The Paperless Medical Office: Digital Technology's Potential for the Internist

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Executive Summary

Recent reports (1–3) show that while only 5% to 9% of American physicians use electronic health records (EHRs) on a regular basis, there is a great deal of variability within geographic regions. For example, EHR adoption in Massachusetts is as high as 30.2% (4) A much smaller number of physicians, about 0.1% nationally according to one expert in the field (5), have taken the next big step to make their practices virtually "paperless." The core of a paperless office is a system that integrates EHRs with physician practice management and patient scheduling software. Such software has the ability to facilitate many critical practice functions, including patient record keeping, scheduling and communications, issuance of bills and tracking of claims, ordering and receipt of diagnostic test information, generation and tracking of physician referrals, measurement of physician and staff productivity and performance, and internal administrative workload and budget control.

In its fully realized form, a paperless office can enhance the quality of care that a physician practice delivers while also offering an array of other benefits. These can include the following:

- Instant access to patient health data from any location with a computer and Internet access;
- Real-time medical decision support;
- Updating of the EHR while the patient is being seen;
- Digital transmission and receipt of all patient lab requests and results, physician consult requests and reports, and patient prescriptions;
- Medication and formulary information and advice, aimed at avoiding errors and untoward drug interactions and keeping drug costs as low as possible;
- Coding advice to physicians to assure accurate documentation of a visit's level of complexity;
- Generation of patient bill and patient take-home medical summaries, condition-specific information, and treatment instructions for patients before leaving the office;
- Scheduling patient appointments and sending reminders to patients about important treatment items and upcoming tests and appointments;
- Digital transmission and tracking of claims sent to insurers;
- Physician performance measurement and health care outcomes research.

Technology and software already exist that would allow internists to spend more time seeing patients and less time on paperwork; however, physicians in the United States have been slow to embrace this new technology. England has committed $17 billion to wire every hospital, clinic, and doctor's office. All of England's 50 million citizens are expected to get an electronic medical record by 2005, and, by the end of 2008, the system will handle an estimated 5 billion transactions a year, including electronic appointments, prescriptions, and access of patient records (6).

The optimal impact of this new and emerging technology cannot be fully realized until the entire U.S. health care system is wired to send and receive all patient information in a digital format—and does so in a language that is common and accepted by all providers. This ability of all components of the health care system to freely and transparently share patient medical information digitally is called interoperability—the subject of an American College of Physicians (ACP) policy paper. Solving interoperability issues is a major initiative presently under way under sponsorship of the U.S. Department of Health and Human Services.

The purpose of this paper is to illuminate the great potential going paperless can have on quality of care, patient safety, administrative efficiency and overhead, physician productivity, practice revenue, and profitability. Such a shift in the way practices operate will not be without its costs and obstacles.

This paper will provide an balanced exposition of the benefits and costs of converting to a virtually paperless, digitally based physician office technology and will provide examples and experiences of internal medicine practices that have converted to a paperless operation. Because going paperless is still in its infancy with a relatively small number of operationally diverse utilizers, the information presented herein should not be considered generalizable.

Indeed, not every practice's experience with implementing paperless systems has been positive. As one author writes: "Horror stories abound. EHR technology has been on the market for years, and many times a system is outdated within months of being installed. Vendor histories have been shaky, too, leaving some docs wondering who'll stay in business and for how long. 'Doctors have been ripped off in the past when they've bought systems…They have a really bad taste in their mouth about buying technology'" (7).

Yet, it is possible to avoid the pitfalls that can undermine successful conversion to a paperless system. By learning from the mistakes of those who have failed, as well as the insights and advice of those who have succeeded, the goal of this paper is to help internists ask the right questions about whether or not investing in a paperless operation is worthwhile.

In addition to this discussion paper, the ACP offers a number of very useful guides to aid physicians in the proper selection and installation of both EHRs and practice management systems. (See Appendix for a listing of these publications.)

I. What Are the Key Issues, Start-up Costs, and Obstacles Internists Must Address before Deciding To Go Paperless?

Converting to a paperless physician office has many costs and obstacles internists must fully weigh before making such a major change in how they do business. The time, cost, and practice disruption involved in purchasing and learning how to use a new system has to be balanced against its potential benefits and ability to recover the initial investment. Important start-up costs and obstacles that the internist should carefully consider include the following:

A. The cost of purchasing and/or upgrading hardware and new software.

Software/hardware start-up costs for a paperless office depend on a wide array of factors. These factors include the number of physicians comprising the practice and deciding whether to purchase EHR/practice management software and install new servers and workstations, or to lease software and/or servers from an application service provider. Cost is also driven up by the number of links to the servers, e.g., links to reference labs and to area hospitals, which allow direct electronic transmission of patient medical data.

The two small, noncorporate practices visited both purchased new software and servers costing in the range of $20,000 to $40,000 per physician. These figures are in agreement with an October 2003 report entitled "Electronic Medical Records—Lessons from Small Physician Practices," which studied 20 small practices in California, showing that "initial costs ranged from $15,000 to $50,000 per physician, with a median cost of $30,000 per physician" (8).

Important Tip for Small Practices: It is much more expensive to have a customizable EHR/practice management software package installed at the office. A lower upfront cost option is software leased from an application service provider—all software is maintained at the application service provider's office, and usage is transmitted over the Internet (either by downloading onto the small practice's in-house computer system or interacting with the software through an Internet browser).

