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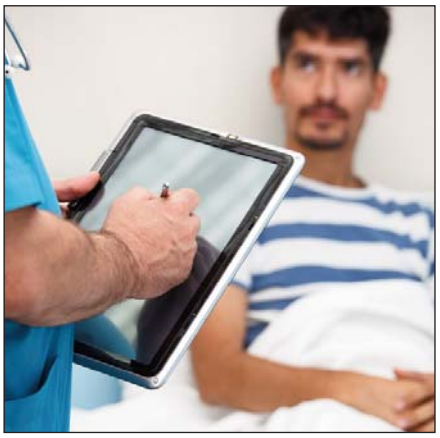

Using Health Information Technology to Reduce Health Care Disparities

"Only a thoughtfully designed and implemented health information technology system will be capable of improving health care quality for all—in the process addressing disparities in health care."

—López et al. (p. 443)

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Health Care Disparities

Health Information Technology and the Collection of Race, Ethnicity, and Language Data to Reduce Disparities in Quality of Care

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Racial disparities in health care delivery and patient outcomes exist and persist unabatedly in the health care system in the United States. One potentially modifiable mechanism for disparities attributed to health care is the quality of care provided to minorities. Minorities tend to receive lower-quality health care even when insurance status and income are controlled.[1] Black patients receive less intensive hospital care, for example, receiving fewer cardiac procedures, lung resections for cancer, and kidney and bone marrow transplants.[2] Partially because of geography, minority patients also tend to seek care at a relatively small number of lower-performing institutions and thus are disproportionately affected by suboptimal quality of care. For example, trauma patients seen at hospitals with more than 50% minority patients have a 37% higher adjusted odds of death when compared with similarly injured patients treated at hospitals with less than 25% minority patients.[3]

Opportunities to identify and address inequalities in the quality of care for minority patients are emerging via the ongoing implementation and expansion of health information technology (HIT) in the United States. In the current issue of *The Joint Commission Journal on Quality and Patient Safety*, López et al. argue that HIT innovations should be harnessed to address the underlying causes for health care disparities.[4] They offer a set of five recommendations for health care organizations to address in implementing and tailoring their HIT systems, as follows:

1. Automate and standardize the collection of race/ethnicity and language (R/E/L) data.
2. Prioritize use of the data for identifying disparities and tailoring quality improvement (QI) efforts.
3. Focus HIT efforts to address fragmented care delivery for racial/ethnic minorities and limited-English-proficiency patients.
4. Develop focused computerized clinical decision support systems in clinical areas with significant health disparities.
5. Include input from racial/ethnic minorities and those with limited English proficiency in developing patient HIT tools.

We agree with the full set of these recommendations; of particular timeliness and importance is the first recommendation, which concerns the automation and standardization of the collection of race/ethnicity and language data. As López and colleagues state, R/E/L data are infrequently and unreliably collected and are generally not used to identify disparities and to tailor QI initiatives. The Joint Commission requires accredited hospitals to identify the patient's primary language, race, and ethnicity.[5] As hospitals roll out new HIT systems and expand the use of electronic health records, automatic and standardized collection of R/E/L data should be incorporated. Standardized R/E/L data collection will enable the identification of otherwise invisible disparities and will inform interventions designed to address specific disparities within health care organizations.

The growing trend in public reporting of quality of care measures will provide an unprecedented opportunity to make health care disparities within and between hospitals transparent. Although race-stratified quality of care measures have not been routinely reported, hospital report cards are becoming increasingly common. Hospital Compare reports performance of hospitals in the United States to allow "consumers" (patients) to make more informed decisions on provider selection.[6] Although the impact of report cards on patient choice and hospital performance remains unclear, publicly available data may encourage consumers to seek higher-performing hospitals and, hopefully, provide incentives for undertaking QI initiatives. Patients, employers, and insurers also may use quality of care data to help inform health care purchasing decisions as they attempt to select high-quality, lower-cost providers.

