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National Aeronautics and Space Administration
Lyndon B. Johnson Space Center

OPERATIONAL TEST REQUIREMENT
FOR
SPACELAB MISSION SIMULATION

Title: MEDICAL MONITORING

12
OTR Number

Principal Investigator(s):

Signature Date
J. R. Hordinsky, M.D.

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MEDICAL MONITORING

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A. Background/Purpose

The purpose of this requirement is to formalize the medical monitoring approach for the short Shuttle flight in a pattern that resembles the monitoring and on-call response capability proposed for the actual Shuttle flights and to piece together an appropriate medical evaluation not only of individual crewmembers but of the entire mission.

This OTR recognizes the presence of an on-board physician. A subsequent OTR will be formulated to describe medical monitoring when a physician is not in the flight crew.

B. Functional Objectives

- To establish the items that will be reported to and discussed with ground-based medical personnel.
- To establish optimum time for the daily medical reports.
- To establish a standardized pattern for obtaining experiment data that has medical relevance.
- To provide for collection and integration of data from all pertinent on-board experiments and monitoring systems (e.g., respiratory, cardiovascular, metabolic, microbiological, endocrine, excretory, radiation, and atmospheric) that could bear on maintenance of or departures from crew health.
- To establish an optimum briefing pattern for medical personnel monitoring a flight or called in to consult on a flight.
- To test the hypothesis that the Test Director may be the optimum initial briefing point before and after any scheduled or spontaneous medical discussion.

- To activate a medical data base and retrieval system for Shuttle crewmember and passenger medical data.
- To establish a flight medical monitoring and response capability directly in Flight Medicine (Building 8).
- To establish efficient on-call roster and paging systems for physicians in support of the Shuttle flights.

C. Participants

Participants will include all crewmen, the medical officers assigned to support SMD-III, the Test Director, and, as necessary, other Test Operations Team members, as well as PI's of experiments, and any others who will be required for collection of data, for briefing purposes, and for system operation such as an attendant or system operator in Building 8 during clinic off hours (nights and weekends) and an ambulance driver from the clinic or fire station.

D. Performance Requirements and Conditions

Test Operational Requirements

a. Preflight (training, support)

- Brief the crew on medical monitoring components; MS will assist.
- Assist the experimenters in identifying clinically significant data components and determine the expected reliability of those parameters in the actual testing.
- Provide the individual crew members with appropriately formatted checklists to record the required test data for a daily status report.

- ° Provide each crewman an individual log book for daily recording of:

1. An estimate of food and water intake
2. The quantity and quality of sleep
3. Elimination
4. Any vestibular or other upsets
5. Any medications taken
6. Other problems.

- ° Activate a system such that medical personnel in Building 8 can follow the significant elements of the payload simulation in order to participate or advise in crew operations with particular emphasis on crew health; and, if away from Building 8, they can be reached on short notice through an established communication system.
- ° Minimum of three complete checkouts of monitoring capability, paging system, and computer data base access prior to start of SMD-III.

b. In-flight (crew requirements, constraints, and frequency)

The MS (on-board Physician) will:

- ° Review the individual log books.
- ° Discuss with the crewman any medical problems they may have.
- ° Give a brief status report to the ground-based mission surgeon at a predetermined time each day, preferably after the evening meal.

(Any crewman may communicate medical problems to the on-board physician and if indicated may communicate with a ground-based physician via private communications loop to either the test site monitoring area (Bldg. 36) or to the Bldg. 8 console.)

Test Preparation

NA

Test Operations

Building 8 monitoring capability will be in effect during daytime operating hours of clinic, and on-call system would be operable at all hours other than that. For the medical status report, medical conference, or TD conference, the medical officer (during this simulation) would actually be present at the simulation site.

c. Postflight (data retrieval, special handling, DTU access, etc.)

Specialized medical data base [REDACTED] -data is considered sensitive.

Clinically significant data from any experiments executed postflight will be delivered to the Medical Team.

