



2019 ABSTRACTS OF THE AsMA SCIENTIFIC SESSIONS

90th Annual Scientific Meeting
May 5–May 9, 2019

Rio All Suite Hotel
Las Vegas, NV

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 2019 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-1 through S-89 (including workshops). Session chairs are included in the index to participants. The order of some sessions may have changed (check the Addendum provided at the meeting for the latest information). Abstracts withdrawn are listed as W/D. Presenters are underlined in the text.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 minute per presenter format. There will be a discussion period of 15 minutes at the end of each panel.

POSTERS: Posters Sessions may be displayed all day on both Wednesday and Thursday! They will be on display in the Exhibit Hall. Poster authors must be present for the full morning or afternoon session in which their poster is scheduled: **Wednesday 8:30 a.m.–10:30 a.m. or 2:00 p.m.–4:00 p.m.; Thursday 9:30 a.m.–11:30 a.m. or 1:30 p.m.–3:30 p.m.**

EXHIBITS: Exhibits will be open Sunday evening during the Welcome Reception, and 9:30 a.m. to 4:30 p.m. on 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.

PLEASE NOTE: FAA AME Sessions will be held in the Miranda 1/3 Room all week. The preliminary schedule is printed elsewhere in this issue. Updates will be posted when available.

ENDORSEMENTS: New this year.... This is the first year we have introduced endorsements to highlight outstanding submissions. You will see “Endorsed by:...” under the title of certain panels and abstracts. **Endorsement** of a poster, slide, or panel by the Fellows or Associate Fellows Group, a Constituent or Affiliate organization, or other aeromedical group or committee is a recognition of excellence. Professional, applicable, completed projects that are well-written in their abstract form but are felt to exceed expectations are recommended after masked review and unanimous agreement by usually at least ten peers, followed by concurrence of the leadership of the endorsing group.

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 conditions 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 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 5, 2019 WORKSHOPS

Sunday, 05/05/2019
Brasilia 5

8:00 AM

[S-01] WORKSHOP: INTRODUCTION TO AEROSPACE EPIDEMIOLOGY - KEY METHODS FOR THE STUDY OF RARE EVENTS

Sponsored by The AsMA and the International Association of Military Flight Surgeon Pilots

Chair: Pete Mapes

[1] INTRODUCTION TO AEROSPACE EPIDEMIOLOGY - KEY METHODS FOR THE STUDY OF RARE EVENTS: WORKSHOP OVERVIEW

(Education: Tutorial)

PROBLEM STATEMENT: Aerospace Mishap Epidemiology is a unique application of epidemiology to the study of aviation and space mishaps. These events are rare and the mathematical evaluation of the data is relatively unique. Sampling is seldom an option and many times the entire universe of events must be captured over a prolonged period to achieve meaningful analysis with significant results. Due to low frequencies, sometimes decades of data are required to achieve statistically significant results. **TOPIC:** This workshop takes the learner through the many methodologies associated with the manipulation of parametric data associated with aerospace mishaps. It also teaches the learner to calculate power to ensure proper sample size. Non-parametric data is discussed at length and the necessity for selecting proper analytical tools to evaluate it is emphasized. The workshop addresses modelling and regression. It discusses considerations for building models. Roughly six hours are spent in classroom teaching and two hours of supervised problem solving are included in the eight-hour program. **APPLICATIONS:** The techniques addressed in this workshop should be considered any time the analyses and/or meta-analyses of rare events is contemplated. Learners will understand the method & need to calculate 'p-values' and how to interpret them. Learners will practice with U.S. Government freeware - the CDC&P 'EPI INFO' (TM) program in a way that allows its use for the study of Aerospace Epidemiology. The workshop covers many topics found on the board certification examinations conducted by the American Board of Preventive Medicine. **RESOURCES:** Learners will be provided with a student manual and slide set as well as materials in electronic format either on a CD or a memory stick. Learners should bring a fully charged computer with a copy of the applicable version of the EPI INFO program installed on it. Of particular interest will be the 'STAT CALC'™ subroutines. Practice problems will be provided for use during the course. A MOC question review will also be provided. The MOC question review must be completed, turned in, and corrected to 100% before MOC credit will be awarded.

Learning Objectives:

1. Learners will fully comprehend the nature of aerospace denominators and be able to select appropriate denominators for use in studies of aerospace events.
2. Learners will understand the difference between parametric, nonparametric and Bayesian analyses. They will be able to calculate p-values from parametric data and conduct parametric analyses of rare events.
3. Learners will comprehend the differences between Taylor Series 2 by 2 table analyses, ANOVA and regression and know when to apply each. Learners will know the nine Bradford-Hill criteria and when to apply them. They will understand the difference between association and causation. They will also understand confounding and bias as well as the differences between internal and external reliability and the import and application of each.

