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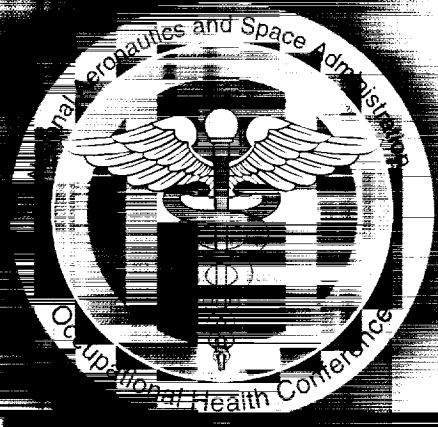
Proceedings

from the

2001 NASA Occupational Health Conference



Risk Assessment and Management in 2001

February 25 - March 2, 2001

Galveston Island, Texas

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2001 NASA Occupational Health Conference

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Prepared for

The National Aeronautics and Space Administration
Occupational Health Program Office
John F. Kennedy Space Center, Florida

By

The Bionetics Corporation
Mail Code BIO-5
Kennedy Space Center, Florida 32899

Under Contract S-NAS10-001
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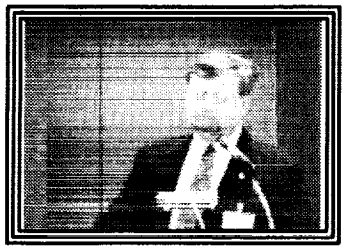

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William Barry, MD, MPH
Manager, NASA Occupational Health Program
Principal Center, Kennedy Space Center

Welcome and Opening Remarks ***Pg 10***
Guy Camomilli, CSP, CHMM, CHSP
Senior Industrial Hygienist
NASA Occupational Health Program
Principal Center, Kennedy Space Center

Welcome and Opening Remarks ***Pg 10***
Fatima Phillips, MD, MPH, MS
Manager, Occupational Health Program Support Office
The Bionetics Corporation
Principal Center, Kennedy Space Center

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William Barry, MD, MPH
Manager, NASA Occupational Health Program
Principal Center, Kennedy Space Center

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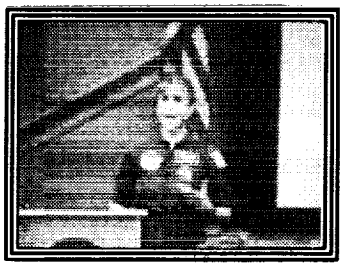
Richard Williams, MD, MPH
Acting Chief Health and Medical Officer
NASA Headquarters



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Bruce Kelly, CIH, CSP
Senior Industrial Hygienist
Occupational Health Program Support Office
The Bionetics Corporation

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Preventative Medicine and Community Health
University of Texas Medical Branch

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Employee Assistance Coordinator
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Manager, NASA Occupational Health Program
Principal Center, Kennedy Space Center

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Helen Shoemaker, MS, RN, COHN-S/CM
Occupational Health Program Support Office
The Bionetics Corporation
NASA Occupational Health Program

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Joint Commission on Accreditation of Healthcare Organizations (JCAHO)
Martin Myers, BSN, RN
Performance Improvement
Johnson Space Center Flight Medicine Clinic

Photo Not Available

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Injury/Illness Case Management
Connie Hesselgesser, RN
Case Manager, Performance Improvement
Johnson Space Center Occupational Health Clinic

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John Houseman, CIH
Jet Propulsion Laboratory

Photo Not Available

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Hoover & Keith, Inc.

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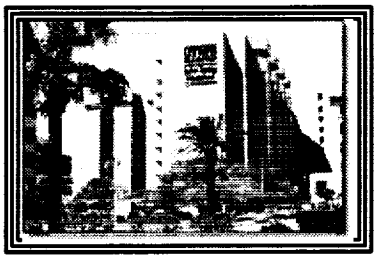
Bernard Silverstein, CIH
Bernard D. Silverstein, Inc

Susan Arnold, CIH
Bernard D. Silverstein, Inc.



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University of Texas Medical Branch at Galveston

Mardi Gras Welcome Reception ***Pg 106***
Moody Gardens Hotel
View Finders Terrace
Sheri Roberson
Meeting and Communications Specialist
Occupational Health Program Support Office
The Bionetics Corporation
NASA Occupational Health Program

Foreword

Knowledge Management is the utilization of systematic approaches to collect, analyze, disseminate and use knowledge to create added value. One value created is the reduction of risk to mission success. The paradigm exists that the more valuable the knowledge, the less sophisticated is the technology to contain it. Explicit knowledge can be shared through hard copy papers or reports, books, or electronic media. Tacit knowledge – from experience, rules of thumb, intuition, etc. - can account for up to 80% of valuable knowledge. This tacit knowledge is best shared through people. Throughout the year through various communities of practice which include ViTS teleconferences, a Health Physics Conference, and small group visits between Centers have facilitated this exchange of knowledge. This year's NASA annual Occupational Health Program (OHP) Conference brings a wider range of specialties and knowledge together in one area. Risk management and audit issues, this year's Conference emphasis, are in line with NASA's continued efforts to insure mission success.

NASA, in re-assessing its activities produces actions and recommendations to serve as a framework in which to safely and successfully execute our Agency's mission. This effort to enhance mission success is reflected in the themes of the NASA Integrated Action Team (NIAT) report. Several of these themes apply to our Conference emphasis and OHP's continued efforts. Theme I "Developing and Supporting Exceptional People and Teams" applies to all disciplines represented by OHP. The specific action (NIAT-1) stated under this first theme is to "Provide a physically and psychologically safe and healthy work environment for all NASA employees." During the past year, in looking at new ways to detect skin cancer and discussing improved Hydrazine detection, we have touched upon Theme II "Delivering Advanced Technology." Theme III "Understanding and Controlling Risk" also reflects this Conference's emphasis. The action (NIAT-7) under this theme is "Risk Identification, Assessment, and Management." Theme IV is "Ensuring Formulation Rigor and Implementation Discipline." OHP's disciplines and activities reflect some of the theme's actions – "Integrated Review Process (NIAT-10), "Surveillance" (NIAT-13), "Verification and Validation" (NIAT-14). "Improving Communication" is Theme V. The actions under this are "Organizational Communication" (NIAT-16), and "Knowledge Management" (NIAT-17).

The Conference and speakers have afforded the attendees an opportunity to see how integration of OHP discipline knowledge is frequently necessary to reach NASA's risk management goals. Topics in this year's Conference range from the discussion of internal work pressures and stress to external risks that can threaten NASA's mission.

Besides our conference topics, we have provided specific educational opportunities and a tour of the host NASA Center – Johnson Space Center.

While these Conference Proceedings capture some of the explicit information from the conference, it is our hope that this conference has also allowed an opportunity to capture and exchange some of the wide expanse of our attendees' tacit knowledge.

As always, it has been a pleasure to work and interact with NASA's exceptional people and teams.

William S. Barry, M.D., M.P.H.
Manager, NASA Occupational Health Program

NASA Occupational Health Conference
Welcome and Opening Remarks

Dr. William Barry, Manager of the NASA Occupational Health Program, opened the conference, welcomed all attendees, gave an overview of the purpose and structure of the Conference, and introduced his staff. They, in turn, described the specialty areas of their responsibilities and highlighted recent activities of general interest.

Staff contributors included Mr. Guy Camomilli, NASA Senior Industrial Hygienist, Mr. Alan Gettleman, NASA Program Analyst, and Dr. Fatima Phillips, Manager, Occupational Health Program Principal Center Support Office (The Bionetics Corporation). Some of the subjects addressed were: new and pending requirements, both from within and external to NASA; the growing content and use of the dedicated NASA OHP Web Site; and new training provisions at individual Centers covering specific subjects and broadly through joint collaborations and invited experts (as via ViTS and these Agency Conferences). Dr. Phillips also introduced her support staff and overviewed their roles at the Principal Center.

Editors' Note: Summary provided by Dr. G. Wyckliffe Hoffler.

Principal Center Updates

William Barry, MD, MPH
Manager, NASA Occupational Health Program
Principal Center, Kennedy Space Center

NASA's Occupational Health Program Manager briefed attendees on current Agency initiatives and projects affecting Center Occupational Health personnel. Plans, insight, and expectations for the coming year will be discussed.

OHP Areas of Emphasis

- NASA Integrated Action Team (NIAT)
- Self Assessment Checklists
- Handbook
- Individual Center Activities
- Audit Tool

• NASA Integrated Action Team (NIAT)

A required framework to safely and successfully execute NASA's mission.

Themes:

- Developing and Supporting Exceptional People and Teams
- Delivering Advanced Technology
- Understanding and Controlling Risk
- Ensuring Formulation Rigor and Implementation Discipline
- Improving Communication

• NASA Integrated Action Team

Theme: Developing and Supporting Exceptional People and Teams

NIAT 1 Action:
"Provide a physically and psychologically safe and healthy work environment for all NASA employees."

•NIAT 1 Action: "Provide a physically and psychologically safe and healthy work environment for all NASA employees."

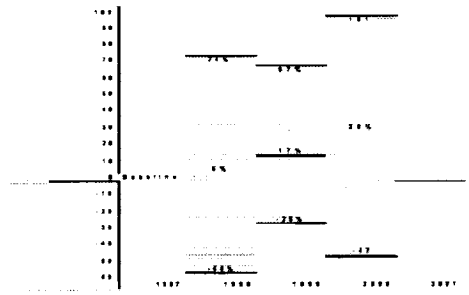
A. Continued implementation of the Agency Safety Initiative
B. Implement key recommendations for reducing stress
   1. Reassess new initiative, explore aligning workforce
   2. Enhance EAP stress efforts, and retain telephone depression screening capability
   3. Establish a complaint and improvement opportunity reporting system for workplace stress
C. Develop training modules and train supervisors and employees to be aware of stress levels and mitigation
D. Implement key recommendations for reducing stress

- **Self Assessment Checklists**
  - Infection Control
  - Environment of Care
  - Medication Management
  - Professional Credentialing and Privileging

- **Occupational Health Handbook**
  - Information on specific topics
  - Self Assessment Checklists
  - ISO type flow diagrams

- **Individual Center Activities**
  - Center Preventive Health Efforts
    - Number of Clinic Preventive Health Patients
    - Participants in Health Programs
    - Participants in Fitness Centers

- **Individual Center Activities**
  - Center Preventive Health Efforts

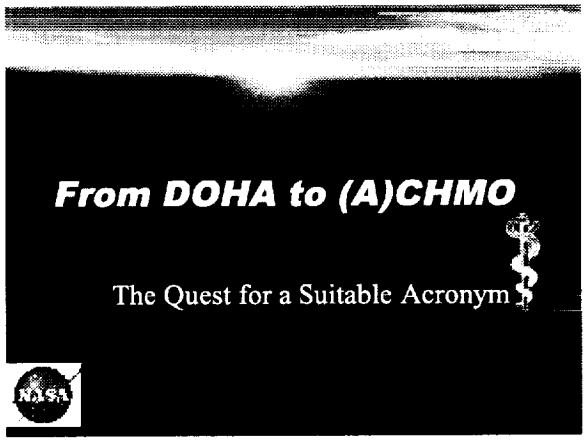


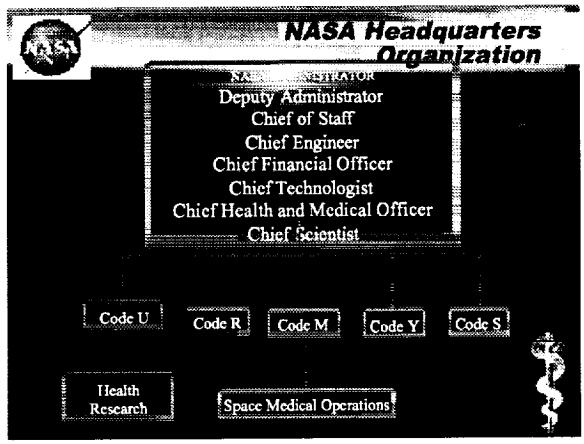
- **Individual Center Activities**
  - Center Preventive Health Efforts
  - Employee Assistance Program and Center efforts for stress amelioration
  - Alignment with standardized required and voluntary physical examinations

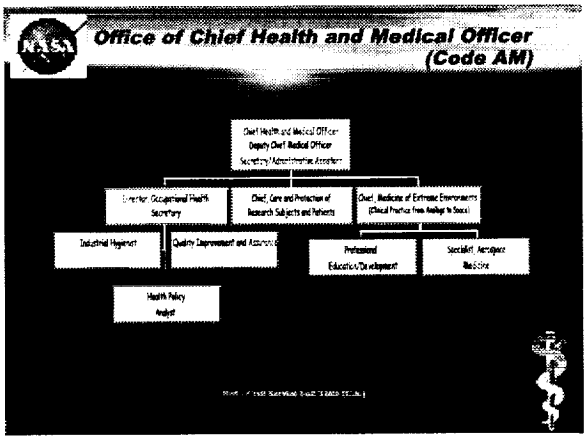
- **Occupational Health Audit Tool**
  - Health Care
  - Employee Assistance Program
  - Fitness Centers
  - Environmental Health
  - Health Physics

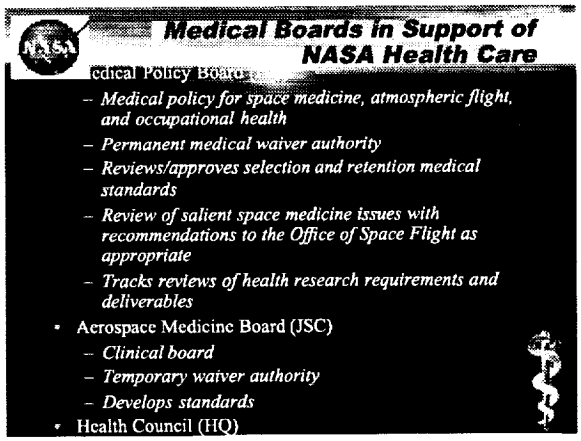
NASA Headquarters Updates

Richard Williams, MD, MPH
Acting Chief Health and Medical Officer
NASA Headquarters









Occupational Health

- Major roles and responsibilities remain unchanged
  - *Seamless transition*
  - *Staff remains the same*
- Principal Center remains responsible for implementation oversight
- Primary administrative support for Health Council
- Headquarters oversight for Medical Quality Improvement and Assurance Effort
  - *Medical Quality Improvement Expert*

Quality Improvement and Assurance

- Credentials and Privileging Process
  - *Cornerstone of practice*
  - *Medical Staff Review Functions*
  - *Administrative and clinical*
- Periodic Site Visits
  - *Emphasis on safety of practice, infection control, etc.*
  - *Checklist Methodology*
  - *Principal Center, augmented as necessary*
  - *JCAHO influence*
- Medical Quality Assurance Program
  - *Protected incident investigation methodology*

Professional Education and Development

- Aerospace Medicine Residencies
  - *Wright State University*
  - *University of Texas, Galveston*
- East-West Space Science Center
- Sponsorship of workshops and skills development seminars
- Video-teleconference series on Selected Health Topics
  - *2 per year*
  - *15-20 hours CME offered per series*

Continuing Medical Education

Occupational Health Policies

Public Health Policies

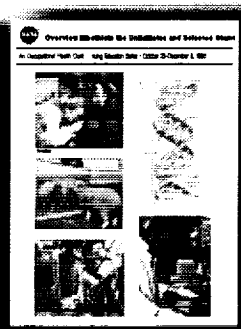
Bioethics

Health Surveillance and Maintenance in the Workplace

Emerging Diseases

Aging

99 Hours CME Delivered



Care and Protection of Research Subjects and Patients

- Clear distinction between motives of investigators and research subjects
- Potential conflict between need to rest hypotheses and requirement to respect and protect subjects
- Many prospective research subjects believe research connotes benevolence
- History of abuse and exploitation
  - *Tuskegee Syphilis Study*
  - *Human radiation studies*
- Oversight is required to ensure abuses do not occur

Care and Protection of Research Subjects and Patients

- 1994 - Advisory Committee on Human Radiation Experiments (ACHRE) created
  - *Investigate reports of federally sponsored human research involving radioactive materials*
  - *Assess current state of protection for research participants*
- 1995 - National Bioethics Advisory Commission established
- 1997 - "No person in the United States should be enrolled in research without the twin protections of informed consent by an authorized person and independent review of the risks and benefits of the research"
- "We must never allow our citizens to be unwitting guinea pigs in scientific experiments that put them at risk without their consent and full knowledge" - Clinton, 1997

Care and Protection of Research Subjects and Patients

- NASA is a research organization
- Human research is necessary to develop countermeasures to microgravity and the extreme environment of space
- Human research will be necessary to develop the evidence base to support the practice of medicine in space
- Animal research is necessary to explore the fundamental biology of microgravity
- NASA Institutional Review Boards and the NASA Animal Care and Use Committee exist to protect the health and safety of human research subjects and to assure the ethical and humane treatment of animal research subjects

Care and Protection of Research Subjects and Patients

- Astronauts as Research Subjects
  - *No other opportunities for research subjects on orbit at present*
  - *No immediate benefit for Astronauts as participants in research, may benefit subsequent crewmembers*
  - *Astronauts begin in good health - why volunteer to participate in research that may involve risks?*
  - *Why volunteer to participate in additional physiological tests that may reveal a medical problem?*
  - *Investigator/subject dynamics are particularly difficult*
- Flight Surgeons
  - *Primary purpose is to care for the crewmembers*
  - *Essential link in NASA human research*

Care and Protection of Research Subjects and Patients

- OCHMO Role
  - *Serve as a center of excellence for Bioethics in the Agency and for the Nation*
  - *Provide review and oversight for NASA IRB and ACUC activities*
  - *Provide expertise to investigate untoward events if necessary*
  - *Liaison to NBAC*
  - *Work with NASA Chief Scientist to help address research integrity issues (if required)*

Health Care in Space - Long Duration Flight

primary prevention
secondary prevention
tertiary prevention

Pre flight	Preventive Health Screening/Countermeasures	Preventive Health Screening/Improved Countermeasures	Preventive Health Screening/Advanced Countermeasures
In flight	Limited Countermeasures & Intensive Monitoring	Improved Countermeasures & Intensive Monitoring	Effective Countermeasures/monitoring
Post flight		Rehabilitation	Maintenance of Health
	1999	**2006**	**2010**

Medicine of Extreme Environments

- Provide a national resource for developing databases and analysis of experience in the medicine of extreme environments
  - *Polar medicine*
  - *Submarine analogs*
  - *Surface ship analogs*
  - *Contingency support experience/Military medicine*
- Development of space medicine practice
  - *Workshops co-sponsored by OCHMO and JSC*
  - *Develop "best practice" based on available evidence*
- Explore analog opportunities
  - *Underwater habitats*
  - *Remote site medical support*
  - *Confinement/isolation*

Medicine of Extreme Environments

- Close liaison with Code M and JSC Medical Operations
  - *Teaching opportunities*
- Ongoing review/analysis of the Longitudinal Study of Astronaut Health
- Aerospace Medicine
  - *Administrative support to Medical Policy Board*
  - *Support to NASA non-astronaut pilots*
  - *Intercenter Aviation Operations Panel (IAOP) participation*
- Review and validation of health related research requirements and research deliverables

Health Related Research Requirements and Deliverables

- New role for CHMO - established by NASA Administrator
- Serves as the "FDA" of NASA
- Review and validation of health research requirements
  - *Requirements articulated by Code M*
    - Astronaut Corps
    - Flight Surgeons
    - Mission Support Personnel
- Review and validation of health research deliverables
  - *Pharmacological regimens*
  - *Exercise protocols*
  - *Medical treatment protocols, etc.*
- Reviews accomplished via panels or advisory groups with nationally recognized expertise in subject matter under review

Major Health and Safety Issues

Risk	On the Ground/ In the Atmosphere	In Space
Radiation	• Nonionizing & ionizing • Increased skin cancer and cataract risk	• Exposure to solar and cosmic radiation
Stress	• Workforce stresses • Multicultural work environments • Extensive international travel	• Remote environment • Multicultural, psychological, human factors issues • Leaving Earth/isolation
Noise/ Vibration	• Physical hazards (noise)	• Space systems engineering design
Habitability/ Toxicology	• Toxic exposures • Ergonomic issues • Biohazards • Physical hazards	• Confined environment • Biohazards • Microgravity-induced physiologic changes • Human-machine interfaces

+ Dysbarism, Aging, Countermeasures, Medical Care in Space

OCHMO Mission

The CHMO assists the Administrator to ensure the health and safety of NASA employees in space and on the ground by establishing guidelines for health and medical practice in the Agency, developing health and medical policy, providing oversight of health care delivery and professional competency Agency-wide, and reviewing/validating research requirements and deliverables. The CHMO also monitors human and animal research and clinical practice to ensure that the Agency adheres to the highest medical and ethical standards and satisfies all regulatory and statutory requirements.

The Office of the Chief Health and Medical Officer

- OCHMO will maintain oversight
  - *health and safety initiatives*
  - *health care in space*
  - *external review and accreditation*
  - *research requirements and deliverables review*
- OCHMO will facilitate key agency programs
  - *support health care for each NASA field center*
  - *women's health*
  - *coordinate telemedicine technology transfer*
  - *multicultural public health education*
  - *agency-wide multi-phased Coping with Stress*
  - *support NASA flight ops*
  - *establish preventive and corrective actions based on critical health and safety issues*

Healthy People 2010

Catherine M. Angotti, RD, LD
Director, Occupational Health
Office of the Chief Health and Medical Officer
NASA Headquarters

NASA Occupational Health Program Conference

Galveston, Texas
February 25-March 2, 2001

Catherine M. Angotti, R.D.
Office of the Chief Health and Medical Officer

Healthy People 2010

Role of Prevention in the National Health Care Agenda

Background: Major HP 2000 Goals closely tied to prevention were not met nationally

- **Physical activity DID NOT improve; evidence that it actually decreased**
- **Obesity DID NOT decrease; increased in all groups, actually doubling in children**
- **Incidence of Type II diabetes DID NOT decrease; evidence that it increased in all age groups**

Prevention and HP 2010

Jan. 4, 2001, President Clinton issued a White House Directive on Preventive Health Services at the Federal Workplace

- **Acknowledged progress made in preventive screening activities and the challenges remaining to motivate positive lifestyle changes for disease prevention**
- **Designated federal worksites as the logical place to provide preventive health information and programs such as smoking cessation, sun avoidance, physical fitness, etc.**
- **Each Federal agency required to provide OPM with program descriptions for Best Practices publication**

Prevention and HP 2010

In the 1990's NASA identified 85 of the 226 HP 2000 objectives as being applicable to the Agency workforce

- **Selected the objective relating to exercise, increase physical activity by 30%, for decadal focus**
- **Used first year of *Exercise for the Health of It* data for baseline year**
- **Hearty inter-Center, multi-year competition. Improved exercise participation even though goals not met. HQ, SSC, and DFRC came closest**

Prevention and HP 2010

HP 2010 has two major goals
(467 objectives grouped into 28 focus areas)

- Increase the years and quality of healthy life
- Eliminate health disparities

The Nation is still trying to move from tertiary medical care to self-reliance and equal access to preventive services

Prevention and HP 2010

Surgeon General's Leading Health Indicators

- Areas of broad public health importance
- Linked to HP 2010
- Measurable at the State and local levels
- Ability to motivate people to change behavior

Prevention and HP 2010

Leading Health Indicators

- Physical activity*
- Overweight and obesity*
- Tobacco use*
- Substance abuse
- Responsible sexual behavior
- Mental health*
- Injuries and violence*
- Environmental quality*
- Immunizations*
- Access to healthcare

Prevention and HP 2010

Economic Factors

- Environmental-type changes, not changes in genetics, lie behind increases in obesity and overweight over the past two decades.
- People may eat unhealthy diets and maintain sedentary lifestyles because future health is a lower priority than current taste and convenience or demanding schedules.
- Need a broader outcome variable, e.g. health or healthy lifestyles, rather than merely nutrition or weight status.

Prevention and HP 2010

Like the 90's NASA Fitness Challenge efforts to meet HP 2000 goals, HP 2010 prevention efforts will have the greatest impact on health risk reduction by focusing on the top two leading health indicators; physical activity (exercise) and overweight and obesity (diet).

Prevention and HP 2010

Why promote physical activity?

- Can reduce CHD by 50%
- Can reduce hip fractures in the elderly by 40-50%
- Can reduce the impact of depression
  - Recent Duke study showed that after 1 year, exercise was as effective in reducing the impact of depression as the most common medication and after 2 years it was even more effective.
- Can reduce and prevent Type II diabetes
- Can reduce severity and prevent hypertension
- Can reduce body fat
- Can enhance psychological well-being

Prevention and HP 2010

Why promote normal body weight?

- Obesity is associated with higher death rates
- Obesity increases risk of hypertension, hyperlipidemia, and diabetes
- Obesity carries a social stigma and decreases self-esteem

Prevention and HP 2010

Mental Health as a Leading Health Indicator

- **No single illness interferes with health and productivity more than depression. Mental illness is second only to cardiovascular disease (leading cause of death and disability) for impact and prevalence.**
- **Recent Duke University study showed that after 1 year, depressed individuals who exercised regularly showed improvement similar to those on medication. After 2 years, the exercise group showed greater improvement.**

Back-up

We should encourage individuals to go on a program of exercise and good nutrition to improve their health and quality of life NOT just to lose weight

Back-up

Prevention and intervention activities are complicated by political will, knowledge, and social strategies.

Prevention program emphasis should be placed on small behavioral changes with a strong focus on motivating factors

Back-Up

Increase years and quality of life

First goal focuses not only length of life but also the quality and health of those added years. (HP 2000 goal was to increase healthy life span)

This goal looks at physical and mental health as well as interactions in one's social and physical environment.

Back-Up

Eliminate health disparities

HP 2000 sought only to reduce health disparities Second HP 2010 goal recognizes the need to take a multidisciplinary approach as the U.S. population becomes more diverse with certain ethnic populations continuing to have higher rates of infant deaths, CHD, HIV, etc.

These conditions translate into poorer general health and reduced life expectancy.

Back-Up

Leading Health Indicators

- **At beginning of the 20th century leading causes of death dominated by infectious diseases**
- **100 years later, the leading causes of death can be attributed, for the most part, to behaviors and environmental factors.**
- **Leading Health Indicators reflect the major public health concerns in the U.S.**
- **Intended to help everyone more easily understand the importance of health promotion and disease prevention and to encourage wide participation in improving health in the next decade/**

Back-up

Life is full of golden opportunities carefully disguised as insurmountable problems.

