Editorial

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Network Radiology as a New Paradigm in Radiology Practice: Recent Insights From Integrated Health Systems in the United States

Woojin Yi[1], Hyo Jin Lee[1], Kyung Won Kim[1,2], Abdullah S. Al-Yousef[2], Mitulkumar Patel[2], Saurabh Pallod[2], Katherine M. Krajewski[2]

[1]Department of Radiology and Research Institute of Radiology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, Republic of Korea
[2]Department of Imaging, Dana-Farber Cancer Institute, Brigham and Women's Hospital, Harvard Medical School, Boston, MA, USA

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Healthcare delivery is undergoing fundamental transformation in the United States as independent hospitals and fragmented practices consolidate into integrated healthcare systems [1]. Driven by value-based care initiatives, regulatory pressures, and digital innovation, this shift has particularly impacted radiology, a specialty positioned at the intersection of technology, subspecialty expertise, and network-wide service delivery [2]. From 2014 to 2023, radiologists grew by 17.3% while independent practices fell 14.7%, reflecting consolidation into large organizations [3]. This trend has created new challenges for radiology, including ensuring subspecialty access across diverse sites, managing financial pressures associated with duplicative equipment, and coordinating increasingly complex workflows.

Understanding how integrated health systems have evolved is critical to appreciating their impact on radiology practice and patient care. Mass General Brigham (MGB) represents a prominent example of comprehensive, ownership-based consolidation [4]. In 1994, Brigham and Women's Hospital (BWH) and Massachusetts General Hospital (MGH) established an affiliation under a newly formed parent organization, Partners HealthCare. While the two hospitals remained operationally distinct, often competing in clinical and research domains, their shared governance structure laid the foundation for gradual network expansion. Over subsequent decades, the system grew to include multiple community hospitals and specialty centers. In 2019, the network was rebranded as Mass General Brigham (MGB), comprising two academic medical centers (MGH and BWH), three specialty hospitals, seven community hospitals, and more than 300 care sites, including over 60 imaging centers (Fig. 1) [4]. This large integrated network reflects the culmination of a long-term strategy to unify governance, clinical workflows, and digital infrastructure across a complex and geographically distributed health system.

A key milestone of this integration was the launch of the Epic-based Partners eCare initiative in 2015, which unified electronic medical records (EMR) across sites [2]. In 2019, Partners adopted the Visage 7 Enterprise Imaging Platform as Picture Archiving and Communication System (PACS) across its network, beginning with its flagship academic hospitals (MGH and BWH), with planned rollout to community hospitals and imaging centers. This enabled centralized image storage and server-side rendering, allowing subspecialty radiologists at academic

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Corresponding author: Kyung Won Kim, MD, PhD, Department of Radiology and Research Institute of Radiology, Asan Medical Center, University of Ulsan College of Medicine, 88 Olympic-ro 43-gil, Songpa-gu, Seoul 05505, Republic of Korea
• E-mail: kyungwon.kim@aim-aicro.com

