Renegotiating Expertise: An Examination of PACS and the Challenges to Radiology Using a Medical Anthropologic Approach

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Purpose: The aim of this study was to examine how the adoption of PACS has affected the professional relationships among radiologists and referring providers and to evaluate the effect of PACS on perceptions of radiologists' roles in patient care.

Methods: A medical anthropologic approach was used to assess the impact of PACS among radiologists and a community of clinical subspecialists at a large academic medical center (n = 40). Data collection techniques included 3 months of ethnographic participant observation during the routine medical practice of study participants as well as semistructured interviews and archival research. These data were then analyzed to identify behavioral and narrative patterns and themes among the study populations.

Results: The difficulty of establishing and maintaining relationships of trust between referring providers and radiologists due to the drop in post-PACS reading room visits emerged as a major source of concern for study participants. By interacting primarily over the phone or at weekly conferences, radiologists felt that they had fewer opportunities to build personal relationships with other clinicians. Meanwhile, the specialist referring providers stated they generally consulted only radiologists with whom they had established personal relationships and otherwise preferred to interpret their patients' images themselves.

Conclusions: Generating and sustaining relationships of trust and effective communication are vital for radiologists to communicate their expertise in medical imaging to referring providers. Because PACS have caused a reduction in referring provider visits to the reading room, radiologists must seek out new opportunities to form personal relationships with other physicians.

Key Words: Medical anthropology, communication, expertise

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INTRODUCTION

The widespread adoption of PACS has revolutionized the practice of radiology by increasing radiologist productivity, virtually eliminating lost films, and allowing images to be viewed throughout hospitals, in clinics, and beyond. PACS has also drastically reshaped how radiologists interact with referring providers. Despite studies that explore the efficiency, effectiveness, and reliability of PACS, there is a striking absence of research on the communication and interphysician relations that facilitate these practices and efficiencies. Therefore, the purpose of this study was to use the techniques and methods of medical anthropology (1) to examine how PACS adoption has affected the professional relationships among radiologists and referring providers and (2) to evaluate the effect of PACS on perceptions of the role of radiologists as members of the patient care team.

Why Medical Anthropology?

Broadly, the field of sociocultural anthropology identifies and examines current patterns and processes of cultural change and human behavior, "with a special interest in how people live in particular places, how they organize, govern, and create meaning" [1]. A subset of this broader field, medical anthropology focuses on the study of human health, disease, and healing systems, seeking to understand them within larger social, cultural, political, and

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economic contexts. Medical anthropologists primarily use ethnography, a qualitative research technique that includes participant observation, interviews, and archival research to investigate how people's health shapes and is shaped by social and cultural forces and norms. Participant observation is often the primary means by which anthropologists gather data, which "involves placing oneself in the research context for extended periods to gain a first-hand sense of how local knowledge is put to work in grappling with practical problems of everyday life" [1]. Ethnographers "embed' themselves into study populations, facilitating observations of everyday behaviors and practices, the development of relationships of trust, and movement beyond standard rhetoric offered to perceived "outsiders."

Unlike quantitative research methods that test the relationships among measurable variables, the goal of qualitative methods, such as ethnography, is to explore and understand the meanings individuals or groups give to social, political, or technical problems [2]. Qualitative methods, such as ethnography, are particularly effective for generating rich, detailed, context-specific data about how people speak, behave, and think about complex and emergent situations. Although qualitative techniques may lack the ability to assess statistical significance, the data that are gathered can suggest important themes, patterns, and hypotheses for future research that can be evaluated using quantitative methodologies. Thus, rather than perceiving "anecdotal evidence" or "personal bias" as problems to be overcome, anthropologists consider these to be important sources of data, as they provide insight into how people think, remember, and perceive events.

Background

Medical imaging technologies, such as radiography, CT, and MRI, are a cornerstone of modern medical practice. Traditionally, radiologists have been responsible for and considered experts in the interpretation of medical images. Before the capacity to digitize and distribute medical images (via PACS and other systems) was developed, a clinician requesting an imaging study was usually required to consult a radiologist and look at the appropriate films on a view box located in a radiology reading room. In his study of radiologists' behaviors when interpreting film-based images, Saunders [3] found that the images themselves were an important source of professional authority for radiologists, who acted as the "voice" of the images and translated the scientific knowledge generated via CT, MRI, or radiography into the language of clinical medicine. Face-to-face interaction between radiologists and clinicians was frequent, and radiologists had an integral role in communicating with and among their professional colleagues. Indeed, radiologists have historically been able to lay claim to and control the majority of medical image production and interpretation, a major source of both economic and knowledge-based power [3-7].

With the development and adoption of PACS, clinicians of all types have the ability to examine and interpret medical images without interacting with radiologists. Also, with radiologists using the speech recognition software that usually is adopted together with PACS, clinicians receive radiologists' reports as soon as they are dictated. As early as 1999, studies showed as much as an 82% reduction in the rate of in-person consultation for general radiography [8], sparking a wave of concern among radiologists that they might be "considered as disembodied functionaries, more akin to servicing technicians than professional colleagues" [9]. Still a relatively new technology in 1999, filmless radiology and PACS have now been widely adopted and are seen as improving productivity, lowering cost, and improving patient care. However, concerns remain that radiology is vulnerable to the erosion of its domain of expertise. As the importance of imaging informatics technologies continues to grow, "turf wars" over the control of image production and analysis [10] raise questions about the current role of the radiologist and the future of the specialty. The crucial change involving the transition from the view box to PACS workstations involves both a redefinition of radiologists' expert diagnostic interpretation and also a shift in the practices surrounding that visual expertise.

Recent research in medical anthropology, science and technology studies, and medical sociology indicates that medical technologies are an important site for redefining medical knowledge, with conflicts often arising over practices and agendas [11-13]. Furthermore, social scientists have found that when engaging with new technologies, people enter into unfamiliar and uncertain terrain, producing concern over the possible destabilization of identities, professional futures, and control over resources [11]. The aim of this study was to build on this area of research and examine the specific ways that PACS has changed how radiologists define their professional identities and establish claims of visual expertise with referring providers, as well as to explore the potential impact of these changes on patient care.

METHODS

For this study, the primary author conducted 3 months of ethnography at a large tertiary care academic medical center in northern California. Ethnographic observations were focused on radiologists and a community of clinical specialists (neurologists on the neurovascular service or "stroke team"), who rely heavily on imaging for their work. These two study groups included both men and women with a broad range of levels of medical experience and training ($n = 40$). Observations of the daily practices and interactions of these two groups took place in reading rooms, at multidisciplinary conferences such as tumor boards, and on daily patient rounds. In addi-