Teleradiology: A Case Study Of The Economic And Legal Considerations In International Trade In Telemedicine

Teleradiology is already a reality; policymakers need to address its implications as it spreads.

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ABSTRACT: Growth in the global market for telemedical services is being driven by economics. Two operational models are already recognizable. “Nighthawk” providers are virtually indistinguishable from their domestic counterparts with respect to medical malpractice liability and price for service. Indian providers, in contrast, offer deep price discounts on services, but jurisdictional loopholes are likely to allow these providers a method to avoid medical malpractice liability. Hospitals that outsource their radiology services need to be aware of these differences, because hiring Indian telemedical providers will likely result in a shift of medical malpractice liability from providers to hospitals. [Health Affairs 25, no. 5 (2006): 1378–1385; 10.1377/hlthaff.25.5.1378]

The advent of telemedicine, from videoteleconferencing between physicians to remote robotic surgery, frees patients from a geographic link to their doctors. It also frees the jobs of medical specialists to be outsourced to low-wage foreign providers. Teleradiology is the most economically viable of the telemedical fields, making radiologists in the United States increasingly fearful of foreign competition. More generally, international delivery of teleradiology could be the harbinger of a future model used to outsource medical jobs in the United States to countries such as India, Spain, and Australia.

This paper examines the growing market for telemedical services—teleradiology in particular—and seeks to identify areas where regulatory gaps are likely to create unintended consequences. Attention is focused on medical malpractice litigation and insurance coverage costs, because one of the models for teleradiology delivery (the Indian model) attempts to change the nature of radiology services to avoid medical malpractice liability.

The Indian model’s dramatically lower costs make it attractive to U.S. hospitals that might be struggling to make a profit. These hospitals might not anticipate that using the Indian model will shift medical malpractice premium costs normally borne by individual radiologists to the domestic institution that is contracting for teleradiology services. In short, this analysis highlights issues that should be...
considered in regulating medicine in a global environment, a context where state laws concerned with licensing physicians need to be harmonized with World Trade Organization (WTO) rules on free trade in services.

Telemedicine Today

Why is there a need for telemedicine? Health care in the United States is expensive ($4,887 per person in 2001) when compared with other countries. One factor contributing to the high cost of health care is the inefficient use of physicians and specialized equipment. To lower costs and improve the use of costly resources, the Institute of Medicine (IOM) has recommended, among other things, that the United States increase its use of telemedicine. This could also improve access to care in communities that are now underserved because of isolation or poverty.

The U.S. Federal Trade Commission (FTC) and the U.S. Department of Justice calculate that the use of telemedicine could lower the cost of medical services by stimulating price competition. Its calculation could be conservative, because it appears that the FTC considered only the impact that domestic telemedicine providers would have on medical costs. The entry of foreign telemedical physicians who are willing to provide their services for one-tenth the pay of U.S. physicians would dramatically increase price competition.

Global telemedicine today: teleradiology. Although the size of the U.S. domestic telemedicine market is in dispute, this market is already significant and expanding. Similarly, little hard information about the size of the global market for teleradiology services exists because most firms in the business are private and have no public reporting obligations. Public organizations, such as the World Bank, do not appear to be sponsoring any international telemedical projects as of this writing. Existing sources, however, suggest that telemedical technology has already allowed India to capture 2 percent of the U.S. health care market. (This includes $350 million for outsourced medical transcription and billing.) India believes that it has only tapped into the “tip of the e-health iceberg.” The prospect of tapping into the U.S. health care market, the world’s largest, has also drawn attention from Mexico and Paraguay.

Three factors stand behind market expansion in international telemedicine: its technological feasibility, financial considerations, and specialty clinics’ interest. Simple videoteleconferencing has become routine with the advent of cheap, reliable broadband access across the United States. More exotic techniques, such as remote robotic surgery, are at the proof-of-concept stage and are not yet reliable enough to be economically viable. Remote reading of radiology images, however, is now the most widespread, economically successful model for global telemedicine in the United States.