Sunday, 05/05/2019
Brasilia 1

8:00 AM

[S-02] WORKSHOP: NASA CHIEF MEDICAL OFFICER'S PRIMER ON HUMAN SPACEFLIGHT

Chair: Krista McPhail

Co-Chair: James Polk

WORKSHOP OVERVIEW: NASA Chief Medical Officer's Primer on Human Spaceflight. The recent years have seen a great expansion in the number of organizations, companies, and countries that are now interested in initiating human spaceflight programs. At the same time, there has also been a rapid increase in recent advances in availability of access to both suborbital and orbital space. NASA has over 60 years of experience supporting human spaceflight that would be helpful to those interested in starting up a new human spaceflight program. The one-day workshop will provide participants with a general overview of the many facets of human spaceflight that a space medicine practitioner should be concerned about. Specific areas of discussion will include hazards of spaceflight; physiologic changes; psychologic considerations; selection and duty standards; medical care, pre-, during, and post flight; and long-term medical care. Participants will also participate in a few short class participation events to help emphasize the intellectual challenges of protecting humans in space. This class intended for those who are new to human spaceflight and have found themselves in need of this knowledge in their new role.

[2] PROTECTING THE HUMAN SYSTEM

Terrance Taddeo¹, Vincent Michaud²

¹NASA, Houston, TX, USA; ²NASA, Fairfax Station, VA, USA

(Education - Program / Process Review Proposal)

BACKGROUND: NASA Chief Medical Officer's Primer on Human Spaceflight. The recent years have seen a great expansion in the number of organizations, companies, and countries that are now interested in initiating human spaceflight programs. At the same time, there has also been a rapid increase in recent advances in availability of access to both suborbital and orbital space. NASA has over 60 years of experience supporting human spaceflight that would be helpful to those interested in starting up a new human spaceflight program. This class intended for those who are new to human spaceflight and have found themselves in need of this knowledge in their new role.

OVERVIEW: This lecture is one in the series of the NASA Chief Medical Officer's Primer on Human Spaceflight. The lecture gives insight to the development of standards for selection of astronauts, in addition to the retention standards of astronauts. In addition, the lecture will address the development of human system integration standards for vehicles in development, how those standards are developed, special considerations for a close atmosphere vehicle in the extremes of space, and occupant protection, as well as abort and escape and contingency requirements and standards. **DISCUSSION:** The lecture will discuss pros and cons of such standards, how they are developed, and how those in violation of these standards are managed, including disposition, waiver, and the role of the Aerospace Medicine Board and Chief Medical Officer in mitigating human risk to the spaceflight mission.

Learning Objectives:

1. The participant will be able to list several selection standards and why those particular standards are in place.
2. The participant will know and understand how a waiver is granted and what role the Aerospace Medicine board plays in the quantifying the risk to the human system.
3. The participant will know and understand the development of standards and requirements for vehicles and how the changes in human physiology for spaceflight must be taken into consideration.

[3] HAZARDS OF HUMAN SPACEFLIGHTEdward Zapp¹, David Francisco²¹NASA, Houston, TX, USA; ²NASA, Houston, TX, USA*(Education - Program / Process Review Proposal)*

BACKGROUND: NASA Chief Medical Officer's Primer on Human Spaceflight. The recent years have seen a great expansion in the number of organizations, companies, and countries that are now interested in initiating human spaceflight programs. At the same time, there has also been a rapid increase in recent advances in availability of access to both suborbital and orbital space. NASA has over 60 years of experience supporting human spaceflight that would be helpful to those interested in starting up a new human spaceflight program. This class intended for those who are new to human spaceflight and have found themselves in need of this knowledge in their new role.

OVERVIEW: This lecture is one in the series of the NASA Chief Medical Officer's Primer on Human Spaceflight. The lecture gives insight into the unique hazards of human spaceflight and spacecraft.

Toxicologic hazards in an enclosed environment will be addressed, including CO₂, combustion products, setting exposure limits, considerations for the lunar and Mars surface, and unique aspects of spacesuit environmental controls and hazards. **DISCUSSION:** The lecture will discuss the radiation environment and the differences between Solar and Galactic Cosmic Radiation and their impacts on the human body as well as how vehicles or operations are used to manage the radiation risk.

Learning Objectives:

1. The participant will be able to discuss the unique aspects of CO₂ in space, how it differs from on Earth, and the challenges it presents.
2. The participant will be able to discuss the differences in solar radiation, Galactic Cosmic Radiation (GCR), and their energies and impacts to human cells.
3. The participant will be able to discuss the unique aspects of the enclosed environment of the spacesuit and its particular considerations in preventing toxicologic and other exposures.

[4] OVERVIEW OF SPACE PHYSIOLOGY

James Polk

NASA, Washington, DC, USA

(Education - Program / Process Review Proposal)

BACKGROUND: NASA Chief Medical Officer's Primer on Human Spaceflight. The recent years have seen a great expansion in the number of organizations, companies, and countries that are now interested in initiating human spaceflight programs. At the same time, there has also been a rapid increase in recent advances in availability of access to both suborbital and orbital space. NASA has over 60 years of experience supporting human spaceflight that would be helpful to those interested in starting up a new human spaceflight program. This class intended for those who are new to human spaceflight and have found themselves in need of this knowledge in their new role.

