2024 ABSTRACTS OF THE AsMA SCIENTIFIC SESSIONS

94th Annual Scientific Meeting **Hyatt Regency Hotel**
May 5 – 9, 2024 **Chicago, IL**

The following are the sessions and abstracts with rooms and presentation times for all presentations accepted after blind peer-review—in workshop, panel, slide, or poster sessions—for the 2023 Annual Scientific Meeting of the Aerospace Medical Association. The numbered abstracts are keyed to both the daily schedule and the author index. The Sessions numbers are listed as S-01 through S-89 (including workshops). Session chairs are included in the index to participants. The order of some sessions may have changed, so some abstracts may be out of numerical order. Abstracts withdrawn are listed as **WITHDRAWN**. Presenters are underlined in the text.

SLIDES & PANELS: Each slide presentation is scheduled for 15 minutes (10-min talk and 5-min Q&A). We strive to keep slide presentation on time. Panel presentations have more flexibility and may not keep to a strict 15 minutes per presenter format. There will be a discussion period of 15 minutes at the end of each panel.

POSTERS: Posters will be presented digitally this year. Poster authors must be present for the full session in which their poster is scheduled.

EXHIBITS: Exhibits will be open Sunday evening during the Welcome Reception, and 9:30 a.m. to 4:30 p.m. Monday and Tuesday. Please wear your badge and visit every exhibit.

CONFLICT OF INTEREST: All meeting planners and presenters completed financial disclosure forms for this live educational activity. All potential conflicts of interest were resolved before planners and presenters were approved to participate in the educational activity. Any conflicts of interest that could not be resolved resulted in disqualification from any role involved in planning, management, presentation, or evaluation of the educational activity.

TEMPLATES: All Abstracts were submitted according to a certain category and type using provided templates. Not all abstracts submitted fit the mold for Original Research abstracts. We therefore have created an Education category with three additional types: Case Report, Program/Process, and Tutorial. The templates for these are provided for your information.

ORIGINAL RESEARCH TEMPLATE:

This type of abstract describes the results and significance of new research undertaken to address gaps in the current knowledge of aerospace medicine or human performance. It is typically an original analysis of a hypothesis involving data collection and analysis.

INTRODUCTION: *<This section includes the background, including a statement of the problem and why it is important, the status of the current research, and the hypothesis to be tested.>*
METHODS: *<This section includes a brief description of how the study was conducted, the number, type, and gender of the subjects, and how they were selected and grouped. It should also include the metrics collected, how they were measured, and how frequently they were recorded. The types of scales or questionnaires administered should be identified. Environmental condition and administered medications should be described. In addition, a summary of the statistical methods should be provided. A statement concerning ethics approval for studies using human or animal subjects is also required.>*
RESULTS: *<This section includes a summary of the data and metrics of operational and/or statistical significance. "**Results will be discussed" is not acceptable.**>*
DISCUSSION: *<This section interprets the meaning of the results in terms of their application to the operational/clinical/scientific community and suggests areas for future research.>*

EDUCATION: CASE STUDY: CLINICAL OR HUMAN PERFORMANCE TEMPLATE:

This type of abstract describes the analysis of an individual clinical or operational case that is not a research study but provides pertinent information directly applicable to aeromedical practices, safety, or human performance.

INTRODUCTION: *<This section concisely summarizes the case.>*
BACKGROUND: *<This section describes the importance of the case and provides supporting evidence in the form of a literature review.>*
CASE PRESENTATION: *<This section describes the event.>*
DISCUSSION: *<This section explains the applicability and relevance to civilian and military operations.>*

EDUCATION: PROGRAM/PROCESS REVIEW TEMPLATE:

This type of abstract can describe a new Service thrust, e.g., identifying capability gaps, or reviews of critical areas, e.g., safety. It may be a description of a program or process that is used to solve a problem or accomplish a task.

BACKGROUND: *<This section describes why this is important to AsMA attendees and why this needs to be addressed now.>*
OVERVIEW: *<This section concisely describes the effort and how it applies to current or future gaps.>*
DISCUSSION: *<This section describes (1) the operational or clinical significance, (2) how it will this advance aeromedicine/human performance, and (3) address whether it supports cross Service/International/Military – Civilian spheres.>*

EDUCATION: TUTORIAL TEMPLATE:

This type of abstract describes new tools, models, techniques, methodologies pertinent to civilian and military aerospace medicine and human performance.

