Evaluating the Medical Kit System for the International Space Station
A Paradigm Revisited

Melinda Hailey, Michelle Urbina, Jessica Hughlett, Stevan Gilmore, James Locke, Baraquiel Reyna, Gwyn E. Smith

82nd Annual Scientific and Human Performance Meeting

Melinda Hailey RN BSN
May 2011
Overview

- Kit history, function
- Additional considerations driving update
- Users
- Implementation of new kits
- Lessons learned
History & Function

• System functions
  – Nominal preventive health care
  – Treatment for minor illness / injury
  – Some advanced life support capability

• Launched in support of ISS Expedition 1
  – Designed to support crew of three for a 6-month mission
  – Designed to be prepared on the ground and resupplied in total on a shuttle with each crew rotation
  – Shuttle program events required real-time change to support paradigm
    • Logistic support via international partner vehicles
    • On-board crew required to do inventory and integration work to keep kits contents up to date and in a known configuration.
Additional Considerations

• Hardware Obsolescence
• Medication Issue
  – Medication no longer available
  – Delivery system obsolete
  – Unable to procure injectable medications in desired packaging
• Adapt design to accommodate multi-country shipping and logistics chain and on-board maintenance by the crew.
• Accommodate addition/deletion/change of hardware in kits
  – Updates to required testing
    • Example Eye equipment
  – Identify and certify COTS hardware where possible as opposed to in-house development.
ISS Medical Kit Users

• 6 Crewmembers on ISS
  – 4 trained as Crew Medical Officers (CMO)
  – CMO
    • Wide spectrum of professional and health system backgrounds
      – IP crew can also be CMO
      – Typical CMO has a technical/engineering background
    – Approximately 25 hours of crew training available to learn CMO role

• In-flight support of CMO duties is augmented with
  – Communication with medical support team
    • (video conference, email, phone)
  – ISS Medical Checklist
    • Provide directive steps in support of routine activities and medical intervention
System Components

Defibrillator

Personal Protective Equipment

Restraint / Electrical Isolation

Ventilator / Oxygen Supplementation
Durable and consumable medical items:
• Medications
• Tools (wound repair, dental)
• Bandaging supplies
• Bladder catheterization items
• IV catheterization
• Physical exam hardware
New ISS Medical Kits

Non-Emergency Medication

1. Convenience Medications
2. Oral Medications
3. Topical & Injectable Medications

Non-Emergency Hardware

4. Medical Diagnostic
5. Minor Treatment
6. Medical Supply
7. IV Supply
8. Physician’s Equipment

Emergency Medication and Hardware

9. Emergency Medical Treatment
Exterior/Interior Softgoods Design

Front

Inside with locator card
Injectable Medications

• Small, consistently sized footprint
• No air in syringe
• Reduced shelf life due to repackaging
Injectable Medications
Crew Efficiency - Ops
Crew Efficiency - Ops

Need image of emer med tx pack here
Advanced Life Support Pack (ALSP)

Ambulatory Medical Pack (AMP)

**Short Shelf-Life Items**
(medications, consumables)

Crew Efficiency – Resupply
Accommodate Hardware Modifications
Miscellaneous Improvements
Lessons Learned

• Thoroughly define requirements are a challenge to develop
  – All requirements revisions have significant system impacts
  – Huge variability in commercially available equipment
    • Imprecisely worded requirements make capturing the correct equipment difficult.

• Use of commercially acquired goods requires flexibility
  – Kit design
  – Procedures and training

• Think Efficiency when selecting hardware
  – Make items serve multiple purposes

• Communicate
  – Engineering and clinical stakeholders don’t always speak the same language
  – Miscommunication impacts can have broad impacts (procedures, training)
Implementation

• Launched to ISS via a Russian Progress on 30 April
• Planned on-board implementation in June 2011
• Expedition 27/28 will be first users
• Miscellaneous
  – Rewrote >120 ISS Medical Checklist procedures
  – Modified 10 training lesson plans and classes
  – >200 unique medical items included in new kits

Questions?
82nd Annual Scientific and Human Performance Meeting Disclosure Statement

We have no financial relationships to disclose.

We will not discuss off-label use and/or investigational use of medications in this presentation.