Teleradiology is possible because radiology services consist of two separate functions: taking the image, which requires the patient’s presence, and having a physician analyze (“read”) the image. The image is usually taken by a nonphysician technician, which allows separation in time and space between the imaging and the reading. Hospitals provide radiology services as part of their in-house diagnostic laboratories. Accreditation standards require that hospitals with emergency departments have a trained radiologist available to read film around the clock. Radiologists are reluctant to work at night, which makes it difficult for hospitals to meet this standard and creates a niche for teleradiology.

The shift from film to digital imaging and falling telecommunications costs have also facilitated teleradiology. The cost of equipment for transmitting and viewing digital x-rays has dropped dramatically. For as little as $150,000 in technology costs, a well-connected provider can become an international teleradiology provider. These costs will continue to fall with costs in the rest of the electronics market. Notably, this trend does not include medical liability insurance, a sizable expense that has gotten more expensive over time.

Current reimbursement rules favor teleradiology, because these rules have not been adjusted to account for the possibility that radi-
ologists are reading images in higher volumes at centralized locations. Recognizing both the economic opportunity and the competitive threat, large U.S. providers, including the Johns Hopkins University and the Mayo Clinic, have launched major domestic telemedical programs. Presumably, these providers are also looking to expand their franchises to high-end medical consumers outside the United States.17

**Models for teleradiology services.** Domestic teleradiology providers hire physicians based and licensed in the United States to read the images. The only difference between a domestic teleradiologist and a traditional radiologist is the physician's proximity to the patient. The domestic telemedicine market is governed by state law. Violations can lead to loss of licensure for a physician and loss of accreditation for a hospital, which gives domestic telemedicine providers a strong incentive to comply with state regulations.

There are two models for global teleradiology. The so-called Nighthawk model, named for Nighthawk Radiology Services, is an extension of the domestic model. It uses physicians trained and licensed in the United States and places them in time zones that are eight to ten hours ahead of or behind the United States. When such physicians are placed in Spain or Australia, the Nighthawk providers' workday occurs during the evening hours for U.S. hospitals, thereby filling the gaps in physician coverage described above.

Nighthawk companies are incorporated in the United States and compensate their physicians at a rate comparable to that received by other domestic radiologists. Thus, Nighthawk telemedical services are inherently more expensive than domestic teleradiology services because of telecommunication and physician transportation costs. Also, existing rules for international telemedicine require that a domestic provider review the images the following morning. Hospitals are willing to pay a premium for Nighthawk coverage, which assures around-the-clock radiology coverage and allows them to remain in compliance with accreditation guidelines.

The Nighthawk model becomes price competitive when it operates at a high volume. Only the largest hospitals produce enough images to keep their in-house radiologists busy for a full eight-hour day. A Nighthawk teleradiology service that concentrates business from several hospitals could keep its radiologists busy full time. This greater operating efficiency would allow high-volume Nighthawk providers to cut their prices.

The Indian model, named after the country that makes the most use of it, is an innovative model that uses price competition to gain market share. As the term is used in this paper, the Indian model consists of a telemedical provider based outside the United States, using physicians who are not licensed in the United States and who are paid much less than physicians licensed in the United States.18 Indian-model companies can thus draw from a much larger pool of radiologists and can deliver services for a fraction of the cost of domestic or Nighthawk companies.

Hospitals purchasing Indian-model services take on added risks that might offset some of the savings. In addition to taking on medical malpractice liability, discussed below, doing business with an Indian telemedicine provider could result in several violations of Medicare regulations. For example, Medicare funds are not to be distributed to nonresident providers.19 This means that a hospital that hires an Indian-model provider might be accused of illegally diverting Medicare funds to foreign providers.

More generally, the risks associated with the Indian model for telemedicine services are important because as foreign teleradiology gains acceptance, the market will expand beyond overnight coverage to increase competition in the domestic market. As one commentator notes, it is hard to argue that it is acceptable to use Indian teleradiology at 2:00 a.m. but not at 2:00 p.m.20 In addition, the domestic teleradiology market is now protected from foreign competition by nontariff trade barriers. While state licensure requirements are an effective barrier to foreign medical competition today, because of the General Agree-
ment on Trade in Services (GATS), trade barriers might not be able to protect the domestic health care market much longer.

