight, BMI, and BFM.

Conclusion
Our study is one of the few that focuses on the physical characteristics of female flight cadets. Notable differences in weight, BMI, and BFM were observed between female aircrew and the general female population.

Relevance
An extended study would be valuable in establishing the relationship between body characteristics and flight performance, such as G tolerance.

Keywords: anthropometric measurement, body composition, military cadets

ABS:117

Assessment of Changes in Psychomotor Skills Under the Influence of a Special Training Process in Cadet Pilots

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Introduction
The aim of the study was to investigate the effect of a special pilot training process on psychomotor skills.

Methods
A total of 36 male cadets with an average age of 21 ± 0.96 years were examined. Based on the average number of loop rotations performed by the cadets, they were divided into two groups. Group A (research, n=22) above the average of 44.11 ± 9.22, and group B (control, n=14) below. In both groups, two exercise tests were performed: before (test I) and after (test II) a special 40-hour training process. The exercise test consisted of performing the number of loop rotations. During the loop rotations, the percentage of task completion was assessed using a diagnostic and training device. The tasks were transmitted wirelessly to the training goggles from the operator's station. Heart rate (HR) and blood pressure were measured using a Microlife device. The obtained results were analyzed using the STATISTICA 13.3 package.

Results
In group A, significant improvement in the percentage of task completion and the number of turns performed on the loop was observed in test II at $p<0.05$ compared to test I. In group B, significant increase in the number of turns was observed in test II at $p<0.0001$ and non-significant improvement in the percentage of task completion compared to test I.
In group A, significantly greater number of turns was observed in tests I and II than in group B, respectively, at $p<0.0001$ and $p<0.002$. In group B, significant increase in diastolic blood pressure was observed in test II compared to test I, at $p<0.05$.

Conclusions
The special pilot training process significantly improved the performance of turns on the loop in groups A and B and increased the percentage of task completion, but significantly only in group A.

Relevance
Flight Safety

Keywords: looping, exercise, heart rate, process training, rotation, psychomotor, test,skills

ABS:147

Personality Traits and Autonomic Nervous System Activity During a Simulated Military Flight

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Introduction
The military pilots are under high task demands during real and simulated flight. This requires a high level of cognitive functioning associated with various stress factors. Such conditions affect the activity of the autonomic nervous system (ANS). The aim of this study was to investigate the relationship between autonomic nervous system activity, personality traits, and physiological parameters during psychological stress induced by a simulated flight.

Methods
41 candidates to the Polish Air Force Academy underwent psychophysiological testing (the NEO PI-R and CISS) and performed a simulated flight (SFT) using the Hyperion simulator. They all had ECG monitoring to evaluate heart rate (HR) and the heart rate variability (HRV) with frequency domain analysis. HR and HRV parameters were measured at baseline and during SFT. Spectral power of the high frequency (HF) and low frequency (LF), and the ratio of LF to HF power (LF/HF) were calculated. RESULTS: There were significant differences between resting HR and during SFT. Furthermore, throughout SFT, we noticed a significant HF reduction. In the psychological tests, several significant correlations were observed. The intensity of neuroticism showed a positive correlation with HR at baseline and during SFT. The intensity of extraversion was positively correlated with baseline LF and HF power. The intensity of conscientiousness was negatively correlated with baseline HR. Preference for a task-oriented coping style was negatively correlated with the mean HR during the SFT.

Conclusions
The autonomic nervous system strives to maintain a dynamic balance between parasympathetic and sympathetic activity during tasks that engage cognitive and executive functions. Changes in autonomic nervous system activity during simulated flight are influenced by the intensity of selected personality traits.

Relevance
The autonomic nervous system responses to cognitive load and tasks may be relevant for psychophysiological profiling in pilot selection.

Keywords: HRV; psychological stress; flight simulation; personality traits; military pilots; autonomic nervous system

ABS:200

Haemodynamic assessment of mild atrioventricular valve regurgitation in the aero-medical aspect

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Background
Trace or mild mitral and tricuspid regurgitation (TMR/MMR and TTR/MTR) are frequently observed in the general population and are not uncommon, among candidates and qualified military pilots. TMR and TTR are often asymptomatic at rest, but may affect left ventricular (LV) function under stress (e.g., G-forces, exercise testing),. However, this hypothesis lacks haemodynamic confirmation.
The aim of the study was to assess changes in haemodynamic parameters during the Valsalva maneuver in persons with benign atrioventricular valve regurgitation.

Material and Methods
Thirty individuals diagnosed with TMR/MMR or TTR/MTR, as well as ten men without valvular insufficiency, were evaluated. All participants underwent transthoracic echocardiogaphy and full haemodynamic assessment using impedance cardiography (ICG) at baseline, during, and after the Valsalva maneuver (VM). Qualitative assessments of the cardioimpedance waveform were performed alongside quantitative analyses of changes in haemodynamic parameters, including those reflecting LV systolic and diastolic subperiods, afterload, preload, total peripheral resistance, cardiac output, heart rate, systolic, diastolic, and mean blood pressure values. Data obtained from the control group were utilized to ascertain the trend pattern of changes in haemodynamic parameters. During and after VM, significant differences compared to baseline values for all haemodynamic parameters except acceleration index and left ventricle work index in both groups were found.

Results
1. During the Valsalva maneuver, beneficial changes in this haemodynamic parameter, which may significantly impact blood redistribution under conditions of high +Gz acceleration were observed. Determining these parameters in dynamic tests could be useful in aero-medical certification.
2. Changes in haemodynamic parameters observed in patients with trace or mild atrioventricular regurgitation suggest that such a minimal degree of valvular insufficiency should not constitute a contraindication to flight training, including on high-performance jet aircraft, particularly in the absence of morphological abnormalities of the valvular annulus or other structural or functional cardiac pathology.