OVERVIEW: This lecture is one in the series of the NASA Chief Medical Officer's Primer on Human Spaceflight. The lecture will cover the broad overview of physiologic changes associated with human spaceflight, including changes to bone, neuro-vestibular, cardiovascular, and muscle systems, as well as multiple other organ systems. **DISCUSSION:** In addition, an in-depth overview of specific pathological changes seen in long duration human spaceflight such as intracranial pressure, vision changes due to optic nerve edema and choroidal folds, and mild cerebral edema will be discussed.

Learning Objectives:

1. The participant will be able to discuss the basic changes in human physiology as a consequence to microgravity and the stresses of exposure in the spaceflight environment.
2. The participant will be able to discuss the specific impact of microgravity on bone and muscle, and how those systems adapt and what treatments may be applied as countermeasures.
3. The participant will be able to discuss the pathology association with vision changes, optic nerve edema and choroidal folds, and mild brain edema as a consequence of long duration spaceflight.

[5] CONSIDERATIONS IN CLINICAL MEDICINE IN SPACEFLIGHT

Josef Schmid

NASA, Houston, TX, USA

(Education - Program / Process Review Proposal)

BACKGROUND: NASA Chief Medical Officer's Primer on Human Spaceflight. The recent years have seen a great expansion in the number of organizations, companies, and countries that are now interested in initiating human spaceflight programs. At the same time, there has also been a rapid increase in recent advances in availability of access to both suborbital and orbital space. NASA has over 60 years of experience supporting human spaceflight that would be helpful to those interested in starting up a new human spaceflight program. This class intended for those who are new to human spaceflight and have found themselves in need of this knowledge in their new role. **OVERVIEW:** This lecture is one in the series of the NASA Chief Medical Officer's Primer on Human Spaceflight. Pre-flight management of special medical issues and their deviations from standard practice due to spaceflight considerations will be covered.

Considerations for on-orbit care and risk of certain maladies (renal stone, thrombosis, space adaptation syndrome, infection) and how they are managed will be discussed. Unique aspects in post-flight care such as considerations in spaceflight associated pathology are explored and how the management or follow up of an astronaut differs from the general population will be discussed. **DISCUSSION:** The lecture will discuss the clinical medicine considerations that are unique to those flying in space.

Learning Objectives:

1. The participant will be able to discuss the multiple different areas in which the clinical care is adjusted from the typical earth-board clinical practice guidelines.
2. The participant will be able to discuss the management of atrial fibrillation pre-flight and how ablation may have some procedural caveats or considerations, especially for space walkers.
3. The participant will be able to discuss the treatment of space adaptation syndrome and the considerations for the selection of medications.

[6] ON-ORBIT CARE AND MANAGEMENT OF MISSION MEDICAL RISKVincent Michaud¹, Erik Antonsen²¹NASA, Fairfax Station, VA, USA; ²NASA, Houston, TX, USA*(Education - Program / Process Review Proposal)*

BACKGROUND: NASA Chief Medical Officer's Primer on Human Spaceflight. The recent years have seen a great expansion in the number of organizations, companies, and countries that are now interested in initiating human spaceflight programs. At the same time, there has also been a rapid increase in recent advances in availability of access to both suborbital and orbital space. NASA has over 60 years of experience supporting human spaceflight that would be helpful to those interested in starting up a new human spaceflight program. This class intended for those who are new to human spaceflight and have found themselves in need of this knowledge in their new role. **OVERVIEW:** This lecture is one in the series of the NASA Chief Medical Officer's Primer on Human Spaceflight. The lecture will discuss, in detail, how risk to the human system is conceived, modeled, and planned for. The lecture will also discuss how on-orbit care is provided, what is autonomous versus flight surgeon guided, and what nuances and understanding of unique aspects are required for the treatment of an astronaut in space. **DISCUSSION:** Discussions will focus on the Integrated Medical Model and Monte Carlo simulations, Modified Delphi techniques, and past spaceflight experience and how they are used to extrapolate risk, plan for the medical missions, and impart knowledge to the planning of future exploration missions.

Learning Objectives:

1. The participant will be able to understand and convey how NASA bounds risk in the human system, what instruments and techniques are used to try and predict what ailments to protect for, and what medications to take on exploration missions.
2. The participant will be able to know and understand what medical equipment, diagnostic equipment, and treatment is currently available on the International Space Station.
3. The participant will know and understand the differences between the care that is provided or available for a suborbital flight, a Low Earth Orbital mission, and an Exploration mission.

