

Image management systems

The American Society for Gastrointestinal Endoscopy (ASGE) Technology Committee provides reviews of existing, new, or emerging endoscopic technologies that have an impact on the practice of GI endoscopy. Evidence-based methodology is used, with a MEDLINE literature search to identify pertinent clinical studies on the topic, and a MAUDE (U.S. Food and Drug Administration Center for Devices and Radiological Health) database search to identify the reported adverse events of a given technology. Both are supplemented by accessing the “related articles” feature of PubMed and by scrutinizing pertinent references cited by the identified studies. Controlled clinical trials are emphasized, but, in many cases, data from randomized controlled trials are lacking. In such cases, large case series, preliminary clinical studies, and expert opinions are used. Technical data are gathered from traditional and Web-based publications, proprietary publications, and informal communications with pertinent vendors.

Technology Status Evaluation Reports are drafted by 1 or 2 members of the ASGE Technology Committee, reviewed and edited by the committee as a whole, and approved by the governing board of the ASGE. When financial guidance is indicated, the most recent coding data and list prices at the time of publication are provided. For this review the MEDLINE database was searched through February 2013 for relevant articles by using the key words endoscopy, video recording, digital capture device, tele-endoscopy, quality, and endoscopic imaging.

Technology Status Evaluation Reports are scientific reviews provided solely for educational and informational purposes. Technology Status Evaluation Reports are not rules and should not be construed as establishing a legal standard of care or as encouraging, advocating, requiring, or discouraging any particular treatment or payment for such treatment.

BACKGROUND

Endoscopic procedures are traditionally documented with a written report and variable use of still images (eg, photographs or diagrams). Endoscopic documentation may be supplemented with video recording of part or all of the procedure. Potential applications of videos include

documentation of procedures (eg, cecal intubation during colonoscopy), the ability to provide assistance to others (tele-endoscopy), sharing new techniques with a wider audience during presentations or via the Internet, monitoring of quality of endoscopic examinations, providing second opinions, training, and patient education. Image management systems enable capture, storage, and labeling of digital still images and videos. This review summarizes the features of image management systems.

TECHNOLOGY UNDER REVIEW

Image management systems are digital capture devices (DCDs) that store and encode endoscopic images and video. Options for still photograph capture and storage include comprehensive software systems that generate an endoscopy report and capture and save still images and videos as well as external DCDs. External DCDs plug into the endoscopic processor or are routed through an integration system.

Equipment necessary for recording video during endoscopy includes a video recorder and a method of storage. There are a few options for video recorders. Some endoscopic software has built-in video recording capabilities (Table 1). The videos are saved on a central server and can be exported to other media (eg, flash drive, disk).

External video recorders designed specifically for medical use are commercially available from a number of sources (Table 2). Care must be taken when purchasing an external video recorder to ensure that the device connection will be compatible with the endoscopy processor being used. To ensure recording in high definition (HD) to an HD DCD, an HD-compatible cable must be used for the connection.

Standard commercially available digital video disk (DVD) recorders can be used for recording endoscopy. Laptop computers can be connected to the endoscopy processor (or monitor) and special software purchased to record and store video.

Capturing a still image is accomplished by depressing a button on the endoscope or using capture controls on the image storage software. The system can be arranged so that the image can be frozen with 1 button and captured with another button. In systems with fully integrated software, the system saves the image digitally and incorporates it into the endoscopy report. Images can be retrieved and viewed later. Thermal printers allow for printing a hard copy of the picture frame that is frozen, but once the image is unfrozen, the image is not digitally retrievable unless it was saved by integrated software or to an external

TABLE 1. Software with integrated image management systems

	Web site	Image management	Video clip management	Remote Internet access	Software and installation (cost/room)
gCare EMR (gMed, Inc, Weston, Fla)	www.gmed.com	Yes	No	Yes	\$15,000-\$45,000
EndoWorks 7 (Olympus America, Inc, Center Valley, Pa)	www.endoworks.com	Yes	No	Yes	\$5,000-\$15,000
endoPROiQ (Pentax Research Montvale, NJ)	www.pentaxmedical.com	Yes	Yes	Yes	\$15,000-\$40,000
Provation MD (ProVation Medical, Inc, Minneapolis, Minn)	www.provationmedical.com	Yes	Yes	Yes	\$10,000-\$25,000
Endoprose (Summit Imaging, Inc, Lee's Summit, Mo)	www.summitimaging.net	Yes	Yes	Yes	\$15,000-\$20,000
Endosoft (UTECH Products, Inc, Schenectady, NY)	www.endosoft.com	Yes	Yes	Yes	\$10,000-\$20,000
Studio3 (Stryker Communications, Flower Mound, TX)	www.stryker.com/mediamanagement/	Yes	Yes	Yes	\$12,500-\$20,000

storage device. Depending on the device, video recording can be initiated and paused via touch screen and/or mouse click, depressing a foot pedal, or pressing a button on the endoscope. Some devices have dual-channel recording so that video can be captured from 2 inputs simultaneously (eg, video endoscopy and US). Images and video from a variety of sources can be recorded (endoscopic, fluoroscopic, US) and stored by a DCD.

Image quality

Image and video quality are determined by a number of factors, including the resolution of the output (eg, standard definition [SD] vs HD), the data transfer rate, and the method of compression.¹

SD versus HD. All DCDs are capable of SD image and video capture, whereas some of them are capable of HD recording. SD handles resolution up to 640 × 480 pixels. HD cameras and monitors can handle video at resolutions of 1280 × 720 pixels, and some have higher available resolutions (1920 × 1080 pixels). SD-compatible signals include separate video (S-video) and composite. HD-compatible signals include digital visual interface (DVI) and HD-serial digital interface (HD-SDI).

HD video uses either progressive or interlaced scanning. Progressive scanning renders each frame of video as a series of horizontal lines drawn from left to right and then top to bottom. The process then repeats to display the next frame. Interlaced scans are different in that the rendering happens every odd-numbered horizontal line of the frame until the bottom of the page is reached, and then it fills in the even numbered lines.² A field is a set of even or odd lines. As long as the fields

are drawn in rapid succession, the viewer perceives them as one complete moving image. The type of scan used is indicated along with the image resolution: 720p (p for progressive) video contains 720 lines drawn in sequence by using a progressive scan to complete the frame, whereas 1080i (i for interlaced) video contains 2 fields of 540 lines each, drawn in succession by using an interlaced scan. Video is captured in either progressive or interlaced scans and requires playback in the same format.

Data transfer rate. The data transfer rate (DTR) is commonly used to measure how quickly data are transferred from one location to another. In telecommunications, data transfer usually is measured in bits per second. In computers, data transfer is often measured in bytes per second. The DTR is important in HD because a higher DTR will be required for clean video streaming.

Compression. Compression reduces file sizes by eliminating all nonessential data. Uncompressed HD video uses a significant amount of storage space. For example, 1 hour of HD video requires 500 GB of space. Because of the large volume of memory required for HD video, compression is almost always used during recording. The codec is a program used to compress and decompress images and video into a variety of image formats.

Image format. Images and videos can be captured in various formats. Image format types include bitmap (BMP), Joint Photographic Experts Group (JPEG), JPEG 2000, Truvision Graphics Adapter (TGA), Tagged Image File Format (TIFF), and others. These formats vary in image quality, file size, and compatibility with software programs. When images are converted between formats, image quality may deteriorate because of loss of data.

Download English Version:

<https://daneshyari.com/en/article/3303772>

Download Persian Version:

<https://daneshyari.com/article/3303772>

[Daneshyari.com](https://daneshyari.com)