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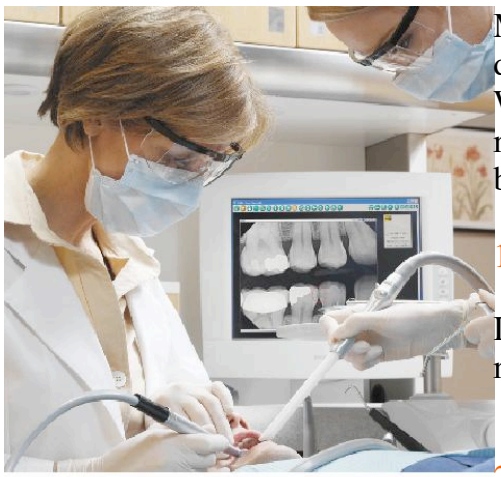
6 Benefits of the Technology

Digital radiography can store, transmit, and enhance Your DATA. What are you waiting for?

Digital radiography: Part 1 Part 2



Most dentists know the basic idea behind the amazing technology of digital radiography—a digital sensor replaces film and a film processor. What many dentists don't fully appreciate, though, is why digital radiography matters and what its advantages are. Here are its six key benefits:

1. Lower radiation

Digital radiographs require significantly less radiation than film radiographs. This is always an advantage.

2. It's a digital image

One of the most powerful features of a digital radiograph—the fact that it's digital—is so obvious that it's sometimes ignored. It's an advantage that people with limited digital technology experience often don't appreciate.

Just the simple fact that an x-ray image is digital is a tremendous benefit. Here's why: To digitize anything, including an x-ray, means to turn the information into the electronic language that computers can understand. Once that has been accomplished, there are three things you can now do with the digital information: store it, transmit it, and enhance it using a computer network.

• Storage means that the radiograph can be part of an electronic health record. Without digital diagnostics, there's no way to create a paperless record.

• Transmission means that the image can be stored in a server computer and viewed instantly at any office computer. However, beyond that, the image also could be viewed instantly by the specialist across town, the insurance carrier in another state, or a consulting radiologist in another country.

• Enhancement means that a dentist can use software to bring out features in an image that otherwise would not be seen. Enhancement is the most interesting digital advantage; it's also an advantage that is often overlooked. (For more on enhancement, see No. 4.)

3. Speed of acquisition

With a direct sensor, a digital radiography image can be viewed on the computer screen in as little as 4 or 5

seconds after the sensor is exposed. Once again, this advantage is not always appreciated. We tend to compare the time it takes for an image to appear on the screen—4 or 5 seconds—with the time it takes to process an x-ray—4 or 5 minutes. However, when you examine the workflow, there is much more time and fuss involved with film than simply the time it takes to process the image, as follows:

After a film is exposed, the technician must leave the room, which creates an asepsis issue with gloves and cleanup. The film packs must be opened in a dark room and inserted in the processor. After the films are processed, they need to be properly placed in a dated and labeled film mount. Then the mounted films need to be returned to the clinical area for viewing.

As a general rule, it takes 8 to 10 minutes after exposure before a dentist can view a film image for diagnosis. Digital acquisition is not just a little faster than processing film; it's 120

times faster. Here's another great benefit from a direct sensor's speed of acquisition, and one that's almost never discussed: A user can view the image before the sensor leaves a patient's mouth. If you miss the apex, cone cut the distal, or overlap the interproximal, you can see the error in seconds and make the necessary positioning adjustments to the sensor or the cone to get a perfect image.

With film, you would not know about these problems until the film was processed, and then you would have no physical reference point to return to, so that you could improve the image.

Digital radiography means…
1 Lower radiation
2 A digital image…Store, transmit, or enhance it.
3 A fast procedure…View an image in 4 or 5 seconds.
4 Enhancement…Use software to bring out diagnostic features not visible to the naked eye.
5 The Wow! factor…Patients are impressed when a digital image of their teeth shows up on the computer.
6 Money and time savings.

4. Why enhancement matters

At the most basic level, a radiograph is a diagnostic tool. However, a radiograph does not possess any intrinsic diagnostic knowledge. It only has value because we have learned to interpret features we see on an image to mean the tissue is either healthy or there is a pathological change. These features can indicate dental caries, bone loss, periapical pathology, or a host of other concerns. Generally, we make these determinations based on the density of the tissues as indicated by the shade of the image as it varies from black to white and as it compares to similar features on the image.

