Video Otoscopes

An Overview of the Market and Technology

March 30, 2011

A Webinar from the Telehealth Technology Assessment Center
Welcome

- Slides and recorded presentation will be posted to the website – [www.telehealthtac.org](http://www.telehealthtac.org)

- Funding for this presentation comes from the Health Resources and Services Administration, the Office for the Advancement of Telehealth, and Indian Health Services

- Presented in partnership with the Regional Telehealth Resource Centers – [www.telehealthresourcecenters.org](http://www.telehealthresourcecenters.org)
Welcome – Overview of Today’s Talk

- Definition of Terms
- Technology Overview
- Making Them Work – VTC and Store-and-Foward
- A Look at the Market
- Thoughts on Imaging
- Image Comparisons
- Summary
- The Toolkit
- Q&A
Definition of Terms

A look at the terminology associated with video otoscopes
Definitions – The Categories

• Otoscopes with Video Output
  • Multiple video connector options
    • S-Video
    • Composite
    • HDMI
    • DVI
  • Multiple interface options
    • Stand-alone monitors
    • VTC Endpoints
    • “Framegrabber” video cards
    • Video-USB adapters
Definitions – The Categories

- Otoscopes with USB Output
  - Requires a computer to view video
  - Multiple interface options
    - Live VTC software
    - Store-and-forward software applications
Definitions – Resolution

- **Standard Definition**
  - 640x480 pixels (NTSC)
  - ~300,000 pixels, or < 1/3 megapixel
  - Uses S-Video or Composite cables / connectors
  - 4:3 aspect ratio

- **High Definition**
  - 1280x720 vs 1920x1080
  - ~1 megapixel vs ~2 megapixels
  - Uses HDMI, DVI or Component cables / connectors
  - May have 16:9 aspect ratio
Technology Overview

A look at how the devices work, and common features, functions, and issues surrounding this technology
The Parts
The Parts – Specula
The Parts – Probe
The Parts – Imaging Sensor
The Parts – Focus Ring
The Parts – Light Source
The Parts – Cables

- Fiber Optics
- Power – to Probe
- Power – to Light Box
- Video Output – to Light Box
- Video Output – to Auxiliary Device
- USB
White Balancing

- Automatic
  - Slight adjustments may change color
  - Performance varies
- Manual
  - Reset the sensor to “white” before use
Light Intensity

- Manual controls for increasing or decreasing the brightness of the lights
- Lower light levels may reduce “blooming” in images
- Not all devices support this
Sensor Sensitivity

• “Gain Control”
  • Easier to use
  • Can result in variations in color or brightness with minor movements

• Manual
  • Easier to control
  • May require frequent adjustments to get the best image
Insufflation

- Can clear humidity in the ear and “clouding” of the lens
- Not all devices support this
- Not all insufflation bulbs work on all probes
Anti-Moiré

- Moiré is an imaging artifact that results in the appearance of a regular pattern in the final image
- Important to suppress when supporting flexible scopes
Capture Image

- Internal memory
  - Images are stored to the device
  - Images may or may not be deleted on power down
  - Images can be retrieved through USB or media readers
- External software
  - Devices may communicate with proprietary software
Software

- Store patient information
- Capture images
- Case / encounter management
- May have limits on how many images can be added in one encounter
- Sometimes have background processes that use CPU
Focusing

• Fixed Focus
  • Typically only on devices with large focal length
  • Usually does not allow for “wide” shots

• Manual Focus
  • Requires user to focus the camera
  • May be prone to accidental adjustments

• Useful to be able to focus before inserting into ear canal
Depth of Field

- Also referred to as “focal length”
- Refers to the range of distances that an object can be in focus
- Very important when imaging with an otoscope
  - A greater depth of field is very useful
Field of View

- How much of the world can be captured by the sensor
- Wide field of view is important
- Extremely wide FOV can lead to distortion or “fish-eye”
Making Them Work With VTC

Getting video otoscopes to work with videoconferencing systems.
VTC Overview – Inputs