INTRODUCTION: *<This section summarizes what will be covered, e.g., list of topics or syllabus.>*
TOPIC: *<Description of new technology, procedure, methodology.>*
APPLICATION: *<This section details how the new material will be implemented and how broadly it applies to aerospace medicine and human performance.>*
RESOURCES: *<This is an optional section to provide citations where additional information can be found.>*

SUNDAY, MAY 05, 2024

Sunday, 05/05/2024 ***8:00 AM***
Michigan 1A, 1B

[S-01]: WORKSHOP: AVIATION MENTAL HEALTH: OUR HISTORY AND OUR FUTURE: WHERE WE ARE & WHERE WE ARE GOING?

Sponsored by AsMA Aviation Mental Health Work Group

Chair: Quay Snyder
Co-Chair: William Hoffman

WORKSHOP OVERVIEW: BACKGROUND: *Mental Wellness of all aviation professionals is critical to the safety of operations, optimization of performance and health of individuals. AsMA attendees are key educators and providers of mental wellness programs who need has been highlighted in several aviation mishaps and the aviation consequences of COVID worldwide.* ***OVERVIEW:*** *This workshop will evaluate the status of current global aviation mental health programs including Peer Support Programs (PSP), regulatory initiatives to reduce barriers to seeking help and industry proposals to improve fitness to fly. It will discuss future possibilities for personally assessing mental wellness, improving fitness and incorporation of programs into an Aviation Safety Management System (SMS). Breakout sessions will target aerospace medicine providers with specific interests. Active participant support will facilitate exchange of ideas to improve current gaps in wellness programs.* ***DISCUSSION:*** *The workshop will address international spheres across all aspects of aviation including airline, military, business, general and student training. Aerospace medicine initiatives in mental wellness training and support for the individual, providing templates for organizations and suggested guidance for regulators will improve safety and personal wellness. The workshop will initially present a historical review and current state of aviation mental wellness programs. A salutogenic approach rather than the current pathologic approach to medical certification is then discussed. Research initiatives for evidence-based recommendations is then discussed followed by a presentation on use of new technologies, including using AI and biomarkers in mental health. The above presentations trigger a discussion of ethical boundaries review in mental health research and evaluation. Regulators will present global initiatives followed by strategies to incorporate these program into an SMS. Two breakouts allow attendees discussion on peer support programs and clinical care. The workshop closes with a substantial time for open attendee discussion.*

[1] OUR HISTORY & OUR FUTURE: WHERE ARE WE & WHERE ARE WE GOING?

Quay Snyder
Aviation Medicine Advisory Service, Centennial, CO, United States

(Education - Program/Process Review)

INTRODUCTION: Mental well-being and its impact on aviation safety has gained worldwide attention following high-profile aircraft accidents and crew incidents in the previous decade. Within the aviation industry, several successful, but limited, programs to support the mental well-being of pilots have been established in the last 50 years. Increased attention to the magnitude and severity of reduced mental well-being in aviation has led to the discussion of strategies and establishment of programs to support mental health and aviation safety. This presentation will discuss past history, current progress, and future possibilities to optimize mental wellness in aviation professionals. **HISTORICAL BACKGROUND:** Previously, civil aviation authorities have medical disqualified pilots and Air Traffic Control Officers (ATCO's) who have been identified with mental illness diagnoses. Society stigmatized those with mental illnesses. The fear of loss of occupation if mental health help was obtained presented the biggest barrier to seeking help. The FAA/ALPA HIMS program proposed in 1974 was the first cooperative program using peer support, the medical community, the regulator, and the employer in assisting pilots with alcohol dependence. Fatal aircraft accidents in the late 1980's and early 1990's led to the creation of Critical Incident Response Programs (CIRP). The Germanwings murder-suicide by aircraft in March 2015 triggered worldwide calls for more widespread programs to support pilots' mental health. The result is a plethora of pilot union and regulator recommendations/regulations to institute pilot support programs industry wide. Recently, there is recognition at all aviation professionals and students should have similar resources available. **THE FUTURE:** A combination of strategies are proposed to enhance mental wellness in aviation. Primarily, regulators taking a salutogenic approach to mental health as opposed to the previous taxonomy based pathological approach to certification will remove barriers to seeking help. Transparency in certification and involvement of peers will reduce stigma and barriers to accessing assistance. Artificial Intelligence using biometric markers to assess fitness/wellness prior to duty compared to an individual baseline is a possible quantitative method of assessing fitness to fly. Workshop participants will be encouraged to offer their ideas to support future efforts.