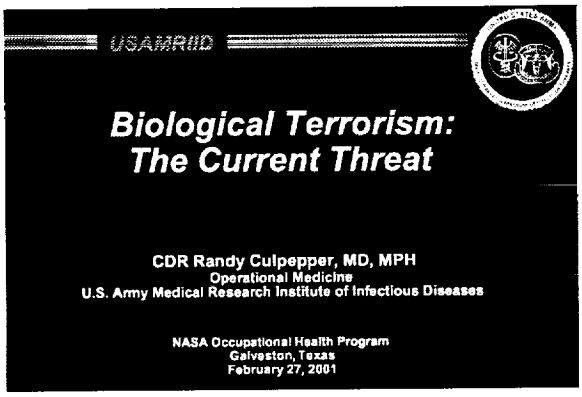
Biological Terrorism: The Current Threat

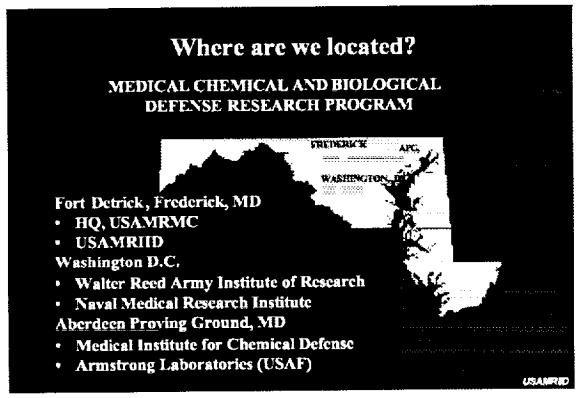
CDR Randy Culpepper, MD, MPH
US Army Medical Research Institute of Infectious Diseases

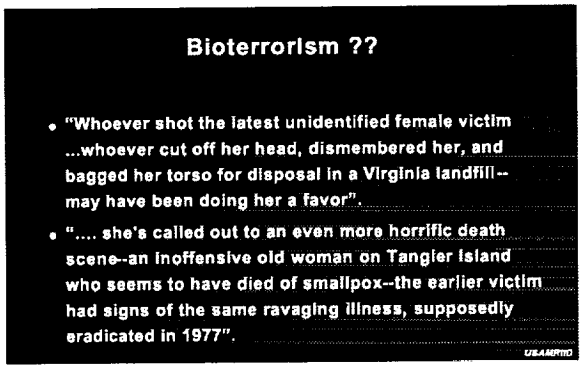
Bioterrorism is a very real threat to US civilians as we have seen an increased worldwide interest in bioterrorism over the past several years. Although the risk of a bioterrorism event occurring in any one location is low, the catastrophic consequences from an event could be overwhelming.

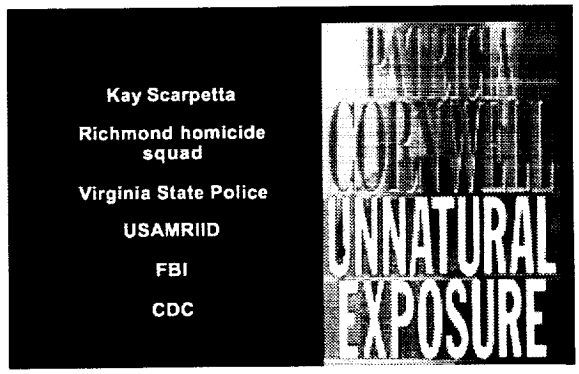
Our country is vulnerable to foreign and domestic terrorism and we must prepare to defend against biological weapons such as anthrax, smallpox, plague, and botulinum toxins.

The first responders in a biological terrorist attack will be our healthcare providers in emergency rooms and primary care clinics. They must have a raised index of suspicion in the setting of mass casualties for the possibility of bioterrorism. The epidemiology of a bioterrorist event would be similar to that of naturally occurring diseases. Medical countermeasures such as pre- and post-exposure antibiotics are available against many of the bioterrorist agents and we must remember that some of the agents are highly transmissible person-to-person (e.g., small pox, pneumoni plague). A tiered laboratory response network is being established by the Centers for Disease Control and Prevention to aid in the rapid detection and diagnosis of biological terrorism agents.









The Changing World

Cold War

- For 50 years, military power was bi-polar
  - ✓ Western free world
  - ✓ Eastern block countries tied to the Soviet Union
- Threat was Mutual Assured Destruction

Now

- Classic threat has disappeared
- Nations with contrary idealogic and economic motives
- The global political environment is more complex, uncertain, and volatile
- Proliferation of Weapons of Mass Destruction

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"Any new war will be characterized by mass use of air power, various types of rocket, atomic, thermo-nuclear, chemical and biological weapons"

Soviet Defense Minister Georgi Zhukov, 1956

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State Supporters of Terrorism	BW Program
Cuba	Confirmed
Iraq	Confirmed
Iran	Confirmed
Libya	Confirmed
North Korea	Confirmed
Sudan	Confirmed
Syria	Confirmed

Why is Biodefense a Very High Priority?

- Low risk occurrence - catastrophic consequences
- Protect civilian populations, airfields, ports, depots
- Prevent, mitigate terrorism against population centers
- Bioengineering technology may lead to new pathogens

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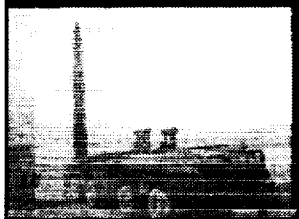
Soviet BW Priorities
"Agents Likely to be Used"



- Anthrax: 4000 tons annually
- Smallpox: 300 tons annually
- Marburg: 250 tons annually
- Plague: 2200 tons annually

- Smallpox
- Plague (engineered ?)
- Anthrax
- Botulism
- VEE
- Tularemia (engineered ?)
- Q Fever
- Marburg
- Influenza
- Melioidosis
- Typhus

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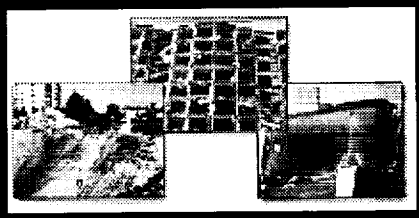
U.S. Vulnerability

February 1993: World trade Center bombing
✓ Foreign terrorism in the U.S.

U.S. Vulnerability

June 1996: Dhahran, Saudi Arabia military barracks bombing

✓Reexamination of DoD security programs to protect its forces overseas



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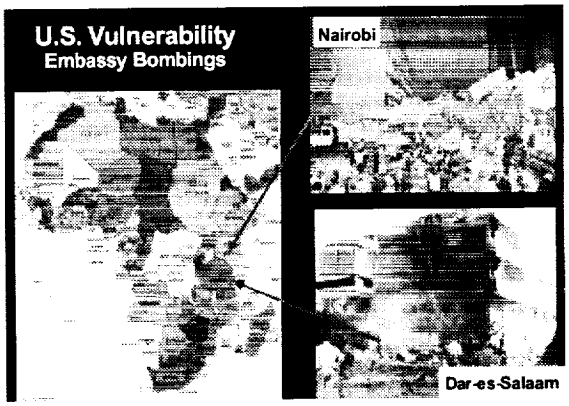
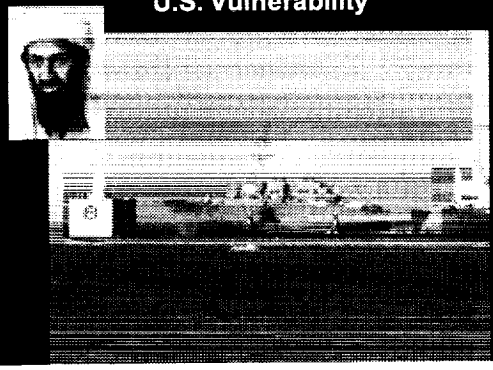
U.S. Vulnerability
Embassy Bombings



U.S. Vulnerability



Bioterrorism

The premeditated, unlawful use or threat of use of microorganisms or toxins derived from living organisms.....

- to produce death or disease
- in humans, animals, or plants
- to create fear and/or intimidate governments & societies
- in the pursuit of political, religious, or ideological goals

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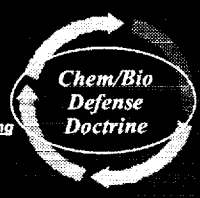
Protection
Through Integration and Teamwork

Intelligence
- Agent
- Delivery system
- Organization
- Time

Education & Training
- Health care providers
- Electronic communication
- Distance learning



Medical Countermeasures
- Vaccines
- Diagnostics
- Therapeutics

Physical Countermeasures
- Detection
- Individual protection
- Collective protection
- Decontamination

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Possible Bioterrorism Agents

BACTERIA
- *Bacillus anthracis* *
- *Yersinia pestis* *
- *Francisella tularensis* *
- *Brucella species* *
- *Coxiella burnetii* *
- *Shigella sp.*
- *Salmonella sp.*

TOXINS
- Staphylococcal enterotoxins *
- Botulinum toxins *
- Ricin
- Trichothecene mycotoxins
- Saxitoxins

VIRUSES
- Alphavirus encephalitis viruses *
- Variola virus (smallpox)
- Hemorrhagic fever viruses (Marburg and Ebola)

* Included in the former U.S. offensive program (destroyed 1971-1973)

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Bioterrorist Agents
Most Likely Candidates

Bacteria	Toxins	Viruses
Anthrax *	Botulinum *	Smallpox *
Plague *	Ricin	VHFs *
Tularemia *		VEE
Salmonella		

* Highly contagious, easily disseminated, or highly lethal

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How likely is a Bioterrorist Attack?

"Not a matter of *if* it's going to happen, it's *when*"

Robert Blitzer
Former FBI's counter-terrorism section

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Recent Bioterrorist Activity

- FBI
  - ✓Increased interest - few actual verified incidents
  - ✓Bio threats >>> chemical threats
  - ✓Over 220 current NBC investigations
- Sources of information for terrorists
  - ✓Internet, gun shows, survivalist fairs
  - ✓The Terrorists Handbook
  - ✓Kurt Saxon

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Terrorist Organizations

Armed Islamic Gp.
Aum Shinrikyo
Hamas
Japanese Red Army
Khmer Rouge
Kurdistan Worker's Party
Abu Nidal Org.
Abu Sayyaf Gp.
Gama'a Al-Islamiyya
Harakat Ul-Ansar
Al-Jihad
Baader - Meinhof Grp
Aum Shinrikyo
Shining Path
Liberation Tigers of Tamil
Rev. Armed Forces of Colombia
Euzkadi Ta Askatasuna
Kach
Kahane Chi
Manual Rodriguez Patriotic Front
Mujahedin-E-Khalq Org.
National Liberation Army
Palestine Liberation Army
W. German Red Army faction
Palestine Liberation Ft
Pop Ft for Liberation of Palestine
Rev. Org - 17 November
Rev. People's Liberation Party/Front
Revolutionary People's Struggle
Tupac Amaru Rev. Movement
Order of the Rising Sun
Bhagwan Shree Rajneesh

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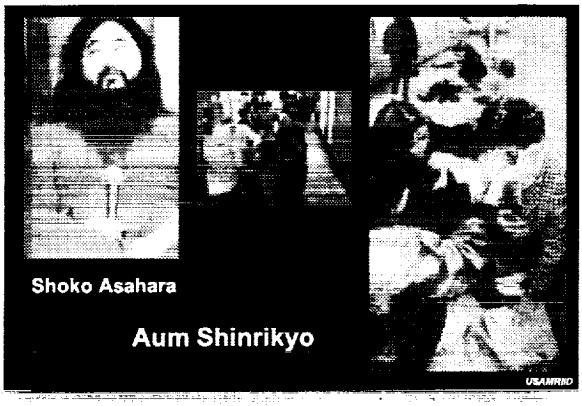

Shoko Asahara

Aum Shinrikyo

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Aum Shinrikyo
Tokyo Sarin Attack
March 1995

- 15 Subway stations affected
  - ✓Hibya Line had heaviest casualties
- 3,796 injured
- 1,000 require hospitalization
- 12 dead or dying

Biological Weapons
Aum Shinrikyo

- Asahara's first WMD interest
- Dedicated toxin production laboratory as early as 1990
- Two new labs: Kamakuishiki and Tokyo
- Produced and attempted to aerosolize:
  - ✓Botulin toxin, Anthrax, Cholera, Q-Fever
- Ebola Zaire - 1993

Aum Shinrikyo
Bioterrorism Activities

- April 1990 - Tokyo
  - ✓*Botulinum Toxin* released near Diet
- Early June 1993 - Tokyo
  - ✓Botulinum Toxin again sprayed from vehicle
  - ✓Timed to coincide with royal wedding
  - ✓Released around imperial Palace

Aum Shinrikyo
Bioterrorism Activities

- Late June 1993 - Tokyo
  - ✓*Anthrax* spores released from office building in East Tokyo
  - ✓Foul smells, "brown" steam, pet deaths
- March 1995 - Tokyo
  - ✓Briefcase devices in subway intended to release Botulinum toxin
  - ✓No reports of any injuries

Future of Aum Shinrikyo

- Actively recruiting
- 50 seminars/month
- 15 offices, 16 training centers, 17 factories and other sites
- 100 hideouts / 700+ live-in followers
- Back in the computer business
- Estimated income: $30 million
- Cult is buying real estate

Other Recent Bioterrorist Activity

- 1998-00: ~ 400 bio-hoaxes nationwide
- 1998: Larry Wayne Harris, Las Vegas: anthrax vet. vaccine
- 1997: Counter Holocaust Lobbyists of Hillel, B'nai B'rith headquarters, Washington, D.C.: anthrax hoax
- 1997: James Dalton Bell: bot toxin & ricin
- 1995: Aum Supreme Truth, Tokyo: anthrax, bot tox., sarin
- 1995: Larry Wayne Harris, Ohio: Y. pestis (bubonic plague)
- 1993: Thomas Lavy, Canada: ricin
- 1992: Minnesota Patriot's Council: ricin

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Bioterrorist Threats
1998 - 2000

	1998	1999	2000
Total	181	267	155
Bio	112	187	82
Chem	23	27	
Nuc/Rad	29	15	
Combo	17	38	

Bioterrorist Threats 1999 - 2000

Anthrax:	237	Bubonic Plague:	1
Ebola:	2	"Black" Plague:	1
TB:	2	Epstein Barr:	1
Ricin:	3	Phenol:	1
Cholera:	2	Mercury:	1
Brucellosis:	2		

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Biological Terrorism The Ultimate Weapon?

Easy to procure

Inexpensive

Disseminate at great distance

Invisible

Detection quite difficult

First sign is illness

Overwhelms medical capabilities

Simple threat creates panic

Perpetrators escape before effects

Ideal terrorist weapon

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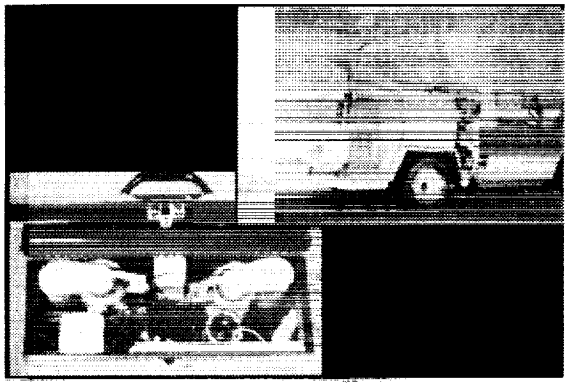
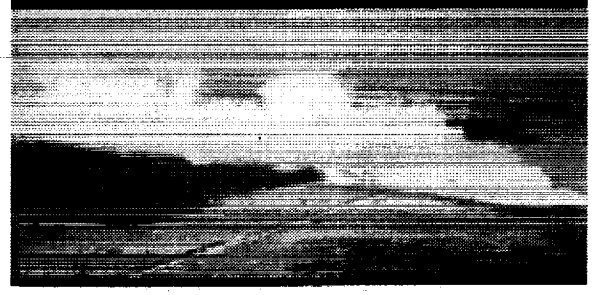


Line Source Distinctive downwind pattern - plume



Hypothetical Dissemination

50 kg agent, 2 km front, upwind of city of 500,000

Disease	Downwind reach (km)	Dead	Dead/Incapacitated
RVF	1	400	35000
TBE	1	9500	35000
Typhus	5	19000	85000
Brucellosis	10	500	100000
Q fever	>20	150	125000
Tularemia	>20	30000	125000
Anthrax	>>20	95000	125000

Health Aspects of Chemical and Biological Weapons, WHO 1970

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Portals of Entry

- Cutaneous
  - ✓ Effective barrier vs BW agents (ex. T-2 mycotoxins)
  - ✓ Abrasions, wounds, exposed mucosal surfaces
- Gastrointestinal
  - ✓ Food & water delivery
- Inhalational (aerosol)
  - ✓ 1-5 micron diameter particles
  - ✓ Focal infection (pneumonia)
  - ✓ Susceptible to aerosol delivery
  - ✓ Hematogenous metastasis, systemic illness

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Gastrointestinal Exposure

- "Potentially" significant route of delivery
- Food supply contamination
  - ✓MREs vs locally procured foods
- Water supply contamination
  - ✓Significant contamination unlikely
  - ✓Dilution results in nontoxic exposure
  - ✓Water treatment (chlorination, filtration) effective
  - ✓End-user supply: potential risk

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Medical Countermeasures

Minimize potential impact of BW

- Environmental Detection
- Protective Equipment
- Immunization
- Chemoprophylaxis
- Diagnosis
- Therapy

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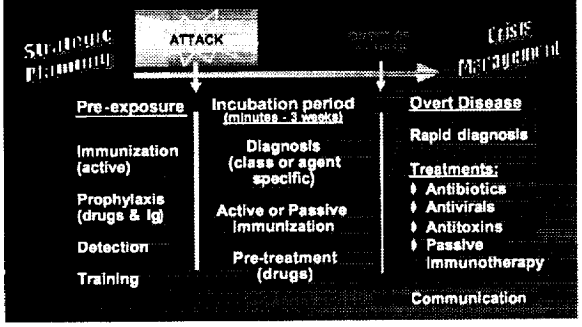
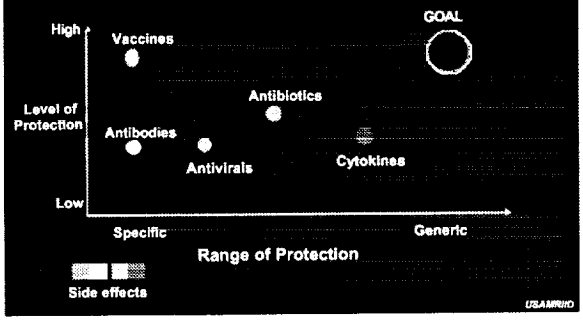
BW RESPONSE TIMELINES



BW Medical Countermeasures



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Clinical Specimens

- Immediate Post Exposure Period (0-24 hours)
  - *Swab: nares, face, hairy portions of face*
  - *Serum (archive)*
- Acutely Ill Patient (>24 hours)
  - *Swab: nares and throat*
  - *Blood, urine, sputum*
- Critically Ill Patient
  - *Swab: throat*
  - *Blood, urine, sputum, feces*

Autopsy: spleen, lymph nodes, kidney, liver, brain, and lung

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Projected Timeline

Action	Elapsed Time, hours	Comment
Receive sample	0	Chain-of-custody
Initial risk assessment	1 - 2	Threat/Non-threat
Sample processing	2 - 7	Sample dependent
Immunodiagnosis	4 - 5	Antigen/Toxin ID (Presumptive)
Nucleic acid analysis	6 - 12	Workload dependent (Confirmed)
Culture confirmation	20 h to 30 days	Agent dependent (Confirmed)

✓ *Assumes unknown agent*

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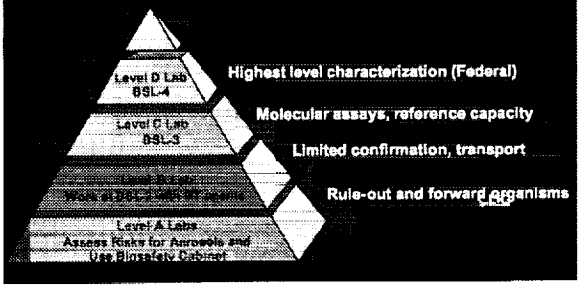
Classification of Bioterrorism Laboratory Response Network

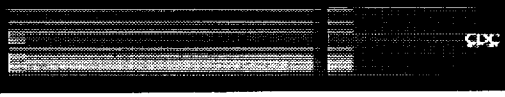


Have a Plan: Level A Labs

- If announced:
  - ✓Notify the FBI, and the PHL
  - ✓Based on consultation ---> test +/- refer
- If unannounced (but suspected):
  - ✓Rule-out
  - ✓If unable to rule- out, call the nearest Level B lab

Have a Plan: Level A Labs

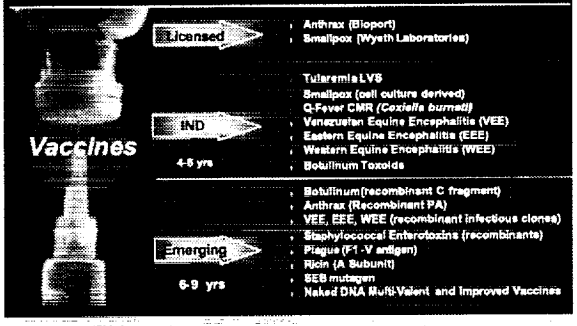
- Be aware
- Have a plan, test your plan, and keep it updated
- Provide training / in-service to your staff
- Know whom to call
- Know chain of custody requirements
- Know shipping requirements



Action Items

- What is the BT level of my lab?
- Is my lab active in the LRN?
- Where is the nearest higher level lab?
- What guidelines should be followed to package and ship biological agents?
- Whom should I call?
- Review your current protocols and safety practices
- Incorporate BT plan into your SOP
- Keep updated
  - ✓Additional agent protocols
  - ✓Additional training opportunities (NLTN, professional societies, etc.)

Medical Biological Defense BW Vaccine Status



USAMRIID Bioengineered Vaccine Candidates

- Staphylococcal enterotoxins
- Botulinum toxins
- Anthrax (*B. anthracis*)
- Plague (*Y. pestis*)
- Alphaviruses
  - ✓VEE, WEE, and EEE

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Medical Management of BW Casualties

- Epidemiologic assessment
  - ✓ Naturally occurring epidemic vs BW attack
- Disease reporting
  - ✓ Immediately report to Public Health authorities
- Laboratory specimens
  - ✓ Forward to designated laboratories
- Disposition of fatalities

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BW Attack or Naturally Occurring Disease

- Environmental detectors may not be sufficient
- Sentinel ill patient: First evidence of BW attack
- Occurrence of large numbers of acutely ill patients
- Unusual or impossible agent for geographical area
- Unusual distribution of disease
- Unexplained number of dead animals
- Direct evidence of munitions with BW agents

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Sverdlovsk Epidemic April 1979

- Onset 4 April-15 May
  - ✓ Modal incubation period: 9-10 days
- 77 patients
  - ✓ 55 males, ages 24-52 (mean age 42)
    - ★ 60% of 33 moderate or heavy smokers
    - ★ 50% of 33 moderate or heavy EtOH
  - ✓ 22 females, ages 24-69 (mean age 55)
  - ✓ 73 of 77 lived/worked within 4 Km in narrow zone southwest of Compound 19 during 1st week of April, 1979
  - ✓ 2 April: Prevailing southwest winds 18 Km/hr

Meselson et al. *Science* 1994;266:1202-8

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Sverdlovsk Outcome

- 11 survivors, 66 fatalities (Case fatality = 87%)
- Average length of hospitalization:
  - ✓ 2-3 days for fatalities
  - ✓ 3 weeks for survivors

Meselson et al. *Science* 1994;266:1202-8

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Sverdlovsk Autopsy Findings

- Inhalation Anthrax
  - ✓ Hemorrhagic necrosis of thoracic lymph nodes 42/42
  - ✓ Hemorrhagic mediastinitis 42/42
  - ✓ Focal hemorrhagic necrotizing pneumonia 11/42
- Metastatic infection
  - ✓ Multiple gastrointestinal submucosal lesions 39/42
  - ✓ Hemorrhagic meningitis 21/42
- Microbiology
  - ✓ *B. anthracis* identified by tissue culture in 20/42
  - ✓ *B. anthracis* identified by histology 35/42
  - ✓ PCR analysis of tissue from 11 victims demonstrated DNA from vaccine and at least 4 different virulent *B. anthracis* strains

Abramova et al. *Proc Natl Acad Sci USA* 1993;90:2291-4
Jackson et al. *Proc Natl Acad Sci USA* 1998;95:1224-9

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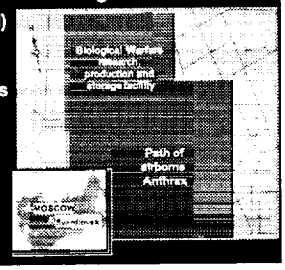
Sverdlovsk Estimated Spore Release

- Spore release estimated from a few milligrams to < 1 gram (computer modeled)
- LD_{50} 8,000-10,000 spores
- Implications: Consequences of intentional release of biological agent



Meselson et al. *Science* 1994;266:1202-8

Shopping Mall Scenario Denver

- Anthrax aerosolized into shopping mall ventilation
  - ✓ 10,000 people present
  - ✓ 9,000 people are exposed
- Terrorist announces attack 24 hours after release
- 90% of exposed started on antibiotics by end of second day
- 10% cannot be found initially

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Shopping Mall Scenario Denver

- Resources required
  - ✓ Total patients hospitalized = 4950 (55%)
  - ✓ Total ICU beds required = 2925 (33%)
  - ✓ Total ICU beds available = 150 out of 300
  - ✓ Total ventilators required = 2601 (29%)
  - ✓ Total deaths = 855 (9%)
- Even a small scale bioterrorism event can overwhelm a city's medical care resources
- The 13,000 military beds deployed to the Persian Gulf War would still not provide enough ICU beds (only about 1300)

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Impact on the Medical System

- Terror in the affected population and in the medical care system
- Overwhelming numbers, ICU demands, or special medication needs
- Need for personal protection in medical care, clinical laboratory, and autopsy suites
- Problems with handling of remains

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Summary

- Bioterrorism is a very real threat to U.S. civilians
- Vulnerable from foreign and domestic terrorists
- Anthrax, smallpox, plague, botulinum toxins
- Suspect BT in setting of mass casualties
- Epidemiology similar to naturally occurring disease

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Summary

- Medical countermeasures ARE available
- Person-to-person spread uncommon
  - ✓ Smallpox
  - ✓ Pneumonic plague
- Pre- and post-exposure prophylactic measures exist for many agents
- Tiered laboratory response network

"Awareness without paranoia"

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Occupational Safety and Health Administration (OSHA) Recordability

Linda Ballas
Linda Ballas & Associates

This presentation is intended to provide attendees with an overview of OSHA record keeping guidelines with regard to occupational injuries and illnesses. Both recordable and non-recordable cases will be discussed, various types of medical treatment guidelines, definition of work-relationship and modified duty issues.

OSHA 200 Forms

Regulations

Recordable Cases:

You are required to record information about every:

- Occupational Death
- Non-Fatal Occupational Illness

Regulations (cont.)