- Videoconferencing systems often support auxiliary inputs
  - VCR, DVD player, etc
    - Older Tandberg units supports Composite inputs
    - Tandberg C* series codecs may support HDMI, Component, Composite and DVI
    - Polycom supports S-Video inputs
    - Vidyo does not support auxiliary inputs
      - Recommends using a “video scaler” device
    - Lifesize supports HDMI, Component, Composite, S-Video, and DVI inputs
Connections and Conversions

- Connecting to Standard Definition
  - S-Video and Composite connectors
    - Non-USB video otoscopes should support this
  - High-definition converters
    - Requires down-conversion from HDMI or Component to SD
    - Aspect ratio becomes a problem
Connections and Conversions

- Connecting to High Definition
  - HDMI and DVI
    - This is not yet a common feature on video otoscopes
  - High-definition converters
    - Requires up-conversion from S-Video or Composite to HDMI or Component
    - Will not gain resolution in conversion
    - Aspect ratio becomes a problem
Desktop Videoconferencing

- USB-based converters
  - S-Video and Composite video can be attached to USB “dongles” that make the camera input appear as a webcam to desktop videoconferencing applications
  - Success may depend on software and USB converter
  - Would require switching the video source from the normal USB webcam to the converter
Making Them Work With S&F

Getting video otoscopes to work with frame grabbers and store-and-forward systems.
Frame Grabbers

- Capture standard-definition video or high-definition video to a PC through a special card
- Usually integrated with a store-and-forward software application
- Same requirements as VTC systems
  - Converters, connectors, etc
Full-Resolution Captured Content

- USB video otoscopes may support capturing images to internal memory or removable media
- Proprietary software may support capturing still images
- Requires USB connection or memory card reader
- Allows saved files to be transmitted
Product Overview

A look at the manufacturers and their devices
The Products

- Advanced Monitors VO – USB
- Advanced Monitors VO – Video
- AMD 300 (discontinued)
- AMD 500
- Aurical OTOCam 300
- Jedmed Combo 24
- Jedmed Digicam
- Lightning Enterprises M-100
- MedRx
- MGE DinoLite Pro – USB
- MGE DinoLite Pro – Video
- RF Co. ME-16 Morse TypeS – Video
- RF Co. ME-16 Morse TypeS – USB
- SecondOpinion DrCamscope – Standard Definition
- SecondOpinion DrCamscope – High Definition (discontinued)
- WelchAllyn Macroview
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Advanced Monitors – Video and USB
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AMD 500
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Aurical OTOCam 300
Video Otoscopes

JEDMED Combo 24

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JEDMED Digicam – G3 and MightBrite
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MEDIT M-100
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MedRx

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DinoLite Pro – USB and Video

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Sometech – Dr. Camscope
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Welch Allyn - Digital MacroView
Thoughts on Imaging

General feedback on issues that were experienced with devices when used to capture images
What Are Useful Images?

- Clinical Images
  - Most familiar to providers performing reviews
  - Challenging to control completely
    - Changes in humidity and temperature
    - Movements of subject and operator will be captured

- “Technical” Images
  - Allow for additional analysis of performance
  - May not reflect realistic use cases
  - May cause devices to look worse in review
When Capturing Images ...

- Learn before you start shooting
  - See if there are tests that don’t fare well on all devices
  - Get a feel for how to use the devices
- Stay consistent
  - Fixed distance or consistent framing?
  - Speculum on or off?
  - Image labels
Image Comparisons

A review of images from various devices.
Resolution – USB
“Technical” Imaging
“Technical” Imaging
“Technical” Imaging
“Technical” Imaging
Shooting “Wide” Images
Shooting “Wide” Images
Color Accuracy and Wide Images
Color Accuracy and Wide Images
Color Accuracy
Color Accuracy
Summary
Summary

- Program requirements should drive purchasing decisions

- Video otoscopes vary widely in features, performance, and cost

- Testing these devices can be challenging due to the variations with each manufacturer’s product
Toolkit

- A toolkit on video otoscopes will be available at the Telehealth Technology Assessment Center’s website – www.telehealthtac.org

- Includes more information, additional comparison data, and will have labeled sample images available for review
Webinars

- Next webinar is April 27, 2011

- Looking for webinar ideas – either requests for information or offers to give a presentation

- Adding podcasts to our lineup of content
Questions

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