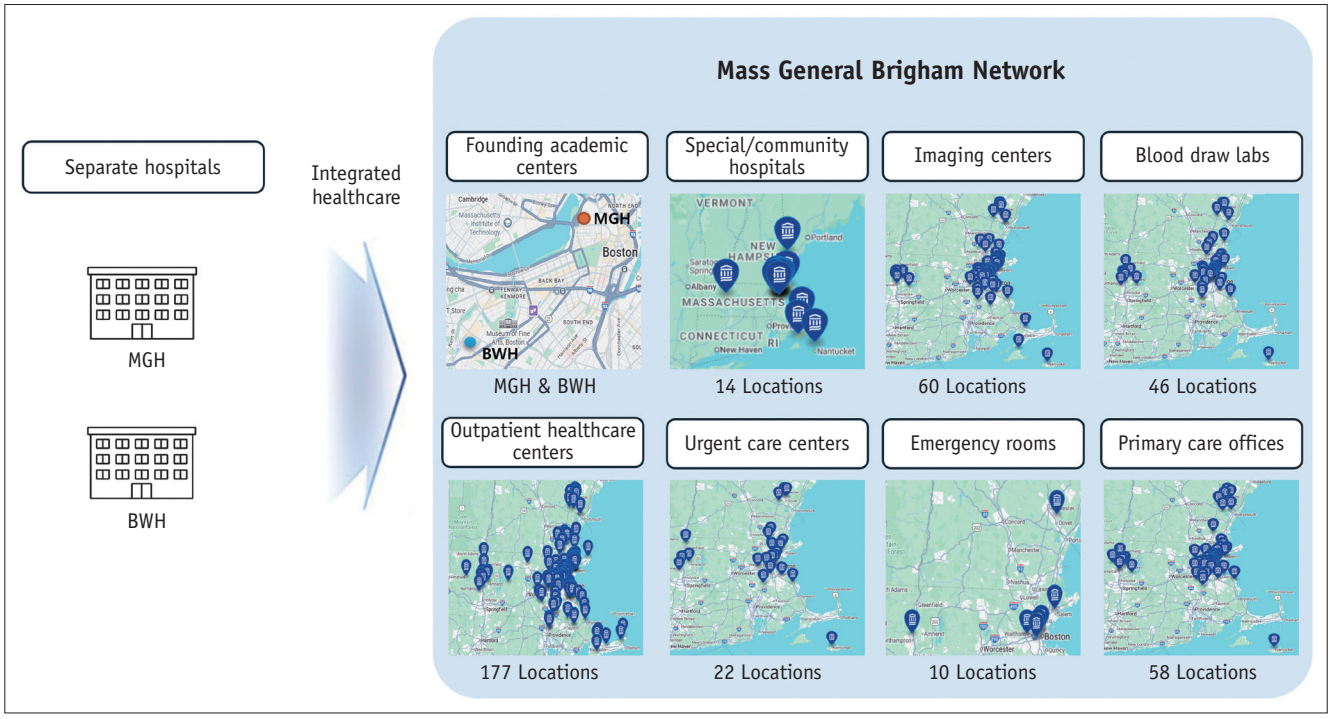

Fig. 1. Evolution from separate hospitals to the Mass General Brigham integrated healthcare network [8]. MGH = Masschusetts General Hospital, BWH = Brigham and Women's Hospital

centers to seamlessly interpret studies from community sites in high speed. This structure eliminated operational barriers between academic and community sites, enabling subspecialty radiologists at MGH and BWH to interpret across the network. The model expanded network-wide access and standardized quality through centralized protocols, however harmonizing workflows across established practices remains challenging, alongside heavy capital and maintenance costs.

This type of healthcare integration has become widespread across the United States, with similar models implemented at leading academic health systems such as Johns Hopkins Hospital, the Hospital of the University of Pennsylvania, and the City of Hope [5,6]. These trends have fundamentally changed radiology practice and radiologist workflows (Table 1) [7].

The first major change is the rise of community-based imaging centers, representing a redistribution of diagnostic services and altering traditional referral patterns. Previously, patients often needed to travel to academic centers for advanced imaging, but network integration now enables patients to undergo imaging at local community sites while maintaining access to subspecialty specialists through telemedicine (Fig. 2) [8]. This shift has reduced travel burdens and broadened access, particularly for elderly populations. Nevertheless, ensuring consistent imaging protocols across dispersed locations remains an ongoing challenge. Variations in equipment calibration, differences in technologist training, and local practice patterns can introduce quality variability despite centralized oversight [9].