Important Tip for Larger Practices: Purchasing a customized system may be cheaper than leasing from an application service provider over the long run, especially if there is a one-time cost for purchasing the software and the practice expands in size or to multiple locations, gaining a significant economy of scale (8).

Besides initial hardware and software costs, practices need to consider ongoing costs, such as Internet access and ongoing system maintenance costs.

B. The time and cost of system testing and customization before implementing new EHR and practice management software.

The system vendor can usually do system testing when the office is closed for business, thereby not disrupting normal practice operating hours. However, customizing the system to meet the individual practice's needs can take a large number of hours and may require vendor technical assistance if the practice's physicians are not technically oriented. Still, it appears new systems can be customized, debugged, and brought online within a matter of a few weeks. Vendor support contracts are particularly vital in the first year of system implementation. The two small, noncorporate practices visited reported software support costing in the vicinity of $2000 per physician per year.

C. The cost of designing and building or redesigning and renovating the office's physical layout to accommodate a paperless operation.

This could be as simple as moving some furniture around in the office or require architectural changes in the office, depending on the preferences of the physicians and office staff and the budget committed to the project. None of the three practices visited required any physical space changes. Also, once a practice eliminates the need for paper medical record storage space, it can actually decrease its square footage needs and possibly reduce lease costs.

D. The cost and time of training staff to use new EHR and practice management software and related updated office protocols.

According to the physician owner of one practice visited, once physicians get over the initial fear and unfamiliarity of working with something new, it takes about 2 weeks for physicians to start using the new technology comfortably. However, if the physician does not accept the new system and is uncomfortable using it, using the new technology will be cumbersome and not as useful.

E. The time and cost for existing practices to upload paper medical records into an electronic health record format.

This will require a substantial amount of staff time scanning in existing records, as well as purging information that is irrelevant or obsolete. Also, practice physicians will need to spend time reviewing new electronic records for completeness and accuracy. One physician practice estimated that this task took 6 months of one office staff person's time to load the data for her practice. Another estimated that it took 1 hour a day of physician time to load the data over a period of several months. The practice's experience will vary depending upon how many patients are being served and the strategy the practice uses to load the patient data into the system.

F. Short-term loss of productivity and practice revenue while the new system is being installed and debugged and staff is learning new software and office protocols.

Lack of familiarity with the new system may initially cause longer office visits and, thus, a decrease in the number of patients seen per hour. Also, scanning in existing patient paper medical records will require a large, one-time cost of staff and physician time. However, much of the extra work involved with system implementation, debugging, and staff training need not be disruptive to normal operations—performed either in prescheduled blocks of office time or during nonbusiness hours.

G. Digital communication of patient information among different health care settings and health care insurers is still very problematic due to the lack of commonality of the large numbers of different EHR software and billing coding nomenclature in use in the marketplace.

This lack of commonality will require that a practice still communicate by paper, fax, or phone with physicians, pharmacists, laboratories, and diagnostic imaging providers that do not transmit data electronically and that all paper information received be scanned into the EHR. This will also require additional steps when physicians and other providers store data electronically but on different electronic platforms. For example, it may require the doctor to electronically "cut and paste" relevant notes from a consulting physician's electronic note into the primary physician's EHR rather than their appearing on the same electronic platform with the relevant data being automatically uploaded into the primary physician's EHR.

As outside parties convert to a digital format, the practice's system and staff will have to be regularly updated as to which parties still require paper communications and which can accept digital communications, as well as the requirements for processing the electronic communications properly.

H. Ongoing costs of system maintenance, upgrading, technical support, and staff training.

EHR/practice management systems require regular vendor maintenance, as well as periodic installation of new software upgrades. When system upgrades are installed, there will also be a need to familiarize staff with the changes through in-house training. As with all computer systems, technical problems may occasionally arise which require vendor assistance to resolve. One physician's paperless system stopped generating bills after the system's billing software was upgraded, causing the EHR and billing components to stop communicating. Software interface problems such as these can usually be avoided by making sure all system software components come from the same vendor who can update the interface to account for any system component software upgrades (7).

During the writing of this paper, one of the reviewers noted that his voice transcription software became nonfunctional. The reviewer is an owner of a small physician practice that does not have

computer technical support on staff. So, the practice contacted the software technical support line, only to learn that the 3-year-old software package is now considered "out of date" and is no longer supported technically by the manufacturer. Instead of fixing the current technical problem, the manufacturer sent a software update on a CD via the U.S. mail. In the meantime, the reviewer was forced to return to hand-written/hand-typed notes. This is a real-world example of common technical support problems that physician practices encounter. If this were an EHR system rather than a transcription system, the practice would have been essentially shut down. The issue of support of aging software and the availability of necessary computer acumen for maintenance is an important issue for small offices to consider as an ongoing cost of system maintenance.

I. Temporary loss of system access due to computer crashes or power failures can occur.

Investment in backup systems to avoid loss of critical patient medical information is an absolute necessity (and unavoidable cost of going digital). Daily downloading of patient medical data at a remote site, a service most vendors offer, ensures that there will always be an alternate source of patient data should the in-house system crash. In-house backup power generators will also ensure that data are not lost during a power failure. Off-site storage of back-up data provides an additional level of security, making the EHR more secure than a paper record in case of fire, flood, or other disaster.

J. Paperless offices require the use of a computer keyboard or other digital data entry device, such as an electronic stylus or electronic dictation.