Keywords: mitral regurgitation, aero-medical examination, haemodynamics

ABS:88

Grounded by a Virus: Parvovirus B19 Presenting as Acute Polyarthritis in an Aircrew Member

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Introduction
Acute joint symptoms in pilots raise immediate concerns about musculoskeletal function, fitness to fly, and potential underlying autoimmune disease. Viral arthritides like Parvovirus B19 are often overlooked but can mimic inflammatory joint disease, leading to diagnostic uncertainty and unnecessary grounding.

Purpose
This case highlights Parvovirus B19 as a reversible cause of acute polyarthritis in a pilot, underscoring the need to consider viral infections in the differential diagnosis to support safe and timely return to flight duties.

Methods
A 50-year-old commercial pilot presented with a two-day history of joint pain and swelling in the hands, wrists, and ankles, alongside a bilateral, non-blanching rash on the lower legs. He reported transient fever but no respiratory, gastrointestinal, or urinary symptoms. Examination showed swollen hands held in a clawed posture, swollen wrists, and a tender left ankle. Blood tests revealed raised CRP (58 mg/L), lymphopenia, and positive Parvovirus B19 IgM and IgG. PCR confirmed a high viral load (1.03 million copies/mL). Imaging showed mild osteoarthritic changes only. Treatment with naproxen 500 mg twice daily led to rapid improvement. Repeat PCR one week later showed a markedly reduced viral load (18,501 IU/mL).

Results
The clinical picture and laboratory findings confirmed Parvovirus B19 viral arthritis. Symptoms resolved fully with supportive care alone, and no long-term joint damage was evident.

Discussion
This case highlights the occupational relevance of recognising viral causes of acute arthritis in pilots. Misdiagnosis could lead to inappropriate immunosuppression or prolonged grounding. Recognising self-limiting viral arthritis can facilitate appropriate reassurance, conservative management, and an early safe return to flight.

Conclusion
Parvovirus B19 should be a key differential in acute polyarthritis among aircrew. Early recognition avoids over-treatment, reduces downtime, and maintains operational readiness.

Keywords: Parvovirus, Arthritis, Joint Pains

POSTER SESSION 6

ABS:82

Civil aviation emergency management information platform for public health emergencies System: Information Technology Solution for Pandemic Preparedness, Response, and Management

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Introduction

Global threats, such as pandemic, have highlighted the critical importance of robust and well-functioning information management systems in effectively addressing public health emergencies. Relying on advanced information technology,Civil Aviation Administration of China (CAAC)built Public Health Emergency Management System (PHMS)to comprehensively improve preparedness, early warning mechanisms, resource coordination, and response capabilities.

This paper outlines PHMS's functional architecture, scenario-based applications, and insights into optimizing public health emergency response through digital transformation.

The platform is based on Spring Boot, Vue, and My Bat isframework technology, the Camunda workflow engine for business process automation. The overall architecture a layered design, including an infrastructure layer, a system framework layer, and an application display layer. Development adopted agile methodologies with iterative and incremental implementation.

Results

Since its implementation in February 2025, PHMS has served civil aviation entities, including the CAAC, regional administration, safety supervision and management bureaus, airlines and airports. The system has established a multi-dimensional monitoring and early warning framework, along with a unified emergency management mechanism for public health emergencies.

Discussion

PHMS both PC and mobile terminals, enabling efficient reporting and activation of“sentinel” functions. A variety of information promotion channels are also established, including multimedia platform, information exchange platform, international column exchange platform, questionnaire, online communication, etc., to ensure that all users can obtain information timely and smoothly. In addition, PHMS will provide data visualization and intelligent reporting functions to meet the needs of the bureau's decision-making.

Conclusion

By merging digital platforms with emergency governance, PHMS establishes a data-driven ecosystem that bridges operational silos, accelerates policy execution, and elevates systemic resilience.

Keywords: Pandemic Preparedness,Public Health, Emergency Management, Information Technology

ABS:132

Methods of Diagnosing Aircraft Components as a Factor for Ensuring Safety in Air Training and Preventing Air Accidents. Selected Aspects

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Introduction
Aircraft maintenance is a team process involving a group of skilled technicians. The main focus is on methods for diagnosing aircraft and their impact on aviation safety and accident prevention. These discoveries inspired the idea of using AI in real time for early detection of changes in aircraft components.

Purpose
The aim of this article is to present the existing methods of aircraft diagnostics and to indicate several new ones which are the result of scientific observations of contemporary aircraft operation with a view to ensuring the safety of military aviation personnel.

Methods
Theoretical methods were used in the research process: analysis, synthesis, generalization, inference, analogy and comparison. Methods of diagnosing aircraft elements were presented. It included a diagnosis of the most modern trainer aircraft. The use of AI in diagnosing aircraft elements was indicated in order to ensure the safety of aviation personnel.

Results
Modern military aviation, with its increasingly advanced equipment, requires the use of modern methods for diagnosing aircraft components as an integral element ensuring the safety of flight training. Depending on the component being tested, its purpose and construction, we use different research methods. As algorithms continue to develop and more and more extensive data is collected, the effectiveness of AI in the aircraft maintenance process will increase – making the aircraft operation process even safer and more predictable.

Discussion
AI is significantly impacting aircraft maintenance by enabling predictive maintenance, automated visual inspections, and enhanced decision-making. AI algorithms analyze vast datasets from aircraft sensors, identifying anomalies and predicting potential failures before they occur, allowing for proactive maintenance.

Conclusion
AI has become an important tool in the aircraft maintenance process, allowing for more effective training of personnel, predicting and preventing faults, and better use of operational data. Its application translates into greater flight safety.