The second major change is the evolution of teleradiology. A 2019 national survey found that 84% of radiologists provided teleradiology for internal examinations and 46% for external studies [10]. Network integration has accelerated this shift by creating capacity mismatches between community facilities and academic subspecialty expertise. This structure optimizes resource allocation by enabling subspecialty radiologists to interpret studies within their areas of expertise across the network. However, it also brings significant challenges, including multi-state licensing, limited clinical context, cybersecurity risks, increased productivity demands, and diminished in-person collaboration [7].

Successful implementation of network radiology relies on three essential infrastructure components: EMR–PACS integration, quality assurance mechanisms, and standardized reporting protocols.

EMR-PACS integration serves as the technological foundation for network radiology operations. The most effective strategy is to adopt a single unified enterprise-

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Table 1. Traditional radiology vs. network radiology for integrated health system

Dimension	Traditional radiology practice	Network radiology practice (integrated health systems)
Organizational structure	Independent hospitals or small practice groups operating autonomously	Consolidated multi-hospital systems with shared governance and unified digital infrastructure
Technology infrastructure	Separate EMR and PACS per site; limited data sharing	Enterprise-wide EMR–PACS integration or interoperable HIE platforms (e.g., Epic Care Everywhere) enabling cross-site access
Subspecialty coverage	On-site generalists or limited subspecialist availability	Subspecialty radiologists interpret studies across the network via centralized PACS and telecommunication
Imaging locations	Patients travel to academic centers for imaging	Decentralized imaging through community-based centers linked to academic hospitals
Workflow coordination	Site-specific protocols and manual image transfers	Standardized acquisition protocols, automated image routing, and centralized worklists
QA	Local peer review and limited cross-institutional learning	Online peer learning, centralized QA dashboards, and virtual case conferences
Reporting practices	Narrative reports with variable structure and terminology	Structured reporting templates standardized across the network
Data utilization	Limited data aggregation; local research initiatives	Large-scale data integration enabling AI analytics, quality benchmarking, and outcomes research
Radiologist workflow model	Physically site-bound interpretation	Remote, flexible, and subspecialty-aligned interpretation across multiple institutions

EMR = electronic medical record, PACS = Picture Archiving and Communication System, HIE = health information exchange, QA = quality assurance, AI = artificial intelligence