Learning Objectives

1. Participants will understand of the historical evolution of various mental wellness enhancing programs in professional aviation.
2. Participants will understand current barriers to aviation professionals seeking mental health assistance and new strategies by aviation professional associations, employers, regulators, and training organizations to reduce those barriers.
3. Participants will become familiar with the role of artificial intelligence and other emerging technologies to enhance mental wellness and quantitate individualized assessments of fitness for duty.

[2] GENERATING WELLBEING, RESTORING HEALTH, FLYING SAFELY – HOW CAN WE PUT THE PUZZLE TOGETHER?

Kate Manderson
Civil Aviation Safety Authority, Canberra, Australia

(Education - Program/Process Review)

BACKGROUND: The connection between wellbeing, illness and flight safety has been described as a jigsaw puzzle, where we have only a few pieces and no clear final picture. More recently, we have suggested approaching the mental wellbeing and health puzzle in the same way as other medical certification decisions such as diabetes and heart disease, that had previously been too hard to put together safely because of missing pieces. **OVERVIEW:** Evidence-based aeromedical risk assessment relies on data about the individual pilot or controller that is matched with population-level data to identify, quantify and stratify risk. Each of these data points is a piece of that aeromedical "puzzle". Quality medical care is usually built around multidisciplinary teams, but we rarely expand the team membership beyond the clinical. That means the pieces of our puzzle are based on clinical parameters, test results, clinical reporting and assessment. However, many of these puzzle pieces are missing or don't exist at all when we try to use this approach for mental health certification. It's now time to look outside the box the jigsaw came in, and outside the purely clinical team, to build a picture of safe certification of pilots and controllers with mental health problems. We can also build a different picture, using these same pieces but aligned in different ways, of wellness and disease prevention. **DISCUSSION:** These pieces use input from colleagues, employers, qualified peers, flight performance data are shaped by the work, home and life environment to fit together into a cohesive whole. It's not a small task; these pieces occupy the spaces that no clinical measure or wellbeing policy can fill and each new piece needs to be found, shaped and polished before it can fit into our puzzle. Every sector – health, aviation, civil, military, academic and more – has a role in this. Eventually, our combined pieces will create a richer and more

complete picture of aeromedical certification and aviation safety than could ever have been achieved by clinical aeromedical risk measures alone, for not only mental health but all medical conditions and states of wellbeing.

Learning Objectives

1. The audience will learn about new approaches to risk assessment and stratification in aeromedical certification for pilots with mental illness and neurodiversity.
2. The participant will be able to explore ways that they can contribute to a salutogenic environment in their aviation and medical environment.
3. The participant will be able to identify processes to identify and assess risk for aviation medical certificate-holders with neurodiversity and mental health issues.

[3] BUILDING AN EVIDENCE BASED & HEALTH SYSTEMS APPROACH TO MENTAL WELLNESS IN AEROSPACE MEDICINE: ESTABLISHING A RESEARCH STRATEGY TO MEETING DATA NEEDS

William Hoffman
Columbia University Medical Center, New York, NY, United States

(Education - Program/Process Review)

BACKGROUND: Aircrew mental wellness is thought to support performance and system-wide safety. Many factors within the aerospace system are thought to influence aircrew mental wellness to include operational factors, aeromedical screening programs, peer support and wellness efforts among many others. Efforts to optimize and maintain aircrew mental wellness while sustaining safety in an evolving world will require continued research, but no consensus exists on the type of data and topics needed to support this aim. Further, how data collection might fit into the aerospace system of the future remains an open question. **OVERVIEW**: This session will first outline the AsMA Mental Health Research Subgroup's effort to generate a consensus statement defining the relevant research gaps in aviation related to mental health that, when accomplished, aims to enable aerospace leaders to optimize and maintain aircrew mental wellness while sustaining safety. The working subgroup included over 50 aerospace medicine professionals from 6 countries that employed an iterative, Delphi approach to generate a consensus statement between April and November 2023. Six topics areas were identified including clinical care, peer support and wellness programs, epidemiology, topics in special populations, wellness and safety programs, and emerging technology. The second part of this session will explore ways to build outcomes focused data collection and research initiatives into the aerospace system of the future that might support operations and policy. **DISCUSSION:** The paucity of research related to mental health in aviation is a limiting factor in building a data-backed approach to optimizing aircrew mental wellness while sustaining safety. Many challenges exist related to research in this area to include questions surrounding relevant questions, data ownership, implementation, ethics, and many others. This session explores one effort aimed at defining relevant questions and how data collection might fit into our rapidly evolving aerospace system.

Learning Objectives

1. Describe the two research topics identified by the AsMA Mental Health Research Working Subgroup that remain unanswered related to mental health in aviation.
2. Describe two challenges related to building an outcome-focused data collection effort into the aerospace system of the future.