[7] POST-FLIGHT REHAB AND LIFETIME SURVEILLANCERichard Scheuring

NASA, Houston, TX, USA

(Education - Program / Process Review Proposal)

BACKGROUND: NASA Chief Medical Officer's Primer on Human Spaceflight. The recent years have seen a great expansion in the number of organizations, companies, and countries that are now interested in initiating human spaceflight programs. At the same time, there has also been a rapid increase in recent advances in availability of access to both suborbital and orbital space. NASA has over 60 years of experience supporting human spaceflight that would be helpful to those interested in starting up a new human spaceflight program. This class intended for those who are new to human spaceflight and have found themselves in need of this knowledge in their new role. **OVERVIEW:** This lecture is one in the series of the NASA Chief Medical Officer's Primer on Human Spaceflight. The discussion will center on how an astronaut is rehabilitated from the physiologic changes in space. When can they drive again? What are their capabilities and limitations upon landing? These aspects, and more, are explored to impart the consequences and management of spaceflight physiology and how an astronaut is rehabilitated in terms of muscle, bone, and the neurovestibular system. **DISCUSSION:** The lecture will discuss how the astronauts are surveilled throughout their entire lifetime to watch for, prevent, and understand the long-term lifetime consequences of exposures such as microgravity and radiation.

Learning Objectives:

1. The participant will be able to explain the general state of health and consequences of space adaptation on the astronaut upon landing and post flight.
2. The participant will understand what rehab techniques are employed and the specific considerations on the neurovestibular system and musculoskeletal system.
3. The participant will know and understand what the purpose of the Lifetime Surveillance of Astronaut Health is, and how NASA medical professionals look out for the lifelong risks of spaceflight exposures.

[8] ETHICS, BEHAVIOR, AND EXPLORATION STRATEGIESMark Weyland

NASA, Washington, DC, USA

(Education - Program / Process Review Proposal)

BACKGROUND: NASA Chief Medical Officer's Primer on Human Spaceflight. The recent years have seen a great expansion in the number of organizations, companies, and countries that are now interested in initiating human spaceflight programs. At the same time, there has also been a rapid increase in recent advances in availability of access to both suborbital and orbital space. NASA has over 60 years of experience supporting human spaceflight that would be helpful to those interested in starting up a new human spaceflight program. This class intended for those who are new to human spaceflight and have found themselves in need of this knowledge in their new role. **OVERVIEW:** This lecture is one in the series of the NASA Chief Medical Officer's Primer on Human Spaceflight. Exploration brings about many policy and ethical conundrums and considerations that should be considered. How will we deal with death on another planetary body? How does exploration change the "life, limb, mission" paradigm? Should astronauts have certain organs removed or procedures performed before a space mission to minimize risk (e.g., Appendectomy, Cholecystectomy) and how will these decisions be made? What psychologic changes and complications will come about for deep space missions? What strategies, policies, and tactics will NASA use to tackle some of these tough ethical questions? **DISCUSSION:** These ethical conundrums will be discussed in-depth, using the information that is presented in this lecture and throughout the entire NASA Chief Medical Officer's Primer on Human Spaceflight workshop.

Learning Objectives:

1. The participant will know and understand the various ethical challenges associated with exploration missions and how NASA intends to address those questions.
2. The participant will be able to understand the lack of laws and regulations governing other planetary bodies, and the role of the United Nations Committee for the Peaceful Use of Outer Space, and the NASA policies that govern our approach.

3. The participant will be able to understand the challenges of human behavior in space environments and long duration missions, and what mitigations and protections have been provided and helpful from the beginnings of exploration.

Sunday, 05/05/2019**8:00 AM****Brasilia 2****[S-03] WORKSHOP: AIR CREW FATIGUE: CAUSES, CONSEQUENCES, AND COUNTERMEASURES****Chair: Jo Lynn Caldwell****Co-Chair: John Caldwell****[9] WORKSHOP OVERVIEW: AIR CREW FATIGUE: CAUSES, CONSEQUENCES, AND COUNTERMEASURE: 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 mistakes, cognitive difficulties, and mood disturbances that can degrade performance and compromise safety. It is possible to effectively mitigate these difficulties if scientifically validated strategies are systematically applied, including the implementation of crew scheduling practices that are based on a scientific understanding about the underpinnings of fatigue. This workshop will provide a fully-updated, science-based overview of fatigue factors and relevant countermeasures and will emphasize the importance of implementing educational, preventative, monitoring, and mitigation strategies within the context of a fully-integrated fatigue risk management system. **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 a position to safeguard and augment human performance in today's demanding operational environments.