- Those non-fatal occupational injuries which involve one or more of the following:
  - Loss of consciousness
  - Restriction of work or motion
  - Transfer to another job
  - Medical treatment (other than first aid)

OSHA Recordkeeping Guidelines for Occupational Injuries & Illnesses

1. An injury or illness is considered work related if it results from an event or exposure in the work environment. The work environment is primarily composed of:
   - The employer's premises, and
   - Other locations where employees are engaged in work related activities or are present as a condition of their employment. When an employee is off the employer's premises, work relationship must be established; when on the premises, this relationship is presumed. The employer's premises encompass the total establishment, not only the primary work facility, but also such areas as company storage facilities. In addition to physical locations, equipment or materials used in the course of an employee's work are also considered part of the employee's work environment.

OSHA Recordkeeping Guidelines for Occupational Injuries & Illnesses

2. All work-related fatalities are recordable.
3. All work-related illnesses are recordable.
4. All work-related injuries are recordable if they require medical treatment or involved loss of consciousness, restriction of work or motion, or transfer to another job.

Medical Treatment

The following are generally considered medical treatment. Work-related injuries for which this type of treatment was provided or should have been provided are almost always recordable:

- Treatment of infection.
- Application of antiseptics during second or subsequent visit of medical personnel (if only antiseptics are used, now first aid).
- Treatment of second or third degree burn(s).
- Application of sutures (stitches).

Medical Treatment (cont.)

- Application of butterfly adhesive dressing(s) or steri strip(s) in lieu of sutures (line out in lieu of sutures).
- Removal of foreign bodies embedded in eye.
- Removal of foreign bodies from wound. If procedure is complicated because of depth of embedment, size, or location.
- Use of prescription medications (except a single dose administered on first visit for minor injury or discomfort.
- Use of hot or cold soaking therapy during second or subsequent visit to medical personnel.

Medical Treatment (cont.)

- Application of hot or cold compress(es) during second or subsequent visit to medical personnel.
- Cutting away dead skin (surgical debridement).
- Application of heat therapy during second or subsequent visit to medical personnel.
- Use of whirlpool bath therapy during second or subsequent visit to medical personnel.
- Positive X-ray diagnosis (fractures, broken bones, etc.)
- Admission to a hospital or equivalent medical facility for treatment.

First Aid Treatment

The following are generally considered First Aid treatment (e.g., one-time treatment and subsequent observation of minor injuries) and should not be recorded if the work-related injury does not involve loss of consciousness, restriction of work or motion, or transfer to another job:

- Application of antiseptics during first visit to medical personnel.
- Treatment of first degree burn(s).

First Aid Treatment (cont.)

- Application of bandage(s) during any visit to medical personnel.
- Use of elastic bandage(s) during first visit to medical personnel.
- Removal of foreign bodies not embedded in eye if only irrigation is required or cotton swab, Q-tip.
- Removal of foreign bodies from wound, if procedure is uncomplicated, and is, for example, by tweezers or other simple technique.

First Aid Treatment (cont.)

- Use of nonprescription medication and administration of single dose of prescription medication on first visit for minor injury or discomfort.
- Soaking therapy on initial visit to medical personnel or removal of bandages by soaking.
- Application of hot or cold compress(es) during first visit to medical personnel.

First Aid Treatment (cont.)

- Application of ointments to abrasions to prevent drying or cracking.
- Application of heat therapy during first visit to medical personnel.
- Use of whirlpool bath therapy during first visit to medical personnel.
- Negative X-ray diagnosis.
- Observation of injury during visit to medical personnel.

First Aid Treatment (cont.)

The following procedure, by itself, is not considered medical treatment:

- Administration of tetanus shot(s) or booster(s). However, these shots are often given in conjunction with the more serious injuries; consequently, injuries requiring tetanus shots may be recordable for other reasons.

Reminder: Work-related injuries requiring only First Aid Treatment and that does not involve loss of consciousness, restriction of work or motion, or transfer to another job, are not recordable.

The concept of restricted work is based on three criteria as follows:

1. The employee was assigned to another job on a temporary basis.
2. The employee worked at a permanent job less than full time.
3. The employee worked at his permanently assigned job but could not perform all the duties normally connected with it.

The phrase, "employee's normal job duties" has been interpreted to include any tasks that the employee performs or may be expected to perform throughout the calendar year.

Major Changes

Definition of Work Relationship

Work relationship is established under the OSHA recordkeeping system when the injury or illness results from an event or exposure in the work environment. The work environment is primarily composed of:

1. The employer's premises.
2. Other locations where employees are engaged in work-related activities or are present as a condition of their employment. When an an employee is off the employer's premises, work relationship must be established; when on the premises, this relationship is presumed.

The specific activity the employee was engaged in at the time of the injury is not the controlling factor.

Modified Issue Positions

Company Ball Fields

Injuries to employees in employer controlled recreational facilities are not recordable unless the employee was engaged in some work-related activity, or was required by the employer to participate.

Modified Issue Positions (cont.)

Company Parking Lots

Injuries to employees on/in parking lots are not presumed to be work-related and are not recordable unless the employee was engaged in some work-related activity.

Modified Issue Positions (cont.)

Travel Status

Injuries and illnesses are not recordable if it occurred during normal living activities; or if the employee deviates from a reasonable direct route of travel.

Modified Issue Positions (cont.)

Prescription Medications

A single dose is the measured quantity of a therapeutic agent to be taken at one time. More than a single dose is recordable.

Modified Issue Positions (cont.)

Occupational Illness

Occupational illnesses must be diagnosed to be recordable. Diagnosis may be by a physician, registered nurse, or a person who by training or experience is capable to make such a determination.

Workers Compensation

Larry J. Regan
Assistant United States Attorney, Senior Litigation Counsel
United States Attorney's Office, Western District of Louisiana

A. Overview of the Federal Employees Compensation Act

1. Rationale for the program

2. FECA is not a retirement program

B. Impact of Fraud on the FECA Program and NASA Budgets

1. First year FECA Program in effect-$35,000 expended

2. At end of this century - total program costs - approximately1.9 to 2 billion dollars.

3. In beginning funds came out of U.S. DOL budget – within last 20 years - FECA costs for each federal agency/department are charged back to that agency/department at end of DOL'S fiscal year.

4. FECA Program funds are administered through regional DOL offices by the Office of Workers Compensation Programs (OWCP).

5. NASA as DOD has set budget figure to cover its FECA Program costs. If budget amount exceeded in any given year comes out of NASA's hide in other ways. Impacts other areas in NASA. In DA at Installation level - training, we well as health and morale funds lost.

C. Fort Polk - A Community of Success in Curtailing FECA Fraud and Costs

1. 1992-93 - FECA Status at Ft. Polk - The problem of costs in the program expanding exponentially. The how and why the U.S. Attorney's Office got involved in the prosecution of FECA fraud. Impact on Army.

2. The Method of Attack to Correct the Problem – Criminal prosecution and civil suits. Resulting drop in claims and time out on COP.

3. The results - 1993-1999 - Attack on problem during this time period was successful. Resulting savings - current and future-money returned to Ft. Polk.

4. Current situation at Ft. Polk - Four cases are being investigated as of this time. Medical providers are being looked at. Rise in claims beginning as employees

anticipate the next rift. DA civilians are going to have to be reminded again that federal prosecutors and
investigators in the Western District of Louisiana are not going to sit by idly while they rip the taxpayers off with fraudulent claims.

5. Not all cases will get prosecuted or handled by civil suit. If a person voluntarily takes steps to end fraudulent claims and agrees to make restitution of overpayment prior to his or her being investigated, then strong consideration would be given to not prosecuting that person.

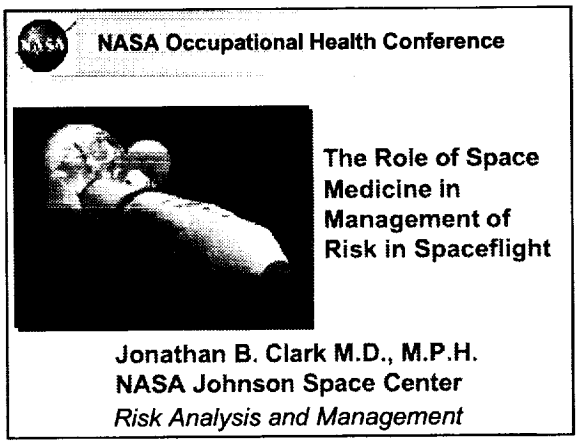
D. Case Study of Significant Cases:

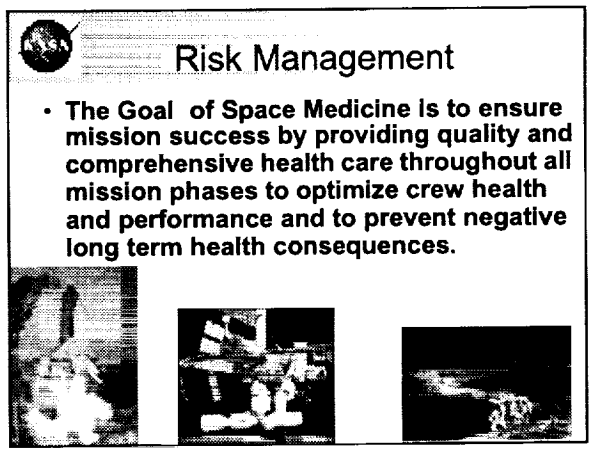
1. Carlous Pelt
2. Alton Norris
3. Jerry Mitchell
4. Tony Clemons
5. John L. Hoss
6. Civil Case - Richard Bottini - First FECA civil case tried under FFC Act 1998 (5th Cir. Aff'd, S.Ct. cert denied)

The Role of Space Medicine in Management of Risk in Spaceflight

Jonathan B. Clark, MD, MPH
Risk Analysis and Management
NASA Johnson Space Center

The purpose of Space Medicine is to ensure mission success by providing quality and comprehensive health care throughout all mission phases to optimize crew health and performance and to prevent negative long-term health consequences. Space flight presents additional hazards and associated risks to crew health, performance and safety. With an extended human presence in space it is expected that illness and injury will occur on orbit, which may present a significant threat to crew health and performance and to mission success. Maintaining crew health, safety and performance and preventing illness and injury are high priorities necessary for mission success and agency goals. Space flight health care should meet the standards of practice of evidence based clinical medicine. The function of Space Medicine is expected to meet the agency goals as stated in the 1998 NASA Strategic Plan and the priorities established by the Critical Path Roadmap Project. The Critical Path Roadmap Project is an integrated NASA cross-disciplinary strategy to assess, understand, mitigate, and manage the risks associated with long-term exposure to the space flight environment. The evidence based approach to space medicine should be standardized, objective process yielding expected results and establishing clinical practice standards while balancing individual risk with mission (programmatic) risk. The ability to methodically apply available knowledge and expertise to individual and mission health issues will ensure appropriate priorities are assigned and resources are allocated. NASA Space Medicine risk management process is a combined clinical and engineering approach. Competition for weight, power, volume, cost, and crew time must be balanced in making decisions about the care of individual crew with competing agency resources.





Common Questions?

- What are the space flight risks to health and performance?
- How can the health risks best be managed within acceptable range (to ensure mission success and prevent negative health consequences)?
- How do the potential health risks and impacts stack up against other mission priorities?
- What are the minimal medical and health-related resources required? (What do we REALLY need?)



Overview

Human space exploration is inherently risky

Risk Management Strategy:

- **Identify risks**
- **Understand risks**
- **Reduce uncertainties associated with predicting risk**
- **Manage risks by preventing or reducing their effects to acceptable levels**

Potential Impacts From Significant Medical Event

- Decreased crew performance during mission
- Minor impairment, illness or injury
- Negative behavioral changes
- Decreased performance during descent and egress
- Post-flight debilitation
- Long term health effect
- Crew rescue required due to risk of severe illness, injury, or life threatening event
- Mission failure
- Death of a crewmember

Medical Concerns in Space Operations

The Threats

Medical events affecting mission timeline

Medical events affecting mission accomplishment

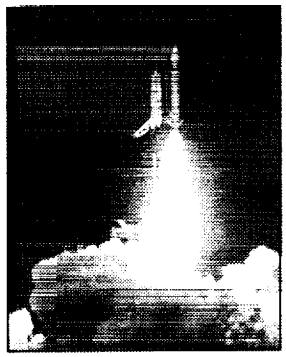
Damaged spacecraft, injured or ill crew

Catastrophic events affecting vehicle integrity and crew survivability

Class 1 alarms:

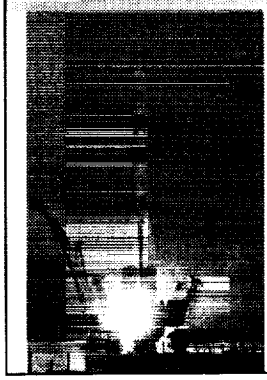
Fire, toxic atmosphere, cabin depressurization

Space Shuttle

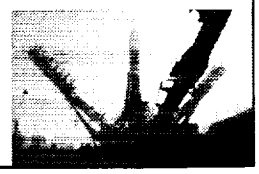


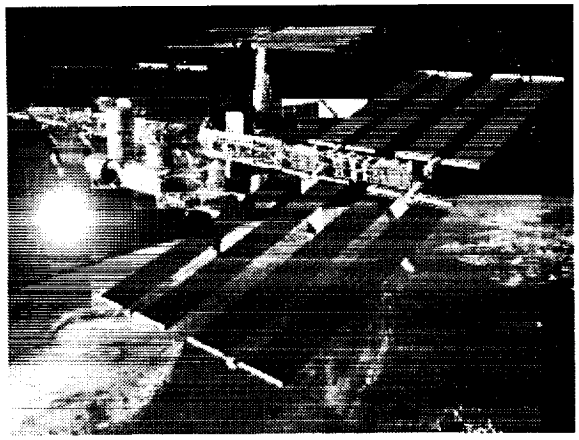
- Four orbiter fleet
- Primary component of US Human Space Flight Program
- 7 person crew

Soyuz Launch Vehicle

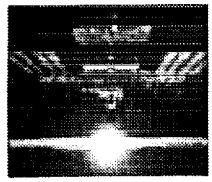


- Primary component of Russian Human Space Flight Program
- 3 person crew





Hazards of Space Flight



Space Environment
- Reduced Gravity
- Radiation
- Vacuum
- Debris

Space Craft Environment
- Isolation and confinement
- Noise and Vibration
- Closed loop environment (life support)
- Payloads and construction activities
- Waste production

Space Flight
- Remoteness and communication access
- Flight activity (propulsion, G-forces, impacts)
- Circadian rhythms and crew schedule changes

Significant Illness or Injury

Definition: would normally require evacuation, emergency room visit, or hospital admission (as applied to the operational environment)

Compilation of:
- U.S. and Russia space flight data
- Astronaut longitudinal study data
- Submarine crew data
- Antarctic winter-over data
- Military aviator data

Risk of occurrence = 0.06 to 0.07 per person year

Subset requiring advanced life support = 0.02 per person year

Significant Illness or Injury

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- Compilation of:
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  - Antarctic winter-over data
  - Military aviator data
- Risk of occurrence = 0.06 to 0.07 per person year
- Subset requiring advanced life support = 0.02 per person year

Space Fatalities

- Russian Space Program
  - 1 Fatality – Soyuz 1 (1967) parachute entanglement during reentry
  - 3 Fatalities – Soyuz 11 (1971) cabin decompression during reentry
- U.S. Space Program
  - 3 Fatalities – Apollo 1 pad fire
  - 7 Fatalities – Challenger STS 51-L (1986) launch breakup

Medical Evacuation from Space

- Salyut 5 space station (1976) abandoned 49 days into 54 day mission for intractable headaches
- Salyut 7 space station (1985) evacuation 56 days into 216 day mission for sepsis/ prostatitis
- Mir space station (1987) evacuation 6 months into 11 month mission for cardiac dysrhythmia

Medical events in Russian Space Program

- Events not resulting in mission termination or early return
  - Spacecraft fires - 1971, 1977, 1988, 1997
  - Kidney stone - 1982
  - Hypothermia during EVA - 1985
  - Psychological stress reaction - 1988
  - Spacecraft depressurization -1997
  - Toxic atmosphere - 1997

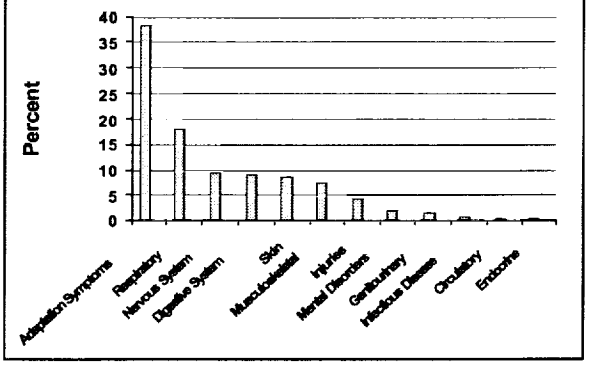
Medical events in U.S. Space Program

- Events not resulting in mission termination or early return
  - Apollo 8 crew – 1st Americans to report SMS
  - Apollo 9 - SMS caused EVA to be rescheduled (1st timeline change due to medical cause)
  - Apollo 11 – Type 1 DCS in command module pilot
  - Apollo 13 – Kidney infection during mission
  - Apollo 15 – Cardiac disrhythmia (PVC, PAC, bigeminy) during lunar EVA
  - Apollo Soyuz Test Project – Nitrogen Tetroxide chemical pneumonitis on reentry

Medical symptoms in U.S. Space Program

- Shuttle program (89 missions) 1981-1998
- 508 crew (439 men, 69 women)
- 4443 flight days
  - 79% reported Space Motion Sickness
  - 98% reported some medical symptom
    - 67% reported headache
    - 64% reported respiratory complaints
    - 59% reported facial fullness
    - 32% reported gastrointestinal complaints
    - 26% reported musculoskeletal complaints

Medical Symptoms on Space Shuttle Mission



Summary of medical events Russian space flight experience

Mission	Launch date	Crew	Duration	Remarks
Soyuz	Sept. 27, 1983	Titov Strekalov		Explosion 90 sec before launch, LES activated, 17G, unharmed
Soyuz TM2 – MIR	Feb. 6,1987	Romanenko Laveikin	326d 11h 174d 2h	Laveikin returned early following cardiac dysrhythmia
Soyuz TM10 - MIR	August 1,1990	Manakov Strekalov	130d 36 min	Crewmember exhibited URI, EVA delayed until recovery

Adapted from: Nicogossian, A.E., C.L. Huntoon and S. Pool. Space Physiology and Medicine. 1994

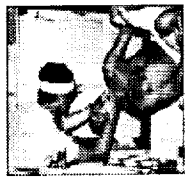
Summary of medical events Russian space flight experience

Mission	Launch date	Crew	Duration	Remarks
Soyuz 18 Salyut 4	May 24,1975	Klimuk Sevatsyanov	63d 23 hrs 31 min.	First use of oral saline as countermeasure for PFOI
Soyuz 21 Salyut 5	July 6, 1976	Volynov Zholobov	49d 6h 24 min.	Early return of crew due to crewmember headaches
Soyuz 26 Salyut 6	Dec 9, 1977	Romanenko Grechko	96d 9h 59 min.	Significant CV deconditioning postflight due to poor compliance with countermeasures
Soyuz 32 Salyut 76	Feb 25, 1979	Lyakhov Ryumin	175d 36min	Recurrent vestibular symptoms on orbit and postflight
Soyuz T4 Salyut 6	Mar 12, 1981	Kovalenok Savinykh	74d 18hr 38 min.	Significant postflight vestibular disturbances
Soyuz T5 Salyut 7	May 13,1982	Berezovoy Lebedev	211d 8hr 25 min.	Reported renal colic possible urolithiasis, no mission impact

Summary of medical events Russian space flight experience

Mission	Launch date	Crew	Duration	Remarks
Vostok 1	April 12,1961	Gagarin	1hr 48min.	First human space flight
Vostok 2	July 21,1961	Titov	1d 1hr 18min.	First reports of space motion sickness
Voskhod 2	March 18, 1965	Belyayev Leonov	1d 2 hrs 2 min.	First EVA visor fogging
Soyuz 1	April 23,1967	Komarov	1d 45 min.	Parachute system failed first space flight casualty
Soyuz 11-Salyut 1	June 6, 1971	Dobrovolskiy Volkov Patsayev	23d 18hrs 2 min.	First space station; reentry sudden depressurization caused death of crew members
Soyuz-18a	April 5, 1975	Lazarev Makarov	21 min.	Mission to Salyut-4 aborted, third stage failure on launch Crew experiences minor injuries from up to 20 G

Clinical Health Monitoring



- Astronaut selection
- Annual physical exams
- Pre-flight screening and certification
- In-flight monitoring
- Hazard exposure monitoring
- Clinical/ science investigations
- Post-flight evaluations
- Longitudinal (career) studies

Utilization of Clinical Monitoring

- Medical screening and certification
- Medical diagnosis and treatment of individuals / health maintenance
- Establishing crew member baseline values
- Defining population norms
- Validating countermeasures and clinical protocols
- Performing risk analysis
  - Updating medical standards
  - Refining likelihood ratios
  - Setting medical requirements
  - Defining medical resource needs

Inflight Care Emergent Crew Return

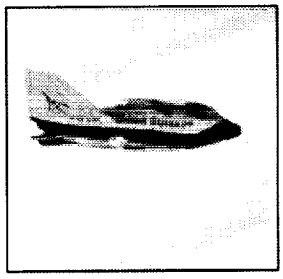
Worst case - complete program interruption

Cost of incapacitation of single crew-member causing an ISS increment to be terminated could be over $500 M in total program costs (utilization of crew return capability, additional Shuttle flights, disruption/ cancellation of science program elements, re-programming of ground processing)

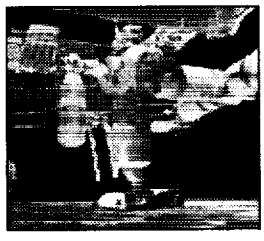
Mid-level scenario - major program disruption

Cost of one or more crew members unable to fulfill mission assignments (e.g., 25% reduction in 2 crewmembers) could cost the program between $25 to $50 M - reduced science production and the overall re-scheduling in future increments to make up the deficit

Stabilization and Evacuation



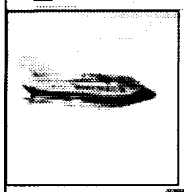
Crew Return Vehicle (CRV)



Crew Return Vehicle

- Contingency Evacuation
  - ISS Life Support System Failure
    - 4 to 7 deconditioned crew members
  - Medical Event
    - one incapacitated crew member
    - transport to a Definitive Medical Care Facility in 24 hours

Off Nominal Crew Return



- Contingency Evacuation
  - ISS Life Support System Failure
    - 3 to 7 deconditioned crew members
  - Medical Event
    - one Incapacitated crew member
    - transport to a Definitive Medical Care Facility in 24 hours

Risk Mitigation and Definition

- Probability of occurrence of an undesired event within a stated period of time
- Resulting severity of harm, or illness/ disorder
- Uncertainties associated with probability and severity
- Cumulative effects of exposures

Consequences of Medical Events

- General Crew Health
  - Difficult readaptation to 1g environment
  - Prolonged periods between flight readiness for individual crewmembers
  - Acute or long-term health consequences
- Crew operational impact
  - Loss of productive time
  - Illness
  - Injury
  - Death
- Mission Impact
  - Postponement
  - Interruption
  - Loss of mission objective(s)
  - Failure
- Program Impact
  - Program disruption/stand-down
  - Loss of program objectives
  - Decreased program effectiveness

Risk Mitigation Matrix

Risk Mitigation requires **predicting**, **preventing**, **monitoring** and **responding** to these risk areas.