E. Hardware (or Software) Identification and Description

Two voice-tone pagers (Motorola Page Boy II) (supplied by Space Clinical Medicine)

Mobile radiotelephone (to be supplied by Space Clinical Medicine)

A console (in the Flight Medicine Clinic) with video reception and 2-way voice communication to the Test Director and the crew, but with ECG capabilities simulated. Console also to have access to computerized medical data base derived from Shuttle crewmember and passenger participants. Means to protect data confidentiality is desired.

Video/audio recording, but recordings not easily accessible to persons without need to know.

Telephone access to ambulance dispatch (telephone #3333)

A site equipped with video reception, two-way voice (to TD and crew) and a tape recorder within the test monitoring room in Bldg. 36 to permit private medical review (routine or contingency requirements).

Site will also have data base terminal. Data security is desired.

A medical officer's collection basket in the test monitoring room in Bldg. 36 for experimental data previously judged as clinically significant. These data must include the date the data are provided to the mission surgeon, the date of actual data generation, the quality of the data, any data in processing and when they are to be provided, any data lost, and why lost.

Data security is desired.

Access to current and projected flight plans.

The crew status report for the mission surgeon in either voice transcript or logged on appropriate log sheets by assigned test team members.

Other inputs from the MS, TOT, and others in order for the mission surgeon and MS to evaluate system performance and prepare a useful report.

F. Interface Information

Location of Hardware (or Software)

Pager carried by physician.

Mobile radiotelephone.

Consoles in Room 124, Building 8, and at test monitoring site, Bldg. 36.

Data base terminal in Building 8 (Room 124) and at medical console in the Medical Monitoring Area of Building 36.

Mounting Requirements

Visual and auditory environment suitable for viewing displays and communicating already exists in the rooms which will contain the terminal equipment. Other equipment TBD.

Utility Requirements (Electrical, Gases, Fluids, etc.)

TBD

Support Equipment Information

TBD

Frequency allocation and RT licensing may be required.

Environmental Requirements

Normal Spacelab and Shuttle cabin environment.

G. Flight Operational Requirements (crew communications, real-time operational support, specific data, etc.)

Communications systems should be operational at all times during the flight.

It is expected that various aspects of the communications support system will be utilized both for responses to unexpected medical problems inflight, as well as to the simulated medical events planned for the SMD-III.

H. Data Support Requirements

a. Preflight (including close-out photos)

- ° All experiments will be performed to identify clinically significant parameters and the reliability of these, as well as the actual planned collection times (pre-, in-, and postflight).
- ° A separate medical data base containing the relevant history of the flight participants which can be accessed from the Building 8 medical console area and the Science Monitoring Area of Building 36 will be established under appropriate security measures.

b. Inflight

- Access to MEDICS terminal in Building 8 and mission surgeon's console in simulation area. The twenty-four hour activation of Building 8 console and paging system. Ability to update MEDICS data bank.
- Voice transcripts or correctly completed log sheets containing daily crew status report.
- Test Director briefing on the mission status prior to the daily medical review.
- Clinically significant data from experiments provided verbally in emergencies and otherwise on appropriate log sheets deposited in the mission surgeon's medical collection basket.

c. Postflight

N/A

I. FDF Requirements

The flight plan will reference crew status reports and allow for optional mission surgeon-crew conferences subsequent to the status reports.

Crew procedures are required for the FDF. Communication system documents will be required for the simulation supervisor and facilities engineer.

J. Reporting Requirements

- The mission surgeon or his designated representative will present the crew medical status at the daily TOT meeting, or directly to the Test Director as required by contingency medical developments.

- ° A final report will be required within two weeks of test completion. Inputs will be required by test participants as well as collaboration by the MS.

K. Postmission Requirements

- ° Access to the facility will be required to secure crew logs and data not already transmitted.
- ° A crew debriefing will be required.

L. Data Analysis Support

On-call computer operator support in case of difficulties with retrieval of medical data base information.