

# Chapter 6.14

## Inter–Organizational E–Commerce in Healthcare Services: The Case of Global Teleradiology

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### ABSTRACT

Advances in healthcare information technology have enabled new models for electronic delivery of healthcare services. In this article, we present the case of electronic delivery of radiological services and describe the market-based and technological factors that have led to the development of Internet-based service models for flexible delivery of radiological services. Specifically, we describe the technical, regulatory, and security issues that affect teleradiology and propose a service delivery model for providing cost-effective and flexible radiological services.

### INTRODUCTION

The continued wide-scale adoption of information technology in the healthcare industry is facilitating the electronic delivery of healthcare related services. Following the integration of medical infrastructure with information and communication technologies (ICT), patient-facing, and inter-organizational healthcare services can now be delivered using Internet-based applications and e-commerce platforms. In order to understand the factors influencing the evolution of e-commerce models in healthcare services, we present the case of global teleradiology.

Teleradiology refers to the electronic transmission of radiological images such as x-rays, computed tomograms (CT's), and magnetic resonance images (MRI's) across geographical locations for the purposes of interpretation and consultation. The digital radiological images are typically transmitted using standard telephone lines, satellite connections, or wide area networks (WANs). Teleradiology is an empowering technology and a facilitator for enhanced medical care. It enables a single radiologist to simultaneously provide services to several hospitals independent of their location and allows the exploitation of global time differences to provide emergency night coverage by personnel in a different time zone working a day shift. Additionally, the quality of care delivered by an alert physician working a day shift is far superior to that provided by a radiologist who is up all night. In addition, teleradiology also enables the delivery of subspecialty opinions to remote locations, where otherwise expertise is not available. In this article, we describe the current state-of-art in teleradiology, the benefits of the clinical practice of teleradiology, and the technical, regulatory, and security issues related to teleradiology. We begin by discussing relevant work in healthcare e-commerce and subsequently the evolution of global teleradiology.

## **E-Commerce in Healthcare Services**

In the past decade, several new businesses have developed that deliver healthcare related services over the Internet. They can be broadly classified into four different forms of e-health business (Parente, 2000). These include portal, connectivity, B2B, and B2C applications. Portal, connectivity, and B2C commerce in healthcare typically involves either the provisioning of information to consumers via advertising supported Web sites, or the Web-based ordering services for prescription drugs (Zehnder, Bruppacher, Ruppanner, & Hersberger, 2004). In B2B e-commerce, the healthcare industry is mostly focused on the procurement

and supply of medical devices and equipment (Arbietman, Lirov, Lirov, & Lirov, 2001; Smith & Correa, 2005). The exchange of services has been mostly limited to non-medical services such as billing and claims processing.

The exchange of medical services over the Internet has received little attention both in the industry and in academic literature. However, recent advances and developments in the healthcare industry and medical information technology are now enabling several new models for delivery of medical services over the Internet (Siau, 2003), primary examples of which include telemedicine and teleradiology. In addition, initiatives on data standardization and standardization of quality are also driving the development of outsourcing-based models in the healthcare industry (Segouin, Hodges, Brechat, 2005). Following the development of enabling technologies and the emergence of favorable market factors for medical service outsourcing, the outsourcing of medical services is now a major topic for discussion and research (Wachter, 2006). Among the first applications of medical service outsourcing and offshoring is the teleradiology service, and is now practiced by firms like NightHawk (<http://www.nighthawkrad.net/>), virtual radiologic ([www.virtualrad.com](http://www.virtualrad.com)), teleradiology solutions ([www.teleradsol.com](http://www.teleradsol.com)), etc.

Although the concept of teleradiology was first tested and clinically utilized in the late 1950's (Gershon-Cohen & Cooley, 1950), the high cost of transmission and the variability in digital imaging protocols limited the widespread adoption and application of teleradiology applications. However, the rapid progress in digital communication technologies and the development of efficient Internet-based software for image transmission, storage, and display in the 1990s has significantly reduced the technical barriers to teleradiology adoption. In addition to the previous developments, the universal adoption of the DICOM standard, as required by the ACR-NEMA (American College of Radiology and the National

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