

# Internet-Based Practice Management Software

By Charles A. Lewis

## The Need

The rapidly growing trend of replacing paper patient records with electronic records is leading to improved functionality for health care providers. As doctors phase their practices into increasingly paperless operations, having easy, instant, around the clock access to the electronic records becomes more vital. Equally important is the effortless transmission, exchange, collation and aggregation of electronic records from multiple sources. Safeguarding the privacy of patient information is critical, which is why the Department of Health and Human Services enacted the Health Insurance Portability and Accountability Act of 1996 ('HIPAA').

## The Idea & Plan

As CEO of a dental management software technologies company, it seemed not only logical, but essential, to explore new avenues for increasing the accessibility and transferability of electronic records for those with a right (*and need*) to see protected health information. The obvious method that came to mind for accomplishing this goal was to use the global information system called the World Wide Web, or Internet. Consequently, in 2002 our company began the process of designing practice management software (*the basic source of patient electronic records*) capable of being operated over the Internet.

## The Process

In designing dental management software that would be operated totally over the Internet, certain standards and objectives had to be established. Some were set by our company and others were mandated by HIPAA, current technologies, and common sense. These included:

- It had to be full-functioning Windows XP-based software with all the capabilities of management software used in local area networks ('LAN'); a limited-function web-based interface requiring connection to a LAN in the practice would be burdensome and unacceptable;
- The program had to be capable of handling all the clinical data, diagnostic records and images;
- To be capable of paperless operation, it had to integrate with the ancillary systems practices use;
- The software had to incorporate extensive data encryption capabilities to prevent unauthorized access and to meet the patient information confidentiality safeguards required under HIPAA;
- Strict control at all levels of the program would be required to completely regulate access based on a 'need to see' the protected health information;
- The electronic records in the program would have to be available 24/7/365, which required total software stability;
- It would be highly desirable for the software to operate on PCs, Tablet PCs, thin client terminals, Macs, and on PDAs or Pocket PCs;
- To eliminate the problem of having to support more than one software application, the program should also be capable of operating on LANs since some doctors do not have broadband access.

As the criterion above was set forth, it was done with the complete awareness that no other company, worldwide, had ever successfully developed and/or sustained operation of a comparable system. In every sense of the word, this would truly be a ground-breaking effort.

Once the software guidelines had been established, the next step was to work out all the requirements and mechanisms for delivering the management program and data to the user. The necessities included:

- Bi-directional encryption of all data and images;
- Transmitting the data and images in formats that cannot be attached by viruses;
- Multiple software and hardware firewalls;

- Multiple RAID Fault-Tolerant backup systems and NAS servers;
- Multiple failover and load-balancing systems and servers;
- Managed Internet Services 24/7/365 with 99.99% guaranteed uptime;
- Frame Relay service
- Establishing a system to keep the IPD network in the practice operating in the event the broadband connection from the local Internet Service Provider is lost;

## What it Is

In essence, developing and putting into place everything described above would technically mean becoming what is commonly called an Application Service Provider ('ASP'). The Application Service Provider Industry Consortium provides the following definition for Application Service Provider:

"An ASP deploys, hosts and manages access to a packaged application to multiple parties from a centrally managed facility. The applications are delivered over networks on a subscription basis. This delivery model speeds implementation, minimizes the expenses and risks incurred across the application life cycle, and overcomes the chronic shortage of qualified technical personnel available in-house."

There were concerns about using the term ASP to describe what would be offered since ASPs have not typically been health care related. Also, Microsoft uses the phrase ASP.NET (the initials stand for Active Server Pages) for its set of technologies in the Microsoft .NET Framework for building Web applications and XML Web Services. Because the ASP designation can be confusing, our company chose to use the terminology Internet Program Delivery ('IPD'); a description that better explains the service actually provided for clients.

## Advantages

Sooner than expected the software was completed, the delivery system was in place, everything had been fully tested in actual operations, and IPD suddenly became a reality. System operations are now well into their second year and IPD has been overwhelmingly successful. So, what does this leading edge system offer dental health care providers? The list of advantages is impressive:

- ☑ The software offers the same all-inclusive features of a LAN-based program, integrates with all the ancillary systems used in practices, and is capable of paperless operation. *(It can also be used in LANs.)*
- ☑ The software is tremendously stable and has never 'crashed.'
- ☑ The software and practice data resides on powerful servers in a state-of-the-art data center and is available to users around the clock from anywhere in the world with an Internet connection.
- ☑ The data and images are bi-directionally encrypted and the user has an encryption key. Viruses cannot attach to the format in which the data and images are transmitted.
- ☑ The speed of the office IPD network is determined by the data center's multi processor-equipped servers and the user's broadband connection, reducing the need to constantly upgrade workstations.
- ☑ Servers in the data center are protected by both software and hardware firewalls.
- ☑ Network workstations can consist of PCs, Tablet PCs, thin client terminals, or Macs and the program will also operate on PDAs or Pocket PCs. Since workstation CPU speed is not critical, users with PCs capable of connecting to the Internet can use them on an IPD network.
- ☑ Users never have to purchase expensive servers or do time-consuming, annoying daily backups; their data is constantly backed up, on multiple servers, at the data center.