Whether or not GATS applies to a WTO member’s economy depends on the commitments made by the country and the mode of the service. Briefly, a “commitment” is an explicit statement by a country that it has created legally enforceable trade conditions for a particular mode of commerce (for example, electronic or person-to-person). Thus far, eighty-eight members of the WTO have made some commitment on behalf of their health and dental sectors.

If a country makes a commitment, GATS operates to remove barriers to trade by a number of mechanisms. First, WTO members are expected to lower their trade barriers during each round of trade negotiations. Second, GATS’ Most Favored Nation and National Treatment clauses require WTO members to treat all other members equally. That is, GATS prohibits discrimination based on a provider’s country of origin. Third, GATS’ Market Access clause prohibits WTO members from regulating their economies by using caps in the form of the number of suppliers, the value of transactions, or the number of people that might be employed. Finally, GATS’ Domestic Restrictions clause stipulates that any licensing, certification, or technical standards imposed by a WTO member on a particular sector of its economy must not be “more burdensome than necessary to ensure the quality of the service.”

Taken collectively, the GATS clauses abridge the rights of states and provinces within WTO member nations to impose regulations on markets. But if the United States makes a commitment to free trade in telemedicine and GATS abrogates the rights of states to regulate the market, loopholes would appear in the U.S. system for regulating medicine. While some might think that the United States would never commit its health care sector to free trade, this might be more a wish than a firm trade negotiation strategy. After all, it could be shown that Indian-model providers delivered the same level of health care as Nighthawk or domestic providers, then buying health care services from abroad could be an important way to cut U.S. spending on such services. Also, as major insurance and banking corporations seek to expand their markets overseas, the United States could be pressured to commit its health care to free trade.

**Legal Issues In Teleradiology**

Understanding the legal issues is critical to a proper evaluation of the potential impact of globalization on teleradiology services and the liability that could be shifted in the United States from telemedicine providers to hospitals that contract with foreign vendors. The Indian model raises such liability issues.

- **Special legal status of radiology.** The primary liability issue in radiology is when the image reader misses an obvious abnormality on an x-ray, thus delaying the diagnosis of a patient’s condition. If the delay greatly harms the patient, especially if it allows a treatable illness to progress to an untreatable state, the damages can be extensive. Plaintiffs in these cases have a fairly easy time exhibiting evidence to support their cases if the x-rays are available. When the abnormality is clearly visible, and jurors themselves can see it, they are going to rule against the radiologist. Since radiologists are “invisible” physicians having no personal relationship with patients, they are not sympathetic defendants.

  The invisibility of radiologists (and pathologists) to patients places these physicians in a special niche in medical malpractice law. The patient almost never chooses the radiologist, does not know his or her identity, and seldom sees the radiologist. In most radiology consultation situations that come to litigation, courts hold the treating physician liable, rather than the consultant, because the treating physician makes the final decision. On the other hand, courts may hold the radiologist liable under the theory that a treating physician must rely on the radiologist because of the radiologist’s unique expertise.

  Since the hospital picked the radiologist, a plaintiff can also sue the hospital. The hospital’s defense is a legalist one: The radiologist is
not a hospital employee but an independent contractor. Therefore, the hospital should not be liable for the radiologist’s negligence.

For domestic and Nighthawk radiology services, some states look at the transaction from the patient’s viewpoint and hold that the hospital cannot insulate itself from liability with agreements that are invisible to the patient. States that take a more legalistic approach will determine if the physician really was independent of the hospital’s control, and if so, their courts will not hold the hospital liable. Either way, these radiology models pose the same risks as in-house radiology services.

In contrast, the Indian model is a different type of radiology service. First, as discussed below, it might be very difficult to bring a lawsuit against an Indian-model telemedicine provider. Second, an unlicensed physician, however well trained, is considered a layperson by the courts, and the courts will not let a physician evade liability by claiming reliance on the opinion of a nonphysician on a medical matter. (This can be further complicated by linguistic differences.) If the treating physician and the patient assume that the hospital provides traditional radiology services, rather than teleradiology services, the courts might find that this is misrepresentation.

