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

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When the Doctor is Really Far Away!

- During space exploration a physician may not be available if astronauts need medical care.
- All astronauts cannot be physicians, or the physician may need medical care.
- Astronaut-physician may be unfamiliar with a particular medical procedure.
- Many other settings also have low physician density.
- Rural areas, less developed countries, first responders, and battlefield situations.

Clinical guidelines can be a solution if implemented using technology and user interfaces appropriate to user’s medical training.

Main Features of GuideView

- Complex guidelines 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
  - Video 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 full platform with consistent look-and-feel.
  - Over the web on Windows and Macintosh clients running the Internet Explorer.
  - Stand-alone on Windows computers.
  - On Windows Mobile PDAs (Pocket PCs).

GuideView User Interface

GuideView supports mobility

- User interface identical to the desktop version.
- Full-motion video and voice output available.
- Video- and text-based visualization for training.
- Navigation:
  - Handheld device is designed for mobile professionals.
  - Voice navigation is being developed.
- Voice instructions rated useful to indispensable by 100% of subjects.

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 choice is final. Can 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.
  - Allows learning by reviewing multiple instructional modules.
  - Each step is presented using multiple media, text, voice, and visual aids.
- Reduce complexity 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 terranially.
- Separation of content and presentation.
- Content saved as XML.

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.
- Train 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 files.

GuideView Author Procedures

- Usability Study

  - A usability study was performed at the Human Patient Simulation Laboratory, WYLE Life Sciences, Houston, TX.
  - Ten subjects used GuideView on a laptop to perform two procedures: Heimlich maneuver and insertion of ILMA.
  - A usability questionnaire and the NASA Task Load Index® were administered immediately after completion.

Results of Usability Study

- Voice instructions rated useful to indispensable by 100% of subjects.
- Video 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 an expert mode for use by physicians.
- Develop extensive mobile 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.
- Typically guidelines are available as text, designed for use by physicians/human.

Example - Disorders of the Elbow

- Perform a clinical examination for deformity, tenderness, or ecchymosis, or associated nerve, neuromuscular, or tenosynovial injury. Also look for the inability to perform spontaneous movement of the elbow.
- Search for any evidence of dedication and external vascular compromise (cold, dusky hand and forearm 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.

GuideView is a solution. It delivers clinical guidelines in an easy-to-understand and easy-to-use package.

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References


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