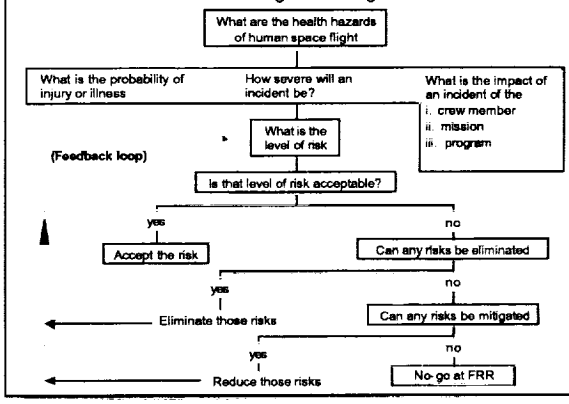
Current Overview of Status

	Predict	Prevent	Monitor	Respond
Behavioral Health	Poor	Fair	Cognition: Good Mood: Poor	Fair
Adaptation	Fair	Fair	Poor	Good
Human Systems	Poor	Poor	Workload: Fair Habitability: Poor	Poor
Sleep and Circadian	Poor	Fair	Poor	Good

Medical Risk Management

Space Flight Issues
- Training mishaps and prevention
- Osteoporosis
- Hearing conservation
- Radiation exposure and cancer risk
- Back pain
- Kidney stones
- Post-flight orthostasis
- Space motion sickness
- Risk of in-flight illness
- Post-landing neurovestibular issues
- In-flight psychological issues
- Risk of Decompression sickness
- Clinical protocols for CPR, ACLS, ATLS, surgical care, dental care, ultrasound imaging, physical examination

Risk Management Logic

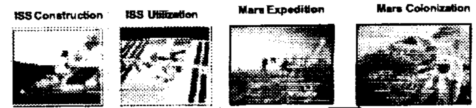


Clinical Confidence Rating Matrix
Strength of Evidence for clinical strategy

STRENGTH OF EVIDENCE/ PROGRAM	1 Technology Unknown Protocol Does Not Exist	1-2	2 Technology Untested Protocol Theoretical	2-3	3 Technology Tested Protocol Accepted	3-4	4 Technology Proven Protocol Verified
SHUTTLE			Culture and sensitivity Resistive exercise		ATLS ACLS Chest tube Restraint system Dental treatment Medical transport capability Hyperbaric Treatment	Laceration closure Burns Toxic exposure Minor surgery Physical exam	Skin trauma Urinary obstruction Nasal bleed CPR Basic laboratory
STATION			Dental prophylaxis X-ray Trauma and Diagnostic endoscopy Tympanometry Medical informatics	Hyperbaric treatment Conscious anesthesia Infectious disease Fracture Treatment	Altitude Treats Telemedicine Suction Automated ventilation Ultrasound Minor surgery Calculus management Appendicitis Gyn dysfunction Abscess Foreign body removal		Basic diagnostics PFT's Basic microbiology Foley catheter Metabolic balance
MARS	Dust management Therapeutic endoscopy	Preparation of public for risk Medical abort criteria Rehabilitation Definitive diagnostics	Inhalation injury Palliative care Bio-isolation Blood substitutes Resource recycling CT/ tomography In-flight rehabilitation Major surgery	Acute diagnostics Rx for chronic disease ABG TPN Sterile Water Thrombolytics Revascularization Amputation Spinal cord injury Appendicitis Closed head injury Abdominal/thoracic Trauma Extremity crush	Advanced ventilator OD Pregnancy Hemostatic capability Glaucoma	Hypothermia	Basic diagnostics

Space Medicine Vision

	ISS Construction	ISS Utilization	Mars Expedition	Mars Colonization



	ISS Construction	ISS Utilization	Mars Expedition	Mars Colonization
Characteristics	3 crewmembers medical return via STS, Soyuz	3-7 crewmembers medical return via STS, Soyuz, or X-38	4-6 crewmembers no medical return daily EVA	12-20 crewmembers medical return impossible
Mission Risk	Moderate	Low to Moderate	High	High
Medical Capability	Outpost	Outpost + Hyperbarics	Outpost + Hyperbarics	Colony
Medical Care Provider(s)	2 astronaut CMOs	2 CMO astronauts - may include physician with clinical proficiency	Clinically trained physician astronaut paramedic level CMO(s)	MD(s) nurse(s) paramedic-level CMO(s)

Medical Risks in Space

CLASS I
- **Mild symptomatology**
- **Minimal effect on performance**
- **Not life threatening**

MISSION IMPACT: Minimal

CLASS II
- **Moderate to severe symptomatology**
- **Significant effect on performance**
- **Potentially life threatening**

MISSION IMPACT: Requires significant inflight capability to prevent mission termination and crew return where appropriate

CLASS III
- **Immediate severe symptomatology**
- **Acutely life threatening - possibly sudden death**
- **Requires immediate resuscitation capability**

MISSION IMPACT: Requires significant inflight capability for resuscitation and assured crew return to definitive care facility

Medical Risks in Space

CLASS I
- Mild symptomatology
- Minimal effect on performance
- Not life threatening

EXAMPLES
- URI
- Small Laceration
- Headache
- SAS/ SMS

MISSION IMPACT: Minimal

Medical Risks in Space

CLASS II
- **Moderate to severe symptomatology**
- **Significant effect on performance**
- **Potentially life threatening**

EXAMPLES
- **DCS**
- **Abscess formation**
- **Nephrolithiasis**
- **Cardiac dysrhythmia**
- **Appendicitis**
- **Sinusitis**
- **Ulcers/ GI Bleed**
- **Trauma**

MISSION IMPACT: Requires significant inflight capability to prevent mission termination and crew return where appropriate

Medical Risks in Space

CLASS III
- **Immediate severe symptomatology**
- **Acutely life threatening - possibly sudden death**
- **Requires immediate resuscitation capability**

EXAMPLES
- **DCS, arterial gas embolus**
- **Anaphylactic shock**
- **Cardiac dysrhythmia**
- **Hypovolemic shock**
- **Electrocution**
- **Dysbaric**
- **Septic Shock**
- **Trauma**

MISSION IMPACT: Requires significant inflight capability for resuscitation and assured crew return to definitive care facility

Medical Risk Analysis

Probability of Occurrence	Minor	Severe
High	Class 1	Class 2
Low		Class 3

Severity of Illness/ Injury

Clinical Problems

- Expected illnesses and ambulatory medical problems
  - Orthopedic and musculoskeletal problems
  - Infectious, hematological, and immune-related diseases
  - Dermatological, ophthalmologic, and ENT problems
- Acute medical emergencies in space
  - Wounds, lacerations, and burns
  - Toxic exposure and acute anaphylaxis
  - Acute radiation illness
  - Dental emergencies
  - Ophthalmologic emergencies
  - Psychiatric emergencies
- Chronic diseases
  - Radiation induced problems
  - Responses to dust exposure
  - Presentation or acute manifestation of nascent illness

Medical Support for Space Operations

- Focus on prevention of illness and injury
- Can support common medical conditions
- Can temporarily support life threatening emergency to some degree
- Crew Surgeon
- Crew Medical Officer (CMO)
- Crew Health Care System (CHeCS)
  - Health Maintenance, Countermeasures, and Environmental Health systems

Crew Health Care System

- Health Maintenance System (HMS)
  - In-flight preventive, diagnostic, and therapeutic medical care
  - Patient stabilization and transport for serious medical situations
- Environmental Health System (EHS)
  - Monitor microbial contamination, atmosphere, water, and radiation
- Countermeasures System (CMS)
  - Partially counteract the physiological effects of microgravity

Health Maintenance

- Prevention and countermeasures
- Physical and behavioral health
- "Ambulatory" care clinic
  - minor illness
  - minor injury

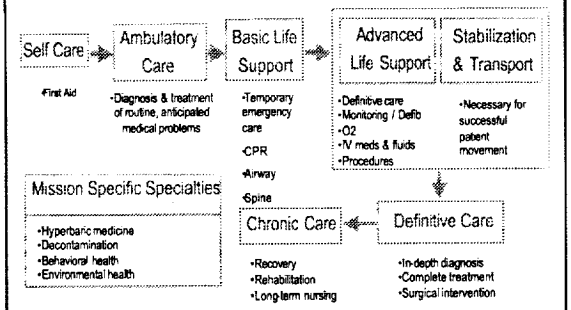
Current ISS planning: not designed for on-orbit care and rehabilitation from major illness or injury

- Resuscitation

Clinical Care Requirements

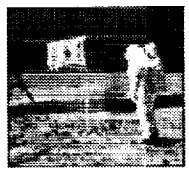
- Medical care required to be available to all crew members
  - capability to treat injury and illness and to return a crew member/ patient to health
- Components include:
  - Airway management
  - Anesthesia,
  - Blood/ blood product replacement
  - Central supply
  - Consultation
  - Dental care
  - Fluid therapy
  - Fluid containment
  - Hyperbaric treatment
  - Imaging diagnostics
  - Informatics
  - Laboratory diagnostics
  - Minor treatment
  - Morgue
  - Patient restraint and support surface
  - Pharmacy
  - Physical exam diagnostics
  - Physiologic monitoring
  - Rescue/ resuscitation/ stabilization
  - Safe haven
  - Surgery
  - Telemedicine
  - Training and simulation
  - Transport
  - Ventilatory support
  - Waste management

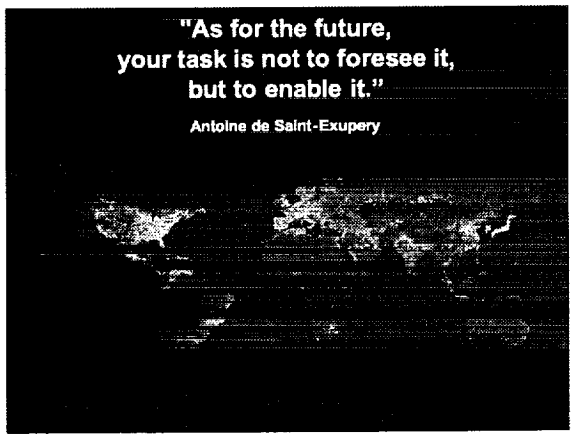
Functional Approach for Mission Scenario Options



Summary

- Space Medicine Program risk management strategy, longitudinal study of astronaut health, and critical path roadmap can be effective tools in providing foundation for practice of evidence based medicine in support of space flight.
- Fully able to:
  - define the problem (given time and resources)
  - track down information sources
  - critically appraise information (intramural experts, IPT's, NSBRI, clinical and academic consultants)
  - apply the information on behalf of patients (within program constraints)
  - evaluate effectiveness (clinical and scientific monitoring)
  - respond to forces of change





Advanced Power and Propulsion: Insuring Human Survival and Productivity in Deep Space Missions

Franklin R. Chang-Diaz, Ph. D.
Astronaut
Advanced Space Propulsion Laboratory
NASA Johnson Space Center

Dr. Chang-Diaz gave an intriguing presentation of his research in advanced rocket propulsion and its relevance for planning and executing crewed deep space explorations. Though not necessarily exclusively Martian, his thrust looks critically at future Mars missions. Initially Dr. Chang-Diaz showed the time constraints of Mars missions due to orbital mechanics and our present chemically powered rocket technology. Since essentially all the energy required to place current generation spacecraft into a Martian trajectory must be expended in the early minutes of a flight, most of such a mission is spent in free-fall drift, captive to the gravitational forces among Earth, the Sun, and Mars. The simple physics of such chemically powered missions requires nearly a year in transit for each direction of a Mars mission. And the optimal orientations of Earth and Mars for rendezvous require further time on or around Mars to await return.

These extensions of mission duration place any crew under a three-fold jeopardy: physiological deconditioning (which in some aspects is still unknown and unpreventable), psychological stress, and ionizing radiation. This latter risk is due to exposure of crew members for extended time to the highly unpredictable and potentially lethal radiations of open space. Any gains in shortening mission duration would reap equivalent or greater benefits for these crew concerns.

Dr. Chang-Diaz has applied his training and expertise (Ph. D. from Massachusetts Institute of Technology in applied plasma physics) toward development of continuous rocket propulsion which would offer great time advantages in travel, and also more launch options than are now available. He clearly explained the enormous gains from a relatively low thrust accelerative force applied essentially continuously versus the high, but short-lived propulsion of present chemical rockets. In fact, such space craft could be powered throughout the mission—accelerating to approximately the mid point and decelerating during the latter half. This would not only provide some level of gravity (acceleration) throughout the mission but also allow very high velocities to be achieved, thus saving many months of travel time.

In proposing the design of such a space craft propulsion system, Dr. Chang Diaz was quick to acknowledge the need for a large power source—which undoubtedly must be nuclear fueled at the solar distances involved. He calls his system the Variable Specific Impulse Magnetoplasma Rocket (VASIMR). The other major ingredient is a mass (deuterium, which could also function as a radiation shield for crews) for energizing into the ultra hot, high velocity exhaust plasma. He foresees models now functional in the laboratory soon to be tested in space. In fact, some of these concepts have already been tried there. His optimism and determination would have operational rockets in the next decades.

Editors' Note: Summary provided by Dr. G. Wyckliffe Hoffler.

Emotional/Mental Challenges Pre-, In-, and Post-flight

Janice Voss, Ph. D.
Astronaut
NASA Johnson Space Center

Dr. Voss has flown aboard the Space Shuttle five times. She knows well her inner concerns, emotions, and mental challenges attending such highly demanding and risky adventures. And she has shared those ideas with her colleagues. She notes that their busy training schedules and fully committed on orbit time allow little time for dwelling on most of these issues. However, they are nonetheless real and may not be ignored with impunity. She thinks that perhaps they are more striking for rookie space farers, but all spacecrew members share them and can profit by assuring proper support and unique solutions for their own specific situation—which could vary with the mission.

In her own experience, she found notable benefit from sharing with close members of her family, both before flight and during. The latter has proved of great value to all crew persons in the form of their personal ground contact time with family and friends. In addition, how one arranges and what one provides in the on board personal space and time goes far toward keeping a confident and upbeat view of the big picture. The type and amount of off duty diversions (e.g., music, reading material) are important, as are how one participates in group time. And it is universally agreed that viewing time at the spacecraft windows offers great joy and calm.

Dr. Voss conjectures that there could be a difference in how people deal with these matters on busy, short-duration (Shuttle type) missions versus those of longer ones, particularly out of low earth orbit, where the options in the advent of mishap are fewer. Her final opinion is one of optimism and assurance that the human person will do well in coping with this new environment.

Editors' Note: Summary provided by Dr. G. Wyckliffe Hoffler.

Johnson Space Center Tour

Dawn Fadner
Environmental Health Laboratory Supervisor/Director
NASA Johnson Space Center

Approximately 60 attendees of the OHP conference were guests of the Johnson Space Center for one day during the conference. Established as the Manned Spacecraft Center in 1961, the Lyndon B. Johnson Space Center (JSC) is responsible for the design, development, and operation of human space flight. JSC is the training base and home for the nation's astronauts and site of Mission Control.

The visit to JSC started with breakfast in the newly renovated Gilruth Center Ballroom. The Gilruth Center, named for the late Center Director, Robert Gilruth, houses meeting facilities and all physical fitness programs at JSC including a weight/exercise room and basketball courts. At the Gilruth, two guest speakers from the JSC Astronaut Office presented individual talks to the group. Astronaut, Dr. Franklin Chang-Diaz, spoke on the topic of Reducing Occupational Exposures in Space Travel, and Dr. Janice Voss spoke on the topic of Emotional/Mental Challenges Pre, In and Post-Flight. Tour guests then had the opportunity to speak to the Astronauts, ask questions, acquire autographs and take pictures.

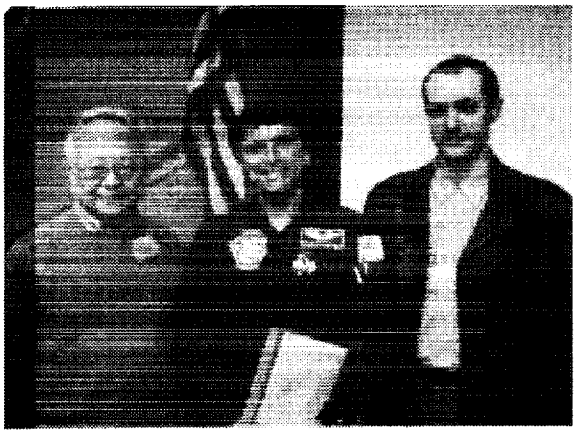
The visit continued with lunch in the JSC Cafeteria. The cafeteria has a large gift shop with a variety of souvenirs and tour attendees were able to purchase items of their choice. After lunch, the group boarded buses for an afternoon tour of JSC that included visits to three onsite buildings and the Sonny Carter Training Facility, located about eight miles from JSC.

The actual tour began with a visit to Building 9 and a view of the Space Shuttle Trainers and International Space Station (ISS) Trainers. An engineer closely linked to the ISS project gave a lengthy presentation on the current status of the project as well as interesting facts. The ISS is the largest and most complex international scientific project in history. The station is in orbit with an altitude of 250 statute miles with an inclination of 51.6 degrees. This orbit provides excellent Earth observations with coverage of 85 percent of the globe. The two-module complex now in orbit has a mass of more than 74,000 pounds and measures 76 feet long with a 78-foot wingspan tip to tip. The international partners, Canada, Japan, the European Space Agency, and Russia, will contribute key elements to the ISS including laboratories, living quarters, and a robotic arm.

Next stop on the tour was a visit to the Mission Control Center (MCC). Both the National Historic Landmark Mission Control Center and the current modernized MCC were visited. A Flight Controller conducted this part of the tour. Since 1965, the Mission Control Center has been the nerve center for America's manned space program. A team of experienced engineers and technicians monitor systems and activities aboard spacecraft 24 hours a day during missions. During its time, the original MCC was a technological wonder and served the Gemini, Apollo and Space Shuttle programs well, but with the invention of new computer systems, it grew outdated and was decommissioned in 1996. One of the main flight control rooms, the Apollo Mission Control Center, has been designated a national historic landmark.
The tour guests were then escorted through the Lunar Sample Laboratory Facility in Building 31. This building at JSC was constructed in 1979 to provide for permanent storage of the lunar

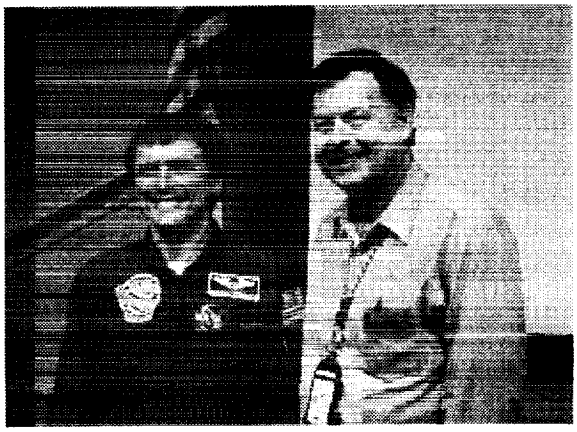
sample collection in a physically secure and non-contaminating environment. The purpose of the Lunar Sample Lab is to maintain the specimens in pristine condition and preserve a priceless national and scientific resource. Between 1969 and 1972, six Apollo missions brought back 382 kilograms (842 pounds) of lunar rocks, core samples, pebbles and sand and dust from the lunar surface. The six space flights returned 2200 separate samples from six different exploration sites on the Moon. They have been processed into more than 97,000 individually catalogued samples. Nearly 1000 samples are distributed each year to approved scientists and educators for research and teaching projects.

The final stop on the tour was the Sonny Carter Training Facility (SCTF) and the Neutral Buoyancy Laboratory (NBL). JSC named this facility in honor of the late astronaut M. L. "Sonny" Carter. Dr. Carter was instrumental in developing many of the current space-walking techniques used by the astronauts. The NBL at the SCTF provides controlled neutral buoyancy operations that simulate the zero-g or weightless condition that is experienced by spacecraft and crew during space flight. This is an essential tool for the design, testing and development of the International Space Station and future NASA programs. For the astronaut, the facility provides important pre-flight training for extravehicular activities as well as the dynamics of body motion under weightless conditions. The NBL was sized to house mockups sufficiently large enough for realistic and meaningful training. It is 202 feet long, 102 feet wide and 40 feet deep (20 feet above ground level and 20 feet below) and holds 6.2 million gallons of water. Even at this size, the Space Station at 350 feet x 240 feet when complete, will not fit inside the NBL. Two overhead bridge cranes and several smaller cranes around the perimeter of the NBL are used to configure mockups for each training session. The water within the NBL is recycled every 19.6 hours. It is automatically monitored and controlled to a temperature of 82-88 degrees F and chemically treated to inhibit contaminant growth and corrosion effects on training mockups and equipment. Video coverage of all training activities is accomplished using hard-mounted and hand held cameras. A full complement of voice communication systems is available. This includes full two-way communications among the suited astronauts, topside trainers, facility test coordinators and the flight control team in JSC's Mission Control Center.



Dr. Chan, Dr. Chang-Diaz, Dr. Popvici

Joyce Eagan, Dr. Chang-Diaz, Dr. Dye, David Thaxton



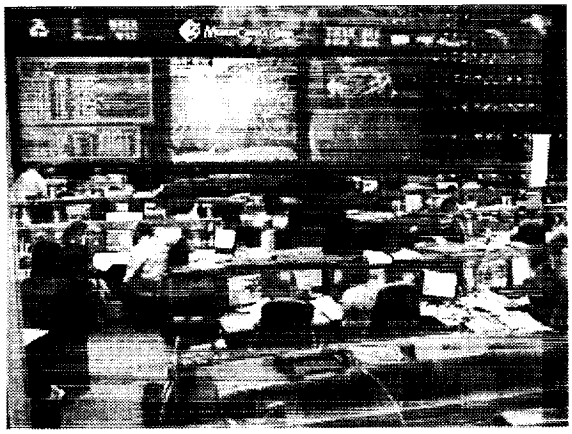
Dr. Chang-Diaz and Randy Scott

Dr. Janice Voss and Sharmila DeMello-Zieschang

Dr. Janice Voss and Dr. Fatima Phillips

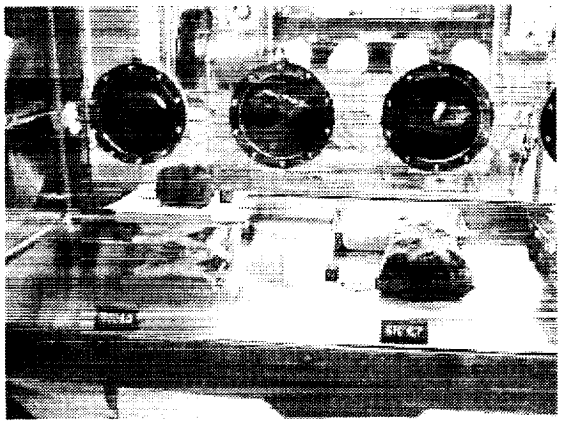
The Bionetics Conference Team and Dr. Janice Voss

Conference attendees waiting patiently to enter Neutral Bouyancy Facility.



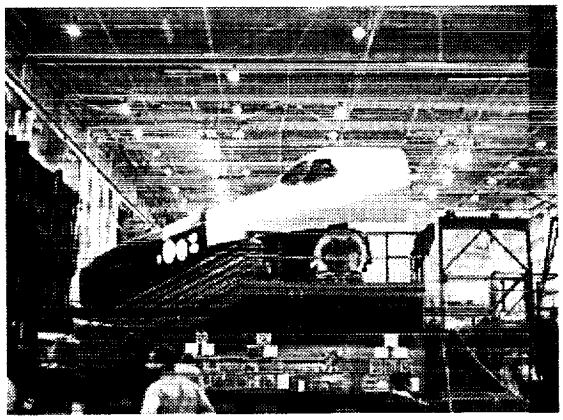
Mission Control

Surgeons Console at Mission Control.

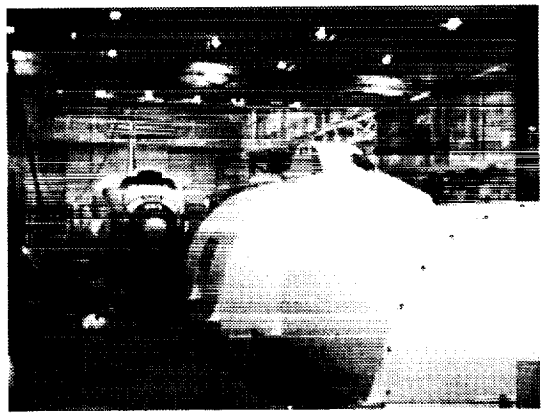


Moon rocks at the Lunar Sample Laboratory Facility in Building 31.

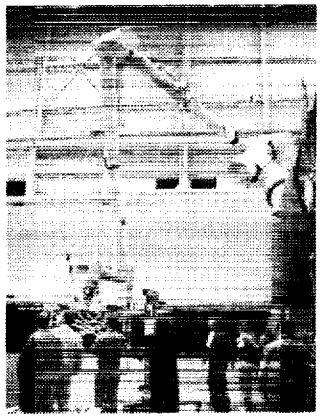
Close up of a moon rock at the Lunar Sample Laboratory Facility.



Space Shuttle mock up at Building 9.

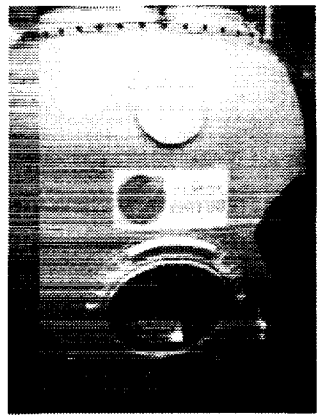


View of the Space Shuttle and International Space Station Trainers .

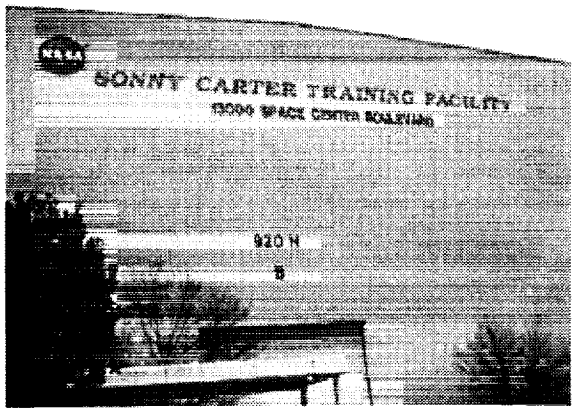


Robotic Arm Trainer

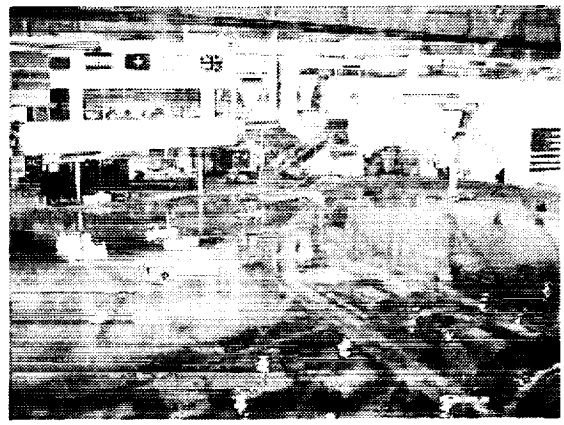
Soyuz Simulator



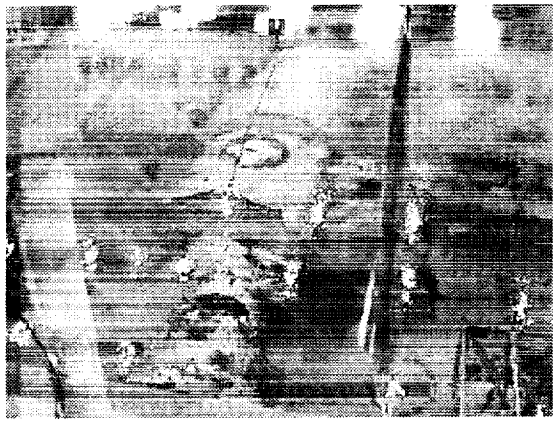
Close up of Soyuz



Sonny Carter Training Facility



Inside the Sonny Carter Training Facility.

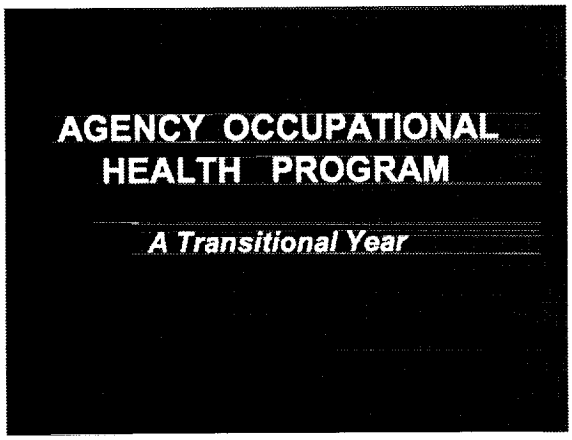


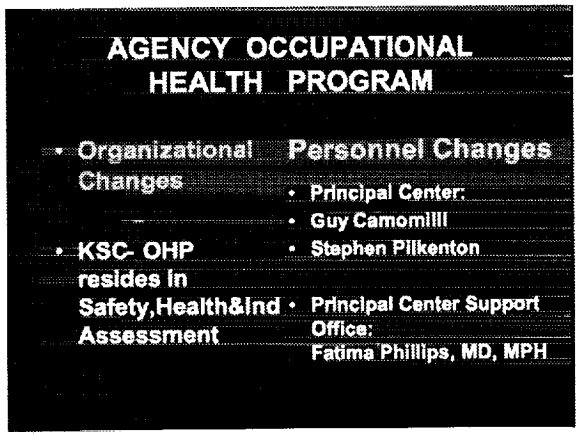
Mock ISS module inside the Sonny Carter Test Facility.

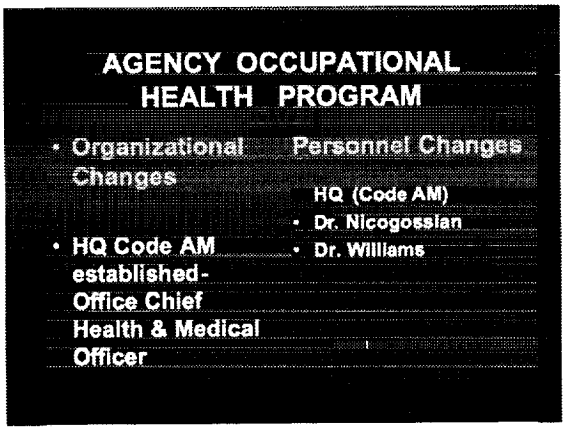
Scuba diver working on the ISS module.