[4] ETHICS OF MENTAL HEALTH SCREENING & PREVENTION PROGRAMS IN AEROSPACE MEDICINE

Diederik De Rooy
Transparant Center for Mental Healthcare, Leiden, Netherlands

(Education - Program/Process Review)

BACKGROUND: Programs to improve mental health, or to screen for or prevent mental health problems in aviation professionals, face ethical challenges. For professionals involved, it is important to know the major ethical values at stake, and to develop an understanding of how these values can be balanced. **OVERVIEW:** The most relevant values are privacy and safety, both for the general public and for those participating in programs. Programs need to balance confidentiality of individuals with the interest of public safety as well as the interest of gathering data for evaluation of these programs. Although the information participants in programs share may be comparable to medical information, medical confidentiality will not always be automatically applicable to programs, for example in case of a peer support program run by peers entirely. **DISCUSSION:** Notwithstanding the applicable law, it may be advisable for programs to apply a same level of confidentiality as is applicable to medical practice. If a program gathers data systematically, it may be considered to have this supervised by a medical or mental health professional that is bound by medical confidentiality rules. There are sound arguments for only sharing information with the consent of the individuals involved, unless there is a clear and imminent danger to others, as was set out for example in the Tarasoff case. To improve the quality of programs, analyzing data scientifically may be helpful. It may be advisable to only gather data for research with the consent of the individual, and to apply similar quality assurances as in medical research. In the near future, some programs may use automated data analyzation methods to predict or identify mental problems by using smartphone or social media use data, or data from simulator sessions or even from the aircraft themselves. If specific diagnostic tools for aviation professionals would become available, it will be important to test and validate them in the same way as regular new diagnostic procedures. These techniques should only be used with informed consent of the individual.

Learning Objectives

1. Attendees will learn about the major ethical challenges that exist with regards to Mental Health Screening & Prevention Programs.
2. Attendees will develop their own viewpoint on how to balance the interests of individual aviation professionals versus those of the general public and support programs.
3. Attendees will learn about ethical considerations in relation to new developments of automated data analyzation methods.

[5] BIOMARKERS: NEW PROTAGONISTS BRIDGING THE GAP BETWEEN BIOSCIENCES AND AEROSPACE MENTAL HEALTH

Nesrine Ramadan
University of Oxford, Oxford, United Kingdom

(Education - Program/Process Review)

BACKGROUND: Biomarkers are described as characteristics that are objectively measured and are indicators of health, disease, or a response to an exposure or intervention. There is growing evidence suggesting that biomarkers have the potential to bring new solutions in the field of aerospace mental health. Moreover, advances in various scientific fields such as digital health, MedTech, neurosciences, and molecular biology could be further exploited in mental health surveillance and assistance. This presentation is expected to be part of a workshop discussing emerging research, innovation, and technologies in the field of mental health with emphasis on the aerospace sector. **OVERVIEW:** This presentation will focus on the need and potential of biological and digital markers for mental health monitoring and the neuroscience of happiness and well-being. Advances in 'omics' technologies including genomics, proteomics, and metabolomics allow to identify new molecular markers and neurobiological mechanisms potentially associated with mental health and happiness. Equally, advances in computational methods and neurosciences are increasing the spectrum of digital biomarkers available for facial and vocal recognition as well as other parameters associated with emotions and mental health. Further, emerging tools for brain health

monitoring, intelligence measurements as well as technologies such as virtual reality (VR) are offering new solutions for dealing with anxiety, post-traumatic stress disorder (PTSD), adversity as well as developing resilient capabilities, wellbeing, and maximising human performance. **DISCUSSION:** Various emerging research trends in biosciences and technological innovation will be discussed to decipher the wide potential of biomarkers in mental health as well as precision and personalised medicine in the aerospace field and beyond. This will also allow to propose novel applications and perspectives in civilians, commercial, and military spheres.

Learning Objectives

1. To understand the importance and potential of biomarkers in the mental health field with emphasis on the aerospace sector.
2. To connect the progress in terrestrial mental health research and innovation with the aerospace field.