Public reporting of quality of care measures is a particularly salient issue as health care reform legislation in the United States moves to link performance to both physician and hospital payment. In 2006 the Physician Quality Reporting Initiative (PQRI) was established as a voluntary reporting program to provide incentive payment to eligible professionals reporting data on quality of care measures for services to Medicare Part B patients.[7] Payment is linked solely to reporting for now, but PQRI

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is believed to be a first step toward Pay for Performance (P4P).[7] The Centers for Medicare & Medicaid Services reduces hospital payment for certain preventable hospital-acquired complications,[8] and accountable care organizations (ACOs)[9] will further put hospitals at risk for patient outcomes.[10]

Although these incentives are needed and may improve care for both minorities and nonminorities, they may also pose particular risks to minorities. Health plans and providers that disproportionately care for minority patients could be placed at a disadvantage, unfairly penalized by poor outcomes among lower-income minority populations.[11] Even more concerning, hospitals may attempt to improve their performance by avoiding patients at higher risk for poor outcomes, such as minority patients. Thus, hospital report cards designed to reduce harm to patients could actually harm minorities and thereby widen disparities. For example, in an analysis of the impact of New York's coronary artery bypass graft (CABG) report on racial disparities, Werner and colleagues found that the release of the report cards was associated with an increase in disparities in CABG use between white versus black and Hispanic patients.[12]

One strategy to mitigate the risks associated with public reporting of quality of care measures is to stratify by, adjust for, and make transparent racial disparities in quality measures. Despite the increasing popularity of hospital report cards, they rarely incorporate data on patient race and ethnicity. Race-stratified and transparently reported data on quality of care measures will help hospitals to better identify particular areas of concern and bring to light disparities previously unrecognized. Adjusting performance for race and ethnicity may minimize the impact of P4P and public reporting on hospitals that disproportionately care for minority patients by minimizing incentives for providers to attempt to reduce access for high-risk patients, who are often minorities. Given the well-documented disparities in health outcomes, efforts to improve equity and quality need to be intrinsically linked. By ignoring data on race and ethnicity, health care is missing an important opportunity to leverage the value of performance measurement and improve quality of care. The promise of high-quality health care implicit in improved clinical and patient reported outcomes must be available to all.

In conclusion, disparities in health care is a complex problem, with contributing factors found both within and beyond the health care system. It is time that health care confronts the factors that it can control. The place to start is making the disparities in quality by race, ethnicity, and primary language transparent, which can be accomplished only by adopting the first recommendation provided by López et al.—the automated and standardized collection of this data. As HIT is adopted and expanded at health care organizations throughout the United States, López and colleagues' five recommendations offer a comprehensive approach to using HIT to identify disparities and tailor culturally competent QI initiatives. The public trust in health care requires that high-quality care is provided to all. Efforts directed at reducing preventable harm and improving quality through innovations in HIT need to be equitable as well. J

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Health Care Disparities

Bridging the Digital Divide in Health Care: The Role of Health Information Technology in Addressing Racial and Ethnic Disparities

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Racial and ethnic disparities in health care have been consistently documented in the diagnosis, treatment, and outcomes of many common clinical conditions, including cardiovascular disease, cancer, and diabetes. The 2003 Institute of Medicine (IOM) report, *Unequal Treatment: Confronting Racial and Ethnic Disparities in Healthcare*, defines disparities as differences in treatment between racial, ethnic or other demographic groups that are not directly attributable to variation in clinical needs or patient preferences and persist even after adjustment for socioeconomic factors.[1] The IOM report *Crossing the Quality Chasm* has highlighted equity—the absence of disparities—as a key pillar of quality.[2] Although some improvements have been achieved, persistent health care disparities in quality and access, which vary in magnitude and pattern within minority subpopulations, were recently documented in the *2009 AHRQ National Healthcare Disparities Report*.[3]

Health care disparities have a multidimensional etiology. *Unequal Treatment* highlighted health system (for example, patients having difficulty navigating the health care system), provider (challenging doctor-patient communication due to language barriers or cultural beliefs, provider stereotyping of patients), and patient factors (mistrust) as particularly pertinent (Table 1, page 439).[4] Quality improvement (QI) has been proposed as an important strategy to reduce or eliminate health care disparities.[5,6]

