

# Radiology Support, Communication, and Alignment Network and Its Role to Promote Health Equity in the Delivery of Radiology Care

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## Abstract

Racial, ethnic, and socioeconomic disparities in radiological care have been well documented in both the emergency and outpatient setting. Health IT has the potential to facilitate equitable care across diverse populations. Ordering the appropriate study is the first step in the greater mission of improving access and equity for everyone. Radiology Support, Communication, and Alignment Network (R-SCAN) is an informatics-based solution using clinical decision support (CDS) to promote health equity through optimization in appropriate imaging utilization. R-SCAN and CDS may help combat the potential implicit bias of clinicians by providing evidence-based imaging guidelines at the point of care and ensure that patients will receive equitable and appropriate imaging regardless of ethnic and socioeconomic background. By fostering multidisciplinary collaboration between radiologists and referring clinicians, R-SCAN initiatives across the nation have demonstrated successful reductions in inappropriate imaging utilization, particularly in regions with vulnerable populations.

**Key Words:** Clinical decision support, health disparity, health equity, value-based care

*J Am Coll Radiol* 2019;16:638-643. Copyright © 2019 American College of Radiology

## HEALTH DISPARITIES IN THE UNITED STATES

The principles of equal opportunity and equality are deeply rooted in the principles of our nation's founding fathers as well as our national values. Yet, levels of income inequality in the United States have been unrivaled since the stock market bubble in the 1920s [1]. As the economic inequality widens in the United States, so too do disparities in health outcomes. The life expectancy gap in the United States between the richest and poorest 1% is now approximately 15 years for men and 10 years for women [2]. Nearly every chronic medical condition—from heart disease to

diabetes to chronic arthritis—has increased in prevalence with decreasing income [3]. Moreover, racial and ethnic disparities in health continue to exist. For example, African Americans had an infant mortality rate twice that of whites in 2013 [4], and they are also more likely to be admitted through the emergency department for low back pain [5]. In radiology, the uninsured receive significantly fewer imaging services than their insured counterparts in the emergency department [6]. Even when accounting for socioeconomic status, race and ethnicity remain significant predictors of quality of health care received [7]. Glover et al [8] note that the effect of race and language on a patient's interaction with the health care system is complex. Factors that include health literacy, medical mistrust, clinician bias, cultural differences, and linguistic barriers play a role [9-13]. In this article, we provide a brief review of the literature on health disparities in imaging and describe how Radiology Support, Communication, and Alignment Network (R-SCAN) promotes health equity.

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The authors state that they have no conflict of interest related to the material discussed in this article.

## HEALTH DISPARITIES IN RADIOLOGY

Racial, ethnic, and socioeconomic disparities in radiology care are best documented in the breast imaging literature [13-31]. For example, socioeconomic factors, including failure to complete high school, lower family income, and absence of continuous insurance, were associated with lower breast cancer screening rates in unadjusted univariate analysis [14]. Additionally, ethnic and racial disparities in screening mammography heavily contribute to the disparities in breast cancer survival [15-19]. African Americans [17] and those greater than 65 years of age [18] were each more likely to be diagnosed with late-stage disease, partly explained by lower screening mammography rates. Higher rates of late-stage disease in African Americans were attenuated or even eliminated after accounting for differences in screening history in one study [19] but persisted despite correction in another study [20]. Hispanic and African American women were more likely to experience a delay in mammography follow-up [21,22] and less likely to receive a breast MRI [23] compared with non-Hispanic whites after an abnormal screening mammogram. African American women are also more likely to travel farther for breast MRI services [24]. Ethnically diverse, low-income women who experienced a delay in mammography follow-up reported the lack of communication of results, perceived disrespect by providers and clinic staff, logistical barriers to diagnostic service, and a lack of information about breast cancer screening as reasons for delay [25].

Racial, ethnic, and socioeconomic disparities in radiology care have also been reported in the emergency setting [6] and more recently in the advanced imaging outpatient setting [8,32]. Uninsured patients received significantly fewer imaging services than their insured counterparts in the emergency setting [6]. African American, Hispanic, and noncommercial insurance patients were more likely to miss appointments for an outpatient CT or MRI [8], with longer waiting times far more likely to result in a missed appointment in minorities [32]. In an Australian cohort, males, those between 45 and 54 years of age, and the indigenous population were each more likely to miss a scheduled imaging appointment [33]. An experiment by a physician posing as a patient with either commercial insurance or Medicaid insurance or without insurance saliently demonstrated the impact of insurance status on access to imaging at freestanding MRI centers [34]. Although virtually every center offered next-day service

when presented with a commercial insurance plan, only 6 of the 17 centers would accept him with Medicaid and would only schedule such a study within 2 to 3 weeks [34]. Repeat imaging rates are higher in regions without image-sharing technologies [35]. These regions are often associated with fragmented care with disparate providers for patients of lower socioeconomic status [36].