Keywords: Safety In Air Training, Methods Of Diagnosing Aircraft Components, Ai

ABS:169

Sleep Restriction Impairs Working Memory Under Hypoxia: Should It Be a New Consideration for Flight Safety?

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Introduction
In aviation, supplemental oxygen is generally not required between 10,000 and 13,000–14,000 feet if exposure does not exceed 30 minutes. While acute hypoxia (11,500 ft) can impair sustained attention, executive functions such as working memory appear relatively preserved. However, in operational contexts, hypoxia often co-occurs with sleep restriction. This study aimed to assess the impact of sleep restriction (3 hours time in bed) on working memory under normobaric hypoxia (simulated altitude of 11,500 ft).

Methods
Seventeen healthy male participants (mean age: 23.5±2.1 years) completed a randomized, controlled, crossover study involving two conditions: hypoxia following habitual sleep (HSHY; total sleep time (TST)>6 h) and following sleep restriction (SRHY; TST≤3 h). Working memory was assessed using the N-Back task at three levels (0-, 1-, and 2-Back) at 30 minutes (T+30) and 4 hours (T+240) of hypoxic exposure. Primary outcomes were accuracy and reaction time (RT).

Results
At T+30 , accuracy was significantly lower and RTs longer in SRHY vs. HSHY for all N-Back levels (all $p<0.05$). At T+240 , the 1-Back task also showed reduced accuracy ($p=0.037$) and slower RTs ($p=0.020$) in SRHY. No significant within-condition differences were found between T+30 and T+240 .

Discussion
These findings demonstrate for the first time that a single night of sleep restriction significantly impairs working memory under normobaric hypoxia, as early as the first 30 minutes. This interaction may impact flight safety by impairing decision-making and situational awareness.

Conclusion
The effect of sleep restriction on working memory under hypoxic conditions is detrimental. In aviation, as well as in high-altitude environments, it is essential to consider all operational constraints when assessing cognitive risks and ensuring safety.

Relevance
These findings provide valuable evidence to support further research and inform aviation regulations concerning oxygen supplementation.

Keywords: Hypoxia, Sleep restriction, Working memory

ABS:206

Strengthening Pilot's Mental Health through Peer Support Network and Programmes

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Introduction
Aviation mishaps attributed to pilot's mental health are rare but can be catastrophic. The attention on pilot's mental health has gone beyond the detection, diagnosis and treatment of psychiatric medical conditions. A more holistic approach especially in the area of pilot peer support becomes significant.

Background
Airline pilots continue to face unique challenges. These include irregular work hours, high workload, circadian rhythm disturbances, absence from home, and strict regulatory competency-based assessments. Repeatedly, these challenges often result in anxiety and distress.
Due to the stigma associated, many pilots choose not to seek assistance leading to non-disclosure and non-treatment. One effective way to overcome this is through pilot peer support programme established by Pilots Assistance Group (PAG).

Methods
PAG was formed in the 1990s, an initiative by the Airline Pilot Association of Singapore. Over the years, PAG has trained a total of 29 peer support volunteers (PSVs) with ages ranging from 30 to 65, comprising of both male and female volunteers.
PSVs were selected after meeting the required ethos determined from psychological test and selection interviews. Thereafter, PSVs undergo trainings by professional practitioners to acquire the crisis intervention and basic counselling skills. Regular workshops by trained professional avail an avenue for the new and incumbent PSVs to continue gaining knowledge in peer support work.
Underscored by Confidentiality, Respect, and Care, PAG assures pilots-in-need a safe haven to discuss their concerns and explore coping strategies as the first level of assistance and intervention. Besides that, PAG also facilitates professional help for pilots if needed.

Conclusion
PAG's Pilot Peer Support Programmes are a critical component of any pilot mental health and wellbeing framework and initiatives. The pilot peer support programmes in Singapore will continue to be strengthened, contributing to a more robust mental health ecosystem as a protective factor for safe flight operations.

Keywords: Pilots Mental Health, Peer Support

ABS:226

Guarding the Point of Entry: A Lesson Learned from Airport Passenger HealthQuarantine Systems

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Background
The role of health quarantine at the point of entry (PoE) is critical to prevent the spread of communicable diseases, particularly the transmission of infectious diseases from endemic to non-endemic areas. However, the high volume and rapid pace of human mobility at airports pose significant challenges to the passenger health quarantine system. Therefore, this field analysis aims to identify and evaluate the barriers hindering the effective implementation of the passenger health quarantine system at airports.

Overview
In this digital era, the limited contact between ground staff and passengers has compromised the effectiveness of the passengers' health quarantine screening measures. Moreover, the lack of effective coordination regarding health screening at PoE with other sectors within the aviation industry may also lead to the missed detection of ill travellers. Inadequate regulation concerning health quarantine enforcement, along with insufficient public awareness about health quarantine, are another critical factors that could undermine the effectiveness of passenger health screening at PoE.

Discussion
This field analysis evaluated a screening program for international arrivals at an Indonesian international airport, highlighting its suboptimal performance and thereby increasing the risk of insufficient detection of communicable diseases that could lead to public health events. A fishbone analysis identified the interplay of multiple factors in contributing to the ineffective implementation of the screening program, including methods, manpower, machines, materials, money, and environmental conditions.

Keywords: health quarantine, airport, communicable disease, travel medicine

POSTER SESSION 7

ABS: 01

Validation of a computational model for G-tolerance prediction using a second participant

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Introduction
With expanding commercial spaceflight, identification of individuals at risk for poor G-tolerance offers opportunities to provide preflight training and interventions to minimize symptom impact. Kennard et al. (2025) developed a model to predict G-tolerance during commercial spaceflight and was initially validated using a young, healthy female. This model will be further validated utilizing a second participant of differing demographic and medical factors.

