

Operator

Where's the action? It's in the treatment rooms where you should place your newest and fastest computers to accommodate a range of diagnostic, patient-education, and communication tools.

By Dr. Larry Emmott

Oh, the marvels of high-tech computers. At your fingertips: digital radiographs and photographs, computerized probes, voice charting, light pens, and a patient chart showing current and future treatments.

And I'm not talking about front-office computers and management software. (For more about that, see the first three articles in this 10-article series, "Building a high-tech office," as outlined in the sidebar to the left.)

I'm talking about powerful computers in the operatory that propel diagnosis, save you time, and reduce errors.

This article, the fourth in the series, looks at treatment-room computer, the technology infrastructure you need to get started using them, the basic computer hardware that powers them, and costs, including replacement costs.

It also reviews a February *Dental Products Report* survey on who's using operatory computers and why.¹ And, it takes a look at the future: How mobile computers will revolutionize the operatory, and how having the dental world computerized fits in the grand scheme of the business world's "digital nervous system," as envisioned by Microsoft's Bill Gates.

Digital data at the ready

"Business will change more in the next 10 years than it has in the last 50." This is what Gates predicts in his best-selling book, *Business @ the Speed of Thought: Using a Digital Nervous System* (Warner Books, 1999).

Gates' prediction on change is based in large part on what he calls "the digital nervous system," which is how he sees the business world of the future. In Gates' world, we'll see the complete connection, via computer networks, of the following:

- All parts of a business,
- All businesses to each other, and

- All customers (through computers and the Internet).

Gates' digital-nervous-system scenario, which allows for the instant flow of information, will transform everything we do in dentistry as well as in other businesses.

In the dental office, Gates so-called digital nervous system would connect treatment rooms to the front desk, but it won't stop there.

- From the office you will connect to suppliers, insurers, laboratories, specialists, and financing.

- Patients also would be connected to your office through Web pages and e-mail, enabling patients to do tasks such as getting appointment or account information, contacting a third party, or learning about dentistry.

All of these tasks would be done through the Internet—anytime, from anywhere.

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At first glance, this electronic-information exchange may not seem too important, but in action, it literally changes everything. The digital exchange of data is what's behind the PC revolution. It's

what powers the Internet. It's the essence of the information age.

Getting started

So how do you develop a "digital nervous system" for your office? It starts with building a technology infrastructure, a two-step process, as follows:

1. *Install and use a complete, integrated practice management software.*

Most dentists start here, but some miss it. If you aren't using a complete management system, designed to be used clinically, with some form of paperless chart, then you aren't ready for the next step, which is:

2. *Establish a network with treatment-room based computers.* In other words, place computers in the operatory.

Building a high-tech office: A 10-article series

How do you build a high-tech office? To find out, we asked Dr. Larry Emmott, DPR's technology editor, to present a 10-article series to guide you through the complex process of choosing and using high-tech systems, from software (see the first three features in this series), to hardware (this issue), to digital devices, as follows:

- **Management software:** charting (February), scheduling (March), and finances (April)
- **Hardware in the operatory (May)**
- **Digital photography** (June)
- **Q&A on building a digital practice** (July)
- **Digital marketing** (August)
- **High-tech diagnostic devices** (September)
- **Online consultations** (October)
- **Digital intraoral cameras** (November)

This month, Dr. Emmott focuses on computer hardware for the operatory, including what you'll need to buy (see opposite page), how you're using these computers (page xx), where to buy computer hardware (page xx), mobile computer workstations (page xx), and costs (page xx).



DR. LARRY EMMOTT

powerhouses

DPR's 2004 computer survey

How many doctors have computers in the operator? Thirty percent have them now, and another 12% plan to buy operator computers within the next 12 months, according to a survey on computer and internet usage sent to GPs this February by *Dental Products Report* and *Dental Practice Report*, its sister publication.² That's almost 42% of dentists investing in these operator powerhouses.

And doctors say they are using these powerful treatment-room computers for a variety of tasks, from scheduling (78% of respondents), to treatment planning (64%), patient education (61%), digital radiography (42%), and cosmetic imaging (23%). For other uses, see the sidebar, "How you're using operator computers," on page xx.

I predict that treatment-room computers soon will be the norm. There are many reasons for this. The most compelling reason, though, is that a computer in the treatment room is the most logical and the most effective way to use computers in dentistry.

Benefits

What makes treatment-room computers so powerful is that they allow for the electronic transfer of information from the clinical area to the administrative area, and then on to anywhere it may be needed, including a third party. Treatment-room computers are the first leg in the digital nervous system.

Computers in the treatment rooms also save time, reduce errors, and lead to all the other high-tech marvels we can use in the dental office. The computer has been trans-

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COMPUTER HARDWARE

What you'll need

A list for building your treatment-room powerhouse

- Intel Pentium 4—2.8 GHz processor
- 512 MB RAM
- 40 GB IDE hard drive
- Microsoft Windows XP Pro operating system
- CD ROM drive
- Sound cards and speakers
- USB 2
- FireWire
- Dual monitors

Source: Dr. Larry Emmott

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formed from a simple data-entry business machine to a multimedia patient-education, diagnostic, and communication station.