Sunday, 05/05/2019**8:00 AM****Brasilia 3****[S-04] WORKSHOP: EFFECTIVE AIRCREW SELECTION METHODS, PART 1, SELECT IN***Sponsored by Aerospace Human Factors Association***Chair: Ray King****Co-Chair: Carl Hoffmann****[10] WORKSHOP OVERVIEW: EFFECTIVE AIRCREW SELECTION METHODS, PART 1, SELECT IN**Raymond King¹, Carl Hoffmann²¹Federal Aviation Administration, Washington, DC, DC, USA; ²Human Capital Management and Performance, Mebane, NC, USA*(Education - Tutorial Proposal)*

PROBLEM STATEMENT: Assessing personnel, particularly those without prior relevant experience (*ab initio* candidates) for high reliability careers presents a challenge for organizational/industrial psychologists and human resource offices. **APPLICATIONS:** This workshop focuses on the selection of aircrew based on measurement of Knowledge, Skills, Abilities, and Other characteristics (KSAOs - which includes the non-pathological domains of personality). This workshop can be taken either in concert with the Select-Out workshop or independently. Aptitude testing

is recognized as a necessary step in the hiring of aviation personnel. When done effectively, such selection efforts can save financial resources and yield valuable additions to the workforce. While the aptitude testing will suggest who CAN become an asset to a flying organization, the assessment of personality and motivation can suggest who WILL become an asset. The psychological profile of a successful aviator has been documented to be composed of low neuroticism, high extraversion (with more gregariousness than warmth), and high conscientiousness (although with a determined effort to appear easy going). While the traditional concept of KSAOs will be reviewed, participants will appreciate that the whole is greater than the sum of its parts. We will review job analysis, the design of validity studies, approaches to analysis especially outcome measures. Participants will understand the components of the selection process from recruitment, screening, selection testing and interviewing and utility analysis or balancing cost and effectiveness at each point in the process. Strategies for effective on-boarding, which considers the corporate culture, in both the civilian and military milieus, will also be considered. Participants will be introduced to the ethical and legal considerations of hiring aviation personnel, to include confidentiality of medical information, balanced against safety concerns. **RESOURCES:** This workshop will employ slide presentations, case vignettes, discussion, questions and answers, and video and/or live demonstrations of applicant interviews.

Learning Objectives:

1. Participants will understand the difference between SELECT IN and SELECT OUT in personnel selection.
2. Participants will come to appreciate the role that personality plays in an aviator's success.
3. Participants will understand the components of the selection process from recruitment, screening, selection testing and interviewing and utility analysis or balancing cost and effectiveness at each point in the process.

Sunday, 05/05/2019

1:00 PM

Brasilia 3

[S-05] WORKSHOP: EFFECTIVE AIRCREW SELECTION METHODS, PART 2, SELECT OUT

Sponsored by Aerospace Human Factors Association

Chair: Ray King

[11] WORKSHOP OVERVIEW: EFFECTIVE AIRCREW SELECTION METHODS, PART 2, SELECT OUT

Raymond King¹, Robert Bor²

¹Federal Aviation Administration, Washington, DC, USA; ²Centre for Aviation Psychology, London, United Kingdom

(Education - Tutorial Proposal)

PROBLEM STATEMENT: The mental health of candidates for aviation careers is of paramount importance, but often receives scant attention due to concerns over stigmatization. **TOPIC:** This workshop focuses on the valid mental health screening of aviation candidates.

APPLICATION: Areas considered include depression, anxiety, substance abuse/dependence as well as personality disorders and maladaptive traits, and other condition incompatible with flight safety. More serious mental health conditions will also be considered, as well as the thorny issue of Attention Deficit/Hyperactivity Disorder. This workshop can be taken either in concert with the Select-In workshop or independently. The assessment of mental health for aviation careers is not without controversy as the stakes are very high, both to safety as well as to potential aviators' careers. While psychological testing is very useful, off-the-shelf instruments must be used with caution as those interested in aviation as well as incumbent aviators present themselves in unique ways. For example, successful aviators typically have compulsive, narcissistic, and histrionic personality traits. Individuals who have dependent or antisocial personalities or who cannot effectively compartmentalize their non-aviation concerns need to be identified early. While it is important to have well-defined medical standards in aviation, it is also important to consider individuals who have received

treatment and consider waivers, termed "special issuances" by some aerospace medical authorities in the military and civilian realms. Such an approach will best avoid driving psychiatric information "underground" or discourage treatment. Screening personnel at the commencement of training and/or before issuance of medical certification will best ensure a successful outcome when an aviator faces the inevitable challenges of a career in aviation, and life in general. Method for improving self-report and comprehensive verification will be explored. **RESOURCES:** This workshop will employ slide presentations, case vignettes, discussion, questions and answers, and video and/or live demonstrations of applicant interviews.

Learning Objectives:

1. Participants will come to appreciate the unique personality structure of aviators.
2. Participants will understand that aviators face most of the same life stressors that confront the rest of the population.
3. Participants will understand the difference between SELECT IN and SELECT OUT in personnel selection.