**Can you get the teleradiologist into court?** The plaintiff must complete three steps to get a defendant physically into the courtroom. First, the plaintiff must show that the defendant has sufficient contact with the state to be subject to legal jurisdiction. Second, the defendant must be served (put on notice) with the legal claim. Third, a plaintiff must figure out what legal means to use to get a defendant into the courtroom.

The hospital can get the teleradiology service to agree, under contract, to submit to the court’s jurisdiction in the state where the hospital is located, to produce the radiologist for trial, and to carry sufficient insurance to cover potential losses. If the Nighthawk or Indian-model teleradiology service and the individual radiologist honor such a contract, then the teleradiologist will be in the courtroom, just as if it were a simple domestic case.

Unfortunately, relying on such contracts is not good risk-management planning. Nighthawk and Indian-model businesses go bankrupt, and since medical malpractice insurance is written on a claims-made basis, if the teleradiology service fails to pay the tail coverage or otherwise does not honor the terms of the insurance, there will be no resources to pay a judgment for breach of contract.

An Indian telemedical corporation without substantial U.S. assets might choose to not honor the contract or shift its U.S operations to a different corporate entity. In either case, the plaintiff (or a hospital defendant who wants to file a counterclaim against an Indian teleradiologist) will have to try to bring the other party into the courtroom. This will require convincing the court that the radiologist or company meets the jurisdictional requirements to be sued in the United States.

In a teleradiology case, the court would also have to determine the nature of the service and where it was performed. If the service is defined as reading the image at the place where it is received by the radiologist, the court could rule that the service was performed at the radiologist’s physical location rather than the place from where the report was sent. The court would then look at the contract between the service provider and the hospital to determine the legal relationship of the provider and the radiologist. The contract to perform the services, standing alone, would probably be found a sufficient minimal contact for jurisdiction in disputes between the hospital and the radiology company, but this finding might not extend to the patient’s claim. Assuming that it does extend to the patient’s claim, the patient could have a cause of action against the company, but if the company uses independent-contractor radiologists, it could be difficult for a plaintiff to convince the court that the contract extended to the radiologist.

For United States–based teleradiologists (domestic or Nighthawk), these jurisdictional issues matter only because they determine whether the plaintiff must bring the action in the plaintiff’s home state or in the state where the radiologist resides. For a United States–
based Nighthawk service that employs radiologists, the plaintiff could sue the company wherever it does business in the United States. The company would have to produce its employee radiologist to defend the claim. Even if the Nighthawk company uses foreign-based independent-contractor physicians, courts are likely to hold the company responsible because the radiology service is provided in the United States. This is the same rule that would be applied against any company providing traditional radiology services.

In contrast, a U.S. court might find that an Indian-based company must be sued at its home—that is, in India—which is nearly impossible for a U.S. plaintiff to do. Even if the court finds that the company can be sued in the United States, the process for suing a foreign corporation is complicated, involving international services of process. If the company refuses to appear in the U.S. courts to defend itself, the plaintiff can get a default judgment, but if the company does not have property in the United States, there will not be a feasible way to collect on the judgment. Moreover, a foreign company with limited assets might elect to ignore the claim, go out of business, and reemerge the next day under a new corporate entity. Whatever the reason, if the radiologist cannot be brought before the court, it will be difficult for the hospital to convince the court that it acted properly in selecting the radiologist.

The hospital can attempt to contract around these risks by requiring bonds or insurance for potential losses, but this will raise the cost of Indian-model teleradiology and make it less competitive. Pricing these bonds, moreover, would be difficult. It is hard to predict when lawsuits will be filed because radiology errors can take time to be discovered, and once they are discovered, litigation takes time to resolve. Judgments and settlements may be paid years after the service was performed. If the services were substandard, there may be hundreds of potential claims in the pipeline before the first one is even filed.