[6] BUILDING AEROSPACE MEDICINE REGULATORY POLICY

Cristian Ionut Panait[1], Susan Northrup[2], Penny Giovanetti[2], Kate Manderson[3], Janis Vegers[1], Virgilijus Valentukevicius[1], Mateja Kotnik Kerbev[1], Pedro Caetano[1]
[1]*European Union Aviation Safety Agency (EASA), Cologne, Germany;* [2]*FAA, Washington DC, United States;* [3]*Civil Aviation Safety Authority (CASA), Canberra, Australia*

(Education - Program/Process Review)

BACKGROUND: "Mens sana in corpore sano". For millennia mental health has remained a challenge for common people as well as medical professionals and regulators. This is not different in the field of aviation, where regulators and industry aim to identify safety risks and mitigate them as early as possible. **OVERVIEW:** "It is better to prevent than to treat". Nevertheless, prevention is a concept that involves multiple layers starting with the individual and continuing with the employer, the aero-medical examiner, the care provider, and the regulator working symbiotically. Acknowledgement of mental illness and asking for support with mental wellbeing continue to be the starting points of any preventive work. And here, denial, fear of consequences and stigma are major obstacles to overcome by the individual alone before getting to the point of asking for support. Regulating any preventive actions has always been a challenge for medical regulators and the mental health-related items are among the most challenging ones. Several aviation regulators are taking a best-practice preventive approach with the use of support groups and peer programs to facilitate the management of risk factors, and to prevent their evolution into established mental illnesses. **DISCUSSION:** "Hope for the best, prepare for the worst." The future of aviation medical certification for mental health as well as maintaining mental health and wellbeing have to be considered in the context of other medical and operational conditions that impact function and performance such as shift work and fatigue. Regulating the field of mental health for all categories of aeronautical personnel is a challenge in itself. However, we must strive to apply scientific method to the prevention, assessment and management of mental health issues. This panel will discuss: what and to which extent we need to regulate; how can we ensure maximum efficiency is achieved by the support groups; models for mental wellbeing, illness prevention and management in the aviation industry; opportunities for research and scientific endeavours in aviation mental health; a considerable amount of work is still ahead for regulators and industry to achieve the goal of having a balanced approach to mental health and wellbeing.

Learning Objectives

1. The audience will learn about the importance of mental health and wellbeing for aviation safety.
2. The audience will learn about regulatory challenges in mandating and enforcing support programmes.

[7] PILOT MENTAL HEALTH AND WELLNESS AND AEROSPACE MEDICINE IN BOWTIE ANALYSES

Anthony Tvaryanas, David Schroeder
FAA, Oklahoma City, OK, United States

(Education - Tutorial/Review)

INTRODUCTION: Approaching pilot mental health using the Safety Management System construct requires an understanding of its representation in risk analysis tools commonly used in aviation. **TOPIC:** The concept of barrier management – implementing and assuring a range of controls to protect against the risk of major losses – is widely used in high-hazard industries. While there are varying methods for evaluating barrier strategies, the Bowtie Analysis is in widespread and growing. The Bowtie Analysis focuses on a 'top event' such as of loss of aircraft control. In flight operations, there are multiple threats potentially causing the top event, resulting in the consequence of a major aviation accident event. Barriers in the bowtie appear on both sides of the top event. Barriers on the left side interrupt the scenario so threats do not result in the top event. Barriers on the right side make sure that if the top event is reached, the scenario does not escalate into an actual impact (the consequences) and/or mitigate the impact. There are different types of barriers, but there is an important subset that involve human performance (sociotechnical barriers). Once barriers are identified, you have a basic understanding of how risks are managed. All barriers have vulnerabilities that may lead to underperformance in preventing or responding to the top event. These vulnerabilities are called degradation factors and are inclusive of many issues addressed in human factors. For pilot medical-related issues, the bowtie focuses on sociotechnical barriers and their expectation for adequate pilot response (timing, accuracy, etc.) in performing one or more elements of the detect, decide and act barrier functions. Safeguards are degradation factor controls, i.e., barriers preventing the occurrence of the degradation factor (inadequate pilot response). Medical fitness for duty is addressed through safeguards. **APPLICATION:** In a Bowtie Analysis of a flight operation, pilot mental health issues impacting performance are potential degradation factors to some barriers. Understanding these barriers provides insight into mental health impacts on safety. The contributions of aerospace medicine and organizational employee stress management and wellness interventions can be understood in terms of safeguards against pilot mental health-related degradation factors. **RESOURCES:** Chartered Institute of Ergonomics and Human Factors. (2016). Human Factors in Barrier Management [White paper].

Learning Objectives

1. Understand how to use Bowtie Analysis to understand the contribution of pilot mental health to safety.
2. Understand how to use Bowtie Analysis to understand the need for and adequacy of aerospace medicine-related safeguards.