Use of electronic devices may interfere with a physician's ability to maintain good rapport with patients during a visit. Some physicians may still prefer the familiarity of writing in a paper record and traditional dictation. However, most integrated EHR/practice management software is customizable and has checkboxes and prepared language templates that can be clicked on (or touched on a touch screen), obviating the need for typing acumen. Becoming accustomed to this new technology within the constructs of the patient encounter requires patience and a willingness to adopt the new technology.

K. Patients may also be resistant to accepting the new system's outputs, such as computer-generated bills, referrals, and prescriptions.

There will always be a small segment of the patient population that is resistant to change and will need help from practice staff in understanding how the new system outputs look, as well as when paper is replaced by direct electronic communications with other providers. All three practices visited reported a generally positive reception to the reduced need for paper among their patient populations.

II. What Are the Potential Benefits of a Paperless Office?

Though the costs and temporary disruption associated with building a paperless office are not inconsequential, the wide array of potential rewards and benefits for physicians and patients merits the internist's close and careful inspection.

Going paperless can offer the internist and patient many benefits, including the following:

A. Improving Quality of Care

In paperless offices, all patient information is instantly available to the physician, not only in the exam room but anywhere an Internet-linked computer can be accessed. With the proper safeguards, this connectivity can be achieved over the Internet, thus allowing physicians to obtain the necessary patient information to render an appropriate clinical decision. Quality of care should be improved by eliminating the risk of having to rely only on the physician's and/or patient's memory or the patient's description of symptoms left in a telephone message.

Physicians also can have instant access to clinical decision support information, which may be included in the vendor's software or available by clicking on links to Internet medical sources, such as the such as the Physicians' Information and Education Resource offered to members of the ACP.

The quality of patient care may also be enhanced by automated system reminders, which alert both physicians and patients to the need for necessary treatments and tests, such as periodic physicals, flu shots, hemoglobin A1c tests for diabetics, colonoscopies, and mammograms.

The previously mentioned study on small practices in California documented how using EHRs had had a visible impact on quality: "Quality benefits were common….almost all users reported increased quality of patient care due to better data legibility, accessibility, and organization, as well as prescription ordering, and prevention and disease management decision support" (8).

B. Improving the Time Spent with Patients

When EHRs replace paper medical records, physicians and staff are freed to spend more time with patients. One report estimated that using keyboard entry of patient information would reduce physician time documenting an office visit from an average of 20 minutes per patient to only 4 minutes per patient (9). The EHRs can be updated instantly by the physician as an exam proceeds, obviating the need and time to later dictate and/or transcribe patient notes, referrals, and lab requests.

Office staff is freed from maintaining and retrieving medical charts. The risk of losing or misplacing charts or using a chart that has critical information, such as recent lab results, lost or missing is also eliminated. One study estimated that not having to pull and file charts saved $5 per visit (2). Lab results and physician consult reports can be digitally transmitted directly to the patient record or scanned into the record from faxed or mailed paper documents.

C. Improving Practice Profitability

According to an April 2003 study of the operational costs and benefits of replacing paper medical records with an EHR system, primary care providers (400 of which were examined in this study) saved an estimated $36,000 over 5 years by switching to EHRs. After the initial cost of implementing the EHR system, benefits started to accrue in years 2 through 5 of the 5-year implementation cycle studied. By the fifth year, the annual benefit of using EHRs averaged $21,000 per physician (2). The previously referenced study on small practices in California showed that "financial benefits varied greatly, ranging from no benefits to gains of more than $20,000 per year per physician…Decreased staff costs were common….More successful users decreased transcriptionist, medical records, data entry, billing, and receptionist costs" (8).

According to one internal medicine practice visited, the cost of purchasing an in-office, customizable integrated EHR/practice management system for a small practice generally falls into the $35,000 to $50,000 range. This visit also demonstrated that efficiencies, cost savings, and increased practice productivity can easily pay off this start-up cost in under a year.

Another practice reported that, even with a start-up cost of $60,000 to institute an EHR system, it only took 1 year of operation for the system to completely pay for itself, citing major savings in physical space, transcription costs, and reduction of clerical staff (10).

With more time for patient care, physicians can not only increase the number of patients seen but also cut the administrative overhead associated with maintenance of a paper-based medical record, referral, and billing system. Increased physician productivity and administrative efficiency also translates to higher practice income and profitability.

The potential for reducing staff and administrative expenses is great. Even when staff is retained, it is possible to reassign them to patient care support duties, which translates to greater patient satisfaction. One practice noted above was able to reduce its support staffing ratio, adding one physician (a 25% increase from 4 to 5) while keeping support staff at the same level. This adds up to more gross revenue and a higher profit ratio per patient seen.

When the day arrives that patients and all health care settings can communicate electronically, the need to use the telephone or paper communications will be virtually eliminated. This will greatly reduce the administrative burden and staffing required to perform routine functions, such as patient scheduling, insurance coverage verification, claims status verification, filing and retrieval of paper records, and precertification and authorization for restricted services. Such gains in administrative efficiency should produce similar gains in practice productivity and profitability.

