

created a powerful impetus for outsourcing. Although corporate globalization has been controversial, when the forces of protectionism have butted up against the demand of consumers for decent products at low prices and the desire of shareholders to maximize returns, outsourcing has usually triumphed.

Although outsourcing is often motivated by the desire for cost reduction, health care’s version may offer substantial advantages for patients. For example, many hospitals now purchase interpretation services from outside companies, whose interpreters often speak a range of languages that individual hospitals cannot match. Outsourcing could also provide patients with access to specialized care that would otherwise be unavailable. A group of mammography experts, for example, could read remotely transmitted mammograms obtained at community hospitals, replacing less specialized radiologists. Herzlinger praised the “focused factory” in the predigital era, using examples (such as the “hernia hospital”) that required the physical presence of patients.<sup>1</sup> In a “dis-located” world, patients may benefit from some of the quality advantages of focused factories without the burdensome travel.

Outsourcing is often initially endorsed by local providers, since the off-site professionals begin by doing work the locals are happy to forgo, such as nighttime reading of radiographs. (Most of today’s overseas teleradiology is designed to capitalize on time differences — Indian radiologists read films while U.S. radiologists are sleeping.) If the arrangement meets its goals (whether these are

## International Teleradiology

Imagine two patients arriving in the emergency department of a Maine hospital at midnight. The first has a presentation consistent with pulmonary embolism; the second, appendicitis. A decade ago, the first patient might have been started on heparin therapy and scheduled for an early-morning ventilation–perfusion scan. The second patient would have been seen by a surgeon, who would have made a judgment call regarding the diagnosis of appendicitis and the need for surgery.

Today, both of these patients and hundreds of others like them would receive middle-of-the-night CT scans, taxing the hospital’s radiologists. But midnight in Bangor, Maine, is 10:30 a.m. in Bangalore, India. There — and in Switzerland, Australia, and Israel — sit teams of radiologists ready to read the scans and fax their findings back to the United States (urgent findings are phoned back). “You can’t reach over and slap [the radiologist] on the back, but every other aspect of the interaction is preserved,” says Dr. Arjun Kalyanpur, a Yale-trained radiologist who runs Teleradiology Solutions, a “nighthawk” company based in Bangalore. In published studies of teleradiology, reports of technical problems have been rare, and the readings have been rapid (average turnaround, one hour) and accurate.<sup>1,2</sup>

The American College of Radiology (ACR) has, unsurprisingly, stated that it is “very concerned” about overseas teleradiology, though its concern is tempered by a recognition that the practice

fills a vacuum left by its own members, who would like to sleep at night. The ACR recommends that radiologists who are performing distant readings be board-certified and carry licenses and malpractice coverage in the state where the image was obtained and appropriate credentials at the source facility.

Several hundred U.S. hospitals use overseas teleradiology services. Industry leaders, such as Teleradiology Solutions, NightHawk Radiology Services, and Virtual Radiologic, state that they adhere to the ACR guidelines with respect to licensure, insurance, and hospital privileges. As for compensation, regulations of the Centers for Medicare and Medicaid Services (CMS) prohibit payments to providers outside the United States — an obstacle that many of the companies finesse by providing a “preliminary report,” which is later followed by a U.S. radiologist’s “final primary report.” The overseas radiologists are paid directly (by the hospital or the local radiologists) at a rate of \$50 to \$75 per radiograph, whereas the local radiologists bill the payer. The ACR has voiced concern about this practice, because of the worry that some domestic radiologists are signing off on the “ghost-read” radiographs without carefully scrutinizing the films themselves.

Although most international teleradiology companies have followed the ACR licensure and credentialing guidelines, in 2003, the Indian technology giant Wipro “tested the waters” (in the words of one Wipro executive) by using Indian radiologists who were nei-

ther licensed nor board-certified in the United States. The controversial experiment was subsequently suspended, but the potential for such practices remains. Although the ACR presents its teleradiology guidelines as quality-assurance measures (and quality is doubtless the organization's greatest concern), the possibility that low-wage foreign radiologists will take work from its members has surely entered its calculus. As one U.S. radiologist wrote on a popular professional Web log, "Who needs to pay us \$350,000 a year if they can get a cheap Indian radiologist for \$25,000 a year?"

The technical and logistic hurdles of remote teleradiology have been overcome, and the practice of having radiologists who were trained and credentialed in the United States read films overseas is now largely accepted. If the ACR guidelines hold, the growth of overseas teleradiology will be markedly constrained by the limited supply of U.S.-trained radiologists who are willing to work abroad. It seems likely that battles over licensure, credentialing, and reimbursement will determine whether providers who were trained and credentialed overseas will be allowed to compete openly with U.S. radiologists. The outcome of these battles will strongly influence the diffusion of international outsourcing to other areas of U.S. medicine.

1. Kalyanpur A, Weinberg J, Neklesa V, Brink JA, Forman HP. Emergency radiology coverage: technical and clinical feasibility of an international teleradiology model. *Emerg Radiol* 2003;10:115-8.

2. Kalyanpur A, Neklesa VP, Pham DT, Forman HP, Stein ST, Brink JA. Implementation of an international teleradiology staffing model. *Radiology* 2004;232:415-9.

saving money, getting a late-night dictation into the chart by morning, or allowing a radiologist a full night's sleep), its scope is bound to grow, as administrators consider other candidates for outsourcing — analysis of pathology specimens or reading of echocardiograms and even colonoscopies. By severing the connection between the "assay" and its interpretation, digitization allows the assay to be performed by a lower-wage technician at the patient's bedside and the more cognitively complex interpretation to be performed by a physician who no longer needs to be in the building — or the country.

Another illustration of "dislocation" is the electronic intensive care unit (ICU), in which off-site intensivists monitor patients by closed-circuit television. Streams of physiological data appear in real time on a remote screen, allowing the off-site physician to advise local providers, sometimes even entering orders remotely into the hospital's computer system. Although electronic ICUs are currently marketed as a response to the national shortage of critical care physicians,<sup>2,3</sup> they may ultimately compete with on-site intensivists. And if lower-wage foreign intensivists develop the knowledge and skills of their U.S. counterparts, they may enter this market as well, following the path of the "nighthawk" radiologists.

Some observers will see the outsourcing of medical care as a positive development. To the extent that outsourcing focuses on improved quality or access to specialized care — allowing patients to obtain services from the best

provider, not just the best in town — it will be hard to criticize it without seeming unduly parochial. In fact, when applied toward these goals, outsourcing represents an extension of telemedicine programs that have long granted some rural providers access to big-city expertise for complex problems.

Provided that quality is not compromised, outsourcing that is focused on the bottom line may also have virtue, particularly for patients who must pay a portion of their bill, for payers, and for fiscally challenged hospitals. Even domestic providers may celebrate outsourcing that frees them from off-hours duties or permits round-the-clock services. Finally, health care outsourcing is the sort of "disruptive innovation" that can transform traditional processes and relationships, ultimately leading to benefits that are hard to anticipate today.<sup>4</sup>

But harm may also result — particularly if, as seems likely, the main driving force proves to be saving money, rather than improving quality. First, to the extent that some care will be provided by anonymous people in cyberspace rather than by local doctors, distinguishing competent providers from hucksters will become even more difficult. In addition, having service providers operating under different laws and, potentially, value systems can create opportunities for new kinds of mischief.

Second, if outsourcing erodes the economic underpinnings of local health care, there will be irremediable consequences — and not only for displaced providers. If the United States loses its do-