Health information technology (HIT) refers to a conglomeration of technologies such as electronic health records (EHRs), which include computerized provider order entry (CPOE), electronic clinical decision support tools, and clinical documentation such as physician notes and discharge summaries; personal health records (PHRs); technology for the management of chronic conditions (such as the use of e-mail, text messaging, or remote monitoring); population health tools (such as patient disease registries, and telemedicine); and data warehouse tools.[7] There has been an acceleration of HIT implementation in the United States with the passage of the American Recovery and Reinvestment Act (ARRA) of 2009, the Health Information

Article-at-a-Glance

Background: Racial and ethnic disparities in health care have been consistently documented in the diagnosis, treatment, and outcomes of many common clinical conditions. There has been an acceleration of health information technology (HIT) implementation in the United States, with health care reform legislation including multiple provisions for collecting and using health information to improve and monitor quality and efficiency in health care. Despite an uneven and generally low level of implementation, research has demonstrated that HIT has the potential to improve quality of care and patient safety. If carefully designed and implemented, HIT also has the potential to eliminate disparities.

HIT and Disparities: Several root causes for disparities are amenable to interventions using HIT, particularly innovations in electronic health records, as well as strategies for chronic disease management. Recommendations regarding health care system, provider, and patient factors can help health care organizations address disparities as they adopt, expand, and tailor their HIT systems. In terms of health care system factors, organizations should (1) automate and standardize the collection of race/ethnicity and language data, (2) prioritize the use of the data for identifying disparities and tailoring improvement efforts, (3) focus HIT efforts to address fragmented care delivery for racial/ethnic minorities and limited-English-proficiency patients, (4) develop focused computerized clinical decision support systems for clinical areas with significant disparities, and (5) include input from racial/ethnic minorities and those with limited English proficiency in developing patient HIT tools to address the digital divide.

Conclusions: As investments are made in HIT, consideration must be given to the impact that these innovations have on the quality and cost of health care for all patients, including those who experience disparities.

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Technology for Economic and Clinical Health (HITECH) Framework (which established the statutory framework for the implementation of HIT and meaningful use criteria), and the Patient Protection and Affordable Care Act of 2010 (ACA),[8–12] which all include multiple provisions for the collection and use of health information to improve and monitor quality and efficiency in health care.

Despite an uneven and generally low level of implementation, research has demonstrated that HIT has the potential to improve quality of care and patient safety. The careful design and implementation of HIT also has the potential to eliminate disparities. To harness its true potential and make the greatest difference, HIT systems need to be (1) designed with components that focus on the identification and elimination of disparities from the start and (2) tailored to the needs of diverse populations. At the patient level, HIT has great potential to improve health communication and the quality of health care. However, long-standing financial, social, and language disparities have resulted in a "digital divide," in which technology and Internet utilization patterns differ by race/ethnicity and socioeconomic lines.[13] In this article, we describe the HIT mechanisms that improve quality and efficiency and discuss how several of the root causes for disparities are amenable to interventions, particularly innovations in the EHR, using HIT.

HIT Mechanisms for Improving Quality and Efficiency

There is evidence that specific EHR functions, when effectively implemented, improve the efficiency of the care delivered,[14,15] particularly when systems interact with one another.[16–19] Improvement has been shown, for example, in the following:

1. Increased adherence to clinical guidelines and protocols[20]
2. Enhanced adherence to preventive measures in the hospital[21]
3. Enhanced capacity of providers to perform surveillance and monitoring for disease conditions and care delivery[22]
4. Reduction of medical errors[23–25]
5. Increased availability of real-time information, clinical care coordination, and decision support.[26] In particular, there is strong evidence that three types of HIT decision support—alerts, reminders, and prompts—and CPOE are associated generally with improved quality outcomes.[14,27]

In addition, HIT applications such as registries and quality reporting, auditing, and feedback are associated with improved quality of care. HIT also has the potential of enhancing the quality of care and decreasing health care costs through increased standardization, automaticity, and connectivity.[14]

Given increasing evidence that provider behaviors, practice patterns, and health care organizational processes contribute to disparities in care, it is essential that as HIT is deployed throughout the United States that it be tailored to the needs of diverse communities. Just as "generic" QI approaches that are not targeted at vulnerable populations and do not take into account the social and cultural factors that might present barriers to quality care and therefore produce uneven results,[28,29] so it will likely be the case with HIT implementation. A one-size-fits-all HIT approach will certainly perpetuate variations in care and disparities in outcomes.