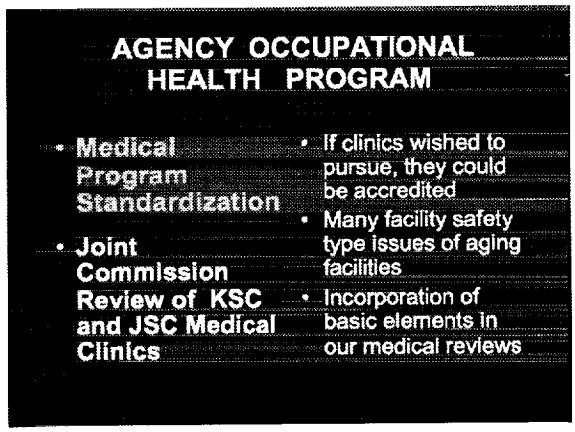
Contracting Officer Technical Representative Briefing

Alan Gettleman, MBA
Program Analyst, NASA Occupational Health Program
Principal Center, Kennedy Space Center









AGENCY OCCUPATIONAL HEALTH PROGRAM

- Medical Program Standardization
  - Credentialing & Privileging
  - Environment of Care
  - Medication Management
  - Infectious Control

AGENCY OCCUPATIONAL HEALTH PROGRAM

- Programmatic Status
  - Government Performance Review Act (GPRA) 25% Improvement in Health Availability
  - Cost & Staffing remains constant
  - Assist with VPP
  - Solar Safe Programs Technology and Awareness Conference

AGENCY OCCUPATIONAL HEALTH PROGRAM

- Policies, Standards and Guides and Resources
  - SOS Contract NASA FAR Clause
  - FDA Agreement
  - TOMES database renewal

AGENCY OCCUPATIONAL HEALTH PROGRAM

- Policies, Standards and Guides and Resources
  - Training Resources
  - KSC EAP
  - MSFC Solar Safe
  - Rekus Confined Space
  - Lead Based Paint Course
  - ACLS Distance Learning

AGENCY OCCUPATIONAL HEALTH PROGRAM

- Policies, Standards and Guides
  - NPG Handbook
  - Physical Std.
  - Workers' Comp.
  - Hearing Conservation
  - Travel Medicine

AGENCY OCCUPATIONAL HEALTH PROGRAM

- Industrial Hygiene and Radiological Health
  - OSHA Ergonomics Standard – policy / poster
  - Health Physics meeting
  - Regular VITS
  - USF Videobroadcasts
  - AIHA Breakout (June 2001)

AGENCY OCCUPATIONAL HEALTH PROGRAM

- Federal Workers' Compensation Program
  - Federal Worker 2000 Number of Injuries (1998)
  - Timeliness of Reporting (1999)
  - Lost Case Rate (2000)
  - Costs Up dramatically in 2001
  - Two additional fatality claims (one new)
  - Review of Cases (KSC/ MSFC)
  - Nurse Case Manager Assists

AGENCY OCCUPATIONAL HEALTH PROGRAM

- Assessment Schedule
  - NASA HQ (Jan 2001)
  - MSFC (April 2001)
  - Goddard/Wallops (May 2001)
  - JPL/DFRC (June 2001)
  - JSC (July 2001)

AGENCY OCCUPATIONAL HEALTH PROGRAM

- Assessment Schedule
  - FY 2002
  - KSC (Fall 2001)
  - ARC (Fall 2001)
  - In CY 2002
  - GRC
  - LaRC
  - Stennis
  - MAF
  - WSTF
  - NASA HQ

AGENCY OCCUPATIONAL HEALTH PROGRAM

- Assessment Methodology
  - Occupational Medicine/Preventive Health
  - Industrial Hygiene/ Radiological Health
  - Employee Assistance Program (EAP)
  - Workers' Compensation
  - Fitness
  - Nutrition
  - Medical Emergency Response

AGENCY OCCUPATIONAL HEALTH PROGRAM

- Nursing/ Wellness Committee
  - Quarterly VITS involving all centers
  - Quarterly areas of health promotion Flu, Solar Safe, Nutrition, [redacted]
  - Continuing Education hours

AGENCY OCCUPATIONAL HEALTH PROGRAM

- Employee Assistance Program
  - New Initiatives Administrator-
  - CD's ltr on EAP
  - Web resources Managing Harmful Stress
  - After Hours EAP
  - Outside Resources
  - NIAT
  - Discipline Specific VITS

AGENCY OCCUPATIONAL HEALTH PROGRAM

- Upcoming Events
  - 2001:
  - AIHA (New Orleans June)
  - Fed. Work. Comp. Conference (Chicago August)
  - EAPA Conference (Vancouver, October)

AGENCY OCCUPATIONAL HEALTH PROGRAM

- Upcoming Events
  - 2002:
  - Combined Safety/Health Mgrs Meeting, Cocoa Beach, FL Feb ?
  - Agency Occupational Health Conference Washington, DC in June HEALTH SCIENCES & THE GOVERNMENT

AGENCY OCCUPATIONAL HEALTH PROGRAM

- Health People 2010
  - Best Practices in Government sector
  - Health initiatives
  - Long term focused
  - Follow-on to Healthy People 2000

AGENCY OCCUPATIONAL HEALTH PROGRAM

- Where we are going . . .
  - Recognition of employee health as a core Agency value
  - Database development
  - Standard contract Statements of Work

AGENCY OCCUPATIONAL HEALTH PROGRAM

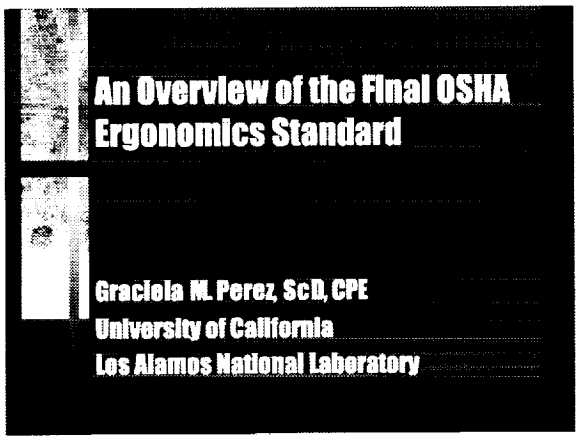
- Where we are going . . .
  - Medical Quality Assurance
  - EAP std. Assessment methodology
  - Interactive web page
  - Stress Management

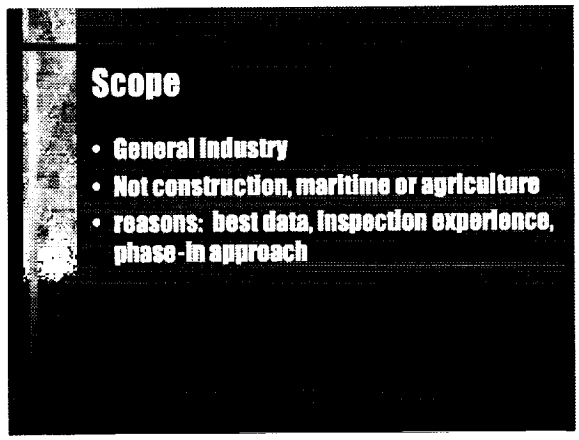
AGENCY OCCUPATIONAL HEALTH PROGRAM

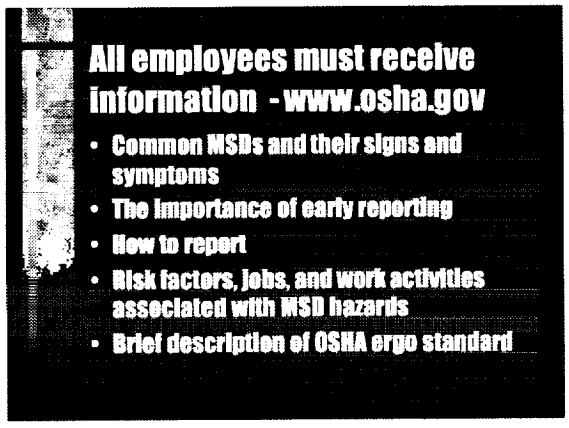
- Where we are going . . .
- WEB PAGE
  - CALENDAR
  - REGS AND POLICIES
  - TRAINING RESOURCES
  - WEBSITE LINKS TO : GOVERNMENT/ PRIVATE SITES
  - WIRING DIAGRAMS AM & PC
  - PHOTO GALLERY
  - WHAT'S NEW IN OCC HEALTH NASA/GOV/PRIVATE

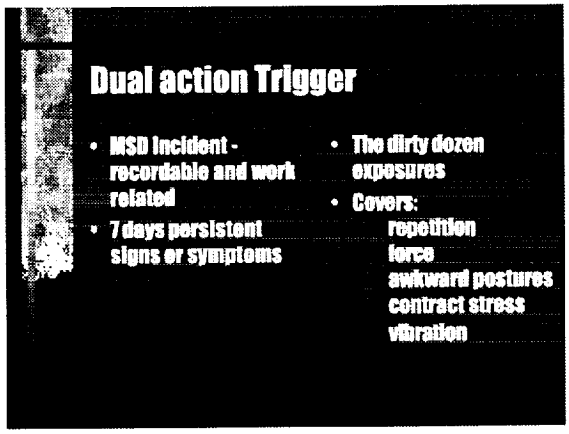
An Overview of the Final OSHA Ergonomics Standard

Graciela, M. Perez, ScD, CPE
University of California
Los Alamos National Laboratory







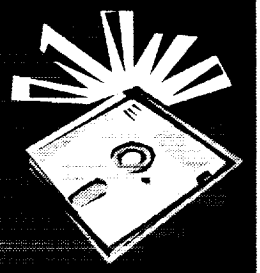


Options

- ***Quick fix***
- Control within 90 days
- Only 1 MSD in that job and no more than 2 in the past 18 mo.

- ***Full program***
- Mgmt. leadership
- Emp. participation
- Job hazard analysis
- Job hazard control
- Training
- MSD management
- Program evaluation

Compliance time line (W-2)



- 7 action trigger/7 Rx
- 30 for ML & EP
- 45 for comm. training
- 60 start analysis
- 90 start controls
- 90 ee/sup/TL training
- 2 yrs - perm controls
- 3 yrs - program eval

The Grandfather Clause 1910.900 (c)

- Implemented before November 14th, 2000
- Written program
- Evaluation before January 15, 2001
- No disincentives
- MSD mgmt by January 18, 2002

How do you Grandfather your program?

- Gap Analysis
- Hire a third party to evaluate/certify
- Document

Current legal hurdles

- Battles in Court (DC)
- New challenges from congress
- State of CA and WA - adapt or adopt?
- OSHA resources

Congressional Review Act

- To be introduced tomorrow or sometime next week - Never used before
- Allows congress to introduce Resolution of Disapproval in house and senate
- Resolution forced to the floor w/o comm.
- 10 hr. debate and no filibuster
- Need simple majority of 51 votes

State Programs

- WA and CA have 90 days to review and comment
- Can adapt or adopt
- WA is proactive and more protective
- CA is more reactive and will need to adapt or adopt

OSHA Resources

- Current gag order on all speeches
- No letters to employers
- No ergo citations
- No directive
- No new courses or outreach materials
- Davis Layne is acting Asst. Sec - Lame duck period for new Asst. Sec. ~ 60 days.

What should we do - pronto?

- Grandfather program
- Good ergonomics means good economics
- Implement a program that makes sense for you

Disclaimer

- The contents of this presentation may not reflect the views of OSHA or the University of California.

Contact Information

Smartwork @lycos.com

NASA Ergonomics Panel

Moderator: Bruce Kelly, CIH, CSP

Panel Members:

William Barry, MD, MPH **Guy Camomili, CSP, CHMM, CHSP**

Jon Mullin, MA, CMSO **Dawn Elliott, PhD**

Statistics show that work-related musculoskeletal disorders (MSD's) are the most prevalent, most expensive and most preventable workplace injuries in the country. Work-related MSDs account for more than one third of all occupational injuries and illnesses that are serious enough to result in days away from work. More than 600,000 employees suffer lost-workday MSDs each year resulting in billions of dollars in workers' compensation costs each year. For these reasons the subject of ergonomics is a very high priority for Occupational Health Professionals particularly in the light of the pending implementation of the OSHA Ergonomics Standard. NASA's OHP leadership believes that the best approach to solving ergonomic issues is through the joint efforts and coordination of a multidisciplinary team.

The introduction of a new OSHA standard brings with it many questions and implementation issues. In an effort to air those common questions and form a consensus on the Agency's approach, a panel of agency representatives was assembled and time was provided to hold an open forum for discussion.

Representing medical on the panel was William S. Barry, MD, MPH, manager of NASA's Occupational Health Program (OHP) based at the Kennedy Space Center (KSC). Dawn Elliott, PhD, a Flight Systems Engineer at KSC represented Human Factors Engineering. Mr. Jon Mullin, MA, CMSO manager of Operational Safety in the Office of Safety and Mission Assurance, Safety and Risk Management Division at NASA Headquarters represented the field of safety. Mr. Guy Camomilli, CSP, CHMM, CHSP, Senior Environmental Health Officer with NASA's OHP at KSC represented the environmental health field. The Panel was moderated by Mr. Bruce Kelly, CIH, CSP with the Bionetics Corporation's Occupational Health Program Support Office at KSC.

Questions ranged from the development of NASA's written policy to issues of procurement and workstation accommodation. The allotted time was filled with lively discussion which, regrettably, had to be ended to keep with the conference schedule.

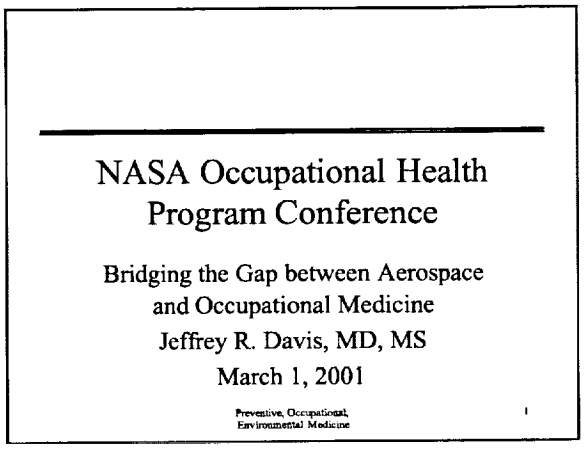
Pictured L to R: Elliott, Barry, Camomilli, Mullin

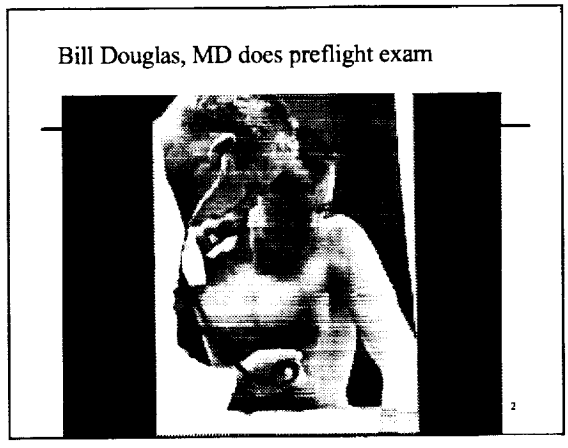
Editors' Note: Summary provided by Bruce Kelly, CIH, CSP

Bridging the Gap between Aerospace and Occupational Medicine

Jeffrey R. Davis, MD, MS
Professor, Preventive Medicine and Community Health
Director, Preventive, Occupational and Environmental Medicine
University of Texas Medical Branch at Galveston

Aerospace Medicine is one of the three specialty areas of Preventive Medicine (aerospace, occupational, and general preventive medicine/public health). Practitioners of aerospace or occupational medicine receive core training in preventive medicine and many receive an MPH degree. Specialists have practiced in both fields over the years due to the similarities in training and practice. Both aerospace and occupational medicine are concerned with maintaining the health of an individual at the worksite, and in the impacts of the work environment on health. Extreme work environments may be encountered in either specialty; aerospace medicine may be distinguished from occupational medicine somewhat by the nature of the extreme environments encountered such as acceleration, low ambient pressure, radiation and fractional gravity. Both fields are concerned with health and productivity, safety, and enhancing performance. This presentation will explore the similar training and practice environments, as well as areas of needed expertise, for the aerospace and occupational medicine practitioner.



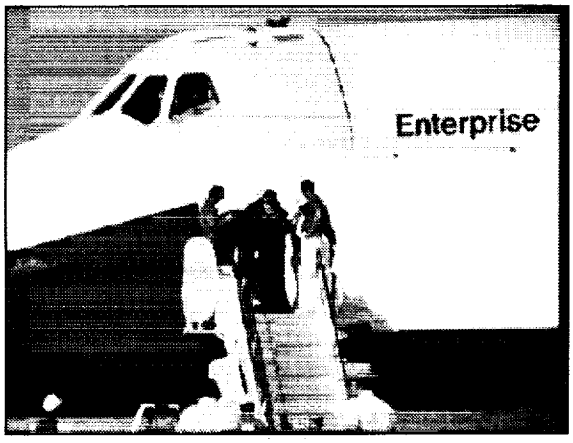


Training

- Residency training in preventive medicine
  - 40 programs (approx) in general preventive medicine and public health
  - 40 programs (approx) in occupational medicine
  - 4 programs in Aerospace Medicine
  - 200 applicants took the Board examination in 2000:
    - 164 Occupational
    - 36 Aerospace

Training

- Program requirements in preventive medicine define the specialties as follows:
  - Occupational medicine focuses on the health of workers including the ability to perform work; the physical, chemical, biological and social environments of the workplace; and the health outcomes of environmental exposures.

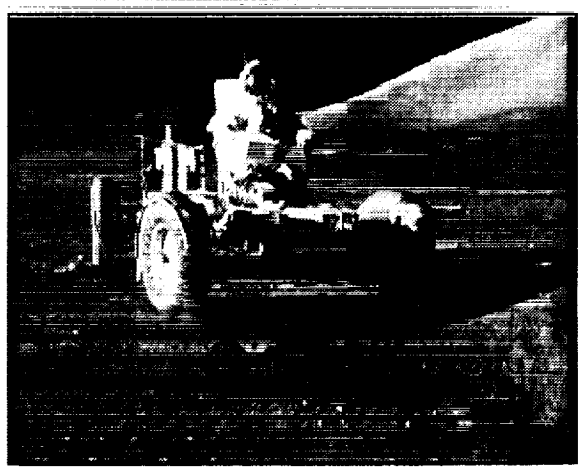


Training

- Program requirements definitions (cont)
  - Aerospace medicine focuses on the health of the operating crews and passengers of air and space vehicles, together with the support personnel who are required to operate such vehicles. Segments of this population often work and live in remote, isolated, and sometimes closed environments under conditions of physical and psychological stress

Training

- Core training leading to an MPH degree
  - Biostatistics
  - Epidemiology
  - Environmental Health
  - Health Services Administration
  - Clinical preventive medicine
  - Environmental health



Training

- Competencies in Preventive Medicine Medicine
  - New program requirements 7/1/2001
  - Core competencies
    - Communication and needs assessment
    - Computer applications
    - Interpretation of laws and regulations
    - Ethical, social and cultural issues
    - Organizational and decision-making processes
    - Management and administration
    - Occupational and environmental health

Training

- Competencies in Occupational Medicine
  - Manage health status in diverse work settings
  - Monitor workforce and surveillance data for prevention of disease; enhance health and productivity
  - Manage worker insurance documentation
  - Recognize outbreaks of public health significance
  - Report clinical and surveillance evaluations

Training

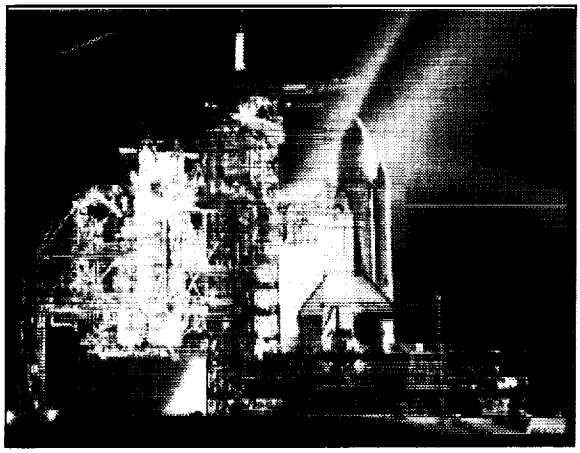
- Competencies in Aerospace Medicine
  - Health status of individuals in aerospace environment; includes operations
  - Promote passenger health, safety and comfort
  - Facilitate care of patients transported in aerospace environment
  - Apply human factors/ergonomic concepts to aerospace environment
  - Interpret, integrate and perform aeromedical research

Training

- Similarities of specialties
  - Health promotion and prevention
  - Medical standards
  - Health surveillance exams
  - Interactive nature of individual health with environmental hazards
  - Newer aspects: health and productivity; optimal human performance

Practice

- Health promotion
  - Education to maintain health of workers
    - Focus programs to high-risk groups
      - Lifestyle risk factors
      - Depression and stress
      - Ergonomics
      - Substance abuse
    - Specific programs based on the work environment



Practice

- Medical standards
  - Standards for safety sensitive and security sensitive jobs
    - Usually concerned with sudden incapacitation and performance
    - Periodic exams to maintain health
    - Outcomes focus on abilities to perform work

Practice

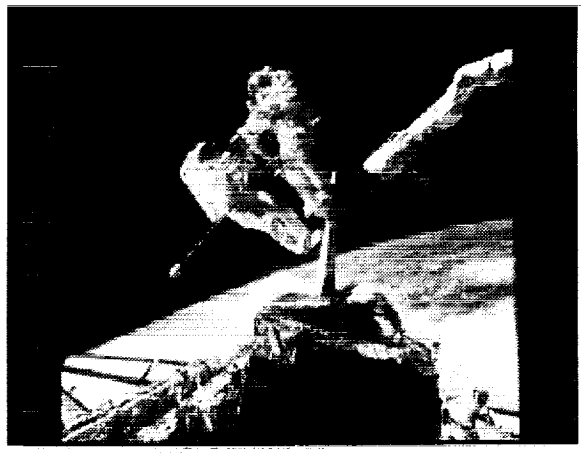
- Screening
  - For risk factors
    - Cardiovascular – blood pressure, cholesterol, ECG/treadmill
    - Pulmonary function
    - Musculoskeletal – ability, range of motion
    - Vision and hearing for some jobs
    - Specific health issues for men and women
      Prostate, breast, colon, lung cancers
    - Focused lab tests as baselines – blood, urine, X-ray

Practice

- Surveillance
  - Noise: hearing conservation programs
  - Specific toxic exposures
  - Dosimetry
  - Repetitive stress injuries
  - Tuberculosis (health care workers)
  - Substance abuse: drug and alcohol screening

Practice

- Hazards of workplace and safety
  - Education
    - Hazardous materials
    - Radiation
    - Thermal stress
    - Fire safety
    - Ergonomics
    - Blood borne pathogens (first responders)
    - Public health – use of AEDs



Practice

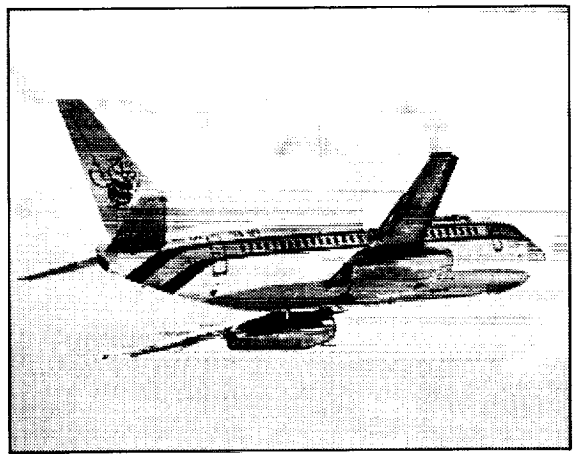
- Medical care and return to work
  - Onsite medical care with trained practitioners
  - Onsite rehabilitation growing in practice
  - Fitness for duty assessments
  - Modified duty programs
  - Employee Assistance Programs
  - Environmental health and safety

Practice

- Human performance
  - Human factors considerations in the workplace
    - Modify worksite to enhance safety and performance
  - Accident investigation
    - Common to both fields for prevention
  - Fatigue and circadian shifting – scheduling to improve performance, safety

Practice

- Policies and programs
  - OSHA
  - DOT
    - FAA
  - DOL
    - Americans with Disabilities Act
  - Best practices – improve health, reduce costs
    - Lifestyle programs and fitness
    - Cancer prevention
    - Injury prevention
    - Stress management

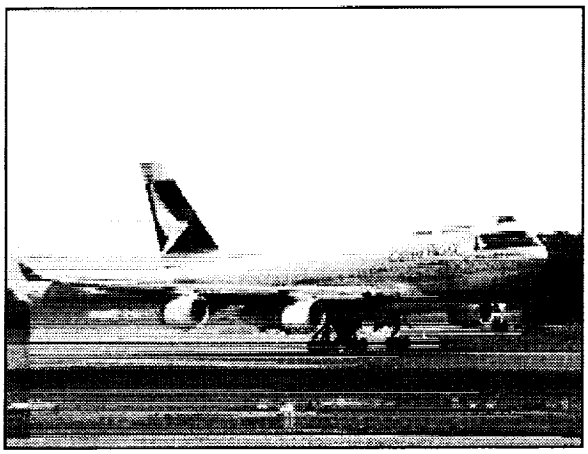


Commercial Aviation

- Health promotion
  - Cardiovascular risk reduction for pilots
  - Carpal tunnel disease prevention for reservation agents
  - Back injury program for ramp workers
  - Breast cancer prevention for entire workforce, but especially flight attendants and office workers

Commercial Aviation

- Medical examinations
  - Pilot standards set by the FAA
    - Special issuance process
  - Other exams for flight attendants, other safety workers often set by the airline



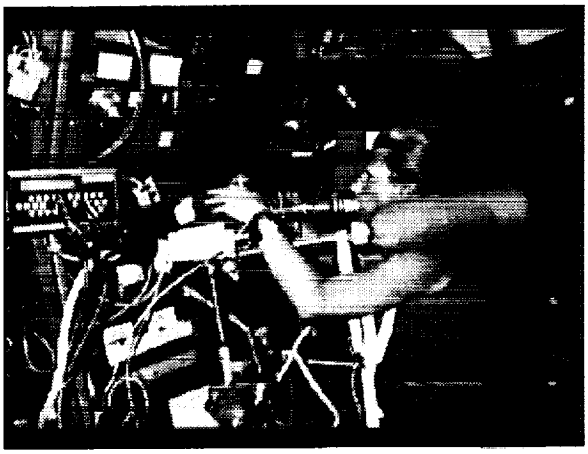
Commercial Aviation

- What is a common special issuance request?
  - Heart disease accounts for over 50% of the causes for loss of medical certificates
  - Special issuance can be granted after a heart attack for example
    - Six month waiting period for recovery
    - If requested in less than 6 months, the FAA will reject the premature application