D. Eliminating the Need for Paper Lab Orders, Paper Physician Referrals, and Paper Medication Prescriptions and Speed Results Back to the Referring Physician

A digitally based practice can generate and transmit all patient referrals, prescriptions, and billing/claims information electronically at the time a patient is seen. Even if the receiving labs, physicians, and pharmacies are not equipped to receive such electronic referrals, the sending physician can at least generate these requests in printed form or have the data automatically faxed to the other provider before the patient leaves the office. Results of lab tests and consultant physician reports can be sped back to the referring physician and placed directly into the patient record when electronic capabilities exist at all sites of care. Even images of electrocardiograms, radiographies, magnetic resonance imaging, and other radiologic images can be sent digitally directly to a patient's record. When this direct digital capability does not exist and patient information is in a paper format by fax or mail, this information can be added to the EHR through use of a scanner.

E. Improving Practice Revenue through More Accurate Software-Assisted Coding

Most EHR software includes coding assistance and prompts to help physicians correctly bill for the level of complexity associated with a patient office visit. One practice visited noted a 30% increase in revenue associated with proper coding of visit complexity. Going paperless reduces the need for administrative staff who handle medical record transcription, updating, and filing, as well as staff who handle coding and billing. Another practice indicated that they also had access to such software but did not use it. Even though they believed they were undercoding, they had ethical concerns about the software prompting their coding decisions.

F. Decreasing the Risk of Medical Errors

Most EHR software includes physician prompts for key clinical questions that should be asked based on past history and diagnosis, avoiding critical oversights. Prescription errors caused by illegible handwriting are avoided when physicians can simply place a check mark next to correct medication(s). Such software also provides medication conflict warnings, thereby averting potentially dangerous drug–drug interactions. In a time of steadily increasing professional liability insurance, the installation of such patient safety/medical error reduction–oriented software could translate into reduced premiums from insurers.

The benefits for patients and the health care system at large can be enormous. According to the Leapfrog Group for Patient Safety, computerized physician order entry for prescriptions can substantially reduce serious medication errors. One major Boston, Massachusetts, hospital had a 55% decrease in medication errors after its computerized physician order entry was installed, while a hospital in Salt Lake City, Utah, experienced a 70% decrease in antibiotic-related adverse drug events (11).

G. Increasing Patient Satisfaction, Education, and Therapeutic Compliance

Paperless offices can increase patient satisfaction by reducing patient waiting times because doctors spend less time on paperwork and retrieving medical data. Patient registration information and patient history data can be filled out online even before a patient visits the office, freeing up the patient encounter with the physician so the physician can focus on the presenting problems and treatments.

Physicians can quickly supplement their advice to patients with the wealth of patient education material software vendors include with their packages, as well as Internet health-related Web links. Physicians can click on the desired information and have it printed out for patients to take home with them. These disease- and treatment-specific printouts help patients understand their illnesses, the plan of treatment, and the proper use of medications—all aimed at making the patient an active participant in his or her care and boosting patient care compliance. Patients can even self-educate themselves in the office waiting areas with available computer terminals, which can query Web sites about their specific conditions.

After an office visit, to help ensure a higher level of patient compliance, the system can send out automatic reminders to patients (by e-mail or letter) of forthcoming appointments; needed lab tests; and preventive therapy, such as flu shots.

H. Ensuring Compliance with the Security and Transactions Provisions of the Health Insurance Portability and Accountability Act of 1996

The security requirements of the Health Insurance Portability and Accountability Act of 1996 (HIPAA) are aimed at protecting the confidentiality of patient medical information. Software for the paperless office can control access to such sensitive information by establishing special computer-access passwords for individual staff. It is not nearly so easy to protect the confidentiality of paper medical records, which must circulate through offices when patients are being seen and when new data, such as lab results and reports of outside medical consults, are inserted into the record.

Software for electronically generating and transmitting claims information can be designed in a manner that ensures complete compliance with HIPAA's transaction requirements.

I. Electronic Billing Is Faster and Can Result in Less Rejected Claims, Higher Revenue, and Faster Payment Turnaround

Claims filed electronically, as required by HIPAA, can be transmitted, received, processed, and paid much more quickly than those filed with paper, meaning payment turnaround can be much faster. Savings attributable to avoidance of submission of errant and/or incomplete claims are highlighted in an October 2003 report entitled "Electronic Medical Records—A Buyer's Guide for Small Physician Practices." The report cites a 40% reduction in erroneous claims for EHRs with advanced physician order entry features, "primarily by flagging missing diagnostic codes and inferring appropriate corrections from analysis of the patient's record" (12).

J. Patients Can Communicate with Physicians by Secure E-Mail, Eliminating Phone Tag and Ensuring That Office Visits Are Appropriate and Necessary While More Minor Problems Can Be Handled Remotely

Some insurers are already paying for structured patient e-consults with their physicians, allowing collection of complete patient information sufficient for a physician to decide whether a visit is indicated or appropriate therapy can be prescribed by return e-mail. Studies on e-consult systems show an increase in physician productivity and a lowering of average cost per patient while increasing patient and physician satisfaction. An in-depth March 2003 policy paper on the use, pros, and cons of e-consults is available from the ACP, entitled "The Changing Face of Ambulatory Care—Reimbursing Physicians for Computer-Based Care."

K. Physician Performance Measurement and Health Care Outcomes Research

One of the great uses of combined EHR/practice management software is the system's ability to measure physician performance against clinically validated norms of care. Over time, such educational feedback on physician performance can lead to individual improvements and increase care consistency within a practice. Also, physicians and researchers can more easily assess the efficacy and cost–benefit of different modalities of treatment for a given condition when they have access to large volumes of patient treatment and outcome data.