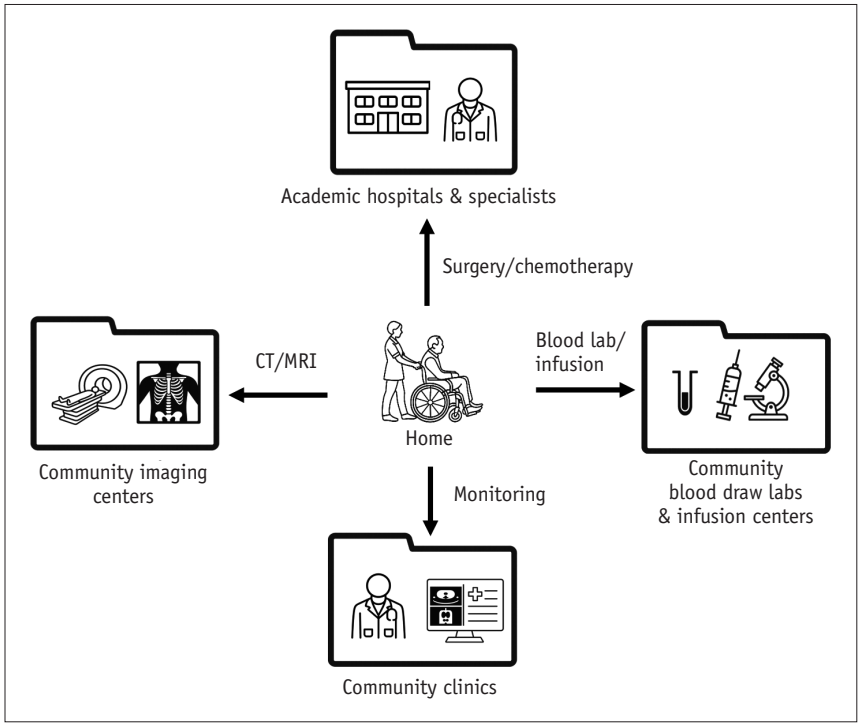

Fig. 2. Patient care pathway across integrated academic and community healthcare settings. This schematic illustrates the coordinated flow of patient care within an integrated healthcare network. Patients receive advanced surgical or chemotherapeutic treatments at academic hospitals and specialist centers. Post-treatment, they return home and continue longitudinal monitoring through community clinics or primary care physician. Routine blood work and infusions are performed at local community blood draw and infusion centers, while imaging studies such as CT and MRI are conducted at community imaging centers.

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wide EMR and PACS platform across all participating institutions, which enables seamless image access, centralized data storage, and standardized viewing environments regardless of acquisition site [11]. A unified EMR allows radiologists and referring clinicians to access patient information and imaging studies within a single ecosystem, greatly improving efficiency and care coordination. However, achieving full enterprise integration can be operationally and financially challenging, especially in large or loosely affiliated networks. In such cases, interoperable health information exchange (HIE) frameworks and data-sharing platforms (such as Epic's Care Everywhere) serve as practical alternatives, enabling clinicians at different sites to view imaging studies and clinical records interchangeably without migrating to a single system [12]. These interoperability solutions allow institutions to maintain local systems while achieving functional integration at the network level, thereby supporting coordinated clinical workflows across diverse facilities.

Quality assurance mechanisms adapted for distributed operations are essential for maintaining diagnostic consistency across network locations. Teleconferencing systems enable real-time consultation between subspecialists and community radiologists, facilitating collaborative case discussions and reducing diagnostic uncertainty [13]. Centralized educational platforms, such as the Learning Center, provide standardized training resources and ensure equitable access to subspecialty knowledge across academic and community sites. These tools work synergistically to reduce practice variability and support continuous professional development, although coordination across multiple sites and time zones continues to pose logistical challenges.

Standardized reporting protocols establish consistency in clinical communication and data management across the network. Uniform templates and terminology enhance communication with referring clinicians while facilitating data aggregation for quality improvement initiatives [14]. Structured reporting systems support both immediate clinical care and long-term applications including outcomes research and clinical decision support development. Implementation requires balancing standardization with clinical flexibility, as overly rigid templates may constrain radiologists' ability to convey important clinical nuances.

In summary, the major trends in healthcare integration have reshaped radiology practice into a network-based model in the United States, enabling more efficient resource utilization and broader access to subspecialty expertise, while introducing new operational complexities. Network radiology models have demonstrated clear benefits, but their long-term sustainability will depend on continued investment in technological infrastructure, robust quality assurance programs, and adaptive organizational change management.

Conflicts of Interest

Kyung Won Kim reports holding equity ownership in Trial Informatics. No other potential conflicts of interest relevant to this article were reported.

Author Contributions

Conceptualization: Kyung Won Kim, Abdullah S. Al-Yousef. Funding acquisition: Kyung Won Kim. Supervision: Kyung Won Kim, Katherine M. Krajewski. Writing—original draft: Woojin Yi, Hyo Jin Lee, Kyung Won Kim, Abdullah S. Al-Yousef. Writing—review & editing: Mitulkumar Patel, Saurabh Pallod, Katherine M. Krajewski.

ORCID IDs

Woojin Yi
https://orcid.org/0009-0001-3620-908X
Hyo Jin Lee
https://orcid.org/0009-0000-3775-7777
Kyung Won Kim
https://orcid.org/0000-0002-1532-5970
Abdullah S. Al-Yousef
https://orcid.org/0009-0000-2996-0513
Mitulkumar Patel
https://orcid.org/0009-0005-1672-7460
Saurabh Pallod
https://orcid.org/0009-0000-9118-3903
Katherine M. Krajewski
https://orcid.org/0000-0002-9286-0416

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