Objectives
To evaluate the relative contribution of model input parameters and test model accuracy using prior participant data.

Methods
A previous centrifuge participant (Blue et al., 2014) was selected given significant cardiovascular co-morbidities, presence of G-tolerance symptoms at increasing +Gz exposure, and he provided a pre-participation echocardiogram, enabling in-depth physiological calculations. The Kennard et al. model correlated acceleration forces to predict the acceleration threshold at which G-induced loss of consciousness (G-LOC) might be observed under steady state conditions, utilizing inputs of blood volume calculated by two methods (Muraki et al., 2018 vs. Nadler), height, resting blood pressure, calculated systemic arterial resistance, and calculated systemic arterial compliance (Lehmann et al., 1998).

Results
Utilizing Muraki, the predicted acceleration at G-LOC was +5.009Gz. When substituting either calculated systemic arterial resistance or systemic arterial compliance, predicted G-LOC was +5.018Gz. Incorporating both calculated systemic arterial resistance and compliance, predicted G-LOC was +5.036Gz. Using the Nadler method, predicted G-LOC was +5.468Gz.

Discussion
The model predicts G-LOC thresholds similar to published USAF relaxed G-LOC averages of +5.2Gz (Gillingham and Fosdick, 1988), which might be a reasonable estimation for our participant experiencing mild G-related symptoms at +3.50Gz. These findings suggest blood volume is the driving factor in G-tolerance, correlating with prior research findings that dehydration reduces G-tolerance (Nunneley et al., 1979) There are currently limited centrifuge data for individuals with different physiological parameters; future work is needed to aggregate such data and clarify the importance of model input parameters.

Keywords: G-tolerance, prediction, spaceflight participant, mathematical model, blood volume, centrifuge

ABS:57

Establishment of a Practical Platform for Rapid Physiological Data Processing and G Tolerance Estimation

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Introduction

Exposure to high G environments activates cardiovascular responses that enhance pilots' G tolerance. To support pre-training assessment, we previously developed an algorithm based on the cardiac force index (CFI) to predict relaxed G tolerance (RGT). However, manual data processing was labor-intensive and time-consuming, limiting the algorithm's rapid application. This study aimed to develop an integrated software platform for data analysis and prediction while validating the accuracy of the existing model using physiological data collected prior to training.

Methods

This study involved 42 flight cadets from the Air Force Flight Training Command in Taiwan. Physiological data including heart rate and activity were collected before high-G training using the BioModule™ (BioHarness) 3.0. Walking CFI values were computed as inputs for the RGT prediction algorithm. A Java-based software platform was developed to automatically import participant data and read the file from the device. The platform estimates the RGT range based on the algorithm. System development and operation were performed offline in a secure Windows-based environment.

Results

Participants had an average age of 23.6 ± 1.6 years and a mean body mass index of 23.9 ± 2.9 kg/m^2. The actual mean RGT was 4.9 ± 0.9 G, which matched closely with the predicted mean of 4.9 ± 0.5 G ($p = 0.969$), confirming the model's consistency. Among 25 individuals with actual RGT above 4.5 G, 21 were correctly identified, achieving an accuracy of 84.0%. The prototype platform reduced the data processing time from about 10 minutes to a few seconds per subject.

Conclusion

A reliable and automated platform was successfully developed for rapid interpretation of pre-training physiological data. It effectively supports G tolerance prediction.

Relevance

Future work will focus on defining physiological thresholds and integrating real-time visual alerts to enhance training safety and performance monitoring.

Keywords: cardiac force index, relaxed G tolerance, high G training

ABS:63

The Impact and Mechanisms of Resistance Training on Hypoxia-Induced Muscle Atrophy

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Introduction
People moving to high altitudes often suffer muscle loss and weakness. Resistance training can help, but its mechanisms in hypoxia are unclear. This study explores how 8-week resistance training reduces hypoxia-induced muscle atrophy.

Method
Twenty-four 7-week-old male C57BL/6J mice were randomly divided into three groups: normoxic control (NC,n=8), hypoxic control (HC,n=8), and hypoxic resistance training (HRT,n=8). The NC group was housed at sea level (400 m), while the HC and HRT groups were housed in hypoxic chambers simulating 4400 m. Mice in the HRT group underwent weighted ladder-climbing resistance training in normoxic conditions over 8 weeks. At the end of the intervention, maximal voluntary carrying capacity (MVCC) and rotarod test were used to evaluate physical function. After euthanasia, we analyzed mitochondrial biogenesis and apoptosis-related proteins.

Result
(1) After 8 weeks of hypoxic resistance training, body weight, grip strength, MVCC, and rotarod retention time were significantly improved in the HRT group ($p<0.05$). (2) Ultrasonic texture analysis showed disorganized and blurred muscle fibers in the HC group. Mitochondrial swelling and vacuolization observed under electron microscopy. In contrast, the HRT group showed denser muscle fiber arrangement, well-preserved mitochondrial structure. (3) Western blot results indicated significantly increased expression of mitochondrial autophagy-related proteins PINK1/Parkin in the gastrocnemius of the HRT group compared to the HC group ($p<0.05$). Expression levels of mitochondrial fusion proteins MFN2 and MFN1 were also upregulated, while mitochondrial fission proteins Drp1 and Fis1 were down-regulated. Bcl-2 expression increased, Bax expression decreased.

Conclusion
This study demonstrates that 8-week resistance training program effectively mitigates skeletal muscle atrophy induced by hypoxia.The underlying mechanism may involve activation of PINK1/Parkin-mediated mitophagy, promotion of mitochondrial fusion and inhibition of fission, thereby reducing oxidative damage and suppressing apoptosis.