- ☑ The constant upgrading of operating systems is eliminated because the operating system on the data center's server is kept up to date at all times.
- ☑ All updates to the management software are made on the servers in the data center and are then immediately available to the user. No more installing updates on the practice system.
- ☑ The data center provides multiple levels of system backup devices. Failover servers are utilized for redundancy and for load balancing to ensure that a server's processing limits are never exceeded. Off-site failover servers in different geographic areas are used in the event of natural catastrophes.
- ☑ The user's electronic records are easily made available to clearinghouses, referring doctors, for interfacing with the practice website, etc.
- ☑ The user's data is stored in the same location where the programming and support staff is based, simplifying support services.
- ☑ The managed Internet services used are guaranteed to have an uptime of 99.99% and thus far have never been down.

There are three more advantages that make IPD operations very desirable for doctors and they come under the categories of emergency operations, operating multiple offices, and access from home.

Emergency Operations: IPD can make it easy to quickly get back to seeing patients after catastrophic events such as the destruction of an office by fire, wind, water, earthquake, etc. Since most doctors have arrangements with colleagues to temporarily share their office facilities in the case of such disasters, they can soon be back in business with a Thin Client/PC/Mac and an Internet connection. And if the practice has been operating in paperless mode, the doctor has access to *all* the patient records.

Operating Multiple Offices: IPD is the ideal solution for operating multiple practice locations. All workstations connected to the central server are using the same data, in real time, no matter where they log on from. No more carrying data between offices with all the backups and restorations that requires.

Access from Home: With an Internet connection, IPD makes it possible for the doctor to have complete and instant access to all the electronic patient records. This can be extremely helpful for handling patient emergencies when the office is closed; the doctor is away on vacation, etc.

### **Reduced Costs**

Using IPD can help reduce system implementation costs. For instance, a large percentage of doctors still use DOS-based management software and many have PCs that are at least Pentium III's, which are certainly browser-capable. Yet most providers of Windows XP-based management software require that a Pentium 4 processor be used. However, because IPD network speeds are based on those of the server and office Internet connection, network speed is not degraded by using older PC workstations. This means doctors can save money by using older PCs until they 'die.'

Practices that need to replace or add hardware, or the doctor opening his/her first practice, can purchase lesser-equipped, cheaper PCs and/or Thin Clients for workstations. This makes it much easier, financially, for the practice to convert to paperless operation, which requires a greater number of workstations. They also avoid having to spend thousands of dollars for an expensive RAID server and backup device for the system.

### **Misconceptions**

It is interesting to hear and read some of the misconceptions regarding operating management systems via the Internet. There are only a few of them ever mentioned but the same ones are repeated by almost everyone that wishes to express an opinion on the subject.

It appears that the primary source of the information might be some of the management software companies that have not yet figured out how to achieve Internet delivery. Consequently, they bring up invalid, uninformed, and misleading issues about using Internet delivery when the subject is raised by prospective clients. Here are examples from recent industry magazine interviews of two management software company CEOs whose companies do not offer systems for use on the Internet.

One CEO said that he thinks that as Internet bandwidth increases more practices will operate their offices from a remote server. He said that it is possible to do this now but as the bandwidth increases it will allow larger offices to utilize these types of operations. It is difficult to comprehend what limitations this person envisions that prevent current bandwidths from operating large numbers of workstations? The truth is that large practices already operate via the Internet. Our company operates single offices using more than 25 workstations and just one properly-equipped server can operate hundreds of workstations in offices all over the nation. *There aren't any known size restrictions that would even be relevant.*

Another CEO acknowledged that ASP systems will eventually be used and even admits that they will provide a number of compelling advantages, such as service-provided data backups and the elimination of expensive workstations. But he then went on to say that Internet dependability and security issues will prevent such operations from being universally adopted for some time. Yet this author is not aware of the Internet having ever been 'down' or otherwise 'undependable.' If he was referring to the dependability of broadband connections from local ISPs, he would have at least had a talking point. However, from the beginning our company designed a methodology to allow office networks to continue operations when those inevitable disconnects occur.

Internet security issues, although they can be formidable, were extensively researched and the appropriate measures were taken. Large financial transactions, including those with banks, are commonplace on the Internet. For good reason, hackers have yet to break the current version of 128-bit encryption. If a 128-bit system key is used for symmetrical encryption, experts say it gives approximately 340,282,266,900,000,000,000,000,000,000 possible keys with which to encrypt the data. Although this seems safe, our company's next system release will use 256-bit encryption. That encryption algorithm uses a key which is a binary number 256 bits in length. The greater the number of bits in the key, the more possible key combinations and the longer it would take to break the code. Because of this, movement of encrypted data across the Internet is safe; it is when it gets to the server hosting the data that it is the most vulnerable to hackers. Our company has taken extraordinary precautions by using the latest protection technologies at the router and firewall levels and feel that the data is as secure as current technology can make it.

In any event, the electronic patient files are much more secure in this system than paper records are in a typical doctors' office. If you disagree, just consider how easy it would be for a burglar to break into your office and steal paper records, or even the file server containing your unencrypted data!

## **Summary**

For all the reasons presented in this article, and for other advantages that will continue to become available, most practice management systems will soon be operated via the Internet. The combination of ease of use, efficiency, and cost effectiveness involved in using IPD systems make this inevitable.

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