With the federal government and private sector already pursuing methodologies that recognize and reward physicians who deliver high-quality care, practices that use their EHR/practice management systems to track and improve physician performance will be first in line to receive these performance-based incentives and recognition.

In early 2002, a major pay-for-performance initiative was launched in California. This statewide effort, which includes six large health plans and about 40,000 physicians, uses common measures to evaluate the performance of the health plans' contracted physicians. Each health plan develops and administers its own quality bonus programs, paying financial incentives based on physician performance (13).

Another major pay-for-performance pilot project, launched in early 2003, is being conducted by a nonprofit organization known as Bridges to Excellence, sponsored by a $330,000 grant from the Robert Wood Johnson Foundation. With pilot sites in Boston, Massachusetts; Cincinnati, Ohio; and Louisville, Kentucky, the organization and participating employers will pay physicians $100 per patient for meeting standards for quality diabetes care. In addition, participating physicians in Boston will receive $55 per patient for installing processes to reduce errors and improve quality. The pilot cities were chosen based on where employees of participating companies were located; the program may be expanded as more employers sign up. The program also plans an effort aimed at cardiac care (14).

L. Electronic Health Records May Help Lower Liability Insurance Costs

In medical liability cases, the completeness and legibility of electronic documentation, including all communications with patients, may make it easier for physicians to defend themselves and may result in lower liability insurance costs. One practice visited noted that it had never been sued, indicating that increased patient satisfaction and thoroughness of documentation were key factors for this spotless record. One system vendor reported that many malpractice insurance carriers offered premium discounts of 5% to 10% for practices using EHRs (15).

III. Advice about Implementing a Paperless Office System Successfully

According to the internal medicine practices visited and an article in the December 2003 ACP Observer (14), the following are the key factors in achieving a successful conversion to a digitally based operation, based on these practices' real world experience:

1. Have at Least One Strong Physician Proponent of the New System

At least one leading physician in the practice must be a strong and tenacious proponent of the new system who encourages all the practice's partners and staff to learn and fully commit to the new system. The California Healthcare Foundation calls having such a physician system "champion" the single most essential factor in achieving successful implementation (15). This physician must also ensure that ongoing technical assistance is provided for successful system implementation, operation, and updating. Achieving the commitment of all other physicians in a practice to use the new paperless system is another vital role the "champion" must play. The best way to overcome this resistance and win new converts is to give the resistors a quick walk-through of the new system's simplicity, speed, utility, and array of benefits. The goal is to permit physicians and staff see how easy using the system is for experienced users and how beneficial a fully implemented system is for patients and the practice alike.

2. Make Sure You Purchase a System Suited to the Practice's Physicians

Have the practice's physicians—not its chief executive officer, office manager, or information technology person—define what they want the new system to do and participate in selecting a vendor who will make sure the system can be customized to meet their needs. A practice must have clear, detailed objectives for what it wants its new system to do and must work with the vendor in assuring the software is precisely customized to meet these specific objectives.

3. Be Sure To Select Software Vendors with Proven Track Records and the Expertise, Staffing, and Financial Foundation Needed for the Long Haul; Ensure Ownership of Practice and Patient Data through a Contract, Including a Plan for Transferring This Data to a New Vendor if Necessary

Practices should be circumspect in selecting a vendor with a solid track record of performance and reliability. Such a vendor should have a sound and lengthy record in the medical marketplace and software that keeps pace with the needs of its customers and has the deep financial underpinnings to assure they will be around for the long haul. Buying a lower-cost system from an upstart vendor may seem appealing, but if the company goes out of business, a practice will be stuck with a system that lacks technical support and cannot be updated when needed.

Another major concern is ownership of data. If a practice's data are maintained over the Internet on a vendor's server, all patient data could be lost if the vendor goes out of business, discontinues its EHR/practice management product, or is sold to a new vendor or if the practice chooses to contract with a new vendor. Thus, it is critical that a contract with a vendor clearly detail a practice's ownership rights to its own data in all eventualities and include an orderly plan for transferring these data to a new vendor if necessary.

In short, practices should choose financially sound vendors with proven and lengthy track records of ease of system use and high system reliability and who offer timely, dedicated technical support.

4. Make Sure That There Is Careful Advance Planning for System Implementation and for Ongoing System Operational Management

Practices must take special care to plan for a phased, step-wise implementation of a new system that allows sufficient time for staff training and gaining facility with the new system. A well-managed system has clear timelines and milestones for implementation, which tie in directly with careful budgeting of staff time and practice cash outlays to meet these implementation targets. A practice should also allow time for dealing with and correcting system technical "glitches" and have a backup plan to conduct business when the system is temporarily nonfunctional. It is also vital that practices build a level of confidence in working with the new system that allows in-house oversight of daily technical operations, calling for vendor support only when technical problems fall outside practice staff's expertise.

5. Make Sure There Is Strong and Ongoing Technical Support for the New System's Software and Hardware

Practice physicians and staff need solid system training and readily available system technical support to deal with early glitches and technical issues, which are sure to arise. It would be ideal if at least one of the practice's physicians had this type of technical know-how, but, more realistically, having a vendor who makes sure the system is responsive to the practice's needs and can quickly respond to problems is a "must" that should be part and parcel of the system purchase.