Keywords: Resistance Training;Hypoxic;Muscle Atrophy

ABS:93

A Pilot Study on Heart Rate Variability in Flight Cadets During Exposure to Hypobaric Hypoxia

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Introduction
Hypoxia is a major physiological challenge for pilots, requiring rapid detection to maintain operational safety. This study assessed heart rate variability (HRV), an indicator of autonomic nervous system (ANS) function, during hypobaric hypoxia exposure.

Objective
By recording HRV changes during hypobaric chamber training, this research aims to provide an objective indicator for evaluating autonomic regulation in flight cadets.

Methods
Sixteen male flight cadets with an average age of 23 years, meeting Class I aircrew standards, underwent hypobaric chamber training at the Aviation Physiology Research Laboratory, Taiwan in March 2025. HRV parameters and heart rate were collected using a wearable ECG monitor (QOCA, Taiwan) and analyzed with SPSS 29.

Results
The average RMSSD was 39.31 ± 21.46 ms at baseline and 31.20 ±26.69 ms at 18,000 ft; LF/HF ratio was 3.82 ± 2.31 at baseline and 5.95 ± 8.51 at 18,000 ft; Heart rate decreased from 76.21 ± 10.87 bpm at baseline to 92.59 ± 9.23 bpm at 18,000 ft. Results indicate notable physiological changes under hypobaric hypoxia; however, only heart rate showed statistical significance.

Discussion
As a preliminary investigation of HRV in a hypobaric chamber, this study observed an expected heart rate increased under acute hypoxia, indicating sympathetic activation. RMSSD increased and LF/HF decreased slightly while showed no significant differences, possibly due to the exposure protocol, exposure time or small sample size.

Conclusion
This study provides a preliminary exploration of autonomic responses under hypoxic conditions. Future research will include more participants to further investigate the effects of hypobaric hypoxia on HRV. Additionally, this study marks the first use of a Taiwan-made AI ECG sensor for physiological monitoring in flight cadets, aiming to offer valuable reference data for future research and training protocols.

Keywords: Hypobaric chamber, HRV, Hypoxia, Autonomic nervous system

ABS:97

Alterations In Oxidative Stress Before And After Hypobaric Chamber Training: Case Report

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Introduction

The hypobaric chamber is widely utilized for hypoxia awareness training globally, enabling aircrews to familiarize themselves with the unique symptoms of hypoxia. To mitigate the risk of decompression sickness, a mandatory 30-minute denitrogenation procedure involves breathing 100% oxygen before ascending to high altitudes. However, silent nitrogen bubbles can persist in the trainee's body, potentially elevating oxidative stress levels and leading to adverse health outcomes. Despite this, there is a notable lack of studies that repeatedly measure the alterations in oxidative stress indicators in response to changes in atmospheric pressure over time.

Overview

Two inside observers (IO) participated in the chamber training. They voluntarily collected urine samples at six-time points: baseline (before training), immediately after training, and at 2-hour, 24-hour, 48-hour, and 72-hour intervals post-training. Using commercial kits, we measured two oxidative stress indicators: 8-hydroxy-2'-deoxyguanosine (8-OHdG) and Trolox Equivalent Antioxidant Capacity (TEAC). IO-1 was a 28-year-old female officer, while IO-2 was a 33-year-old male sergeant, who completed the training at 35,000 feet. At baseline, IO-1 exhibited significantly higher levels of 8-OHdG (3.85 vs. 0.37 μg/mg creatinine) and TEAC (8.09 vs. 4.07 mmol/g creatinine) compared to IO-2. After 2 hours of training, both observers displayed noticeable changes in their 8-OHdG and TEAC levels. IO-1 showed a decreasing trend in both indicators, whereas IO-2 exhibited an increase. These effects appeared to persist for up to 72 hours following the training.

Discussion

In this pilot study, we investigated the molecular level of health effects after the hypobaric exposure. Our findings explained that initial reference of oxidative stress may influence the pattern of its response. The data indicate that individuals require sufficient time to allow their oxidative stress levels to return to near baseline following a single session of hypobaric training.

Keywords: Hypoxia Awareness Training, Decompression Sickness, Oxidative Stress, 8-Hydroxy-Deoxyguanosine, Trolox Equivalent Antioxidant Capacity

ABS:106

Acute high-altitude hypoxia triggers TNF- production in vascular smooth muscle cells via BMAL1-mediated endoplasmic reticulum stress

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Introduction
Vascular dysfunction is a critical pathological driver for cardiovascular maladaptation when exposed to high-altitude environment. Recently, endoplasmic reticulum (ER) stress and related vascular inflammation has been reported to play a key role in response to high-altitude hypoxia. However, little is known whether high-altitude hypoxia impairs vascular function by disrupting ER homeostasis and then inducing the related vascular inflammation.

Methods
Mouse models were exposed to 5500 m hypobaric chamber for 3 days to simulated severe high-altitude hypoxia and cultured vascular smooth muscle cells (VSMCs) were treated with 1% O . Transcriptomic analysis was used to identify the candidate molecular targets. The protein and mRNA expressions of candidate molecules, the knock-out mice were used to investigate the possible mechanisms.

Results
The present work indicated that high-altitude hypoxia impairs vascular compliance by disrupting ER homeostasis and promoting TNF- -mediated inflammation in VSMCs. Independent of HIF-1a pathway, Bmal1 was identified to be a dominant regulator to mediate ER stress and then induced the TNF- production by targeting ATF6 in VSMCs. Furthermore, deletion of smooth-muscle specific Bmal1 significantly attenuated ATF6-mediated ER stress and then suppressed the ADAM17-TNF- inflammatory response in vivo and in vitro under high-altitude hypoxia.