[8] EVOLVING TOPICS IN PEER SUPPORT PROGRAMS

Elizabeth Bjerke[1], Dave Fielding[2], Herwin Bongers[3]
[1]*University of North Dakota, Grand Forks, ND, United States;* [2]*BALPA Welfare Representative, West Drayton, United Kingdom;* [3]*Air New Zealand, Canterbury, New Zealand*

(Education - Case Study)

BACKGROUND: Pilot Peer Support Programs have emerged to play a pivotal role in the aviation industry to address pilot mental health and well-being concerns. Peer Support Programs have evolved over time to serve the mental health (MH) needs of pilots, while reducing the stigma to seek help through a trusted peer. Over time, there is a need to assess these programs and their effectiveness and uptake amongst the pilot community. In parallel to this, there is a growing realization that the same principles that underlie Pilot Peer Support Programs also apply to Peer Support Programs in other areas of aviation which come under ICAO, such as Flight Attendants, Air Traffic Controllers and licensed Engineers. Many of these programs are mature and have been running

for many years, but to date there has been little cross-fertilisation of ideas. Maturation since the provenance of peer support programs has highlighted that in addition to the wellbeing benefits they provide, the potential influence upon threat and error reduction in preventing system failures should accelerate the integration of MH expertise into safety programs. **OVERVIEW:** This workshop panel will be in three parts: 1) Examining how accepted Pilot Peer Support Program principles need to be adapted to service the next generation of airline pilots. Younger pilots have a very different relationship with technology and a different approach to mental health issues, and existing PSPs must reflect these differing needs. 2) Discussing how the proven benefits of Peer Support can be spread across all safety-critical areas of aviation. Can key principles of Peer Support be identified and standardized? Can solutions to address cultural requirements be adapted in other areas of aviation? 3) Exploring the role of peer support programs in providing aviation MH subject matter expertise (SME) to integrate MH wellbeing programs into SMS objectives of safety performance improvements through proactive strategies of threat and error management. **DISCUSSION:** This international panel represents various aviation organization entities to explore on a micro level how best practices in a changing landscape assist all types of Peer Support Programs succeed in helping their clients through challenging times; and on a macro level how the various elements of Peer Support for safety-critical aviation personnel can be drawn together to enhance the Positive Safety Culture of an operator.

Learning Objectives

1. As a result of this workshop, attendees will learn how the attitudes and approaches to mental health and wellbeing differ for the next generation of aviation professionals, and how current Peer Support Programs need to adapt in order to reflect these changing requirements.
2. As a result of this workshop, attendees will learn how Peer Support Programs in different ICAO areas can share ideas and learning in order to advance the field of Peer Support for all safety-critical roles in aviation.
3. As a result of this workshop, attendees will learn how the relationship between Peer Support Programs and an operator's SMS, and how this improves safety.

[9] OLD AND NEW PILOT MENTAL HEALTH CHALLENGES (ETHICS, SCREENING AND AI)

Kris Belland[1], Gerhard Fahnenbruck[2], Robert Bor[3]
[1]*Aerospace Medical Association, Keller, TX, United States;* [2]*University of Hamburg, Langen, Hesse, Germany;* [3]*University of South Africa/Universiteit van Suid-Afrika, London, United Kingdom*

(Education - Tutorial/Review)

BACKGROUND: Maintaining optimal human performance (physical and mental) of all aviation sensitive professionals is critical to the safe and effective aerospace (Space, Commercial, Military, Governmental, and Civilian) operations. **OVERVIEW:** This breakout panel will discuss three separate but complimentary parts of pilot physical/mental performance maintenance: Ethics, Screening Tools and Artificial Intelligence (AI)/ leveraging emerging technologies. **DISCUSSION:** The breakout presenters will discuss clinical challenges and ethics from aviator cases highlighting dilemmas of diagnosis when providing support and enhancing wellbeing. The session will consider the increasingly widespread use of clinical screen tools (including standardized psychometrics, non-standardized questionnaires, and the clinical interview). The use of clinical tests and related psychometric instruments for aircrew assessment has gathered momentum over recent years for mental health screening and fitness to fly assessments. This raises questions as to the suitability, compatibility, interpretation, and standardization of tests, as well as appropriate norms and comparison. This topic is of sensitivity due to competing interests of maintaining aviation safety against supporting individual aviator careers. The enhancements and limitations of Artificial intelligence, social media (Chatbots), Wearable Technology, use of wellbeing app's will be discussed. Time (50%) will be reserved for audience questions facilitating the exchange of ideas to improve knowledge in this area.