The extent of unnecessary or inappropriate imaging received by patients may serve as a proxy for potential clinician implicit bias occurring at the patient encounter level. For example, minorities and the uninsured are less likely to receive diet and exercise counseling [37,38]. Such practices may predispose lower-socioeconomic populations to less physician time and a higher likelihood to receive unnecessary imaging and diagnostic tests in lieu of counseling [36].

Not all studies demonstrated differences by socioeconomic status, specifically with inpatient imaging services utilization [39], myocardial perfusion imaging utilization [40], and on-site availability of advanced breast imaging and image-guided biopsy services [41]. However, in the case of inpatient imaging utilization, hospitalizations facilitate more timely workup given that the uninsured tend to receive less timely care and imaging services as an outpatient [39]. In breast imaging services, despite similar on-site availability, disparities in on-site utilization rates may nevertheless exist related to insurance status and literacy, which were outside the scope of this particular study [41].

## PROMOTING HEALTH EQUITY: MORE THAN A MORAL ARGUMENT

The goal to promote health equity goes beyond a moral argument. Advancement toward health equity would ultimately benefit the overall US economy. Eliminating health disparities for minorities would reduce indirect costs associated with illness and premature death by more than \$1 trillion from 2003 to 2006 [42]. The Urban Institute estimated a total cost of \$337 billion to US insurers related to racial and ethnic disparities from 2009 to 2018 [43]. Moreover, the downstream costs to individuals, insurers, and taxpayers are self-evident when disparities in access to and quality of health care lead to delays in diagnosis and care, higher complication rates, and increased dependency on emergency department services [44-46].

In addition to the financial implications, health disparities are often a result of a combination of social factors that impact patients and their caregivers, dependents, and

communities. Addressing disparities is more than a financial responsibility but also a social responsibility. A greater understanding of the social determinants of health may positively impact our own practices and allow us to provide better care for our patients. This understanding is saliently highlighted by an analogy by Keyes and Galea [47]. As a goldfish residing in a fishbowl, everything it does is influenced by the water quality it inhabits. Any attempt to improve the life of the goldfish and maximize its health without considering water quality would be futile [47]. In the era of value-based health care, we cannot expect to deliver high-value care without consideration of the social, economic, and cultural determinants of health.

## ROLE OF R-SCAN IN PROMOTING HEALTH EQUITY

As radiologists in both private practice and the academic setting, how can we promote health equity in the patient's continuum of care? Health IT has the potential to facilitate equitable care across diverse populations [48]. For example, clinical decision support (CDS) can prompt clinicians on evidence-based diagnostic and screening tests for primary prevention and chronic disease management, eliminating any potential racial or ethnic bias that may impact clinician judgment [48]. CDS can also prompt clinicians when prescribing medications with formulary, cost, and generic alternatives, reducing unnecessary medication costs for socioeconomically disadvantaged patients. Electronic medical records that provide information regarding demographics, risk factor assessments, and chronic disease management to clinicians at the point of care may enable more effective management of the complex health care needs of vulnerable populations [48].

R-SCAN is one such informatics-based solution using CDS that has the potential to mitigate health disparities through optimization in appropriate imaging utilization [49]. As a national initiative funded by CMS Innovation, R-SCAN was created by the ACR to foster multidisciplinary collaboration between radiologists and referring health care providers to improve imaging appropriateness in both the outpatient and emergency setting. Participation is free and accessible to all clinicians. A growing list of imaging Choosing Wisely topics is available for collaborators to select and serves as the starting point to initiate an R-SCAN project tailored to their practice. Collaborators can enter imaging cases into R-SCAN's web-based Care Select

Imaging tool, which provides an appropriateness rating based on evidence-based guidelines from the ACR Appropriateness Criteria. Readers who are interested in learning more and wish to participate in an R-SCAN project are encouraged to explore the website ([rscan.org](http://rscan.org)).