Conclusion
These findings reveal a novel mechanism that Bmal1 promotes ER stress and TNF- synthesis by targeting ATF6 in VSMCs under high-altitude hypoxia, which suggested that circadian gene Bmal1 may act be a potential therapeutic target for altitude-related cardiovascular diseases.

Keywords: High-altitude, Bmal1, Endoplasmic reticulum stress, Inflammation, Vascular smooth muscle

POSTER SESSION 8

ABS:32

Concurrent benign paroxysmal positional vertigo in a civil aviation pilot with ipsilateral sudden sensorineural hearing loss

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Background
Sudden sensorineural hearing loss (SSNHL) may occur concurrently with benign paroxysmal positional vertigo (BPPV), whose etiology remains elusive despite the general consensus that detached otolith particles are responsible for its pathogenesis. Our case report describes a male civil pilot contracted SSNHL with concurrent BPPV, showing potential for morbidity in pilots.

Overview
Following an URI and excessive exercise, a 59-yr-old pilot complained of sudden dizziness and hearing loss accompanied by profuse sweating and palpitation. Laboratory tests revealed that values of total cholesterol, uric acid and creatinine were increased. Ultrasonography indicated bilateral carotid plaque formation. Pure tone audiometry confirmed sensorineural hearing loss on the right side. Dix-hallpike test showed right posterior semicircular canal(SCC) BPPV. The patient had histories of cerebral arteriosclerosis, primary hypertension(grade) and obesity for more than 10 years. He was diagnosed with SSNHL and BPPV. He was treated with drugs and Epley maneuver. When his condition was stabilized 2 months later, Caloric test demonstrated decreased function with directional preponderance in the right horizontal SCC. Furthermore, video-head impulse test revealed significantly lower gain on the right side in all SCC. The aviation medical examiners provided unqualified conclusions according to the CCAR-67FS and AC-67-FS-001R1. The Experts Committee of Chinese Civil Aviation Medicine refused the application for special permission flight due to the too short medical observation period.

Discussion
This was the first case of SSNHL with concurrent BPPV reported in aircrew. This rare condition has been assumptively explained as damage of the cochlea and the SCC due to inner ear ischemia, which may be caused by vascular compromise, viral infection, metabolic disorders and so on. In this case, SSNHL was promptly managed with steroids as well as thrombolytic and circulatory drugs. Meanwhile, Epley maneuver served as a targeted treatment for BPPV. Aviation medical assessment provided unqualified conclusions. Special permission medical assessment should be considered carefully according to the conditions.

Keywords: Concurrent Benign Paroxysmal Positional Vertigo, Sudden Sensorineural Hearing Loss, Civil Aviation Pilot, Medical Assessment

ABS:76

Challenges in color vision, literature on new methods for deficiencies description and detection.

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Introduction/Context
The ability to perceive colors correctly is an essential requirement for workers in the aeronautical field. Color perception is a complex phenomenon that involves not only the transduction of signals in the human retina but also their processing by the optic pathways and the visual cortex. It is the result of the interaction of all shapes, shadows and lights in a scene, and therefore of their spatial arrangement in the scene.

Purpose
In this contribution, we show a new approach to color deficiency, aiming to understand whether and to what extent people with color vision deficiency rely on spatial components to perceive colors.

Methods
R. Eschbach et al. (2021) developed a modified set of Ishihara plates, varying the size of the dots. The dots were progressively enlarged until they touched, forming clear edges and stronger contrast. These plates were tested on both color-normal and color-deficient observers. Results showed that even individuals with severe color vision deficiency were able to recognize the numbers as the size of the dots increased. Other studies (R. Eschbach et al., 2022a; Eschbach et al., 2022b) focused on changing the background color from standard white to various shades of gray. In all cases, color-deficient subjects showed a clear improvement in plate recognition with mid-gray backgrounds.

Discussion
These studies suggest that the human visual system actively integrates spatial information when processing color. This mechanism seems more evident in individuals with color vision deficiency (Plutino et al., 2023).

Conclusion
In summary, spatial components and edges—present in everyday visual experience—are essential to color perception. These factors work together to enrich our visual understanding. Therefore, to improve color vision deficiency diagnosis, it would be useful to employ tests that also assess the spatial component, complementing current methods that may not fully capture real-world conditions.

Keywords: Color Blindness, Spatial Arrangement, Diagnosis, Visual Experience

ABS:71

Aeromedical Certification of a Military Pilot with Asymptomatic Hyperparathyroidism: A Case Report and Literature Review

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Introduction
The incidence of thyroid diseases is relatively high among pilots. Cases of hyperparathyroidism in pilots are rarely reported. This article reviews the case data of a pilot diagnosed with asymptomatic hyperparathyroidism and examines relevant literature.

Purpose
To enhance understanding of asymptomatic hyperparathyroidism, improve diagnostic and treatment approaches in pilots, and explore the principles of aeromedical certification.

Methods
The diagnosis and treatment process of this pilot were retrospectively analyzed, accompanied by a review of related literature.

Results
The pilot did not exhibit typical clinical manifestations such as muscle pain or osteoporosis. After completing laboratory tests, including parathyroid hormone levels, blood calcium, urinary calcium measurements, and parathyroid static imaging, the pilot was diagnosed with asymptomatic hyperparathyroidism (aHPT). Comprehensive evaluation revealed no complications, such as urolithiasis or osteoporosis, and no surgical indications for asymptomatic hyperparathyroidism. Dynamic follow-up with regular monitoring of parathyroid-related indicators was recommended. The pilot expressed a strong desire to continue flying and was certified as fit for flight duties through aeromedical evaluation.

Discussion
A review of relevant literature highlights the need to assess the risk of disease progression in patients with asymptomatic hyperparathyroidism, as well as the potential benefits of surgical intervention in improving clinical symptoms following parathyroidectomy. Surgery is not the only way for hyperparathyroidism pilots to resume flying.