IV. Illustrative Examples of Offices That Have Implemented Paperless Practices

ACP staff visited three small internal medical practices (two private, one corporate) that had converted from paper-based to paperless, digital operations. The first made its conversion about 2.5 years ago (mid-2000), the second about 6 months ago (June 2003), and the third 1 month ago (this practice had an EHR since 1994 but only merged it with a new practice management system in the summer of 2003). ACP cautions against using the data presented on the Northern Virginia practices described in this section of the paper because the patient population served by these practices tends to be wealthier than the average patient population in the United States. Thus, it is likely that the revenue generated by the patients served by these practices is higher than the average internist practice and therefore the cost/benefit of converting to a paperless office will be different than the for the average internist practice.

A. AdvanZed Health Care, Arlington, Virginia

AdvanZed Health Care is a three-physician internal medicine practice that serves an active patient population of approximately 4000 patients, about 40% of whom are Medicare patients. Conversion to a paperless system began in August 2001 and took about 3 months to complete, with the practice's physician owner scanning in critical components of existing paper medical records to create the new EHRs. The combined EHR/practice management/scheduling system was purchased from an internist who was relocating, keeping the acquisition cost low. The lead physician spent a significant amount of time in the first few months customizing the system for his practice's needs and training staff how to use it. He noted, however, that conversion to the new system had minimal impact on the overall number of patients seen, with perhaps only a 20% decrease in patients seen during the first 3 months of the implementation of the paperless system.

Aside from the cost of purchasing the system's software, the only other major implementation cost was derived from adding computer workstations to the practice's exam rooms and purchasing fax server software. The total cost of system software and hardware was approximately $10,000, much less than the $15,000 to $50,000 average for small practices cited previously. This lower cost was due to a number of factors: the software was purchased used from another physician, the practice already had its own server, and much of the installation was performed by the practice's lead physician, eliminating the cost for hardware support. The practice is building its electronic records database as patients come in. For existing patients, this involves electronically inputting the patient's medical problems, allergies, and medication list, with staff later scanning in other pertinent components of the paper medical record. New patients' records are input entirely electronically. For lab and consult reports not received in an electronic format, such paper documents are scanned into the EHR.

The practice is enthusiastic about the new system's dramatic positive impact on the quality of care he and his partners were able to provide. With all patient data instantly available and updateable electronically, the physician's focus can be completely on the patient and his or her needs while in the office. The system's software also prevents

dangerous drug interactions and keeps track of all medications prescribed. Patient lab and radiology results can be obtained and integrated into the patient record much faster, by either direct electronic transmission into the record or fax (with the fax then quickly being scanned into the patient record). The system is tied electronically to the local laboratory, where most of its clinical lab work is done. There is also direct electronic access to the EHRs of any patients admitted to the nearest local hospital.

Efficiency, productivity, and profitability have soared under the new system. The practice increased from two physicians to three, while the support staff of 3.5 full-time employees remained constant (one secretary/receptionist, one medical assistant, one swing person who answers phones and does scanning and billing, and a half-time office manager). This staffing ratio was much less than the usual three-to-one support staff-to-physician ratio that the practice noted was typical in most other internal medicine practices.

In terms of patients seen, a comparison of the first 6 months of 2001 (just before system implementation) with the first 6 months of 2003 (about18 months after implementation) showed a dramatic 10% increase in productivity. Because of the speed of electronic patient data access and input, the practice noted it can schedule four established patients per hour, compared with about three established patients per hour before the system was installed. This increase in efficiency has significantly improved practice revenue.

Patients seem to appreciate the new system, as well. They love knowing that their consults, lab requisitions, and prescriptions are, for the most part, sent electronically, meaning no paper and less waiting. They also received customized patient education materials and a report on their lab results generated by a few simple clicks while the doctor is seeing them in the office. In the near future, the practice plans to subscribe to a Web site where patients can access critical portions of their medical record, such as their problem list and list of medications, as well as their lab results. The practice is also considering adding secure patient e-mail consults in the future.

The practice is now working towards a goal of putting virtually every document in the office in one electronic location—from patient records to patient education materials to office protocols and policies and system technical guides. The truly paperless office is not that far away.

B. Greenspring Village Medical Center, Springfield, Virginia

Greenspring Village Medical Center serves an almost exclusively geriatric population and is part of a large corporate elderly senior retirement community operated by Erickson Retirement Communities. Erickson currently operates a total of 10 such communities located in six states, with a population of 12,000 residents. These communities include independent living apartments, assisted living services, as well as nursing homes. All of these communities have a medical center located on their campuses, with a total of 36 physicians. Approximately 78% of the residents on these campuses receive their primary care through their on-site medical centers. The average population age served at Greenspring is over 80 years old. These patients visit the

clinic at least once a month, on average. The average caseload for each of the 36 physicians is in the 250-to-500 patient range.

Erickson was able to achieve a major economy of scale by centrally purchasing and administering its new EHR/practice management system for use at all office sites. The system's one-time start-up cost was $1.2 million (which includes the costs of system vendor consulting, the addition of new hardware and new corporate information system staffing, and $350,000 for new system software). Erickson projects that it will take 18 months of full system operation to recover its initial investment.

Installation of the system was phased in at all 10 medical offices over the last 6 months of 2003, with the Greenspring office being the first to undergo implementation beginning in June 2003.