Sunday, 05/05/2019

1:00 PM

Miranda 2/4

[S-06] WORKSHOP: AEROSPACE MEDICINE FACULTY DEVELOPMENT WORKSHOP

Chair: Edgar Rodriguez

Co-Chair: Mark Coakwell

WORKSHOP OVERVIEW: This workshop will present current information on various topics of interest to Aerospace Medicine faculty members. The Accreditation Council for Graduate Medical Education (ACGME) requires as part of its residency program accreditation process that faculty members participate in regular faculty development. This may include not only CME-type activities directed toward acquisition of clinical knowledge and skills, but also activities directed toward developing teaching abilities, professionalism, and abilities for incorporating Practice-based Learning & Improvement, Systems-based Practice, and Interpersonal and Communication Skills into medical practice and teaching. This can be accomplished via both didactic (conferences, grand rounds, journal clubs, lecture-based CME events) and experiential (workshops, directed QI projects, practice improvement self-study) types of activities. This conference-based workshop is presented toward the fulfillment of this requirement.

[12] STRATEGIC PLANNING FOR FACULTY DEVELOPMENT IN GRADUATE MEDICAL EDUCATION

Edgar Rodriguez

USAF School of Aerospace Medicine, Oklahoma City, OK, USA

(Education - Tutorial Proposal)

INTRODUCTION: Faculty development is one of the ACGME core common program requirements. Furthermore, graduate medical education programs are required to monitor and track their academic staff faculty development activities. **TOPIC:** Aerospace Medicine residency programs sponsored by the US Armed Forces are subject to regular turnover of the active duty faculty members. Faculty development represents a challenge aggravated by the presence of single programs within the Air Force, Army and Navy. Development of effective faculty development strategies for the academic staff can enhance the learning experience provided by the programs. **APPLICATION:** The purpose of the presentation is to explore ways to assess how establishment of a faculty development strategic plan for aerospace medicine GME programs, particularly military affiliated, enhances the residents learning experience by standardizing the staff training as educators. The limited number of programs and core staff positions do not allow faculty member to follow an academic track early in their careers as seeing among traditional GME programs such as primary care or surgical specialties. Exploring how the use of effective strategic planning for faculty development can enhance our residencies ability to provide new academic staff member with the right tools in a consistent and timely fashion.

Learning Objective:

1. To provide Aerospace Medicine faculty with current clinical knowledge, skills, and activities directed toward developing teaching abilities and professionalism that can be incorporated into their medical practice and teaching.

[13] BUILDING A ROBUST CURRICULUMRobert Haddon*Mayo Clinic, Rochester, MN, USA**(Education - Program / Process Review Proposal)*

INTRODUCTION: Aerospace Medicine curriculum development and maintenance will be discussed. **BACKGROUND:** "Curriculum" derives from the idea of a racecourse for chariots. It is the concept of a sequential coverage of a defined body of knowledge. The idea of curriculum includes the information itself, its organization, schedule and packaging, the materials used to convey it, the culture in which it is applied, and the experiences and perspectives of those who use and convey that body of knowledge in its applied contexts. Curriculum also logically contains review and the means of assessing progress. Also present is the idea of the boundary of what is excluded from the curriculum, both for reasons of pertinence and of practical teaching. As information can and does change, and as the focus of interest may shift with situation and personnel, the boundary of exclusion is necessarily fluid. Out of many equally good permutations, one must be designed, built, and regularly refined. **DISCUSSION:** Curriculum development and delivery in the field of Aerospace Medicine entails particular challenges. Expert personnel are few in number and may deploy or rotate. The subject matter is broad—every organ system is to be considered, both normal and diseased, within a broad array of operational settings and occupational exposures. At the same time, there is comparatively little integration of those operational settings with conventional medical facilities. Added to the mix are knowledge of Epidemiology and Prevention, health infrastructure, law, and airframes and space habitats. A rational curriculum design for this advanced field of study necessarily assumes a solid foundation and calls for dedicated trainees with significant prior medical accomplishment and familiarity with operational aviation. We describe here a modular approach to the field that manageably integrates the operational and the clinical, that targets discrete areas of knowledge can be regularly revised and updated, permits the rotation of personnel without loss of continuity, and contains, embedded within it, real time review and metrics for performance evaluation.

Learning Objective:

1. The audience will consider a methodical and resilient approach to curriculum design, taking into account the particular challenges inherent in aerospace medicine.

[14] FOR WHOM THE POLL BELLS: INTRODUCTION TO SURVEY RESEARCH AND PITFALLS TO AVOIDJoseph LaVan*Naval Aerospace Medical Institute, Pensacola, FL, USA**(Education - Tutorial Proposal)*

INTRODUCTION: When done correctly, surveys offer a powerful tool for gathering factual information about or opinions of the survey takers. However, there are a variety of pitfalls that can interfere with the quality application of the survey tool. **TOPIC:** A discussion of basic survey research methodology, including a review of pitfalls and errors in survey research and exploration of techniques for creating effective survey instruments. **APPLICATION:** Surveys offer a valuable tool for conveniently gathering objective or subjective data from a variety of subjects with little expense, little chance of observer bias and precise results. However, surveys have drawbacks as well, including lack of flexibility, difficulty addressing controversial topics and inability to individualize queries and responses to obtain nuanced answers to complex questions. This session will review basic principles of survey design and discuss common errors which can hurt results or invalidate outcomes in an effort to refine application of tool which can prove very useful in public health and aerospace medicine research and teaching. **RESOURCES:** <https://explorable.com/advantages-and-disadvantages-of-surveys/>; <https://zapier.com/learn/forms-surveys/>; <https://www.surveymzmo.com/survey-blog/designing-surveys/>.