For example, in addition to practice management software, a treatment-room computer could have digital radiographs, patient education, and digital-image management.

The computer hardware might include multiple monitors with sound and speakers. In turn, sophisticated computers and monitors could accommodate computerized probes, voice charting, light pens, video input, a CD-ROM, a modem, DVDs, and even a blood-pressure cuff.



DENTAL PRODUCTS REPORT SURVEY

How you're using operator computers

A 2004 Dental Products Report computer/Internet usage survey

In February, a *Dental Products Report/Dental Practice Report Computer/Internet Usage Survey* was sent to 2,000 GPs in the United States. Practitioners were asked:

Are any of your operatories outfitted with computers?

Yes	30%
No, but plan to purchase one within 12 months	12%
No	58%

If your operatories are outfitted with computers, please indicate the uses of your operator computer.*

USES	% USING
Scheduling	78%
Treatment planning	64
Patient education	61
Tooth charting	58
Periodontal charting	54
Intraoral video	51
Billing	48
Still digital photographs	43
Digital radiography	42
Progress notes	42
Cosmetic imaging	23

* Multiple responses accepted

Source: February 2004 Dental Products Report/Dental Practice Report Computer/Internet Survey

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Computer hardware basics

The development of an amazing array of digital devices to attach to, and integrate with, treatment-room computers has completely changed the concept of dental computer use. It also has changed the basic treatment-room computer requirements. Here are some of these basics to keep in mind as you select computer hardware for treatment rooms:

- Because of its growing usage capacity, the treatment-room computer needs to be the biggest and fastest machine in the office next to the server, especially if you wish to do image management.
- These machines need full multimedia capability, including sound, powerful processors, and lots of memory.
- They do not need any hard drive storage, as all the data will be stored on the server.
- Computer specifications and prices change very rapidly (see Moore's law on page xx). With this in mind, as of March 2004, a reasonably priced clinical work-

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- station will cost from \$1,800 to \$2,000.
- For a list of suggested hardware components, including processors and monitors, see “What you’ll need: A list for building your treatment-room powerhouse,” on page xx.
- For a discussion of whether to buy retail, over the Internet or from a reseller of full-service dental supply

company, see the sidebar: “Where to buy computer hardware, on page xx.

Mobile workstations

The use of wireless mobile computing devices could completely change how we use computers in treatment rooms. With mobile computers, the future vision for the

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BUYING TIPS

Where to buy computer hardware

You have three main options for purchasing computer hardware: retail stores, mail order/Internet, or Value Added Resellers.

Retail

The daily paper shows computers for sale everywhere. You can buy them at special, giant “Computers R Us” types of stores, at appliance stores, and even at department stores. Buying a single computer for home use from a retail outlet might be a good choice, but for most business uses, buying retail has some major problems.

Support is the most critical element to keep in mind when buying a computer. When you buy retail, you take what is on the shelf. There is very little capacity to customize. The most significant problem with buying retail, though, is that stores hardly ever provide on-site service, delivery, set up, troubleshooting, and repair.

I’m sometimes asked if retail computers accept digital dental devices. Stock computers might lack video capture cards, used in digitizing videos, but you can customize them to include capture cards. Setting up a digital radiography system on a stock computer is not a problem, as the system require a USB port, which is standard on most computers.

Mail order/Internet

When buying any kind of computer product, the best selection and prices are available from mail order or Internet outlets. And some major computer companies, such as Gateway and Dell, sell only via mail order. Generally, mail order/Internet offers a wide range of choices, and you even will be able to customize your computer choice at prices below most retail stores.

The problem with mail order is long-distance service and support. Usually, a dental office will need an expert to install and set up the computers and the network.

Value added reseller (VAR)

The advantage of a VAR is the value-added part. A VAR will custom-build a computer to your specific needs and specifications. They will deliver and set up computers, install software and any networking, set up network protocols, install peripherals, set up and network printers, troubleshoot the system, and integrate components. That is a lot of added value, and it is worthwhile to pay more for a VAR.

The most important added value is on-site service and support. When something fails, you need a local person who will come to your office that day to fix or replace the failed component. So, choose your VAR with care. Be sure to get references, and check them out. Ask current clients how the VAR responded to an emergency.

It’s a good idea to work with a VAR that knows dentistry, as many special components and applications are unique to the dental office. Some full-service dental supply companies even offer hardware sales and service as an added benefit.

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dental office will be computers assigned NOT to rooms but to people. Each team member and the dentist will be able to roam freely about the office with a portable computer that is always connected wirelessly to the office network and beyond to the Internet.

The tablet PC drives this change. Tablets are the next version of a laptop. A key feature of tablets is the use of

touch screens and inking. That means a user can easily enter information by tapping on the tablet's screen with one hand while holding the tablet in the other hand. Ink allows users to write or draw on the screen just as if it was a piece of paper.