Learning Objectives

1. Attendees will better understand the ethics associated with pilot mental health programs.
2. Attendees will learn about possible incorporation of technologies such as biometrics in assessing and optimizing mental wellness in aviation.
3. Attendees will better understand the pilot MH screening and fitness to fly challenges.

Sunday, 05/05/2024 ***8:00 AM***
Randolph 3

[S-02]: WORKSHOP: AEROSPACE EPIDEMIOLOGY - THE SCIENCE OF THE DENOMINATOR

Sponsored by International Association of Military Flight Surgeon Pilots

Chair: Peter Mapes

WORKSHOP OVERVIEW: INTRODUCTION: *The learning objectives for the Workshop are as follows: Course Objectives – Individuals completing this course will be able to: 1. Understand the language of epidemiology and how it applied to aviation mishap analysis 2. Identify inadequate statistical analyses 3. Know about EPI INFO™ and have a rudimentary ability to employ it in the field 4. Design adequate studies of rudimentary parametric and non-parametric data 5. Understand the importance of adequate power 6. Understand the importance of adequate denominator data 7. Be able to look at displayed data and determine adequacy of analyses 8. Understand modeling and regression at a fundamental level 9. Understand the Bradford-Hill criteria for causality* ***TOPIC:*** *The Workshop on Aerospace Epidemiology will educate attendees on how the mathematics of epidemiology are applied to aerospace safety and mishap prevention.* ***APPLICATION:*** *The mathematics of epidemiology can be broadly and effectively utilized to conduct meta-analyses of aerospace mishap data. The results of these analyses can be used to focus actions and requirements on data driven conclusions that are currently largely absent from the safety process. The mathematical principles to be covered are well accepted but rarely utilized to analyze aerospace mishap data.* ***RESOURCES:*** *The course will be accompanied by a customized text serving as a reference for the mathematical applications well established in the public domain. The course will also be accompanied by problems for attendees to work through under supervision so that practical experience in aerospace epidemiology can be obtained. Attendees need to bring an adequately charged laptop computer to the course with a copy of the applicable EPI INFO programming loaded from the Centers for Disease Control & Prevention web site.*

[10] AEROSPACE EPIDEMIOLOGY

Peter Mapes
N/A-retired, Oscoda, MI, United States

(Education - Tutorial/Review)

INTRODUCTION: The learning objectives for the Workshop are as follows. Course Objectives Individuals completing this course will be able to: 1. Understand the language of epidemiology and how it applied to aviation mishap analysis. 2. Identify inadequate statistical analyses. 3. Know about EPI INFO™ and have a rudimentary ability to employ it in the field. 4. Design adequate studies of rudimentary parametric and non-parametric data. 5. Understand the importance of adequate power. 6. Understand the importance of adequate denominator data. 7. Be able to look at displayed data and determine adequacy

of analyses. 8. Understand modeling and regression at a fundamental level. 9. Understand the Bradford-Hill criteria for causality. **TOPIC:** The Workshop on Aerospace Epidemiology will educate attendees on how the mathematics of epidemiology are applied to aerospace safety and mishap prevention. **APPLICATION:** The mathematics of epidemiology can be broadly and effectively utilized to conduct meta-analyses of aerospace mishap data. The results of these analyses can be used to focus actions and requirements on data driven conclusions that are currently largely absent from the safety process. The mathematical principles to be covered are well accepted but rarely utilized to analyze aerospace mishap data. **RESOURCES:** The course will be accompanied by a customized text serving as a reference for the mathematical applications well established in the public domain. The course will also be accompanied by problems for attendees to work through under supervision so that practical experience in aerospace epidemiology can be obtained. Attendees need to bring an adequately charged laptop computer to the course with a copy of the applicable EPI INFO programming loaded from the Centers for Disease Control & Prevention web site.

Learning Objectives

1. Understand epidemiological terminology & its application to aerospace mishap analysis, be able to employ parametric and non-parametric analyses, determine adequate denominators & evaluate the adequacy of analyses.
2. Be familiar with the import of adequate power, modeling and regression & the Bradford-Hill criteria for causality.
3. Know about EPI INFO™ and have a rudimentary ability to employ it in the field.