Conclusion
For military flight personnel with asymptomatic hyperparathyroidism, it is essential to perform scientific and rational aeromedical certification, incorporating comprehensive evaluation of the condition and dynamic monitoring of biochemical indicators.

Keywords: Asymptomatic Hyperparathyroidism, aeromedical certification

ABS:84

Incidental discovery of blebs and bullae in fighter pilots: should they be treated or monitored? a case report and literature review

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Introduction
Primitive spontaneous pneumothorax is a cause of aeronautical unfitness in flight personnel, its pathogensis remains complex involving several factors in particular spontaneous rupture of subpleural blebs or bullae also called emphysema-like changes (ELCs). The incidental finding of ECLs in fighter pilots is a challenging situation for the aeromedical doctor.

Overview
A 41-year-old, asymptomatic, F16 fighter pilot in the Royal Moroccan Air Force, showed, incidentally, on thoracic CT scan, apical diffuse Bullous pulmonary emphysema, the pulmonary function testing revealed no restrictive defects. Considering his occupation as an F-16 aviator and the extent of the bullae, the decision was made to proceed with preventive treatment. The pilot declined the surgery and was subsequently reclassified as a transport pilot, with regular clinical and radiological monitoring, showing stability in bullae size and preservation of respiratory function.

Discussion
The role of ELCs in the development of spontaneous pneumothorax is controversial, and given the flight environment, especially for fighter pilots, such as hypobaria, accelerating forces, anti-G loading maneuvers, and oxygen breathing, which can lead to susceptibility to spontaneous pneumothorax, prophylactic treatment of ELCs by thoracoscopy or surgery is recommended. However, only a few studies have shown no evidence of ELCS rupture and no need to recommend prophylactic treatment for incidentally detected ELCs in fighter pilots, the largest being a study of 39 Korean fighter pilots with a follow-up of 1531 days.

Conclusion
The role of ELC in the pathophysiology of PSP is a contentious issue, and the indication of preventive treatment as a prerequisite for fighter pilots to continue their duties is a matter of debate, needing more studies with large groups to decide the necesity of the preventive treatement. considering the cost and side effects of such treatment.

Keywords: blebs and bullae - pneumothorax - fighter pilot

ABS:131

Impact of 15s +9 Gz Acceleration on Contrast Sensitivity in Pilots: A Dynamic Simulator Study

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Background

Aviators are subjected to sustained accelerative forces during flight operations, which modulate retinal perfusion and impair contrast sensitivity. This investigation aimed to quantify the impact of a 15-second exposure to +9 Gz acceleration on contrast sensitivity utilizing the Dynamic Flight Simulator HTC-07 (AMST, Austria).

Methods

The experimental design incorporated two cohorts: Group I, comprising 25 male aviators experienced in high-G maneuvers (mean age 26.4 years), and Group II, consisting of 25 male individuals without flight experience (mean age 26 years). Group I underwent contrast sensitivity assessment pre- and 5 minutes post-exposure to the accelerative stimulus, whereas Group II was evaluated under identical conditions sans accelerative exposure. Contrast sensitivity was measured across photopic, scotopic, mesopic, and glare conditions using the Functional Vision Analyzer (FVA, USA).

Results

Post-exposure, contrast sensitivity and threshold exhibited augmentation at intermediate and high spatial frequencies, specifically at 6 cycles/degree under photopic, mesopic, and mesopic-glare conditions, with analogous enhancements at 12 cycles/degree under photopic illumination. Group I demonstrated statistically superior mean contrast sensitivity and threshold compared to Group II under photopic, mesopic, and mesopic-glare conditions. Maximal contrast sensitivity was recorded under photopic conditions, followed by mesopic, with minimal values under mesopic-glare conditions across both cohorts, independent of accelerative exposure. No statistically significant interocular differences were observed in the assessed parameters.

Conclusions

A 15-second exposure to +9 Gz acceleration during simulated high-G centrifuge conditions elicited statistically significant alterations in contrast sensitivity and threshold, suggesting adaptive visual responses in aviators under such operational stressors. These findings indicate that high-G training may augment visual acuity under operational conditions, potentially mitigating risks of visual impairment during high-maneuver flights.

Keywords: Contrast Sensitivity

POSTER SESSION 9

ABS:56

Nasal Polyposis in Flight Personnel: Traditional Therapeutic Approach or Choice of Biological Treatment?

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Chronic rhinosinusitis with nasal polyps (CRSwNP) is a multifactorial inflammatory condition affecting the nasal and paranasal mucosa, significantly impacting patients' quality of life. This study focuses on CRSwNP in military flight personnel, comparing traditional therapeutic approaches with biological treatments.

Introduction
CRSwNP is characterized by symptoms such as nasal obstruction, rhinorrhea, and reduced olfactory function. The condition is often associated with comorbidities like asthma and atopy, necessitating a multidisciplinary approach for effective management.

Methods
Over two years, 53 military pilots diagnosed with CRSwNP were observed. Diagnostic procedures included anterior rhinoscopy, nasal endoscopy, rhinomanometry, and CT scans. Treatments ranged from topical and systemic steroids to endoscopic sinus surgery (ESS) and biological therapy with dupilumab.

Results
Traditional steroid therapy was effective in 62.26% of cases, while 37.74% required alternative treatments. ESS was successful in 72.22% of surgical cases. Biological therapy with dupilumab showed promising results, particularly in patients with recurrent post-surgical polyposis.

Discussion
While traditional therapies and ESS are effective for many, biological treatments offer a significant advantage in managing refractory cases. However, logistical challenges, such as the need for regular administration and cold chain maintenance, limit their use in military settings.