The Greenspring office is comprised of four internists and has been in operation for 5 years, with a total of about 1000 active patients. Greenspring converted all 1000 patient records into an EHR format. This "pre-loading" process, which required scanning in all critical patient information and diagnostic test results from existing paper medical records, took about 3 months. Existing medical assistants and administrative support staff did most of this work, with office physicians reviewing the electronic records for completeness and accuracy. This decision was made because the 1000 patients were active in the practice, as was noted in the previous example, and some practices chose to transition to paperless records on an as-needed basis, that is, to view the patient schedule for the next day or week and load the records electronically immediately before the patient's visit to the office. The original paper records are being retained on-site until it is certain that all necessary retrospective data are in the EHR but will eventually be stored off-site and then destroyed, in accordance with state record-retention requirements.

Greenspring is capable of receiving electronic lab results, and digital electrocardiograms, which can be entered directly into a patient's EHR with individual data elements automatically disbursed to flowsheets. Electronic faxes of patient test results and consultations are also entered directly into the EHR. Any lab information that is still received in a paper format by mail or fax is added into the EHR through use of a scanner, and thus copied into the EHR in its original format.

Orders for lab tests, consults, and prescriptions can be sent digitally directly to outside providers' computers or by electronic fax. Internal orders are electronically sent to the medical center staff, who execute and document them in the EHR. Ordering physicians have the ability to sign these orders electronically.

When patients are leaving and are scheduled to see outside specialists or have diagnostic and lab services performed, the paperless system is able to print out a patient chart summary highlighting abnormal findings and key medical problems for easy transport to the next provider. Patients like having this summary in hand, and the receiving providers also find this very helpful. These chart summaries can also be faxed.

Greenspring's Medical Director noted that, after an initial drop in the number of patients seen during the system's first 3 months of operation, patient volume has returned to the pre-implementation

levels of 15 to 17 geriatric patients per physician per day. However, support staff (3.0 full-time equivalent medical assistants, 3.0 full-time equivalent front office staff, and a practice manager) is now able to spend more time serving patients, and the group is planning to add a fifth physician without adding new support staff. This means the practice can increase productivity another 25% without adding any overhead.

A favorite feature of the new paperless system among Greenspring's physicians is the "Evaluation and Management Advisor." Physicians are freed from the complex counting of elements that determine the complexity of an office visit, which in turn determines the level of reimbursement. The system provides a summary of all elements consistent with a particular level of complexity (e.g., Level 3 moderate complexity office visit), as well as what elements of examination must be completed to justify billing at the next level of complexity (e.g., Level 4). According to the Medical Director, the impact on the practice's revenues has been significant, leading to an 11% increase in revenue per visit in the first 3 months due to more accurate physician coding of visits. Combined with the addition of a new physician, the impact of going paperless on productivity and profitability has been dramatic.

Two of the practice's four doctors previously had a practice together that was paperless, which has been helpful in getting the new system off the ground and making the transition easier for their peers. One of the great assets of the new system is its ability to generate quality-oriented educational reports and feedback to Greenspring's physicians. These reports can be basic research, such as how often a particular medication is being prescribed and its efficacy, for example, keeping blood pressure down. Or they can be profiles of how individual physicians compare with the group in terms of performance of critical care elements (e.g., taking blood pressure), patient compliance (e.g., all diabetes patients with a hemoglobin A1c test above a certain parameter), or outcomes (e.g., the number and percent of a physician's patients who are readmitted to the nursing home within 30 days after a discharge).

Another quality benefit of the new system is its ability to set appointment reminders and track and report lab and consult results—these alerts are sent automatically to the Greenspring physicians, removing the risk of relying on memory. The physicians in the practice have also established a "buddy alert system" to allow backup coverage for patients when the primary physician is unavailable. Thus, a lab result will be directed to the backup for review and action, showing up on a special page of the computer screen.

All physicians in the 10 corporate medical centers participate in a special users group to share knowledge, experience, and best practices that are aimed at raising the quality of care for their patients, who are essentially a captive, geriatric population. Thus, Greenspring is uniquely positioned for the day when insurers begin to pay for performance and improved patient outcomes.

Inherent in the system's design is a high level of security, with carefully controlled levels of access to patient information based on a staff member's need to know.

With administrative duties greatly reduced by the paperless system, support medical staff are now able to perform more patient care activities—including flu shots, electrocardiograms, and ear washes. This translates to more physician time to spend on critical patient medical issues and an overall positive impact on the quality of care and patient satisfaction.

C. Internal Medicine of Northern Virginia, PLLC, Reston, Virginia

This two-physician practice has used an EHR system since 1994 and has an active patient population of about 3500, with about 15% of patients covered by Medicare and about 30% self-paying, with the remaining 55% coming from preferred provider organizations. Age distribution is evenly spread among all adult age groups. Staffing, which has not been altered by the system's implementation, includes two full-time nurses, one half-time nurse, one full-time office manager, one full-time receptionist, and one full-time billing/patient checkout/medical assistant. A quarter-time clerical assistant is used on an as-needed basis.

In November 2003, Internal Medicine of Northern Virginia merged its EHR system with a document management package and new practice management software package. This new software permits linkage of the EHR with billing, patient scheduling, lab and specialist referrals and reports, and outside area hospitals and radiology facilities. The cost of the EHR component is currently $25,000 to $40,000, depending on the number of interface links (from three to eight) with outside entities, such as practice management system, reference labs, transcription service, hospitals, and scanning device. These amounts include physician licensing fees ($8900 per physician, allowing a total of five users) and $2100 per license per year for maintenance and license renewal.