Commercial Aviation

- Special issuance for a heart attack
  - A letter requesting a special issuance
  - Copies of all medical and hospital records
  - Cardiovascular evaluation - preferably by a cardiologist or internist
    - All original records, tracings, reports and opinions will be required
  - A panel of consultants will render an opinion

- Other FAA special procedures
  - Statement of Demonstrated Ability (SODA) - granted after a medical flight test
    - Does not expire
    - Must be listed on the Form 8500 for a medical examination



Commercial Aviation

- Screenings
  - Required FAA examinations for pilots
  - Noise in workplace; hearing conservation program for many workers
  - Pulmonary for confined space entry
  - Voluntary
    - Lifestyle risk factors
    - mammography

Commercial Aviation

- Surveillance
  - Asbestos
  - Lead
  - Substance abuse - DOT drug and alcohol screening for pilots, flight attendants, mechanics and security screeners

Commercial Aviation

- Hazards of the workplace and safety
  - Ergonomics (ramp, reservations)
  - Radiation (aircrew)
  - Thermal stress
  - Fatigue (aircrew)
  - First responders (blood borne pathogens)

Commercial Aviation

- Medical care and return to work
  - Onsite medical clinics – full service
  - Onsite rehabilitation
  - Moving toward primary care clinics
  - Modified duty programs

Commercial Aviation

- Policies and Programs
  - ADA – company wide programs for accommodations
  - Best practice programs
    - Cancer screening
    - Prenatal care

Future Issues

- Health and Productivity Management
  - Five key elements
    - Turnover
    - Group health
    - Workers' compensation
    - Unscheduled absences
    - Disability

Future Issues

- HPM
  - MEDSTAT benchmarking study 1999
    - 43 organizations participated
    - Average cost of 5 items $9900
    - Opportunity for improvement (to 25th percentile)
      - $2600
    - 50% of improvement opportunity in turnover

Future Issues

- HPM cont
  - Major opportunities in turnover
    - Work-life policies
    - Stress management and depression
  - Group health
    - Disease management

      Asthma - childhood asthma increasing, worker absent for child

      Diabetes

Future issues

- HPM – cont
  - Workers' compensation
    - 24-hour coverage
    - Prevention and safety programs
  - Disability
    - Modified duty programs
    - Accommodations for permanent conditions
  - Unscheduled absences
    - Difficult to get accurate data to manage
    - Affected by company culture, morale

Future issues

- HPM – cont
  - Workers' compensation
    - 24-hour coverage
    - Prevention and safety programs
  - Disability
    - Modified duty programs
    - Accommodations for permanent conditions
  - Unscheduled absences
    - Difficult to get accurate data to manage
    - Affected by company culture, morale

Preventive, Occupational, Environmental Medicine 40

Future Issues

- Optimal human performance
  - Well-being
    - Depression, stress are major reasons for decreased work performance and absence
  - Fatigue and scheduling; flexible scheduling
  - Spirituality issues at work
  - Finding meaningful work experiences

Research

- Corporate Health Research Programs
  - Stanford Corporate Health Program
  - University of Michigan
  - Health Enhancement Research Organization
  - UTMB Corporate Health Consortium
  - All are focused on improving health and productivity at the worksite

Research

- UTMB Corporate Health Consortium (CHC)
  - Initiated 1999 – modeled after the Stanford program
    - Currently 14 corporate, 10 collaborative members
    - Meets twice per year to develop and report on projects
    - Interactive website for project development

Research - members

- Corporate
  - Air Canada
  - Alertness Solutions
  - Chevron
    CIGNA
  - Dupont
    INRTEK
    Johnson & Johnson
    MEDSTAT
    Merck
    Memorial Hermann
  - Pfizer
    Schering-Plough
    Shell Alliance
    St. Luke's
  - Texaco
    United Airlines
- Collaborative
  American Heart Association
  Baylor
  City of Houston
  Houston Business Group on Health
  Houston Business Journal
  NASA
  Stanford
  UT Houston
  - UT Tyler

Research

- UTMB CHC
  - Membership is a blend of several corporations, including airlines
    - Large corporations have the same interest in the health and productivity of their workforce
    - As noted above, many issues are the same and results can be extrapolated to different industries

Research

- UTMB CHC
  - Completed projects
    - "One of a Kind Health Promotion" with the American Heart Association
    - JOBFIT with Johnson & Johnson
    - MEDSTAT benchmark study

Research

- UTMB CHC
  - Ongoing projects
    - Cardiovascular risk reduction with web-based interactive health promotion tool. With Stanford, United Airlines, St. Luke's, Pfizer
    - Prostate screening retrospective analysis of effectiveness – with Baylor, United Airlines
    - Injury reduction – St. Luke's

Research

- UTMB CHC
  - New projects
    - Patient safety study based on assessment of fatigue and performance. Utilize data from aviation experience. Possible participants – Alertness Solutions, Veterans Administration, Georgetown University (CogScreen)
    - Nutrition and performance study

Public Health example

- Automatic External Defibrillators
  - Community-based studies
  - Adopted by major airlines
  - Expanding to Federal Office buildings
  - May further expand into more public locations with lay providers

What Are Those Martians Doing With Our Spacecrafts????

Cynthia D. Cooper, MFT, CADC, CEAP
Employee Assistance Coordinator
Jet Propulsion Laboratory

This presentation looked at how the Jet Propulsion Laboratory (JPL) Employee Assistance Program (EAP) responded to the losses of the 1999 Mars Missions. The challenges and lessons learned will address the following topics: multiple mission losses in an environment that had been impacted by agency downsizing, coordination of efforts with other contracting companies, utilization of multiple communication vehicles, utilization of Critical Incident Stress Management interventions to mitigate stress response and maintain team functioning, collaboration with management, identification of team dynamics, identification and interventions for family members, issues related to the media, and impact on the workforce of the Laboratory.

JPL

An EAP Response to JPL's Losses of the 1999 Mars Missions

Presentation to NASA
Occupational Health Conference
March 1, 2001

JPL

Presentation Objectives

- Explore how Critical Incident Management Techniques for emergency responders can be applied to space mission rescue operations or high performance business missions.
- Discuss how utilization of multiple modes of communication, such as, electronic, telephone conferencing, and in person can assist the EAP to respond to employees at different geographic locations.
- Identify how early intervention and collaboration with management can increase the success of the strategies to mitigate workplace trauma.

2

JPL

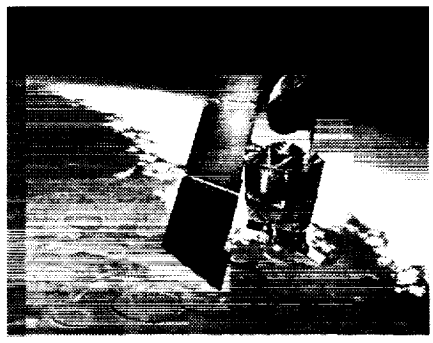
"Ah, but a man's reach should exceed his grasp, Or what's a heaven for?"

Robert Browning

3

JPL

Mars Climate Orbiter



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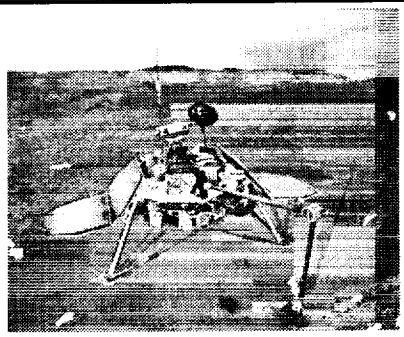
Mars Polar Lander

JPL



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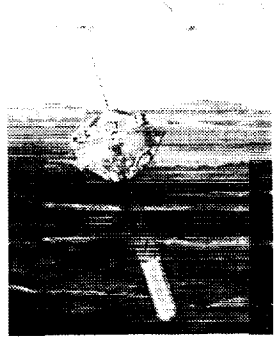
Deep Space 2

JPL



6

Pre-existing Conditions

JPL

- Mars Observer
- Mars Pathfinder
- Mars Surveyor
- Five years of downsizing, outsourcing, and reorganizing

7

Goals of Critical Incident Stress Management

JPL

- Mitigate the psychological impact of a traumatic event
- Prevent the development of post-traumatic syndrome and/or disorder
- Identify individuals who may require professional mental health follow-up

8

Interventions

JPL

Primary Interventions

- Lessen stigma
- Prevent isolation
- Provide professional support

9

Interventions

JPL

Secondary Interventions

- Assessment
- Referral

Preventative Interventions

- "Stress Inoculation"

10

Factors Which Compound Trauma

JPL

- Unusual attention from the news media
- Prolonged and extraordinary expenditures of physical and emotional energy
- Serious repercussion to individual careers, job status

11

Communication to Team Leaders

JPL

- Services provided by EAP
- Tips for managers during intense and compacted work projects
- Symptoms of a distressed employee

12

Tips for Managers During Intense & Compacted Work Projects

JPL

- Rotation
- Cross training
- Post project "letdown"
- Encouragement of wellness
- Critical incident stress debriefing/meeting
- Intervention of distressed employee

13

Communication to Team Members & Their Families

JPL

- EAP and Occupational Health Services
- Self care reminders
- After the landing

14

Communication to Team Members and Families

JPL

- Rest and recovery
- What is "Post-traumatic Stress Reaction"
- Tools for stress for employee and family
- Reactions individuals may experience

15

Feedback

JPL

Response from employees, their families, and management indicated that the EAP interventions were beneficial in the following ways:

- provided a safe, supportive, and confidential service for employees to share their experiences
- provided employees and their families with information and practical tools which assisted in mitigating the impact of the stress
- provided a service in which employees and their families expressed an appreciation that they felt the management of the Laboratory truly cared about their well being
- provided consultation to management and made resources available which benefited the entire JPL community

16

PSYCHOLOGICALLY SPEAKING
with Dr. Jack N. Singer

28 Westcliff • Laguna Niguel, CA 92677
Phone: (949) 481-5660 • Fax: (949) 481-5C
E-mail: funspeaker@home.com
www.funspeaker.com

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Jack N. Singer, Ph.D.
• Licensed Psychologist
• Professional Speaker
• Author
• Consultant & Trainer

RESILIENCY SKILLS FOR THE 21ST CENTURY: HOW TO ADD LIFE TO YOUR YEARS AND YEARS TO YOUR LIFE!

An Exclusive Workshop For The OCCUPATIONAL HEALTH CONFERENCE

NASA

MARCH 1, 2001

Galveston, Texas

DESIGNED AND CONDUCTED BY

JACK N. SINGER, Ph.D.

PSYCHOLOGICALLY SPEAKING
with Dr. Jack Singer

ABOUT YOUR SPEAKER....

Dr. Jack Singer received his doctorate in the dual specialties of Industrial/Organizational and Clinical Psychology and he has been awarded the Diplomate status from the American Academy of Behavioral Medicine. He has taught in the Psychology Departments of seven universities, including the U.S. Air Force Academy.

A member of the National Speakers Association, Jack has spent twenty-five years speaking for and consulting with Fortune 500 companies and professional associations from Miami to Malaysia. His stress management consultations with medical practices and hospitals have been featured in articles across the world and in USA-TODAY.

Jack's research and self-help articles appear in business, medical and human resource journals and periodicals across the USA. He has produced several self-help tapes and he is a featured author in **"The Great Speakers Anthology Series,"** with **"Conquering Your Internal Critic...So You Can Sing Your Own Song".**

A sought after media guest, Jack appears frequently on MSNBC, on FOX SPORTS and on radio and TV talk shows across the U.S. and Canada.

Jack is among the world's leaders in promoting **humor, fun and laughter** as the most effective antidotes to stress and illness and his passion is to inspire, energize and motivate everyone to **practice the FUNdamentals Of success over stress, JEST for the HEALTH of it!**

PSYCHOLOGICALLY SPEAKING
with Dr. Jack Singer

THE IMPACT OF STRESS ON ALL OF US

1. Stress involved in 8 of 10 top causes of death.

2. $270 billion per year in lost productivity, medical bills, and insurance claims.

3. Impact of stress, anxiety and depression in the workplace:

   47% reduced productivity
   40% absenteeism
   40% morale problems
   21% turnover
   50% would not choose same career

4. 35% to 50% of physician visits are "worried well"

5. At least 65% of physician visits are for stress-related symptoms.

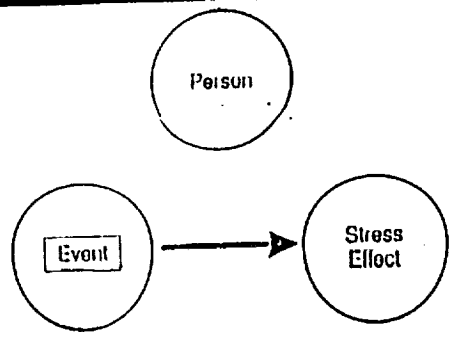
"People are about as happy as they make their minds to be."
Abraham Lincoln

PSYCHOLOGICALLY SPEAKING
with Dr. Jack Singer

Resiliency

Is the Capacity to Spring Back, Rebound, & Successfully Adapt in the Face of Adversity

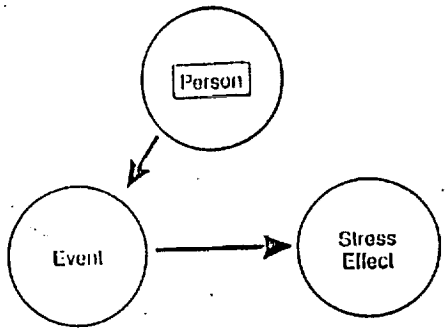
Adapted from *Moving Beyond Risk to Resiliency,* by M. Rirkin and M. Hoopman. Minneapolis: Minneapolis Public Schools, 1991



A Common Perception of Stress

"(People) are disturbed not by things, but by the views which they take of them."
Epictetus

"10% of your stress is caused by what happens to you and 90% by what you say to yourself about it."
Anonymous



A More Useful Perception of Stress

HANDOUT #1

KEEPING YOUR STRESS IN BALANCE

Are you at risk for BURNOUT?

*(The information in this handout is based on the book **The Work Stress Connection** by Robert Veninga and James Spradley.)*

If you smoke cigarettes and have high blood pressure you are more likely to die of a heart attack than someone who doesn't. These are called risk factors. Applying the same method to burnout, we have identified the following five risk factors. See if you are at risk:

1) INDIVIDUAL PERCEPTION OF STRESS. Perception is a funny thing. What one person finds stressful, another person finds stimulating. Some people magnify stress in their own minds. Psychologists call this *awfulizing*. When little things go wrong this person always sees the worst possible scenario.

2) FAMILY STRESS. Stress at home contributes to one's vulnerability to burning out at work. Managers who think that employees leave their personal problems at home are underestimating the power of family stress.

3) ENVIRONMENTAL STRESS. These are the stresses of daily life: inflation, crime, bad weather, a recession, or a traffic jam. To a certain extent we all put up with these stressors every day. But if these stressors pile up, or one particular stress - like the fear of crime - gets out of hand it puts us at greater risk.

4) JOB STRESS. Every business has its seasonal deadlines and its day-to-day pressures. When an important seasonal deadline is added on top of a job that's already brimming with day-to-day stress, watch out, burnout is likely to ensue.

5) INSUFFICIENT STRESS RELEASE ACTIVITIES. Everybody has different ways of blowing off steam. The trouble is, once you start to burn out, stress-release activities like exercise, meditation, reading, vacations, etc., are the first to go. You feel you don't deserve these pleasurable activities, or you *think* you don't have the time.

The presence of one risk factor or all five doesn't necessarily indicate that you are going to experience burn out. But as a general rule, if you have two risk factors you should seek to lower your stress. If you have three or four risk factors, you need to look seriously at changes you can make in both your lifestyle and your job. If you have five risk factors, you should seek professional help.

HANDOUT #6

KEEPING YOUR STRESS IN BALANCE

EARLY WARNING SIGNS OF TOO MUCH STRESS:

Neil S. Hibler, Ph.D has developed this list of early warning signs that will let you know when you are under too much stress:

Emotional signs:

Apathy. The blahs, feelings of sadness, recreation that is no longer pleasurable.
Anxiety. Restlessness, agitation, insecurity, sense of worthlessness.
Irritability. Feeling hypersensitive, defensive, arrogant or argumentative.
Mental fatigue. Feeling preoccupied, having difficulty concentrating, trouble thinking flexibly.
Overcompensation or denial. Grandiosity (exaggerating the importance of your activities to yourself and others), working too hard, denying that you have problems, ignoring symptoms, feeling suspicious.

Behavioral signs:

Avoiding things. Keeping to yourself, avoiding work, having trouble accepting responsibility, neglecting responsibility.
Doing things to extremes. Alcoholism, gambling, spending sprees, sexual promiscuity.
Administrative problems. Being late for work, poor appearance, poor personal hygiene, being accident prone.
Legal problems. Indebtedness, shoplifting, traffic tickets, inability to control violent impulses.

Physical Signs:

Excessive worrying about or denial of illness.
Frequent illness like recurrent colds.
Physical exhaustion.
Over reliance on self-medication, remedies like aspirin, antacids, etc.
Ailments. Headache, insomnia, appetite changes, weight gain or loss, frequent indigestion, nausea, nervous diarrhea, constipation, sexual problems.

Stress-related illness doesn't hit without warning, we simply shut off our alarm system. Typically, people take better care of their cars than they do their own bodies. When a car starts to rattle or shake, you do something about it. The same *should* be true of our bodies. Look and listen for the early warning signs listed above. They could be telling you - you need to make some lifestyle adjustments.

HANDOUT #5

KEEPING YOUR STRESS IN BALANCE

Deskercises

DEEP BREATHING

Believe it or not, if you're like most people, you take about 17,000 breaths per day. And you do it without even giving it a second thought. Yet nothing can lower your stress levels faster or more effectively, than learning to breathe, consciously, from your diaphragm.

To begin, place one hand over your navel. Take a deep breath in. You should feel your hand rise with the air coming in and falling as you breathe out.

This time count slowly to five as you breathe in. Hold the breath in for the count of five and then let the air out to the count of five. (You can increase or decrease this number to suit you. The idea is to comfortably stretch out your normal breathing pattern and to take in more air.)

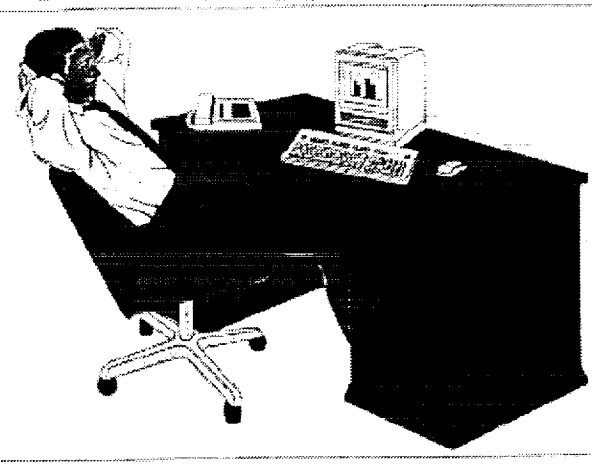
You can use this exercise anytime you feel stressed, in a traffic jam, at your desk at work, or even in a grocery check-out line.

Deskercises

PICTURE YOUR STRESS IN PERSPECTIVE.

Sometimes just a photograph placed on a wall or a desk near where you work can help you keep your stress in perspective. Whether it's a picture of your family or your favorite vacation spot, just looking at it will help you take your mind off your problems.

Most stressful episodes revolve around insignificant annoyances you won't even remember in 24 hours. Your picture will remind you to keep your stress in perspective.



Deskercises

Differential Relaxation

INSTRUCTIONS:

Make a fist with your left hand and tense all the muscles in your left arm, all the way up to your shoulder. You can even tense the left side of your face by lifting one cheek and closing one eye. Clamp your jaw shut tight as you concentrate on tightening all the muscles on the left side of your body.

Now here's the tricky part. Think about relaxing the right side while you simultaneously tense the left. Notice how the tension wants to spread from the left side over to the right. Hold the tension for as long as you comfortably can, and then relax both sides of your body.

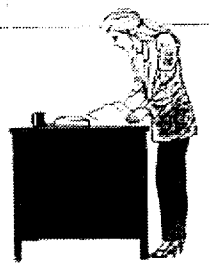
After a short pause, try this exercise again, this time relaxing the left side while you tense the right.

PURPOSE:

The underlying purpose of all relaxation techniques is to foster a sense of awareness between the mind and the body. In this particular exercise, we want you to notice how tension spreads. With a little practice, you can counteract this spread.

CONCLUSION:

Use only the muscles you need to perform a task and relax the rest. Don't let your shoulders tense up, for example, while typing or driving. Let only your fingers and hands do the typing, and let only your hands and arms do the driving. CONSCIOUSLY RELAX THE REST OF YOUR BODY!



PSYCHOLOGICALLY SPEAKING
with Dr. Jack Singer

"Humor will add years to your life and life to your years!"

Anonymous

THE BENEFITS OF FUN AND LAUGHTER

Stimulates the Immune System

- Decreases serum cortisol
- Increases natural killer cells
- Increases number of T cells with helper receptors
- Increases antibodies in saliva which combat upper respiratory infections
- Releases endorphins
- Reduces blood pressure

Stimulates Mental Functioning

- Enhances creativity
- Enhances productivity
- Enhances motivation
- Fosters a positive attitude
- Reduces anger/hostility
- A wonderful antidote for Stress

"Humor is essential to any smoothly functioning system of interaction, to any healthy person, and to any viable group. Humor is, in the last analysis, no joke."

Dr. Gary Fine, University of Minnesota

PSYCHOLOGICALLY SPEAKING
with Dr. Jack Singer

10 WAYS TO LIGHTEN UP YOUR WORKPLACE

1. Show your people how to develop their own "humor survival kits." Visit joke and toy stores for fun contents.

2. Have monthly dress themes (e.g., Superbowl, Schooldays themes) or the ugliest socks day with goofy prizes.

3. Have "fun bulletin boards" in each department. All employees contribute fun cartoons, jokes or funny headlines.

4. Give fun awards and certificates for meaningful recognition and for departmental competition.

5. Have a "Stress Free Zone" in your workplace. (sometimes referred to as a "Whine and Geez Room")

6. Give unpredictable rewards (e.g., tickets to the movies).

7. Keep a joke book near the telephones for hold time.

8. Add fun to your memos and fax covers (see example).

9. Have a positive party funded by negative people.

10. Inject fun and excitement into all of your training!

The most important assets of any organization go home to have dinner at the end of the working day. Humor and fun at work will enhance teamwork, productivity, creativity, and job satisfaction. Everyone and the bottom line will benefit!!

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Physician's Breakout Session

William Barry, MD, MPH
Manager, NASA Occupational Health Program
Principal Center, Kennedy Space Center

Dr. William Barry, Manager, NASA Occupational Health Program, moderated this session. As in one of the opening sessions, he re-iterated that the overall theme for the next year will be facilitating and implementing NIAT-1 (NASA Integrated Action Team – Action 1). He presented a candidate list of topics for consideration and discussion:

1. NIAT–1
2. Skin cancer detection and the NASA Solar Safe Program
3. Weapons of mass destruction
4. Quality assurance
5. Audits
6. Environment of care
7. Infection control
8. Medication management
9. Confidentiality of medical records

1. NASA Integrated Action Team – Action 1

The encompassing goal for this year and the future, as highlighted by the Action is "NASA should provide a physically and psychologically safe and healthy work environment for all its employees." Items under this action for Health personnel include continued implementation of Agency Safety (and Health) Initiative, reduction of stress, development of training modules for supervisors and employees to be aware of stress levels and stress mitigation. All Centers were requested to address and support the NIAT actions

2. Skin Cancer

Increased risk of sun exposure, especially at the NASA Centers located in the sun belt, resulted in the initiation of the Agency-wide Solar Safe Program in FY 2000. One of the metrics for that Program is an emphasis by NASA professionals to assure full body examinations of all employees processing through NASA Health Facilities. This will provide greater probability of detecting suspicious skin lesions and early referral of those employees to dermatologists.

Much discussion developed on the use of newer technologies which might assist occupational health providers in early detection of skin lesions. Some of the questions discussed were:

- How can we concurrently educate employees to contribute to their own health?
- Could specific dermatological training of our health care providers by dermatologists improve the overall effectiveness of our examinations?
- What is the most effective use of such new systems?
- Should teledermatology be implemented throughout the Agency?
- What kinds of liability or disclaimers would be necessary?

The discussions helped pave the way toward future decisions when and if technologies become available.

3. Weapons of Mass Destruction

A cogent plenary presentation had already been given on this topic. The essence of its discussion was to discuss implications for health care planning at all Centers. This must include assuring appropriate liaisons with counterparts in the local and regional communities where our Centers lie. The *Medical Management of Biological Causalities* and the *Medical Management of Chemical Casualties* handbooks were distributed.

4. Quality Assurance

The emphasis was on the essentiality of a Medical Quality Control program for NASA Occupational Health clinics. One early step in the program was a self-assessment /audit checklists. This will surely come with some individuality at the several Centers based on the services they provide, but a core of common requirements will likely emerge. Among these will be primary source verification of licensure, credentials and certifications, record review, and the standardization of training such as ACLS, BCLS, CPR, MRO as well as certain laboratory testing/procedural tasks/examinations.

5. Audits

Oversight of Occupational Health programs by audits is a given. To meet Agency needs, the Principal Center Office is in the process of developing audit tools and conducting specific "gap analysis" to assist Centers in assessing how their programs address Agency goals.

Self-assessment /audit checklists include areas such as Infection Control, Credentialing and Privileging, Medication Management, and Environment of Clinical Care.

6. International Travel Medicine

This subject evoked a lively interchange. With the world-wide-ranging activities of virtually all NASA Centers, health care for and advice to international travel become tasks for many of our health care providers. And while the health specifics vary according to the countries of destination, there are obvious areas where common policies and practices could benefit all.

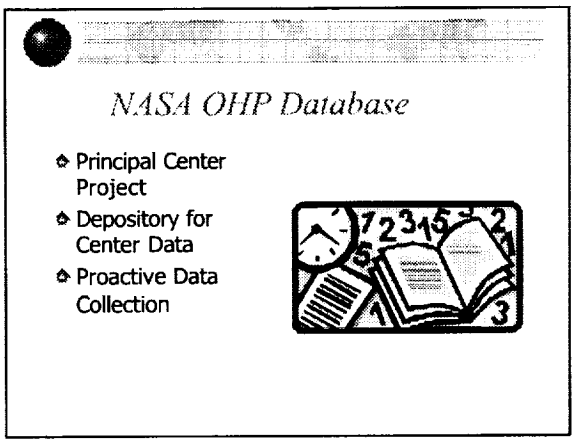
One area discussed was support services for handling acute care and employee/patient transportation in areas where Western standards of care are not available. There was a discussion of the new contract arrangements with SOS for emergency evacuation. Financially NASA may only cover NASA personnel. Travel insurance by contract companies for their personnel and travel insurance for dependants should be strongly encouraged.