Sunday, 05/05/2024 ***9:00 AM***
Randolph 1A, 1B

[S-03]: WORKSHOP: UNDERSTANDING AND MANAGING FATIGUE IN AVIATION

Chair: John Caldwell
Co-Chair: J. Lynn Caldwell

WORKSHOP OVERVIEW: INTRODUCTION: *Human fatigue stemming from lengthy work periods, circadian disruptions, and insufficient sleep poses a serious threat to performance, safety, and general wellbeing. Leaders, healthcare professionals, schedulers, and aircrew members need to understand the causes of fatigue and the scientifically valid strategies for fatigue mitigation.* ***TOPIC:*** *In modern aerospace settings, long work hours, shift work, time-zone transitions, and sleep disturbances are common. These factors often result in personnel reporting for duty in a fatigued state, leading to errors, cognitive difficulties, and mood disturbances that degrade readiness and compromise safety. It is possible to effectively mitigate these difficulties if scientifically validated strategies—administrative, environmental, behavioral, and pharmacological–are systematically applied. This workshop will provide a fully updated, science-based overview of fatigue factors, the effects of fatigue on health and performance, and details on the relevant countermeasures.* ***APPLICATIONS:*** *Effective fatigue management is an important key to optimizing operational performance and safety within aerospace contexts. Up-to-date, evidence-based information on this topic is of broad interest to professionals who are in positions to safeguard and augment human performance in today's demanding operational environments.*

[11] AIR CREW FATIGUE: CAUSES, CONSEQUENCES, AND COUNTERMEASURES

J. Lynn Caldwell, John Caldwell
Coastal Performance Consulting, Yellow Springs, OH, United States

(Education - Tutorial/Review)

INTRODUCTION: Human fatigue stemming from lengthy work periods, circadian disruptions, and insufficient sleep poses a serious threat to performance, safety, and general wellbeing. Leaders, healthcare professionals, schedulers, and aircrew members need to understand the causes of fatigue and the scientifically-valid strategies for fatigue mitigation. **TOPIC:** In modern aerospace settings, long work hours, shift work, time-zone transitions, and sleep disturbances are common. These factors often result in personnel reporting for duty in a fatigued state, leading to errors, cognitive difficulties, and mood disturbances that degrade readiness and compromise safety. It is possible to effectively mitigate these difficulties if scientifically validated strategies—administrative, environmental, behavioral, and pharmacological–are systematically applied. This workshop will provide a fully-updated, science-based overview of fatigue factors, the effects of fatigue on health and performance, and details on the relevant countermeasures. **APPLICATIONS:** Effective fatigue management is an important key to optimizing operational performance and safety within aerospace contexts. Up-to-date, evidence-based information on this topic is of broad interest to professionals who are in positions to safeguard and augment human performance in today's demanding operational environments.

Learning Objectives

1. Know how to recognize the dangers of fatigue in various settings.
2. Understand the major causes of fatigue (both operational and physiological).
3. Be able to know and apply one or more scientifically-valid countermeasures for fatigue in specific industrial/operational contexts.

MONDAY, MAY 06, 2024

Monday, 05/06/2024 ***10:30 AM***
Grand Ballroom CD South, EF

[S-04]: PANEL: RECENT DEVELOPMENTS IN NASA AND SPACEX DECOMPRESSION SICKNESS RISK MITIGATION TESTING AND PROTOCOLS

Chair: Andrew Abercromby

PANEL OVERVIEW: *NASA is partnering with SpaceX on development of the Human Landing System, which will require validation of an efficient and effective DCS risk mitigation protocol to enable the high-frequency extravehicular activities (EVAs) planned for Artemis missions. Through a separate agreement, NASA's DCS experts and facilities are supporting SpaceX's historic Polaris Dawn mission, which will include the first commercial EVA. Meanwhile, suited and unsuited human hypobaric ground testing and training occurs on an ongoing basis at NASA's Johnson Space Center (JSC) in support of the International Space Station (ISS), Artemis, and other NASA and commercial programs. This panel will describe results and medical outcomes of two multi-day experimental hypobaric tests aimed at informing Artemis and Polaris Dawn DCS risk mitigation protocols. Recent updates to NASA's rules regarding unplanned breaks in prebreathe protocols are also described, with implications for ISS EVAs, Polaris Dawn, and beyond.*

[12] DEVELOPMENT, VALIDATION AND APPROVAL OF A PLANETARY EXTRAVEHICULAR ACTIVITY PREBREATHE PROTOCOL: NASA EXPLORATION ATMOSPHERE TESTS 1 & 2

Alejandro Garbino[1], Monica Hew[2], Estep Patrick[1], Brett Siders[2], Edgar Lichar[2], Kadambari Suri[2], Constance Ramsburg[3], Karina Marshall-Goebel[4], Andrew Abercromby[4]
[1]*Geocontrol/NASA, Houston, TX, United States;* [2]*KBR/NASA, Houston, TX, United States;* [3]*USN/NASA, Houston, TX, United States;* [4]*NASA/JSC, Houston, TX, United States*