



Pharmaceutical Care and the Role of a Pharmacist in Space Medicine

Tina Bayuse, Pharm.D.
Lead Pharmacist, JSC Pharmacy
Wyle Laboratories
NASA

Learning Objectives

- Understand how pharmaceutical care is applied to Space Medicine operations.
- Understand the current involvement of a pharmacist in Space Medicine.
- Understand areas of future pharmacy involvement in space tourism.



Definition

- **Traditional role:**
 - Pharmacists dispense the medication from a physician order to the patient
 - Ensure the safe and effective use of medication
 - Counsel patient
 - proper use
 - adverse effects



Definition

- Developing Role:
 - Include other services related to patient care
 - Pharmaceutical care
- Drug therapy experts
- Primary health professionals
 - optimize medication management = positive health-outcomes



Pharmaceutical Care

- Responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life.
- “The outcomes of traditional pharmaceutical care are: cure of a disease, elimination or reduction of a patient's symptomatology, arresting or slowing of a disease process, or preventing a disease or symptomatology”
- Terrestrially, a pharmacist is a major player in providing this care.



Pharmaceutical Care in Space Medicine

- Space medicine primarily preventative medicine
- Outcomes of space medicine pharmaceutical care are:
 - Elimination or reduction of a patient's symptomatology
 - Arresting or slowing of long term effects from microgravity – or -
 - Preventing long term effects or symptomatology as a result of microgravity
- Space medicine pharmaceutical care is about both the patient and the mission



Integration

**Commercial
Space Travel**

Patient Care



Pharmacist

**Drug
Information**

Pharmacovigilance



Integration

**Commercial
Space Travel**

Patient Care



Pharmacist

**Drug
Information**

Pharmacovigilance



Pharmacy Integration

- Team member pre- spaceflight
 - Physician, engineer, human factors, biomedical engineer and pharmacist
- Patient care
- Patient safety issues
- Drug information
 - Medication kit design
 - Selection of medications for the International Space Station and Space Shuttle medical kits
 - More bang for your buck
 - Compatibility issues



Pharmacy Integration

- Team member during spaceflight
 - Physician and pharmacist
 - Patient safety issues
 - Drug information
- Team member post-flight
 - Research support
 - Patient safety issues
 - Drug information



Integration

**Commercial
Space Travel**

**Patient
Care**



Pharmacist

**Drug
Information**

Pharmacovigilance



Patient Care

- Preventative care
 - Drug Tolerance Testing
 - Countermeasure support
- Patient specific medication needs
- Patient Safety
- Drug Utilization Reviews



Integration

**Commercial
Space Travel**

Patient Care



Pharmacist

**Drug
Information**

Pharmacovigilance



Pharmacovigilance

- Kit inspections
- Storage
 - Transdermal patch
- Patient Safety
 - Drug Tolerance Testing
 - Drug recalls
 - Sound alike/look alike



Integration

**Commercial
Space Travel**

Patient Care



**Drug
Information**

Pharmacovigilance



Drug Information

*“Knowledge is power, communication is key”
- unknown*

- Pharmacist involvement in medical checklist procedures
- Medication monographs
- Drug recalls
- Pharmaceutical technology update



Integration

**Commercial
Space
Travel**

Patient Care



Pharmacist

**Drug
Information**

Pharmacovigilance



Commercial Space Travel

- Same challenges as existing system
- New variable added
 - State of civilian health
- Broader population base, all ages
 - Altered pharmacokinetics exist before space travel
 - Gender differences?
 - Alternative medicine consumers?



Commercial Space Travel

- More health issues
 - >50 years of age will present chronic disease states
 - Dyslipidemia
 - Hypertension
 - Diabetes
 - Thyroid disorders
 - Decline in renal function
 - Decline in hepatic function
 - Osteopenia, osteoporosis
 - All require pharmacologic treatment
- More treatments, more consumables
 - Efficiencies can be researched



Commercial Space Travel

- Becomes affordable
 - Physician's time will be in high demand
 - Pharmacist team member required
- Pharmacist required
 - Terrestrially - first point-of-contact for patients with health inquiries
 - Commercial space travel will be no different
- Plan a lunar trip, see the pharmacist for all of your motion sickness needs.



Integration

**Commercial
Space Travel**

Patient Care



Pharmacist

**Drug
Information**

Pharmacovigilance



Closing Statements

- Pharmaceutical care in the area of space medicine is evolving.
- A pharmacist serves a critical role in this care.
- Commercial space travel will require pharmacist involvement.





Questions?

May 14, 2007

Bayuse



References

- (<http://pharmacy.ouhsc.edu/about/information/pharmcare.asp>).