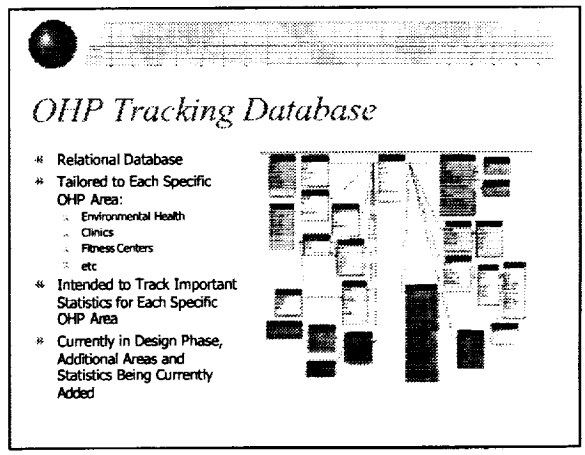
Editors' Note: Summary provided by Dr. G. Wyckliffe Hoffler.

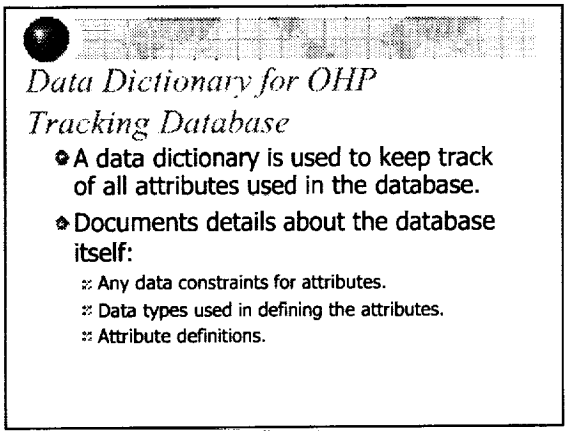
Nurse's Breakout Session
NASA Occupational Health Database

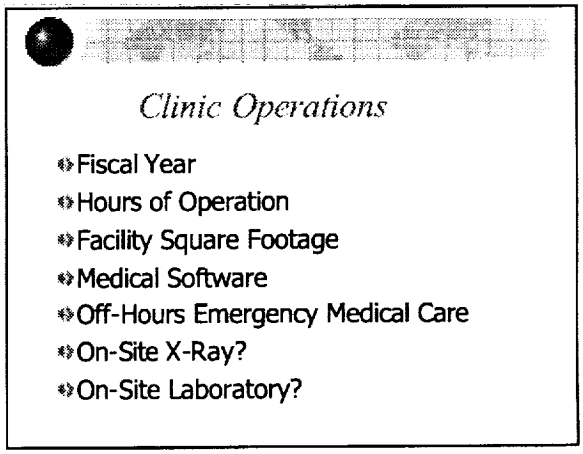
Helen Shoemaker, MS, RN, COHN-S/CM
Occupational Health Program Specialist
The Bionetics Corporation, Occupational Health Program Support Office
Principle Center, Kennedy Space Center

An overview of the NASA Occupational Health Program database project was presented. The presentation stimulated many questions and discussion surrounding the data elements.









Center Health Promotion

- Health Promotion Campaign
  - Solar Safe
  - Influenza and Colds
  - Nutrition
- Start/End Dates
- Activity Details
- Participants
  - NASA
  - Contractors
  - Others

Center Population

- Fiscal Year
- Number of NASA Civil Servants
- Number of Contractors

OHP Contracts

- Type of Contract
  - Medical
  - EAP
  - IH
  - HFC
- Contractor
- Contract Start/End Dates

Health Screenings

- Type of Screening
- Start/End Dates
- # of Participants
- # of Results within Normal Limits
- # of Abnormal Results
- # of Referrals

NASA Center Certifications

- Fiscal Year
- NASA Center
- Certification
  - VPP
  - ISO
- Start/End Dates

OHP Staff

- Fiscal Year
- Category
  - Medical, EAP, EH, HFC
- Type
  - MD, NP, RN, LPN, MT, EMT
- Total # of Employees by Type
- Total # of FTE

OHP Staff

- Certifications by Staff Type
  - Board Certifications
  - Professional Certifications
- ACLS Certification
- BLS Certification

OHP Clinical Services

- Health Maintenance Examinations
- Occupational Examinations
- Work-Related Evaluations
- Non-Work Related/Personal Health Evaluations
- Other Services
- Testing
- Health Promotion

OHP Clinical Services

- Health Maintenance Examinations
  - # of Complete
  - # of Partial
- Occupational Examinations
  - # of Job Certification
  - # of Preplacement
  - # of Surveillance

OHP Clinical Services

- Work-Related Evaluations
  - # of Work-Related Injury Evaluations
  - # of Work-Related Illness Evaluations
  - # of Cases Managed
- Non Work-Related/Personal Health Evaluations
  - # of Illness Evaluations
  - # of Injury Evaluations

OHP Clinical Services
Other

- Allergy Injections
- Consultations
- HFC Clearance Evaluations
- Immunizations
- International Travel Health Evaluations
- Return-To-Work Evaluations
- HIV Testing
- Rehab Evaluations
- Emergency /Ambulance Transports

OHP Clinical Services

- Testing
  - Mammography
  - Pap Smears
  - PSA
  - Sigmoidoscopy
  - Stress Tests
  - ECG
  - Laboratory Tests
  - X-Rays

OHP Clinical Services

- Health Promotion
  - Screenings
  - Education
  - Health and Safety Fairs

OHP Clinical Services

- NASA OHP Website
  - # of Web Hits
    - NASA
    - Other Government
    - All Others

OHP Clinical Services

- Future Areas of Development
  - Other Clinical Areas
    - AED
    - Medical Equipment
    - Scope of Services
  - Audits
  - Reports
  - Training

EH Component of Database

- Database will track occupational health and environment survey questions by Center for each Fiscal Year:
  - Design will be flexible enough to allow new questions to be added as needed.
  - Will Allow Reporting of Surveys by Center, Program, Question or Any Combination of These.

EH Program Status Tracking

Programs Tracked:

- Asbestos
- Biohazards Exposure Program
- Bloodborne Pathogens
- Chemical Hygiene
- Cold Stress/Heat Stress
- Confined Space
- Ergonomics
- Hazard Communications
- Hearing Conservation
- IAQ
- Ionizing Radiation
- LASER
- Lead
- Microwave Radiation
- Noise
- Personal Protective Equipment
- Radio Frequency Radiation

EH Program Status Tracking

- Status Questions:
  - Annual monitoring or reassessment?
  - Center-wide survey performed?
  - Documented programs?
  - Medical surveillance program in place (if required)?
  - Personal monitoring or dosimetry performed?
  - Pre-placement exam program?
  - Training program in place?

EH Center Specific Questions

- EH Center Specific Questions
  - Has center met all regular training requirements?
  - How do the center's rates compare with the BLS averages?
  - Is budget adequate to meet Environmental Health responsibilities?
  - Short NASA center name (i.e., KSC).
  - Are exposure assessments performed on any new equipment?
  - Are exposure assessments performed on any new facilities?
  - Are exposure assessments performed on any new processes?
  - Are exposure assessments performed on all existing significant processes?
  - Fiscal year Center's lost time illness rate.

EH Center Specific Questions

- EH Center Specific Questions
  - Center's lost time injury rate.
  - Number of Environmental Health near-miss incidents.
  - Does center track the number of Environmental Health near-miss incidents.
  - What percentage of time does center Environmental Staff spend on performing planned exposure assessment activities?
  - Percent of time center's Environmental Staff spent on required regulatory training for employees.
  - Is staffing level adequate enough to meet Environmental Health responsibilities?
  - What percentage of time does center Environmental Staff spend on performing number Work related illness rate.
  - Work related injury rate.

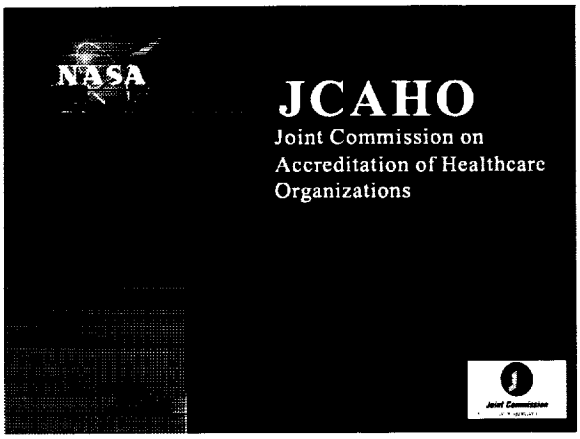
Populating the Database

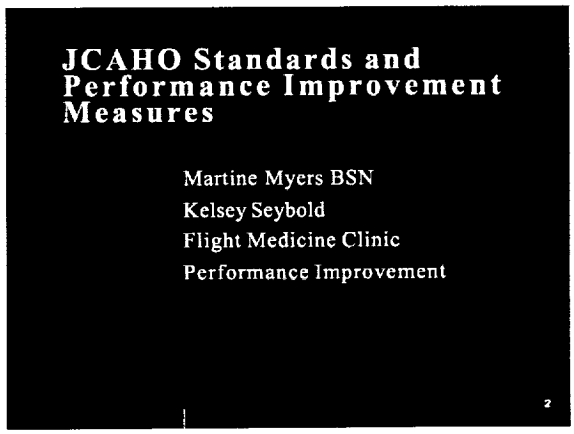
- Data To be Collected From Centers by Fiscal Year.
- Method Used to Gather The Information is Currently Under Discussion. Your Input Is Important!!!
- Possibilities include:
  - Web Forms
  - PDF Forms (fillable PDF's)
  - Excel Spreadsheets Mailed to Centers
  - Structured Text Files
  - Direct Extraction From Existing Databases (when feasable)
- Aim is to Make It Easy For The Centers To Supply The Information, With a Minimum of Data Entry Duplication

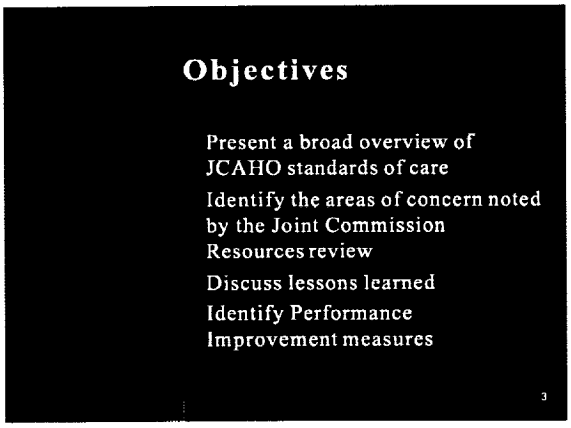
Nurse's Breakout Session
Joint Commission on Accreditation of Healthcare Organizations (JCAHO)

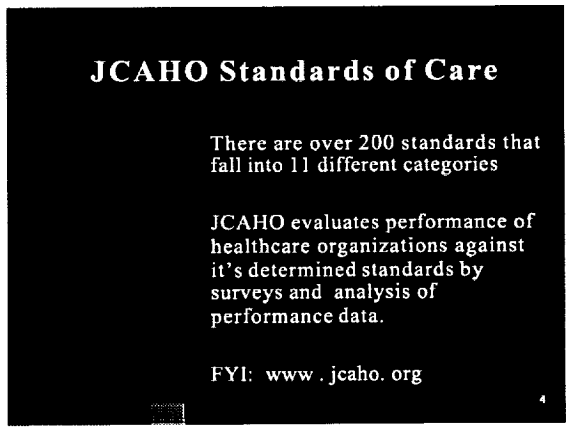
Martine Myers, BSN, RN
Performance Improvement
Flight Medicine Clinic
NASA Johnson Space Center

An overview of the JCAHO standards of care and identification of areas of concern noted by JCR. The "lessons learned" were reviewed and program improvements to improve the quality of care identified.









1. Rights and Responsibilities

Patient's rights and organization's ethics.

This section addresses how to improve patient outcomes by respecting patient's rights and conducting business relationships with patients and the public in an ethical manner.

5

2. Assessment

Addresses the organization's ability to determine what care is required to meet the patient's initial needs as well as the patient's needs as they change in response to the care given.

6

3. Care and Treatment

Addresses the organization's provision of individualized care in the best setting to meet the patient's needs.

- Planning and providing care
- Medication
- Nutrition
- Rehabilitation
- etc.

7

4. Education

Education of the patients and the families

Assesses how the organization improves patient outcomes by promoting healthy behavior and involving the patient in care and in care decision making

8

5. Continuum of Care

Assesses how the organization defines, shapes and sequences processes and activities to maximize the coordination of care along the continuum of care.

- Appropriate level of care
- Appropriate access to care
- Needs based decision making

9

6. Performance Improvement

Examines the processes that the organization has in place to improve care and patient health outcomes. There needs to be a well-designed formal process for improvement which includes design, data collection, aggregation and analysis, and actual performance improvement.

10

7. Leadership

Addresses the degree to which the organization's leaders provide a framework for health care services that are responsive to the patient's needs. Assesses the leadership's effectiveness in enabling the organization to fulfill it's mission.

11

8. Environment of Care

Examines the safety of the organization's physical environment for patients, staff and visitors.

- Fire and Safety
- Emergency Plans
- Medical equipment
- Space

12

9. Management of Human Resources

Examines the planning for and provision of adequate numbers of qualified and competent personnel.

Examines the education and training, the human resource planning and the credentialing and privileging of health care providers.

13

10. Management of Information

Addresses the extent to which the organization ensures that the right information is provided to the right people at the right time. It encompasses information management planning, patient specific data, knowledge based information and comparative data information.

14

11. Surveillance, Prevention and Control of Infections

Evaluation of the organization's comprehensive program for infection surveillance, prevention and control.

It should include all patient care and support services.

- Infectious wastes
- Sterilization Processes
- Program monitoring

15

Joint Commission Resource Review

- The JCR provided a comprehensive 9 day consultation on August 14-24, 2000 at NASA Johnson Space Center and Kennedy Space Center.
- The purpose of the consultation was to assist NASA in determining potential areas of improvement to be consistent with current practice in ambulatory healthcare organizations.

16

Objectives of the JCR review

- Educational update on Ambulatory Care Standards
- Review organization's rights philosophy and organizational ethics
- Assess patient education
- Evaluate patient outcome improvements

17

JCR Objectives (cont)

- Review role of leadership
- Evaluate human resources
- Review information management
- Assess Infection control
- Review care decisions and assessment functions
- Assess environment of care
- Review individualization of care

18

JCR Objectives (cont)

- Evaluate coordination of care
- Evaluate the organization's performance improvement program
- Evaluate facilities space allocation and resources.

19

JCR Areas of Concern

The following areas were noted to be in need of improvement

- Environment of care issues
- Medication control and use
- Credentialing and privileging process
- Staff competency assessment and management

20

JCR Areas of Concern

- Improving Organizational Performance
- Management of Information

21

Lessons Learned

Relate the following areas of concern to your own environment and take back with you a 'Positive Mental Attitude' on changes that can be made to enhance the patient care that is delivered to provide positive outcomes.

22

Environment of Care

- Infectious/biohazardous waste storage and control
- Medical equipment checks
- Space
- Safety and security plans
- Information collection and evaluation system to evaluate EC

23

Medication control and use

- Process of selection of medication
- Dispensing medication
- Medication storage
- Expired medications
- Medication recall system

24

Credentialing and Privileging Process

- Credentialing and privileging guidelines

25

Staff Competency

- Staff competency not continually assessed or maintained.

26

Improving Organizational Performance

- Planning process for identifying and prioritizing areas of improvement

27

Management of Information

- Medical records audit process
- Incomplete medical records (lack of summary list of all significant diagnosis, procedures, drug allergies and medications
- Storage, privacy, and security of medical records (space is an issue)
- Patient's rights

28

Infection control

- Current infection control practices (biohazard storage, food in processing areas, sterilization and cleaning techniques, staff knowledge)
- Actions to prevent or reduce the risk of nosocomial infections in patients and health care workers.

29

On a positive note !

- There is a wealth of knowledge and experience within the organization to guide processes forward
- Excellent preventative health measures and education program.
- Delivery of quality patient care and efforts to increase this quality even more.

30

Performance Improvement Measures

- Medical quality assurance/improvement program
  EDC: August 2001
- Infection control program establishment
  EDC: August 2001
- Medication Control and Dispensing Practices
- EDC: Immediate

31

Performance Improvement Measures

- Environment of Care Issues, safety and medical security related facilities issues
  EDC: August 2001

32

Challenge of Performance Improvement

- Too complicated
- Passing fad
- Only for business people
- Doesn't work
- Terminology
- Wasn't taught this in school
- No time for it

33

Performance Improvement

Continuous Process

- Plan
- Design
- Measure
- Assess
- Improve

34

Performance Improvement

Continuous Process

- Plan
- Do
- Check
- Act

35

Performance Improvement

PI Ownership

- Involvement and Participation
- Education and Information
- Positive Results
- Establishing Goals
- Common Interest

36

Involvement and Participation

- Look at the stakeholders
- Ask for ideas
- Respond to ideas
- Give feedback
- Regular meetings
- Making it a priority

37

Education and Information

- Regular part of staff meetings
- Seminars
- Newsletters
- Email / Internet
- Association with others

38

Positive Results

- Encourage positive actions and results
- Look at opportunities
- Modify when necessary (Semper Gumby)

39

Establishing Goals

- Internal Benchmarking
- External Benchmarking

"If you don't know where you are going, how do you know if you get there"
Will Rogers

40

Common Interest

- Find the common threat
- Rally around the common threat
- Define how this is a priority
- Encouragement

41

Internal Performance Improvement Review

- Where do you start ?
- Who should start this?
- What resources should be allocated?

" When you're on the right track, don't sit on the rail."

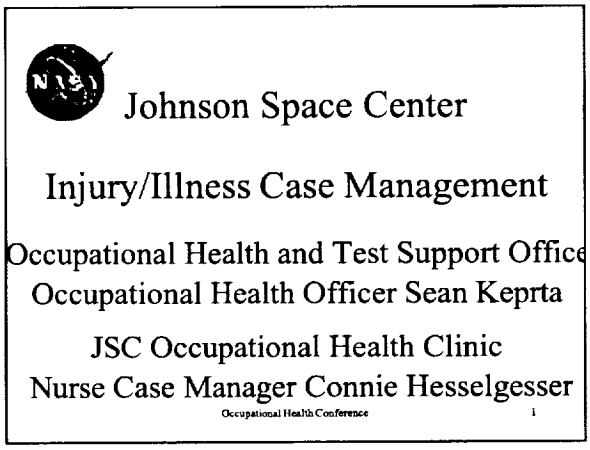
-Will Rogers

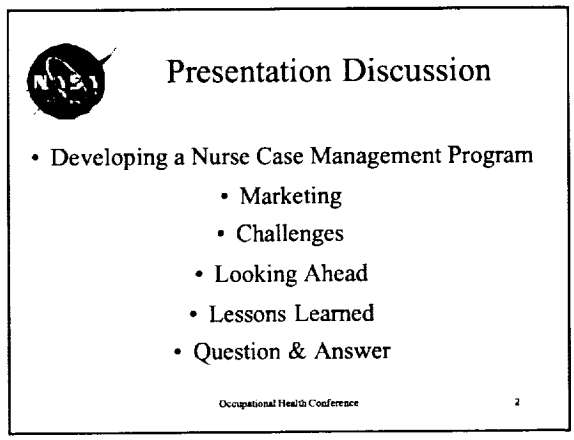
42

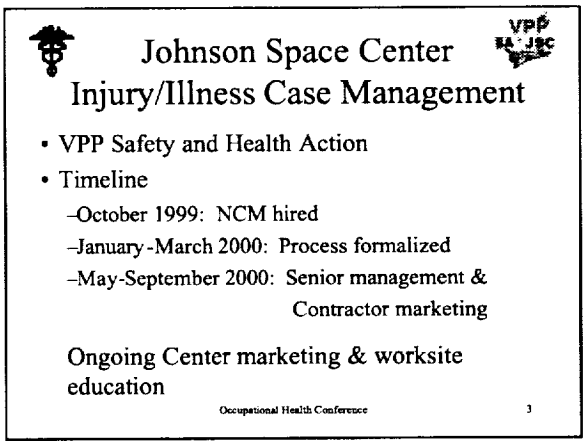
Nurse's Breakout Session
Injury/Illness Case Management

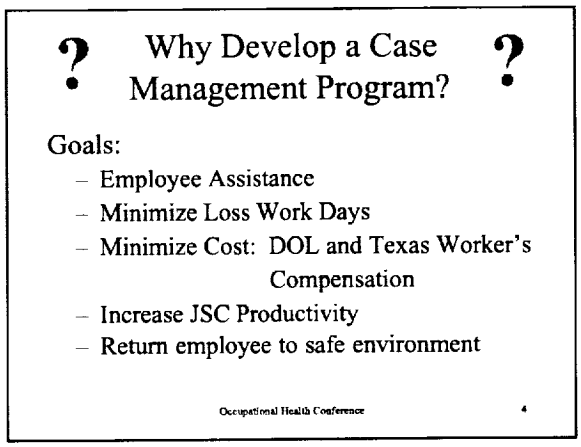
Connie Hesselgesser, RN
Case Manager
Occupational Health Clinic
NASA Johnson Space Center

An overview of the work related injury and illness case management model developed at the Johnson Space Center was presented. The major accomplishments and the challenges of implementation were discussed.









Nurse Case Manager Role

Defined by: Multidisciplinary Team

- Occupational Health Officer
- Physician Project Manager
- Nurse Manager
- Nurse Case Manager
- Workers' Compensation Specialist
- Environmental Health Services
- Safety

Model 'Best Practice' Lockheed Martin

Collaboration utilized to define the role of NCM

Nurse Case Manager Objectives

Coordinate healthcare for job-related injuries or illnesses

Track incidences & contributing factors

Assess Root Cause: Coordinate resolution

Provide safe work environment

Return healthy employee to safe work environment

Center Wide Education Campaign

Senior Management:

- Coordination Committee
- Executive Safety Committee
- Contractor Safety Forum

Marketing Strategies:

- Manager's Cue Card
- Newsletter/Roundup Article
- Web Page
- JSC Employee Safety & Health Guide
- STEP Class

Injury Case Management

Fundamentals Briefed Center Wide:

"Clinic First"

- Coordinated Medical Services
- Follow Up
- Outcome Oriented:
  - Employee Welfare
  - Return to Work (restricted duty, etc.)

Effective Case Management is a TEAM Effort!

- Employee
- Management
- Occupational Health
- Safety
- Industrial Hygiene/Ergonomist
- Human Resources/Legal
- Private Healthcare Providers
- Workers Compensation Specialist (Civil Servants)
- Case/Risk Management (Contractors)

Case Manager Responsibilities

- Notification: **Management**
  Safety
  Occupational Health Services
  Occupation Health Officer
- Coordination of Care
- Employee Advocate:
  Expedite safe return to work
- Continuity of Care:
  Follow until resolution

Key Elements

- *"Clinic First"*
- Early medical treatment/intervention
- Active management involvement
- Coordination of care
- Timely return to work
- Compassionate Care

Challenges

- Education/cooperation of medical and Occupation Health Services
- Contractor contacts- feast or famine
- "Clinic First" policy not practiced by all contractors
- Untimely reporting of injuries
- Supervisor apathy or lack of knowledge
- After hour injuries

More Challenges

- Knowledge Deficit: Consistent definitions
  OSHA recordability
- Notion that a clinic visit equals an OSHA recordable incident
- Communication between Safety and Occupational Health

Looking Ahead

- Continue Marketing/Education
- Develop good working relationships with outside medical personnel
- Collaboration with contractor safety/HR personnel
- Work site visits
- DOL visit

Lessons Learned

- Top management must support
- Marketing/education is an ongoing process
- Change of the Culture will take time
- NCM balance: employee advocate & management productivity
- Never Ending Learning Experience

Case Management Team Members

Connie Hesselgesser,RN,Case Manager
Pam Daley,WC
Sandra Amundson, RN Nurse Manager

JSC Clinic, Building 8, (281)483-4111
Nurse Case Manager, (281)483-1132

Industrial Hygiene Breakout Session
Hydrazine Detection At The 10 PPB Level

John Houseman, CIH
Jet Propulsion Laboratory

The detection of hydrazine at the 10 ppb level in the atmosphere continues to be a challenge. Measurement of the presence of hydrazine-type compounds on the suits of astronauts in the Shuttle airlock is another area of great concern.

Kennedy Space Center, Johnson Space Center and the Jet Propulsion Laboratory are in the process of signing a Memorandum of Understanding to work on solving these problems in a joint effort. The emphasis will be on portable instruments.

Previous work by KSC led to the development of the electrochemical detector for hydrazine. The unit has definite limitations in response time and maintenance needs. JPL conducted a survey to identify promising new technology developments in this area. This survey included miniature gas chromatographs and mass spectrometers, the "electronic nose" concept, the ion mobility spectrometer, and a tunable laser diode spectrometer. Experimental work at JPL showed the technical feasibility of the tunable laser diode approach. The engineering problems of cost and size are still a challenge.

Recent work on a miniature focal plane mass spectrometer has shown considerable promise in the quest for an instrument that will satisfy the requirements in this area.

Industrial Hygiene Breakout Session
Noise Control

Reginald Keith, MS, PE
Hoover & Keith, Inc.

Mr. Reginald Keith, a principal with Hoover & Keith, Inc. has been engaged in noise and vibration control design for over 20 years. A great deal of his experience has been in the power, pipeline, petrochemical and HVAC industries. Mr. Keith has also provided professional services to the NASA Glenn Research Center (GRC) and helped the Industrial Hygiene professionals there to produce a noise demonstration CD that is used in training. Mr. Keith is a graduate of the University of Texas with a Masters Degree in Engineering and is a registered professional engineer in Texas and Oregon with a specialty in acoustics.

During the Industrial Hygiene breakout session Mr. Keith provided a three-hour presentation on industrial noise and noise control methodologies. The presentation included an introduction and review of sound terminologies and measurement techniques then touched on the subject of room acoustics and indoor sound distribution and transmission loss.

Mr. Keith provided many examples and photographs of projects illustrating control measures utilized in real-life industrial and manufacturing environments. Project examples included Heating, Ventilation, and Air Conditioning equipment, pumps, motors, fans, engines and other power generating equipment, as well as metalworking and other industrial process equipment. Included in the project summaries were alternate options considered, net effectiveness of the control measure implemented and the approximate cost. Control methods included full and partial enclosure, mufflers, various sound absorbing materials, vibration dampening and isolation, and noise cancellation.

Discussed briefly was the topic of outdoor sound propagation and community noise issues. Included in the discussion was the effect of distance, atmospherics, barriers, and trees on outdoor sound transmission.

