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

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Melinda Hailey RN BSN
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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

Ventilator / Oxygen Supplementation

Restraint / Electrical Isolation

Personal Protective Equipment
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 emerg med tx pack here
Short Shelf-Life Items
(medications, consumables)

Advanced Life Support Pack (ALSP)

Ambulatory Medical Pack (AMP)

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?
We have no financial relationships to disclose.

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