HIT and Disparities

Several of the root causes for disparities are amenable to interventions using HIT, particularly innovations in the EHR, as stated, as well as strategies for chronic disease management. We present a set of practical recommendations, as summarized in Table 1 (page 439), regarding health care system, provider, and patient factors to help health care organizations address health care disparities as they adopt, expand, and tailor their HIT systems.

Health Care System Factors

Recommendation 1. Automated and Standardized Collection of Race/Ethnicity and Language Data. The IOM, in its 2003 and 2009 reports;[1,30] The Joint Commission;[31]* and The National Quality Forum;[32] among other organizations, have highlighted the importance of race/ethnicity and language (R/E/L) data collection and reporting. In the United States, the rate of R/E/L data collection is low, and the data are generally not standardized or reliable.[33,34] Nor are the data generally used to identify and address disparities or contribute to QI efforts.[35] The new meaningful use Stage 1 core criteria require the collection of R/E/L data, which will allow for stratification of utilization and quality data and, ultimately, the measurement and tracking of disparities within health care organizations. This is the essential first step. Stratified data collection will also address the long-standing problem of not having reliable R/E/L data available for clinical and research purposes. Enabling patients to review and correct personal demographic data, including R/E/L assignment, via patient portals can serve as an important data quality assurance measure. This process can also be included in an ongoing standardized process by patient registration personnel at point of contact with health care providers and organizations. In addi-

* Standard RC.02.01.01, Element of Performance 28: The patient record contains the patient's race and ethnicity. *The Joint Commission: Comprehensive Accreditation Manual for Hospitals: The Official Handbook.* Oak Brook, IL: Joint Commission Resources, 2010.

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Table 1. Root Causes of Disparities and Recommendations for Focusing HIT on the Elimination of Health Care Disparities

Root Causes	Recommendations
Health Care System Factors	
Limited race/ethnicity data collection	Automated and standardized OMB [Office of Management and Budget] categories for race/ethnicity patient information at time of registration
Limited patient language data collection	Automated and standardized patient language preference information at time of registration
Lack of linkage to linguistically appropriate services	Linkage of registration data to interpreter services database
Quality improvement initiatives not focused on needs of minorities	Prioritization of looking for disparities in quality data Linkage of quality data to patients' race/ethnicity and language data Creation and use of patient registries for chronic disease management Automated and standardized quality reporting and auditing with provider feedback
Fragmented care delivery	Facilitated communication among multiple providers Facilitated communication among multiple providers and patients Creation of "virtual care teams" around particular clinical processes Merging traditional self-management programs for chronic diseases with culturally and linguistically appropriate patient navigation programs facilitated by telemedicine
Provider Factors	
Stereotyping and high level of subjectivity with little clinical decision support	Automation of test ordering for quality process measures known to demonstrate disparities Computerized clinical decision support especially in assisting providers in preventive care, guideline adherence in chronic disease management, drug-dosing and prescribing Use of electronic alerts/reminders/prompts to facilitate provider decision making
Patient Factors	
Lack of trust in the medical system	Survey of minority patients to construct IT interfaces that are culturally and linguistically appropriate
Difficulty navigating the system	Automated patient reminders for appointments and chronic disease management via either Internet or text messaging
Misunderstanding provider instructions	Online culturally and linguistically tailored patient education materials via either Internet or text messaging Culturally and linguistically tailored patient self-management chronic disease management tools via either Internet or text messaging
Limited English proficiency	Automation of interpreter need at time of provider-patient encounter Online culturally and linguistically tailored patient education materials via either Internet or text messaging
Different beliefs or preferences for treatment	Documentation in social history to aid in clinical disease management and shared decision making

tion, ACA contains several provisions that require that, no later than 2013, all federally funded health programs (for example, Medicaid and the Children's Health Insurance Program) and population surveys collect and report data on R/E/L for tracking health disparities on a national level.[11] Important remaining challenges include the need for expanding the Office of Management and Budget R/E categories to include a larger number of ethnic groups and the need to address financial and personnel limitations so that these data can be effectively collected at the patient-encounter level.