Learning Objectives:

1. The participant will be able to describe basic methods of survey design.
2. The participant will be able to identify common errors which can invalidate results or decrease accuracy of survey results.

[15] NOVEL TEACHING SCENARIOS FOR RESIDENTS IN AEROSPACE MEDICINERichard Allnutt*U.S. Air Force School of Aerospace Medicine, Wright-Patterson AFB, OH, USA**(Education - Program / Process Review Proposal)*

INTRODUCTION: For present generation residents, standard classroom didactic teaching is often replaced by literature and internet searches. Efforts to reinforce these materials often include group exercises and include all residents as team members to solve real-world dilemmas. **TOPIC:** Numerous situations can be utilized to enhance a resident's ability to think about a problem and develop well-reasoned approaches to developing solution sets. At the U.S. Air Force School of Aerospace Medicine, these scenarios have traditionally included developing deployment plans, dealing with epidemic disease, and preparing for isolated medical response capability, such as a mission to Mars. Novel situations were developed and utilized in the last year. These included 1) comparison of surface pressure reduced oxygen breathing devices and traditional altitude chamber training that simulates loss of aircraft pressure and 2) investigation of claims made for a commercial product for prevention of dehydration. **APPLICATION:** In the first scenario, most residents in the class volunteered to participate in both reduced oxygen breathing device and altitude chamber exposures. They compared their personal symptoms in each of these situations with the other. They concluded, as a group, that exposure to both forms of reduced oxygen had value and that additional value could be found in the dual exposure. In the second scenario, residents concluded that some of the claims made about the dehydration prevention material were not or could not be substantiated from their personal experience while using the product. Both scenarios had value in developing critical thinking skills necessary for preventive medicine.

Learning Objectives:

1. The participant will learn about using teaching scenarios in Resident education.
2. The participant will be exposed to several kinds of teaching scenarios and encouraged to build new ones of their own.
3. The participant will learn techniques for developing meaningful scenarios that will challenge residents and build team building within the residency.

[16] BEYOND ACADEMICS: SUPPORTING THE AVIATION UNIT AS A LEARNING TOOLJohn Venezia, Joseph Pavelites*U.S. Army School of Aviation Medicine, Fort Rucker, AL, USA**(Education - Program / Process Review Proposal)*

In an effort to satisfy Aerospace Medicine (AM) milestones and Accreditation Council for Graduate Medical Education (ACGME) competencies, as well as to provide the Army with quality AM specialists, the USA Army School of Aviation Medicine (USASAM) has supplemented the AM curriculum with military aviation medicine activities that are not necessarily addressed in the traditional AM academic environment. Based on the essential duties and responsibilities of a practicing Army aviation medicine provider and special staff officer for an aviation unit, these educational events provide the residents with real-world exposure and foundational experiences in aviation medicine before they graduate and officially serve in these capacities. These educational practices were initiated and processed through the Program Evaluation Committee (PEC) and are assessed annually for continued applicability to the AM curriculum and required functionality of an Army AM specialist. This panel presents several initiatives that are intended to enhance the educational experience of the Army AM residents. All of the following educational activities are trained using the "see one, do one, teach one" philosophy and are structured to provide increasing responsibilities for senior residents while still providing faculty oversight and role modeling. The first presentation discusses the

assignment of residents to the aviation training units co-located at Fort Rucker. Here, AM residents provide flight surgeon support that includes aircrew duties, delivery of annual regulatory aeromedical briefs, and Aviation Safety Officer (ASO) duties. The second presentation covers the activities that the residents participate in with the local Army Health Clinic that pertain to provision of aviation troop medicine to the most active aviation units in the Army. The third section will highlight flight surgeon duties that the residents perform to support USASAM including aeromedical coverage of the altitude chamber as well as instructional support for a wealth of aviation medicine courses. Following these presentations, an open panel discussion will be facilitated to elaborate on the presented material while soliciting unique approaches and best-practices from the audience for consideration by GME faculty.

Learning Objective:

1. The audience will familiarize themselves with US Army initiatives to add operationally relevant experiential learning to the US Army residency in Aerospace Medicine curriculum.