Conclusion
Both traditional and biological therapies can effectively manage CRSwNP in military pilots. The choice of treatment should consider individual patient needs, logistical constraints, and the potential for improved quality of life.

Keywords: Nasal Polyposis, Military Pilots, Therapy, Biological Therapy

ABS:109

Changes in Pain Intensity of Musculoskeletal Disorders in Flight Attendant Post Stretching Exercise Program

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Background
Flight attendants are often exposed to ergonomic stressors and are therefore susceptible to musculoskeletal disorders. Stretching can help overcome musculoskeletal complaints. The purpose of this study was to determine the prevalence of musculoskeletal disorders and the effect of a 2-week stretching exercise program on changes in musculoskeletal pain intensity in flight attendants on commercial aircraft in Indonesia.

Methods
This research is a pre-post study. The subjects were asked to fill the Nordic Musculoskeletal Questionnaire to assess the presence of musculoskeletal disorders and to assess which area felt the most pain. The intensity of pain was assessed using the Visual Analog Scale. The subjects were then given intervention with stretching exercise videos from the Ministry of Health of the Republic of Indonesia.

Results
The results showed that 92% of the flight attendants (n = 75) had musculoskeletal disorders in at least 1 area ofthe body in the last 12 months.The intensity of pain in the most painful area based on the VAS value was 5.23 (SD: 2.58).34 respondents were used as research subjects with intervention. The stretching exercise program showed significant changes in the complaint level scores in 28 body areas ($p < 0.001$) and pain intensity before and after the stretching exercise intervention ($p < 0.001$).

Conclusion
There were significant changes in the complaint level scores and pain intensity before and after the stretching exercise intervention.

Relevance
Our study suggests specific stretching interventions according to the work tasks performed by flight attendants.

Keywords: Flight attendant, musculoskeletal disorders, stretching exercise program, Nordic Musculoskeletal Questionnaire, Visual Analog Scale

ABS:189

Managing Low Back Pain in Military Aviators: A Meta-Analysis of Core Stabilization Exercise Trials

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Background:
Military aviators require high levels of focus and physical performance. However, the prevalence of lower back pain (LBP) among fighter and helicopter pilots reaches nearly 40%, contributing to reduced concentration, pilot attrition, and even military discharge. Core-strengthening exercises are often used to treat LBP, though evidence in this population is limited.

Purpose
To evaluate the effectiveness of core-strengthening exercise in reducing LBP among military aviators.

Methods
A systematic review and meta-analysis were conducted per PRISMA 2020 guidelines using data from Pubmed, Scopus, and Cochrane. Included randomized clinical trials involved core-strengthening interventions in active military aviators. Risk of bias was assessed using the Cochrane Risk of Bias 2.0 tool. A random effects model using the R{meta} package in RStudio was used to calculate mean differences (MD) and standardised mean differences (SMD) with 95% confidence intervals (CI).

Results
Three randomized controlled trials involving 41 military aviators were included. Pooled analysis revealed that core stabilization exercises showed a significant reduction in pain intensity according to the Numeric Pain Rating Scale with an MD of -2.50 points (95%CI:-4.36– -0.64,I2:0%). The Oswestry Disability Index (ODI) also saw a decrease by -2.90 points, though the SMD remained insignificant compared to the control group (95%CI:-11.97–6.17,I2:90%).

Discussion
Core-strengthening exercises appear effective in both reducing pain and disability in military aviators with LBP. The consistent effect on disability suggests reliable functional improvement, while the high heterogeneity in pain outcomes may reflect variation in baseline ODI scores. Despite this, the overall findings support their use as an intervention in this population.

Conclusion
Core stabilization exercises are effective in reducing disability and pain among military aviators with LBP, supporting their use as a therapeutic intervention.

Keywords: Core-strengthening, Pilates-based exercise, Lower back pain, Military aviators

ABS:172

Prolactinoma in Air Traffic Controller

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Introduction/purpose
Pituitary tumours are prevalent in the general population, with prolactinomas being the most common type. Macroprolactinomas are >10mm in size and can cause symptoms of hyperprolactinaemia +/- pressure-related symptoms. Literature in the aviation context is limited/focuses on pilots. Here we present the case of an air traffic controller (ATC) with macroprolactinoma, outlining the approach to diagnosis, assessment and management including aeromedical implications.

Methods
A 44-year-old ATC presented with secondary amenorrhoea, with bloods demonstrating hyperprolactinaemia (1341 mIU/L). Following confirmation of the prolactin, MRI brain showed an intrasellar cystic mass abutting the optic chiasm. Further assessment showed LH and FSH suppression with low normal oestradiol. Visual fields and bone density were unremarkable, with moderate elevation of fasting lipids. She was reviewed by an endocrinologist and neurosurgeon, underwent visual fields assessment with an optometrist which was unremarkable, and treated with cabergoline. Following a 4-week medication ground trial, she resumed ground controlling duties with another controller. She reported no adverse effects of medication, and 6 week bloods demonstrated a good response with reduction of prolactin levels. She underwent repeat bloods and MRI brain following 3 months of dopamine agonist therapy, which demonstrated significant reduction of tumour size and regularisation of menstruation- confirming the diagnosis of prolactinoma. She is planned for longterm cabergoline therapy, with further endocrine review in 6 months. In the interim, she has continued controlling duties with 6 monthly aviation medical officer review.

Discussion/conclusion
Aeromedical considerations for this diagnosis include tumour size and impact to adjacent structures, apoplexy risk, metabolic effects of hormone excess and side effects/complications of treatment. This is an underdiagnosed, treatable condition- and this case adds further evidence to the utility of screening for prolactin in all women of reproductive age with infertility/amenorrhoea. The opinions expressed in the publication are that of the authors, and not the Department of Defence.

Keywords: prolactinoma, aviation medicine, general practice