A complimentary copy of the GRC CD-ROM Noise Demonstration Disk entitled *Auditory Demonstrations in Acoustics and Hearing Conversation* was provided to all breakout session attendees. Copies of the disk were graciously provided by the Noise Exposure Management Program at GRC.

Editor's Note: Summary provided by Bruce Kelly.

Professional Development Course 1
Exposure Assessment Strategies and Statistics

Bernard Silverstein, CIH
Susan Arnold, CIH
Bernard Silverstein, Inc.

The course provided attendees with the knowledge and skills necessary to develop strategies for effectively managing workplace exposures. The strategies lead to more efficient use of monitoring resources, better evaluation of exposures and monitoring data, and improved communication of exposure risks to employees and management. The comprehensive two-day workshop described strategies for the collection and interpretation of occupational exposure monitoring and data. The course was based on American Industrial Hygiene Association's publication A Strategy for Assessing and Managing Occupational Exposures, 2nd edition, 1998. Key concepts from this recent publication covered in the course included exposure groups, sampling designs, statistical distributions, and interpreting exposure-monitoring data. Experience and lessons learned in the field were shared by attendees. Problem solving exercises were interwoven throughout the course and attendees worked through examples that helped them apply the concepts. Statistical tools to assist with decision-making regarding the acceptability of exposure monitoring results were also presented. The course received two American Board of Industrial Hygiene certification maintenance points and 16 hours of continuing medical education credit from the University of South Florida.

Course Outline:
Day 1
Introduction
Basic Characterization
Qualitative Exposure Assessment
Statistics Review
Exposure Monitoring
Normal and Log Normal Distributions

Day 2
Interpretation and Decision-Making Exercise
Special Topics (Graphing techniques, Censored data, ANOVA)
Implementation Issues
Statistical Software
Consultation with Instructor

Professional Development Course 2
Advanced Cardiac Life Support (ACLS)
Recertification Course

University of Texas Medical Branch

The course implemented the American Heart Association (AHA) ACLS guidelines established in October 1992. The premise behind the new guidelines is to provide a more flexible and patient-focused approach for treating various cardiac dysrhythmias. Teaching in this course focused on lecture, practical skills, group interaction and case-based learning sessions. Each session provided Clinical Case presentations focusing on critical points related to specific algorithm. During Clinical Case presentations, the participants were expected to actively participate and perform/practice skills unprompted. The AHA's current Textbook of Advanced Cardiac Life Support was the recommended reference for this course. The text provided the skills, physiological, and pathophysiological knowledge base necessary for successful completion of this course. Advanced Cardiac Life Support skills were evaluated during the ACLS Clinical Cases. A total of seven hours of Category I credit toward the American Medical Associations (AMA) Physician's Recognition Award, and/or seven hours in Category II for non-physicians were awarded for this course. The University of Texas Medical Branch is accredited by the Accreditation Council for Continuing Medical Education to sponsor continuing medical education for physicians.

Mardi Gras Welcome Reception

Viewfinder Terrace
Moody Gardens Hotel

The Mardi Gras Welcome Reception was well attended by Conference attendees. The evening's theme was Mardi Gras and the festive Conference Court Jesters greeted each guest with beads. The reception provided an opportunity for attendees to reacquaint themselves with fellow NASA coworkers. The evening's reception included hors d'oeuvres representing typical New Orleans' and Cajun specialties.

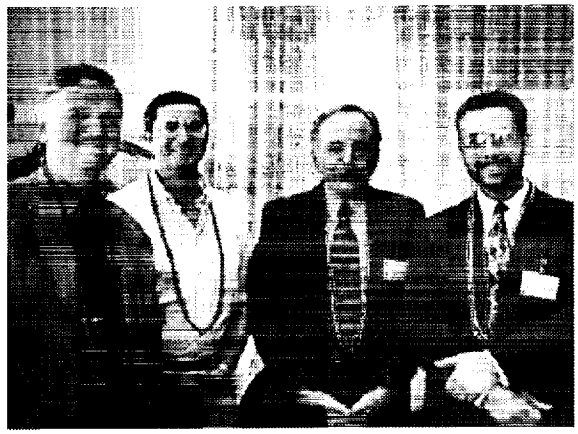
Sheri Roberson, Dr. William Barry, and Shaun West

Mr. And Mrs. Bart Geyer

Stuart Nokes, Guy Camomilli, and Miriam Glazer

Jackie Reeses' Children

Cathy Angotti and Dr. William Barry



Dr. Chuck Ross, Dr. Philip Scarpa,
Alan Gettleman, and Stephen Pilkenton

Jerry Shoemaker, Helen Shoemaker, and
Dr. Fatima Phillips

Joyce Eagan and David Thaxton

Guy Camomilli and Jon Mullin

Continuing Education Credit Information

Professional Development Courses

A. The *Exposure Assessment Strategies and Statistic* course was awarded **2.0** Certification Maintenance (CM) points by American Board of Industrial Hygiene (ABIH). The ABIH certification maintenance approval number is 15047.

B. The *Advanced Cardiac Life Support Recertification Course* was accredited for **7** hours of Category I credit toward the American Medical Associations (AMA) Physician's Recognition Award, and/or **0.7** CEU credits (7 contact hours) in Category II for non-physicians. The University of Texas Medical Branch (UTMB) is accredited by the Accreditation Council for Continuing Medical Education to sponsor continuing medical education for physicians.

General Conference Sessions and Breakout Sessions

A. Physicians

1. The University of South Florida College of Medicine designates this educational activity for a maximum of **33.5** hours in Category I towards the AMA Physicians Recognition Award. Each physician should have claimed those hours of credit that he/she actually spent in the educational activity.

2. This activity had been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint sponsorship of the University of South Florida College of Medicine and NASA Occupational Health Program. The University of South Florida College of Medicine is accredited by the ACCME to provided continuing medical education for physicians.

B. Nurses

The American Association of Occupational Health Nurses (AAOHN) approved **24.0** contact hours of continuing education credit. The AAOHN approval number is 2-44-02.

C. Industrial Hygienists

The American Board Of Industrial Hygiene awarded a total of **3.0** Certification Maintenance Points. The ABIH certification maintenance approval number for the event is 15072.

Summary

Discipline/PDC	Max. No. Hours/Units
Exposure Assessment Strategies and Statistic	2
ACLS Recertification	7
Physicians	33.5
Nurses	24
Industrial Hygienists	3

Conference Participants

Approximately 86 professionals, speakers, and support personnel participated in the 2001 NASA Occupational Health Conference. The NASA Occupational Health Program Principal Center and Support Office planned and managed the event. Johnson Space Center, Houston, Texas hosted the Conference.

The following list of registered participants contains their positions, postal addresses, and email addresses for use by readers of this Proceedings.

Sandra Amundson, RN
Nurse Manager
Johnson Space Center
JSC/SD 22
Houston, TX 77058
samundso@ems.jsc.nasa.gov

Catherine Angotti, RD, LD
Program Executive, Occupational Health
NASA Headquarters
300 E Street, SW
Washington, DC 20536
cangotti@hq.nasa.gov

William Barry, MD, MPH
Manager, NASA Occupational Health Program
OHP Principal Center
Mail Code: QA
Kennedy Space Center, FL 32899
william.barry-1@ksc.nasa.gov

Dolores Bellfore
Contract Administrator
Johnson Space Center
2101 NASA Road 1, SD 22
Houston, TX 77058
Dolores.a.bellfore@jsc.nasa.gov

Terrence Bidnick, MD, MPH
Medical Director/Project Manager
Goddard Space Flight Center
Mail Stop: 205.9, Bldg. 97
Greenbelt, MD 20771
tbidnick@pop200.gsfc.nasa.gov

Shawn Boesen
Safety Team Leader
Goddard Space Flight Center
Mail Stop: 205.2, Bldg. 17
Greenbelt, MD 20771
Shawn.M.Boesen.1@gsfc.nasa.gov

Guy Camomilli, CSP
Senior Industrial Hygienists
OHP Principal Center
Mail Code: QA
Kennedy Space Center, FL 32899
guy.camomilli-1@ksc.nasa.gov

Michael Cardinale, CIH
Industrial Hygiene Officer
Kennedy Space Center
Mail Stop: TA-C2
Kennedy Space Center, FL 32899
Michael.Cardinale-1@ksc.nasa.gov

Wing Chan, PhD, MPH
Senior Public Health Officer
NASA Headquarters
300 E Street, SW
Washington, DC 20536
wchan@hq.nasa.gov

Kathleen Christian, PhD
EAP Manager/Clinical Psychologist
Dryden Flight Research Center
P.O. Box 273 M/S 1626
Edwards, CA 93523
Kathleen.Christian@drfc.nasa.gov

Cynthia Cooper, MFT, CADC, CEAP
EAP Coordinator
Jet Propulsion Laboratory
4800 Oak Grove Drive, Bldg. 310-202
Pasadena, CA 91109
Cynthia.D.Cooper@jpl.nasa.gov

Joanne Creech, CIH
Manager, Environmental Health & Services
Kennedy Space Center
Mail Code; CHS-022
Kennedy Space Center, FL 32899
Joanne.Creech-1@kmail.ksc.nasa.gov

Denton Crotchett, CIH
Manager, Occupational Health Programs
Johnson Space Center
2101 NASA Road 1
Mail Code: SD23
Houston, TX77058
Denton.r.crotchett1@jsc.nasa.gov

Pamela Daley
Workers' Compensation Officer
Johnson Space Center
2101 NASA Road 1
Houston, TX 77058
pamela.j.daley@jsc.nasa.gov

Bette Davis, CIH, CSP
Industrial Hygienist
Dryden Flight Research Center
P.O. Box 273
Mail Stop: 2407
Edwards, CA 93523
bette.davis@dfrc.nasa.gov

Jeff Davis, MD, MS
Professor
Departments of Preventive Medicine and Community Health
301 University Boulevard, Sealy Professional Bldg.
Suite 827, Mail Route 0826
Galveston, TX 77555
jdavis@utmb.edu

Sharmila DeMello-Zieschang, COTR
Manager
NASA Headquarters
Code CP,
300 E. Street S.W.
Washington, DC 20546
cziescha@hq.nasa.gov

Manuel Dominguez, CSP
Chief, Glenn Safety Office
John H. Glenn Research Center
Mail Stop: 6-3
Cleveland, OH 44135
Manuel.Dominguez@grc.nasa.gov

William Dye, MD, MPH
Program Manager, Medical Director
Marshall Space Flight Center
Medical Center, Bldg 4249, AD02M
Huntsville, AL 35812
william.dye@msfc.nasa.gov

Joyce Eagan
Contracting Officer Technical Representative
Marshall Space Flight Center
Mail Stop: AD02M
Huntsville, AL 35812
joyce.eagan@msfc.nasa.gov

Dawn Elliott, PhD
Flight Systems Engineer
Kennedy Space Center
Mail Code: QA-C
Kennedy Space Center, FL 32899
dawn.elliott-1@ksc.nas.gov

Robert Estrada, MD, MPH
Managing Physician
Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, CA 91109
Robert.R.Estrada@jpl.nasa.gov

Dawn Fadner
Environmental Health Laboratory
Supervisor/Director
Johnson Space Center
NASA/JSC SD 23
Houston, TX 77058
dawn.fadner1@jsc.nasa.gov

Michael Foley
Industrial Hygienist
Johnson Space Center
2101 NASA Road 1, SD23
Houston, TX 77058
michael.p.foley1@jsc.nasa.gov

Alan Gettleman, MBA
Program Analyst
OHP Principal Center
Mail Code: QA
Kennedy Space Center, FL 32899
alan.gettleman-1@ksc.nasa.gov

Bart Geyer, CIH
Industrial Hygiene Manager
Kennedy Space Center
Mail Code:CHS-022
Kennedy Space Center, FL 32899
bart.geyer-1@kmail.ksc.nasa.gov

Miriam Glazer, MA, MPH
Health & Wellness Program Manager
NASA Ames Research Center
Mail Code: QH:218-1
Moffett Field, CA 94035
mglazer@mail.arc.nasa.gov

Sheilla Goldberg, MS
Training, Safety, Quality Coordinator
Johnson Space Center
Mail Stop: SD23
Houston, TX 77058
sheilla.o.goldberg1@jsc.nasa.gov

Leroy Gross, MD, MPH
Medical Director
Langley Research Center
10 West Taylor Street
Stop Code: 281
Hampton, VA 23681
l.p.gross@nasa.larc.gov

Ray Gruben, CSP
Industrial Hygienist
White Sands Test Facility
Building 101, Room 139
Las Cruces, NM 88012
rgruben@smtp3.wstf.nasa.gov

Homeyra (Mae) Hafizi, RN, MS
Workers' Compensation Nurse Case Manager
Kennedy Space Center
Mail Code: CHS-005
Kennedy Space Center, FL 32899
Homeyra.hafizi@jbosc.ksc.nasa

Linda Harrison, RN, COHN, MS
Director of Nursing
Goddard Space Flight Center
Mail Code: 205.9, Health Unit Bldg 97
Greenbelt, MD 20771
lharriso@pop200.gsfc.nasa.gov

Wyckliffe Hoffler, MD
Technical Coordinator
OHP Occupational Health Principal Center
Support Office
Mail Code: BIO-5
Kennedy Space Center, FL 32899
wyckliffe.hoffler-1@ksc.nasa.gov

John Houseman, CIH
Chemical Safety Officer
Jet propulsion Laboratory
4800 Oak Grove Drive
Pasadena, CA 91109
john.houseman@jpl.nasa.gov

Gail Howell, L.M.S.W.-A.C.P.,A.C.S.W
Counselor
Johnson Space Center
2101 NASA Road 1, SD242
Houston, TX 77058
ghowell@ems.jsc.nasa.gov

Steven Hulka, CIH
Senior Industrial Hygienist
Johnson Space Center
NASA-JSC-SD23
Houston, TX 77058
STEVEN.HULKA1@JSC.NASA.GOV

Jodi Jacobson, MSW
Work/Family Consultant
Goddard Space Flight Center
1120 G Street, NW, Suite 550
Washington, DC 20005
jjacobso@pop200.gsfc.nasa.gov

Bruce Kelly, CIH, CSP
Industrial Hygienist
OHP Principal Center Support Office
BIO-5
Kennedy Space Center, FL 32899
Bruce.Kelly-1@ksc.nasa.gov

Connie Hesselgesser, RN
Nurse Case Manger
Johnson Space Center
2101 NASA Road 1
Houston, TX 77058

Donald Kilbourn
Department Manager/Safety & Product Assurance
Johnson Space Center
2400 NASA Road 1
Houston, TX 77058
Don.kilbourn@lmco.com

Karen Koch, MA
Human Resources Analyst
Langley Research Center
Mail Stop: 140
Hampton, VA 23681
k.a.koch@larc.nasa.gov

Christina Kominoth, MSW
Work/Family Consultant
Goddard Space Flight Center
1120 G. Street, NW, Suite 550
Washington, DC 20005
ckominot@pop200.gsfc.nasa.gov

Charles Landrum
ESH Engineer
Johnson Space Center
2400 NASA Road 1
Houston, TX 77058
Chuck.landrum1@jsc.nasa.gov

Jose Limardo, MS
Occupational Health Specialist
Johnson Space Center
2101 NASA Road 1, SD13
Houston, TX 77058
jlimardo@ems.jsc.nasa.gov

Sean Keprta, CIH
Occupational Health Officer/COTR
Johnson Space Center
2101 NASA Road 1, SD13
Houston, TX 77058
Sean.R.Keprta@JSC.NASA.GOV

Bruce Mather, PhD
EAP Psychologist
Marshall Space Flight Center
Bldg 4249
Marshall Space Flight Center
Huntsville, AL 35812
bruce.mather@msfc.nasa.gov

Carl Matthews
Safety Manager
Johnson Space Center
2101 NASA Road 1,GC23
Houston, TX 77058
carl.j.matthews1@jsc.nasa.gov

Antoinette Mayor, MBA
Hazardous Chemicals Specialist
John H.Glenn Research Center
21000 Brookpark Road
Cleveland, OH 44135
antionette.c.mayor@grc.nasa.gov

Candace Meyers, RN
Staff Nurse
2101 NASA Road 1
Medical Unit
Houston, TX 77058
Candace.a.meyers1@jsc.nasa.gov

John Meyers, MD
Medical Director
Ames Research Center
Mail Stop: 215-8
Moffett Field, CA 94035
DJM@mail.arc.nasa.gov

Annette Loveday
Safcty & Occupational Health Specialist
Marshall Space Flight Center
NASA-MSFC, QS40
Huntsville, AL 35812
annette.loveday@msfc.nasa.gov

David Loyd
Chief, QARSO
White Sands Test Facility
PO Box 20
Las Cruces, NM 88004
aloyd@wstf.nasa.gov

Stuart Nokes
Administrative Director
Kennedy Space Center
Mail Code: CHS-005
Kennedy Space Center, FL 32899
Stuart.nokes@jbosc.ksc.nasa.gov

Gregory Oblom, MS, CSP
Industrial Hygienist
OHP Principal Center Support Office
BIO-5
Kennedy Space Center, FL 32899
Gregory.Oblom-1@ksc.nasa.gov

Patricia Oleksiak, RN
Lead Nurse
John H. Glenn Research Center
21000 Brookpark Road
Mail Stop: 15-5
Cleveland, OH 44135
poleksiak@singhealth.net

Fatima Phillips, MD, MPH, MS
Director, Bionetics OHP Principal
Center Support Office
OHP Principal Center Support Office
Mail Code: BIO-5
Kennedy Space Center, FL 32899
fatima.phillips-1@ksc.nasa.gov

James Moeller, MD
Medical Director
Dryden Flight Research Center
PO Box 273, Mail Stop: 2004
Edwards, CA 93523
James.moeller@dfrc.nasa.gov

Jonathan Mullin
Manager, Occupational Safety
NASA headquarters
Mail Code: QS
300 E Street SW
Washington, DC 20546
jmullin@hq.nasa.gov

Jackie Reese, MA, LPC
Director, JSC EAP
Johnson Space Center
2101 NASA Road 1, Mail Stop: SD242
Houston, TX 77058
jreese@ems.jsc.nasa.gov

Deborah Ripley
Occupational Safety & Health Technician
John H. Glen Research Center
21000 Brookpark Road
Cleveland, OH 44135
deborah.a.ripley@grc.nasa.gov

Sheri Roberson
Meeting and Communication Specialist
OHP Principal Center Support Office
BIO-5
Kennedy Space Center, FL 32899
sheri.roberson-1@ksc.nasa.gov

Manuel Rodriguez, CIH, CSP, MA
Industrial Hygienist/Industrial Hygiene
Services
Johnson Space Center
2101 NASA Road 1, SD-23
Houston, TX 77058
mrodrig1@jsc.nasa.gov

Stephen Pilkenton
Health Program Analyst
OHP Principal Center Support Office
Mail Code: QA
Kennedy Space Center, FL 32899
PilkeSE@kscems.ksc.nasa.gov

Angel Plaza
Occupational Specialist
Johnson Space Center
NASA JSC, Mail Code: EA5
Houston, TX 77058
angel.l.plaza@jsc.nasa.gov

Calvin Popovici, MD
Research Scholar
University of Maryland
East West Space Science Center, Building 224
College Park, MD 20740
calinp@wam.umd.edu

Alfred Rossum, MD
Medical Director/Project Manager
Johnson Space Center
2101 NASA Road 1, Bldg 8
Mail Stop: SD-22
Houston, TX 77058
alfred.c.rossum1@ems.jsc.nasa

Philip Scarpa, MD
Medical Officer
Kennedy Space Center
Mail Code: TA-C2
Kennedy Space Center, FL 32899
philip.scarpa-1@ksc.nasa.gov

Randall Scott
KSC Radiation Protection Officer
Kennedy Space Center
Mail Code: TA-C2
Kennedy Space Center, FL 32899
randall.scott-1@ksc.nasa.gov

David Rose
Industrial Hygienists/Occupational Health Services
Johnson Space Center
2101 NASA Road 1, SD23
Houston, TX 77058
david.t.rosc1@jsc.nasa.gov

Chuck Ross, DO
Chief, Occupational Health and Test Support
Johnson Space Center
2101 NASA Road 1, SD-13
Houston, TX 77058
ceross@EMS.JSC.NASA.GOV

Therease Ross
Contracting Officer's Technical Representative
John H. Glenn Research Center
21000 Brookpark Road, MD 15-1
Cleveland, OH 44135
therease.c.ross@grc.nasa.gov

Tricia Smith-Araki
Occupational Safety Office Manager
Jet Propulsion Laboratory
4800 Oak Grove Drive, Mail Code: 190-112
Pasadena, CA 91109
Patricia.J.Smith-Araki@jpl.nasa.gov

Lisa Snelling, RN
Chief Nurse
Stennis Space Center
Occupational Health clinice, Bldg. 1100
Stennis Space Center, MS 39529
Lisa.Snellings@ssc.nasa.gov

Richard Spinak, MD
Center Medical Director
Wallops Flight Facility
Building F-160
Wallops Island, VA 23337
punim@jhu.edu

Helen Shoemaker, RN, COHN, MS
Occupation Health Program Specialist
OHP Principal Center Support Office
Mail Code: BIO-5
Kennedy Space Center, FL 32899
Helen.shoemaker-1@ksc.nasa.gov

Liesel Short, RN
Chief Nurse
Ames Research Center
Mail Stop: 215-8
Moffett Field, CA 94035
Lshort@mail.arc.nasa.gov

Kenneth Singleton, MD, MPH
President-Singleton Health Services, L.L.C.
John H. Glenn Research Center
2328 W. Joppa Road, Suite 310
Cleveland, OH 44135
Singhelath@aol.com

Claire Sleboda, RN, COHN
Chief Nurse
Dryden Flight Research Center
PO Box 273, Bldg. 4822
Edwards, CA 93523
claire.sleboda@dfrc.nasa.gov

Jeffrey Wagner
Industrial Hygienist
21000 Brookpark Road, MS 6-4
Cleveland, OH 44135
JEFFERY.T.WAGNER@GRC.NASA.GOV

Reta Warren
Safety Professional
Johnson Space Center
JSC Bld 8, SD22
Houston, TX 77058
Reta.k.warren1@jsc.nasa.gov

Charles Smallwood, MD
Deputy Medical Director
Kennedy Space Center
Mail Code: CHS-005
Kennedy Space Center, FL 32899
Charles.smallwood-1@ksc.nasa.gov

Maurice Taquino, MD
Medical Director
Stennis Space Flight Center
Mail Code: JCWS, OHS Clinic, Bldg 1100
Stennis Space, MS 39529
Maurice.Taquino@ssc.nasa.gov

David Thaxton, CIH
Occupational Health Officer
Marshall Space Flight Center
AD02
Huntsville, AL 35812
David.l.thaxton@msfc.nasa.gov

Richard Vogel, CIH, CSP
Industrial Hygienist
Langley Research Center
MS 429, 5 Hunsaker Loop
Hampton, VA 23881
r.a.vogel@larc.nasa.gov

Shaun West
Web Specialist
OHP Principal Center Support Office
BIO-5
Kennedy Space Center, FL 32899
Shaun.west-1@ksc.nasa.gov

Richard Williams, MD, MPH
Acting Chief Health and Medical Officer
NASA Headquarters
300 E Street SW
Washington, DC 20546
Rwillia3@hq.nasa.gov

Guest Speakers

Linda Ballas
Linda Ballas & Associates
4413 Copper Creek Lane
Toledo, OH 43615

Franklin Chang-Diaz, PhD
Astronaut Appearances Office
NASA/Johnson Space Center
2101 NASA Road 1
Houston, TX 77058

Jon Clark, MD, MPH
Astronaut Appearances Office
NASA/Johnson Space Center
2101 NASA Road 1
Houston, TX 77058

Cynthia Cooper, MFT, CADC, CEAP
EAP Coordinator
Jet Propulsion Laboratory
4800 Oak Grove Drive, Bldg. 310-202
Pasadena, CA 91109
Cynthia.D.Cooper@jpl.nasa.gov

Commander Randy Culpepper
U.S. Army Medical Research Institute
Of Infectious Diseases
Attn: MCMR-UIM-O
1425 Porter Street
Ft. Detrick, MD 21702

Jeff Davis, MD, MS
University of Texas Medical Branch
301 University Boulevard
Sealy Professional Building, Suite 827
Mail Route 0826
Galveston, TX 77555

Larry Regan
Assistant United States Attorney
Western District of Louisiana
611 Broad Street, Suite 347
Lake Charles, LA 70601

Jack N. Singer, PhD
Psychologically Speaking
28 Westcliff
Laguna Niguel, CA 92677
funspeaker@home.com

Janice Voss, PhD
Astronaut Appearances Office
NASA/Johnson Space Center
2101 NASA Road 1
Houston, TX 77058

Graciela Perez, ScD, CPE
307 Tano Road
Santa Fe, NM 87501

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	31 May, 2001	Final 25 Feb – 2 Mar, 2001

4. TITLE AND SUBTITLE

Proceedings from the 2001 NASA Occupational Health Conference:
Risk Assessment and Management in 2001

5. FUNDING NUMBERS

"C" NAS10-12180
"WU" 004-Y7

6. AUTHOR(S)

Sheri Roberson and Bruce Kelly, Editors

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

NASA Occupational Health Program Office
NASA Safety and Health Independent Assessment Directorate
NASA Kennedy Space Center, FL 32899

8. PERFORMING ORGANIZATION REPORT NUMBER

eNASA/CP-2001-210255

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

National Aeronautics and Space Administration
300 E. Street, SW
Washington, D. C. 20546

10. SPONSORING / MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

Published as a NASA Conference Publication (CP)

12a. DISTRIBUTION / AVAILABILITY STATEMENT

Publically Available
Not copyrighted

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

This Conference convened approximately 86 registered participants of invited guest speakers, NASA presenters, and a broad spectrum of the Occupational Health disciplines representing NASA Headquarters and all NASA Field Centers. Two days' Professional Development Courses on Exposure Assessment Strategies and Statistics and on Advanced Cardiac Life Support training and recertification preceded the Conference. With the theme, "Risk Assessment and Management in 2001," conferees were first provided updates from the Program Principal Center Office and the Headquarters Office. Plenary sessions elaborated on several topics: biological terrorism, OSHA recordabiliity, Workers' Compensation issues, Federal ergonomic standards, bridging aerospace medicine and occupational health—especially in management of risk in spaceflight, and EAP operations with mission failures. A keynote address dealt with resiliency skills for 21st century workers and two NASA astronaut speakers highlighted a tour of the Johnson Space Center. During discipline specific breakout sessions, current issues in occupational health management and policy, credentialing and privileging, health risk assessment, measurement and standardization, audits, database development, prevention and rehabilitation, international travel and infection control, employee assistance, nursing process, and environmental health were presented.

14. SUBJECT TERMS

Occupational Medicine, Environmental Health, Risk Assessment, Ergonomics

15. NUMBER OF PAGES

118

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRAC
Unclassified	Unclassified	Unclassified	SAR