We will soon be seeing ink-capable charting. This will allow dentists to draw on the electronic dental chart just like we used to do on the paper charts. It will also allow

for ink-capable forms. A patient will not fill out a paper form. Instead, the patient will be handed a tablet on which to fill out a form using a stylus and ink. And then the patient or dentist can sign the electronic chart using ink.

While wireless mobile computing devices provide more mobility than wired computers, they also require more attention than wired devices. For example, mobile-computer users have to remember to dock or charge batteries multiple times a day, as batteries for these devices have a limited life. Also, connecting x-ray sensors and cameras to a tablet can be a problem, if the camera or sensor uses a capture port or device that is not available in a tablet form.

Users of wireless networks also should be aware that they might encounter dead spots and limited range with wireless networks (just as you do with cell phones). For example, you may find that the tablet suddenly loses contact with the server when you go around a corner or walk to the end of the hall. The rate of data transfer also can be a problem for certain applications, such as full-motion video, which pushes a lot of data.

Finally, as with computers in general, strict security features need to be in place to prevent unauthorized access.

Computer upgrades/ Moore's Law

In the 1960s, Gordon Moore, a co-founder of Intel, made this observation, which has since come to be known as "Moore's law":

"Computer power will double every 18 months."

Moore's law has proven to be true for the last 40 years, and it will continue to be true for as long as we can see into the future. This means that no matter what kind of computer you get today, in less than two years, there will be a computer, which is twice as fast, twice as big, and twice as powerful as the one you just bought.

Moore's law results in exponential growth. That means the new hardware is-

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What's online

 

COMPUTER HARDWARE/ROOM DESIGN RESOURCES—Dr. Larry Emmott's November 2003 column, "[7 ways to make a high-tech office more efficient](#)," carried a sidebar, "[Room design resources](#)," listing contact information for 12 companies that specialize in office design and equipment, including computer hardware installation, support, and services.

To access this sidebar on our Web site, www.dentalproducts.net, go to: <http://www.dentalproducts.net/xml/display.asp?File=2098>.



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n't a little better. It is a lot better, and it gets better again very quickly.

As a result, in the dental office, as in the rest of the business world, computers need to be replaced on a regular basis. The computers need replacing not because they are broken. More often they must be replaced because they are no longer capable of running the current software.

After three years (two Moore cycles or 36 months), the new computers are four times better and, in a little more than a year after that (four years all together), the new machines will be eight times better.

To make this easy to understand, think of Moore's law in terms of cars. If you bought a car five years ago that could travel up to 20 miles per hour, the new cars being sold today would be going close to going 160 miles per

hour. (Eighteen months later the cars will be doing 320 miles per hour!) The old car might still be running, but it is no longer useful.

As a general rule of thumb, computer hardware should be replaced every three years. It is sometimes possible to stretch that to four, but it's probably not worth it. Upgrading technology is a necessary expense of doing business in the modern world. Make technology part of your office budget.

A typical office with one dentist, three treatment rooms, and a front desk will usually need six computers. On average, they should cost about \$1,500 each or \$9,000 total. If you replace one third of the network—that is, two computers—every year, the cost is only \$3,000 per year, which is easily manageable for most dental offices. Then you cycle the computers through the office.

Guess who gets the coolest computer

The fastest, most powerful machines need to be clinical, as that's where the action is. It's where all the multimedia, photo, x-ray, education, and communication programs are used. So the newest, fastest, coolest, most powerful computer goes to the dentist. The hygienist gets last year's model, and the old slow pokey computers go up front.

Computer hardware in the treatment room is a key part of a future digital nervous system. The future is coming and it will be amazing! **DPR**

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Dr. Larry Emmott, a recognized authority on dental technology in America, is a practicing general dentist in Phoenix. He also is a professional speaker, a featured instructor at the Las Vegas Institute, and a member of the American Academy of Dental Practice Administration. He has written hundreds of articles on dentistry, computer use, and management. He also writes a monthly electronic newsletter, "Emmott on Technology."

Technology on the Rocks. *Dr. Emmott offers hands-on technology seminars. His next seminar, "Technology on the Rocks" (June 1-5), is a five-day educational/recreational program in Sedona, Ariz., run by Dr. Emmott and Dr. Dale Miles, another dental technology expert. For details on the seminar, call Dr. Emmott at 602-279-1641 or visit www.drlarryemmott.com. Or, call Dr. Miles at 480-816-6078 or visit his site: www.learn.digital.net.*

Reference

1. A national survey to ascertain accurate and current data about the ways in which dentists are using computers and the Internet was issued to 2,000 GPs in February by Dental Products Report and Dental Practice Report. A total of 407 responses were received for an overall response rate of 20.4%.

Photo credits

- Photo of the A-dec 500 front-side monitor mount on page xx and the A-dec 500 patient chair with monitor mount on page xx, courtesy of A-dec Inc.
- Photo of MediaDent practice management charting software shown on the computer mounted on the monitor mount on page xx, courtesy of MultiMedia Dental Systems Inc.