The GuideView System for Interactive, Structured, Multi-modal Delivery of Clinical Guidelines

M. Siriram Iyengar, Jose Florez-Arango, MD, Carlos Andres Garcia, MD

*School of Health Information Sciences, Univ of Texas, Houston, **Medical Informatics and Health Care Systems, NASA Johnson Space Center

Main Features of GuideView

- Complex features are broken into simple steps in a process flow.
- Instructions for each step are presented in multiple modes:
  - Text
  - Voice and sound
  - Pictures
  - Full-motion video
  - Live action with annotations
  - Animation
- GuideView interacts with the user in two modes:
  - Mouse clicks
  - Voice Navigation: both hands can be free to assist the patient.
- GuideView can interact with medical sensors using Bluetooth (wireless) or wired connections.
- Automatically traverses guideline pathways depending on data values received.
- Saves time and improves accuracy.
- GuideView is a wiki-platform with consistent look-and-feel.
- Over the web and on Windows and Macintosh clients running Internet Explorer.
- Stand-alone on Windows computers.
- On Windows Mobile PDAs (Pocket PCs).

GuideView Design Goals

- Reduce Complexity
- Each process step is a simple task that can be completed even by those with minimal medical training.
- Decrease Cognitive Load
- At each step only a small (5 maximum) choices to next step
- Support backtracking
- No核准 is final. Always return easily to a previous step and follow different path.
- Enable repetition
- Provides instructions for any step as often as desired.
- Support modularity and re-usability of guidelines
- Guidelines can be developed in small modules.
- Modules can be chained and nested as needed to create complex protocols.
- Reinforce learning by providing multiple instructional modes.
- Each step is presented using multiple media, text, voice, and visual aids.
- Look-and-feel as similar as possible over multiple platforms.
- Achievability using Flash technology from Macromedia.
- Support modularity
- GuideView may need to be used by mobile professionals, either within a space habitat or terrestrially.
- Separation of content and presentation.
- Content saved as XML.

GuideView User Interface

- User interface identical to the desktop version.
- Full-motion video and voice output available.
- Interfaces and form-factor very desirable for mobile professionals and astronauts.
- Voice navigation is being developed.

GuideView supports mobility

- Mobile navigation is being developed.
- Support mobility.
- GuideView supports navigation in a mobile environment.
- User Interface identical to the desktop version.
- Content saved as XML.
- A graphical editor for creating, editing, and updating GuideView process flow.

GuideView Author

- Used to develop clinical guidelines and save them in a form capable of being played back using GuideView.
- Up to 5 branch points at each node.
- Fail and zoom functions for navigating across complex, lengthy protocols.
- Supports insertion of text, voice, pictures and video.
- Content saved as XML.
- Cross-platform capability.
- Can create GuideView-compatible protocols over the web.
- A graphical editor for creating, editing, and updating GuideView process flow.

GuideView Procedures

- Two GuideView procedures have been developed.
- Ophthalmic: Evaluation of redeye includes diagnosis and treatment of eye irritation.
  - Instructions for performing eye exam
  - Detection and removal of foreign body in eye
  - Detection and treatment of abrasions in eyes
  - Diagnosis and treatment of bacterial and viral conjunctivitis.
- Foreign body in the eye is the most common medical problem in space travel.
  - (Clark, MD, personal communication)
- Airway Stage: Diagnosis and treatment of acute breathing problems.
  - Hero’s maneuver
  - Inversion of LMA (Inflatable Laryngeal Mask Airway)
  - Corsbytussery
  - Assisted breathing using Ambu bag.
  - Others

Results of Usability Study

- Results showed that: instructions rated useful to indispensable by 100% of subjects.
- Voice instructions also rated highly.
- Task Load Index significantly higher (p < 0.002) with voice navigation than without.
- Reason: Microphone and recognition software were oversensitive and interpreted external noises as commands.

Future Work

- Interface GuideView with electronic health record systems.
- Improve voice navigation.
- Add expert mode for use by physicians.
- Develop: extensive module library with management and search features.
- Enable connectivity with medical devices and sensors.
- Explore engineering applications for GuideView technology.

Clinical Guidelines

- Clinical Guidelines are stepwise instructions for performing diagnostic or therapeutic medical procedures.
- Tightly-guided are available as text, designed for use by physicians/humans.
- Example: Disorders of the Elbow:
- Perform a clinical examination for deformity, tenderness, or ecchymosis, or associated nerve, neurovascular, or tendon injury.
- Also look for the inability to perform spontaneous movement of the elbow.
- Search for any evidence of detachment and anterior vascular compression (cold, dusky hand and forearm with loss of sensation). If found, an immediate reduction should take place (prior to x-rays if necessary).
- X-ray the elbow. Special views should be obtained when necessary.
- (www.guideline.gov, “Disorders of the Elbow”)
- However, these can be hard to understand and perform, especially for untrained or partially trained persons.
- GuideView is a solution. It delivers clinical guidelines in an easy-to-understand and easy-to-use package.