Multiple R-SCAN initiatives across the nation have successfully reduced inappropriate imaging, particularly in regions with a high proportion of underserved, uninsured, and minority populations. For example, the radiology team at the Carle Foundation Hospital worked with ultrasound technologists to standardize imaging reports and follow-up recommendations for adnexal cysts, which resulted in nearly a 55% reduction in inappropriate imaging follow-up recommendations [50]. The Carle Foundation Hospital, based in Urbana, Illinois, partly serves Champaign County, where there is a lower median household income, more children in poverty, and more people with inadequate social support than in greater Illinois [51].

Radiologists at Asheville Radiology Associates and referring providers across a wide geographical area in rural western North Carolina used CDS to find physicians who were outliers in unnecessary imaging and scheduled one-on-one appointments to educate them on appropriate imaging guidelines [52].

Radiologists and emergency physicians used the ACR Select CDS tool to successfully improve CT appropriateness for suspected pulmonary embolism by 45% at Main Line Health's Riddle Memorial Hospital [53], which serves the suburban Philadelphia community that demonstrates a disproportionately higher rate of fertility among women age 15 to 17 years old, low birth weight infants, and premature births in blacks and Latinas compared with whites in certain regions [54]. Moreover, both radiologists and emergency physicians collaborated with the Patient Family Advisory Committee of the hospital to distribute patient-friendly educational handouts to patients with suspected pulmonary embolism [53], emphasizing the patient-centered nature and the level of patient-physician engagement that R-SCAN initiatives can facilitate.

Radiologists and emergency physicians successfully reduced inappropriate radiographs for low back pain by more than 40% through R-SCAN at Hershey Medical Center, which serves an area with substantial disparity in socioeconomic barriers in different zip code regions based on the Community Needs Index map [55]. Lastly, radiologists at the Baylor College of Medicine collaborated with emergency physicians and primary care physicians serving the Harris County community

to reduce CT inappropriateness for pulmonary embolism [56] and lumbar spine MRI for low back pain through R-SCAN [57], respectively. The Harris Health System is a public health system that serves a population comprised of 59.4% Hispanics and 25.1% African Americans and in which 60.1% are uninsured and 20.6% are covered by Medicaid [58].

Although none of the R-SCAN initiatives directly addressed the racial and socioeconomic disparities in health delivery and outcomes within their health system, the impact and by-product of R-SCAN initiatives can facilitate movement toward health equity. As mentioned earlier, despite the low explicit bias among clinicians toward minorities, existing implicit bias may jeopardize patient relationships and detrimentally impact clinical decision making [12]. R-SCAN's ACR Select CDS tool mitigates implicit bias by providing evidence-based imaging guidelines at the point of care and ensures that patients will receive equitable and appropriate imaging regardless of ethnic and socioeconomic background. Given that longer waiting times are far more likely to result in a missed imaging appointment in minorities [32], a decrease in inappropriate imaging will decrease the backlog of scheduled appointments and reduce waiting times, as in the case of the lumbar spine MRI R-SCAN project [59].

Ultimately, ordering the right study is the first step in the greater mission of improving access and equity for everyone. As radiologists, we can increase our value to referring clinicians as collaborators and consultants by improving imaging appropriateness through use of R-SCAN. CDS may further ensure that lower socioeconomic status patients who receive less counseling [37,38] and physician time [36] are not relegated to unnecessary imaging and diagnostic tests in lieu of counseling. Lastly, on a broader scale, reduction of inappropriate imaging and therefore reduction of per capita cost of health care will decrease the burden on publicly funded health care budgets and allow communities to invest in activities that contribute to the vitality and economic well-being of its residents [60].

## TAKE-HOME POINTS

- Radiologists should consider racial, ethnic, and socioeconomic disparities in health delivery and outcome as part of the movement toward high-value health care.

- A growing body of literature has explored health disparities in radiology, particularly in breast imaging, the emergency department, and the advanced imaging outpatient setting.
- Health IT, including CDS, has the potential to facilitate equitable care across diverse populations by eliminating potential implicit bias of clinicians.
- R-SCAN is an informatics-based solution that facilitates collaboration between radiologists and referring clinicians to mitigate health disparities through optimization in imaging utilization, with several R-SCAN initiatives having successfully reduced inappropriate imaging in populations with disproportionate numbers of underserved, uninsured, and minority patients.

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