This rather convoluted description is intended to demonstrate that there's nothing special about a radiographic film. It's the data contained on the film, and our ability to see and interpret that data, that leads to diagnosis. To evaluate a digital radiograph on the basis of how similar it is to film is to miss the point.

A better evaluation of a radiograph would be to ask:

• Does this image contain information or data that I can use to make a diagnosis?

• Can I accurately interpret that data?

Based on these criteria, a digital radiograph is (or, at least, has the potential to be) a much better diagnostic tool than a film radiograph. A high-resolution digital radiograph will capture more individual data points than film. In fact, a digital radiograph will capture more data than we can see.

Using enhancement software allows us to see the differences in the digital data that we cannot see with just our eyes. The software can detect differences in the shades, from black to white, that we cannot detect with our eyes.

For example, each pixel—or dot—on the x-ray can be one of 256 different shades from pure white to pitch black. Our eyes can only detect about 60 to 100 different shades. In practical terms, what this means is that the shade may change slightly from one pixel to the next, but the change is so slight that we cannot see it.

However, the software does know if the shade has changed. We can use the software in one of two ways: We can use the enhancement tools, such as brightness and contrast, to bring out these subtle differences, or we can simply ask the software to detect changes and evaluate them to decide whether they indicate a pathologic change.

5. Wow!

Another advantage is the Wow! factor. Patients are impressed when, in seconds, they see their image pop up on the computer screen. And they are much more likely to tell a friend or family member about the digital image and the office than they would if it were just a film image. Furthermore, in the near future, digital radiography will no longer be a Wow! factor—it will be expected. Any office still using film will be viewed as out of date.

6. Digital radiography costs less than film

The final advantage of digital radiography—which may be a shock to many dentists—is that digital radiography is less expensive than film. (See “Cost of digital vs. film radiography” on page 34.)

Once a computer network is in place, the cost of adding digital radiography runs between $12,000 and $14,000. (This cost doesn’t include a computer network, which also is used for so many other high-tech systems.)

Compare this to the cost of film radiography, which runs about $14,950.

In addition, the total cost of film radiography does not take into account the many hundreds of hours of time saved by not waiting for x-rays. The time saved (about 442 hours a year) can easily amount to more than $10,000 a year in labor costs.

Cost of digital vs. film radiography

Digital radiography is less expensive than film radiography when you compare the following costs:

» **Digital**
Sensor $8,000
Software $3,000
Connections $1,000
Total $12,000

» **Film**
Auto processor $7,400
Darkroom $2,250
Film, chemicals, mounts $5,300
Total $14,950

Note: The costs of digital radiography do not include the cost of a computer network (which most offices already have in place for other high-tech uses). For more details about how film costs are calculated, see ”Basis for cost estimates."

Basis for cost estimates

Here’s a closer look at how the costs of film radiography are calculated and how the time you save also saves you money on labor costs:

• Dark room costs ($2,250) 5 ft. x 3 ft. = 15 sq. ft. @ a cost of construction of $150/sq. ft. = $2,250

• Film, chemicals, mounts, and maintenance costs ($5,300)

• Estimated at 60 cents per film

• Eight hygiene patients a day with four films each = 32 films per day

• One root canal and one new patient = 14 films per day. 14 + 32 = 46 films per day

• 4 workdays a week for 48 weeks = 192 workdays per year

• 46 (films per day) x 192 (workdays) = 8,832 (films) x .60 (per film) = $5,300 (cost of film)

• Time saved (more than $10,000 a year)

3 minutes per film x 8,832 (films) = 26,496 minutes = 442 hours @ $24/hour = $10,608

($24/hour is based on a base wage of $18/hour, plus 33% overhead [$6/hour], to cover taxes, insurance, workman's compensation, etc.).

What are you waiting for?

Digital radiography is not only amazing; it has many significant advantages over film. Not only is it better, it actually can be less expensive. What are you waiting for? The future is coming and it will be amazing!

Dr. Larry Emmott, an authority on dental technology, is a practicing general dentist in Phoenix, Ariz. His next "Technology on the Rocks" seminar is from May 29-31 in Sedona, Arizona. This three-day travel and technology program includes mountain biking and technology seminars. For details, call 602-324-1900 or visit his Web site: www.drlarryemmott.com.

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