The practice management software component had a licensing fee of $6000 per physician and a training cost of $6000 per physician. Annual vendor support per physician is $1400. The document management software allows tracking and scanning of outside documents and costs $5400. The software interface between the EHR and new practice management system costs $1000. In terms of new hardware, two servers had to be purchased at a total cost of $15,000, one for the local area network and one to handle tracking and management of documents. The practice already owned a third server to handle e-mails and visits to its Web site. Each physician and employee has his or her own desktop computer workstation. In May 2004, the practice will convert to a new wireless system to allow access to the entire system in all exam rooms via portable laptop devices, which cost about $1200 each.

Training on the new system had a negligible impact on practice productivity. The EHR component has been in operation for 9 years, with only new staff having to undergo self-training with a compact disk module with instruction and assistance from existing office staff initially and on an as-needed basis. The new practice management component required the practice to shut down only 1 half-day, with rotating training over a 7-day period. Ongoing training costs are expected to be minimal, as current office staff will perform this for any new staff members.

Outside lab and consult reports are, where possible, faxed directly into the medical record or into the document server and transferred by staff into the appropriate medical records. If not received in a digital format, documents are scanned in by staff.

The new system did not require any reconfiguration of office space except for additional cabling.

According to one of the practice's partners, the benefits of the new system have been manifold and most positive. First, quality of care is increased with instant and timely access to complete and legible patient data, rapid communication with outside providers and labs, better tracking of preventive health interventions and follow-up dates, readily available patient handouts regarding almost any medical condition or issue, and avoidance of medication errors. Administrative efficiency is increased, since no one needs to find and handle paper medical records, perform transcription, or copy large amounts of paper, with staff and physicians pleased with this greatly reduced hassle factor.

This increased efficiency has permitted the practice to consciously choose to cut its patient care hours and improve its work life quality. The practice's physicians have two afternoons per week off from seeing patients, while the office has 2 hours of patient-free time during lunch. The practice's two physicians still see approximately 130 patients per week, providing a level of income with which they are satisfied. Patients and referring physicians have expressed how impressed they are with the new system's detailed documentation and speed of communication.

Because the practice has had an EHR system for so long, it is hard to assess impact on profitability, since patient office visits have remained constant even with the addition of the new practice management software. However, the practice's physicians believe that quality of office life and enacting the equivalent of a 4-day workweek for the physician is difficult to put a dollar value on. The practice has never been sued or audited, attributing this in large part to the excellent documentation and quality improvements inherent in a good EHR/practice management system. The practice's lead physician also mentioned that she believes such systems will have a major usage in clinical research and may lead to improved reimbursement and/or reductions in malpractice insurance in larger practice settings.

V. Summary

Operating a paperless office can have great potential benefits for physician productivity, quality of care, patient satisfaction, avoidance of medical errors, administrative efficiency, coding accuracy, billing turnaround, practice productivity, and profitability. Start-up cost, resistance to change, and initial productivity reductions are major barriers that must be overcome before the benefits of a truly paperless system can begin to accrue. Because the technology for a paperless operation is so new and available from so many different vendors, and with only small market penetration to date, physicians may feel daunted by the initial investment in terms of all the software choices. Physicians need to consider the money, time, and training needed to make the system work properly and to recognize that going paperless is a radical new way of doing business before making the decision to redesign their practices.

Trying to do business and exchange medical information with a medical universe that is still primarily based in paper undercuts the full potential a paperless system could have. However, the impetus to go paperless is strong, and it is only a matter of time before the rest of the medical universe fully embraces this technology. There is already evidence that physicians are increasingly willing to move towards electronic patient information, with a 71.5% growth in EHR sales projected for the period 2003 to 2005 (17). The vast bulk of this dramatic growth in EHR usage is being fueled by small practices (17).

The costs and long-term benefits of going paperless depend on a large set of variables—the culture of the organization and how willing the physicians and staff are to implement a paperless system; whether it is done from the ground up or as a transition from a paper-based system; how much a vendor will charge for installing the system, including any needed physical plant redesign, and costs of new hardware, software, training, and ongoing technical support; the numbers of physicians in a practice across which start-up and ongoing operational costs can be spread; the impact the new system has on administrative efficiency, physician productivity, coding accuracy, HIPAA compliance, revenue, and practice profitability; possible reductions in liability insurance resulting from reduced risk of medical and medication errors; and possible improvements in quality of care and physician performance, which could increase patient volume and also result in financial rewards (something the federal government is seriously considering now).

There is no easy formula that can predict how quickly there will be a palpable return on investment in a paperless system, since the initial and ongoing costs will vary widely. However, the practices ACP profiled in this report indicated that, if the physicians and staff are committed to creating a paperless office, the efficiency and revenue gains will absolutely cover the system costs in less than 2 years and the medical practice will provide higher-quality health care. Clearly, the many potential benefits a paperless system offers are worth a closer look.

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Appendix

Technical guides are available from the ACP relating to the selection and installation of EHRs and practice management systems (available to members free online and also on CD-ROM upon request). Contact ACP's Practice Management Center at 800-338-2746, ext. 4565.

1. Selecting an Electronic Medical Records System
   (Available at www.acponline.org/private/pmc/medrecbac.pdf.)

2. Selecting a Practice Management System
   (Available at www.acponline.org/private/pmc/software.pdf.)

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