Informatics Support for Decompression Sickness on Space Missions

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Abstract

- Text-based checklists (paper and electronic) together with telecommunications links to Earth-based physicians are currently used to diagnose and treat medical conditions during space travel.
- GuideView is an application that augments text by presenting clinical guidelines in a structured, interactive, multi-modal format
- GuideViews present clinical instructions simultaneously in voice, text, pictures video or animations
- This project incorporated a Decompression Sickness (DCS) guideline used for the diagnosis and treatment during space flight missions into GuideView.

Background

- For each ISS Expedition, at least one crewmember is designated a Crew Medical Officer (CMO) and tasked with assisting in the health maintenance of his or her fellow crewmembers.
- Although there are a few astronaut physicians, the majority does not have a formal medical background and will have received only limited medical training as part of mission preparation.

Background

Crews aboard the International Space Station rely on telecommunications support to assist them in providing medical care during a mission.

Crews communicate with their ground medical support via audio and/or video telecommunications links as well as downlink images for review.

Text-based clinical guidelines and checklists (paper and electronic) are available too assist the in the diagnosis and treatment of a host of medical conditions.

GuideView

- GuideView technology was originally developed at NASA Johnson Space Center to provide an interactive, electronic means of guiding a user through a series of complex tasks during space exploration missions
- Information and task steps are externalized and presented via text and multimedia
- The cognitive load of the user is decreased.

GuideViews

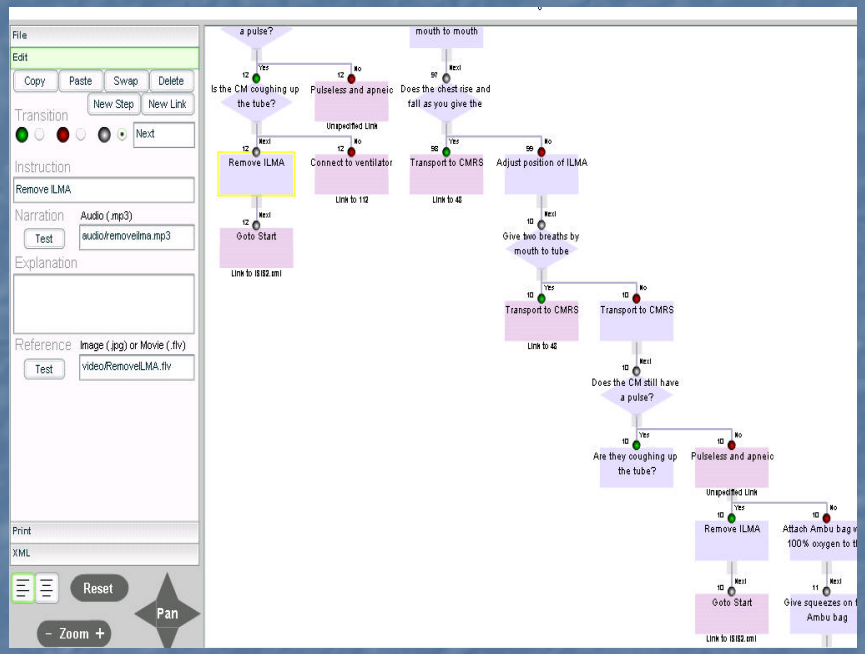
- GuideView consist of two components
  1. GuideView Author - used to develop the guidelines in the GuideView format
  2. GuideView Viewer - used to execute and display these guidelines
- Guidelines developed and saved in the GuideView format are called *GuideViews*.

GuideView Author screen

Enables:

- development of the guidelines in the GuideView format
- insertion of the Visual content (images and/or video)

**The images and video inserted into the program were obtained from NASA archives or produced de novo.*

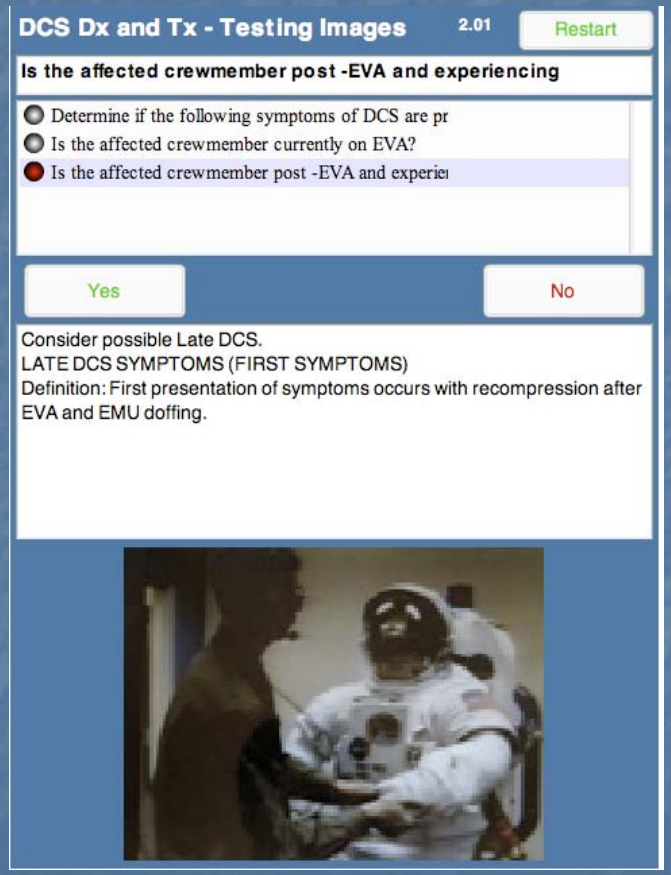


GuideView Author screen

GuideView Viewer

Enables:

- used to execute and display the guidelines in the GuideView format
- Users are able to navigate through the program using mouse clicks



GuideView Viewer screen

Creating the DCS GuideView

- Procedures related to the recognition and treatment of DCS was reviewed by clinician subject matter advisors.
- These documents, developed by NASA Flight Surgeons, were used to create structured procedures that could guide an astronaut through the necessary actions of DCS treatment.
- GuideView Author was used to encode the guideline structure and embedding of text and multi-modal content to create the interface.

GuideView versatility

GuideViews are compatible with multiple platforms including:

- Internet
- stand-alone Windows computers
- PocketPC-based PDAs
- Windows Mobile cell phones
  - T-Mobile SDA and Cingular 3125

This compatibility adds to the versatility of the application in various environments

Conclusion

- Due to telecommunication delays, real-time earth-based medical support may be difficult during long duration space missions.
- Text-based medical checklists have significant limitations, especially for non-physician astronauts.
- A more informative methodology is needed to provide informatics support such as that provided by the GuideView technology.

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