[17] ACADEMIC DUE PROCESS IN GRADUATE MEDICAL EDUCATION

Mark Coakwell

USAF School of Aerospace Medicine, Wright-Patterson AFB, OH, USA

(Education - Tutorial Proposal)

INTRODUCTION: Failure of residents to meet established standards of knowledge and performance necessitates early and deliberate intervention. **TOPIC:** Intervention may escalate from program level remediation to probation and, ultimately, to termination. Throughout this spectrum, specific protocols and elements of due process must be followed to ensure the best interests and outcomes for both the resident and the program. **APPLICATION:** In this presentation, practical examples for different levels of intervention at various degrees of complexity will be described. Program level intervention steps may include tasks required of the resident, due dates, and information about the steps to be followed if those tasks are not completed on time. The importance of documenting any and all intervention is critical to further steps if and when they are required. Multiple interventions, including academic probation, may be tried before action to terminate residency training becomes necessary. This stepwise approach protects both the resident and the program from post-hoc accusations and it ensures that the process was fair and that due process was followed.

Learning Objective:

1. Participants will gain an understanding of the components of due process that should be followed, and how they should be documented, when addressing concerns associated with a struggling learner in the graduate medical education setting.

[18] PROGRESSIVE DISCIPLINE IN COLLABORATIVE GRADUATE MEDICAL EDUCATION PROGRAMS

Michael Jacobson

USAF School of Aerospace Medicine, Wright-Patterson AFB, OH, USA

(Education - Program / Process Review Proposal)

INTRODUCTION: When residents fail to meet established standards of knowledge and performance, progressive discipline is implemented in pursuit of an outcome desirable for both the resident and the training institution. If the training is occurring in an affiliate program, this due process is more complicated and can be hindered or enhanced, depending upon the approach of the respective officials and the agreement that underlies the collaboration. **TOPIC:** Progressive discipline involving a resident in an affiliated Graduate Medical Education (GME) program will not only test the involved resident, but it will challenge leadership of both organizations and require effective communication and cooperation to secure the best interests and outcomes for all concerned. **APPLICATION:** A case will be presented in which a military resident in training at an affiliate GME program underwent progressive discipline for professionalism concerns. While the civilian academic program and institution had primary oversight, military leadership was also engaged and consulted for official guidance to ensure due process. This presentation will describe requirements of the

American College of GME, as well as that of the involved civilian and military institutions. It is hoped that this presentation and discussion will help equip the participant to effectively adjudicate academic due process, should it be faced in the future.

Learning Objectives:

1. Understand essentials to collaborative agreements that can support or adversely affect progressive discipline.
2. Become familiar with ACGME and other organizational requirements for due process.
3. Introduce practical tools and concepts to enable the participant to effectively adjudicate academic due process, should it be faced in the future.

[19] SEXUAL HARASSMENT AS AN ACT OF AGGRESSION : UNDERSTANDING WHAT WORKS AND WHY

Maria-Vittoria Carminati

The Woman's Lawyer, Denver, CO, USA

(Education - Program / Process Review Proposal)

The medical profession, like any other, is plagued by sexual harassment. This is a pervasive, pernicious, and longstanding issue that must be addressed if the profession wants to fully make use of all human resources available to it. Fifty percent of medical school students are women. If the profession drives them away, it is wasting half of its assets. That is unacceptable. Unfortunately, most sexual harassment training fails to properly explain that sexual harassment is an act of aggression. Rather, it is mistakenly depicted as a question of "political correctness," "boys being boys," or singular events. However, sexual harassment is none of those things. Sexual harassment exists on the spectrum of sexual aggression. The only way to tackle it appropriately is to understand it in those terms. Once it is identified and understood as an act of aggression, organizations can work on changing their culture. Sexual harassment will not be addressed on a one-by-one basis. It will be addressed by fundamentally altering the power structures and code of conduct of organizations, top down.

Learning Objectives:

1. The audience will learn about the prevalence of sexual harassment within the medical profession, the forms it takes, and how little is done to address it.
2. The audience will learn that sexual harassment lives on a continuum of sexual aggression and often does escalate to physical assault if left unchecked.
3. The audience will learn how to address sexual harassment as an attempt to take power from the victim rather than an innocent misunderstanding between "well-meaning people."

MONDAY, MAY 6, 2019 WORKSHOPS

Monday, 05/06/2019

8:00 AM

OPENING CEREMONIES & 65TH ANNUAL LOUIS H. BAUER LECTURER

Johann-Dietrich 'Jan' Wörner
"Human Exploration ... and Its Consequences"

Monday, 05/06/2019

10:30 AM

SPECIAL PLENARY SESSION COMMEMORATING THE 50TH ANNIVERSARY OF APOLLO 11 AND THE MOON LANDING

Moderator: Dr. Mike Barratt

Apollo Astronaut: TBD

Apollo Flight Surgeon: Dr. Bill Carpentier

Apollo Flight Director: Gerry Griffin

Apollo Engineering: Milt Heflin (ground test vehicle engineer and test conductor for the development and qualification of water recovery hardware and procedures for the Apollo command module)

There will be a short video highlighting the Apollo 11 mission, followed by a panel discussion with plenty of time for questions from the audience!