**Internalizing medical malpractice risks.** U.S. courts will not tolerate a business model that gives patients no recourse for injuries received as a result of a radiologist’s negligence. Analogizing teleradiology to other consultant situations, a court will decide either that the treating physician cannot rely on the radiologist’s reading or that the hospital should be liable. Ruling that physicians cannot rely on teleradiologists’ readings would have profound consequences, including calling into question the role of the radiologist. Courts are much more likely to hold the hospital liable. Uncertainty over liability will hinder the development of teleradiology and other innovations in medical service delivery. However, there are two ways to resolve such uncertainty: administrative compensation or corporate liability.

The United States and other developed countries could avoid jurisdictional concerns by establishing administrative compensation systems for victims of cyber medical malpractice. Ideally, such administrative systems would be modeled on New Zealand’s 2005 modifications to its Accident Commission Corporation. For telemedicine misadventures, the proposed administrative system would award compensation regardless of fault or the nationality of the provider. This option makes sense if it can be demonstrated that a country would save more money by hiring Indian-model telemedical providers than would have to be paid out in compensation.

The second option, known as corporate liability, evolved from product-liability theory. The premise of corporate liability is that the most powerful party in the transaction—manufacturers for products, hospitals for medical care—is in the best position to internalize the costs of safety and improve the quality of products or services. This legal theory makes the corporate defendant broadly liable for everything that happens that can be controlled by the defendant, even if the defendant traditionally did not exercise such control. Thus, product manufacturers are liable for the defects in their products, even if they are not caused by negligence. This gives manufacturers an incentive to engineer out defects, without regard to how they are caused.
In medicine, corporate liability would mean that hospitals will be liable for all ancillary services provided through the hospital, with no independent-contractor defenses. If the hospital believes that it can get cheaper services overseas, it must understand that if the services are not of proper quality, the money it saves might be lost through liability litigation and claims. Corporate liability also fits the consumer-expectations model: Patients see hospitals as providing unified services, and hospitals hold themselves out the same way. Corporate liability would make the economics of unified services match the rhetoric.

**Will teleradiology raise the standard of care?** Most analyses of teleradiology, and telemedicine in general, focus on the risks of malpractice by the telemedicine provider. It is also possible, however, that teleradiology will raise the standard of care in some situations. There are many specialized conditions that a general radiologist sees infrequently and others that, while common, are difficult to interpret. In both circumstances, there is evidence that radiologists who see a lot of these types of cases do a better job of reading the images. Teleradiology can be used to direct unfamiliar or difficult images to centralized experts, who could then see even more of those cases—far more so than any radiologist in a given community. Panels of experts in different areas could be established, and once such panels are established, plaintiffs could argue that the proper standard of care requires that images potentially falling into the expert panels’ areas of knowledge should be sent to them. Although the courts have not held physicians to a duty to tell patients to seek care from experts elsewhere, it would be much easier to convince courts that an image can be sent elsewhere, especially if the hospital is already sending images out to be read at night.

**International telemedicine is now a reality.** If the United States should ever commit its health care sector to free trade, the operation of GATS would remove trade barriers based on state laws, thereby allowing for an influx of sizable numbers of foreign telemedical providers. But even without the removal of any trade barriers, Indian-model telemedical providers will be able to offer their services at better prices than domestic or Nighthawk providers because the Indian-model providers (1) have access to a labor pool with lower salary demands; (2) do not have to fund physician relocations; and (3) will likely be able to purchase medical malpractice coverage at lower premiums as a result of legal loopholes in the determination of jurisdiction. And while steps can be taken to level the playing field between Indian-model and Nighthawk international telemedical providers, the U.S. market, as it exists today, could be ripe for the entry of foreign telemedical providers.

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**NOTES**

23. World Trade Organization, General Agreement on Trade in Services, Article IV.
24. For the Most Favored Nation clause, see ibid., Article XVI. For the National Treatment clause, see ibid., Article XVII.
25. Ibid., Article XVI.
26. Ibid., Article VI, par. 4.
31. Pamperin v. Trinity Mem’l Hosp., 423 NW.2d 848, 144 Wis. 2d 188 (Wis. 1988).