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Recommendation 2. Prioritization of Using Collected Data for Identifying Disparities and Tailoring Quality Improvement Efforts. Most successful disparities interventions have been multimodal, focusing on the unique barriers that affect vulnerable populations. The interventions include targeting limited-English proficiency, specific cultural beliefs that are at odds with clinical recommendations, and low general or health literacy, among others. QI initiatives such as decision support, alerts/reminders/prompts, and CPOE are generally associated with improved quality outcomes and can be targeted to the needs of diverse populations.[14,27] These IT components are now integral to the Stage 1 set of meaningful criteria, which will expand to more complex applications in Stages 2 and 3. These criteria include the generation of patient registries and patient reminders, for example. ACA has authorized grants for technical assistance to eligible health care providers for improving quality of care, including contracts to develop, improve and expand quality measures targeting health equity and health disparities.[11] Finally, these efforts must be linked to the R/E/L data collection in order to meaningfully identify, track and target the elimination of health care disparities.

Recommendation 3. Focus HIT Efforts to Address Fragmented Care Delivery for Racial/Ethnic Minorities and Limited English Proficiency Patients. Interconnected HIT can help address fragmentation of care, a significant contributor to disparities.[1] HIT can improve quality and decrease fragmentation by supporting increased communication among multiple providers[36–37] and between patients and their providers, as well as by changing the delivery of care from task-focused care to process-focused care.[38] Task-focused care is oriented toward the performance of isolated tasks rather than team-centered and team-coordinated care. Complex clinical care situations that require coordination between patients, multiple health care providers, and multiple care venues, often involving diagnostic tests and procedures, such as follow-up for abnormal mammography results, are more likely to result in suboptimal results when task-care is used.[39] HIT can facilitate follow-up and communication of critical laboratory results by linking patients, provider(s), and organizations.[40,41] HIT would allow for the creation of "virtual care teams" that allow for multiple providers to accomplish complex care plans across organizational boundaries.[38]

Patient Self-Management

Patient self-management is another way to eliminate fragmentation. For example, previous reviews of telemedicine in Type 2 diabetes management have shown significant reductions in glycolated hemoglobin (A1C) and complications, good receptiveness by patients, and patient empowerment and education.[42,43] Interventions that link self-monitoring of blood glucose to educational or behavioral advice and changes in clinical management have been the most successful,[44] and research has shown that minority patients do much better in connecting multiple components of high-quality care and self-management when they have culturally and linguistically sensitive support, such as culturally tailored coaching and navigator programs.[45–47] Importantly, ACA supports the development and dissemination of culturally appropriate patient-decision aids and education regarding personal responsibility. The use of professional interpreters could be extended beyond the clinical encounter to include communication that occurs through patient portals and other Internet and cell-phone-based self-management IT tools. Ideally, the patient portal and self-management IT tools will have linguistic and literacy appropriate interfaces tailored to maximize the patient's activation and utilization.

Wireless mobile technologies such as cell phones and text messaging have been shown in numerous small trials to have a beneficial impact on the management of chronic diseases such as diabetes, asthma, and hypertension, as well as in health improvement activities such as smoking cessation treatment—all which require ongoing advice and support.[48] Text messaging has also been shown to decrease the number of missed appointments and increase the amount of communication between providers and patients between visits.[49,50] Compared with computer technology, the ownership and use of cell phones among persons of low socioeconomic status is as common as use among those of the general population.[51] This high prevalence of cell phone use increases the likelihood of successfully implementing health interventions for traditionally hard-to-reach populations by using text messaging technology. In addition, cell phone methods may be more cost-effective.

Provider Factors

Recommendation 4. Develop Focused Computerized Clinical Decision Support Systems in Those Clinical Areas Identified as Having Significant Health Care Disparities. Implicit bias may contribute to disparities in care through differences in treatment and referral patterns.[52–54] There is increasing evidence that provider behaviors and practice patterns contribute to disparities in care.[52,55] For example, one study found that blacks were less likely than whites to be prescribed antiretrovirals because their providers felt that they were less likely to be adherent to treatment.[56] Another study demonstrated that blacks with chronic kidney disease were less likely to be placed on renal transplant lists simply because they were not referred, not because of their

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preferences.[57] When nephrologists were asked why they did not refer their black patients, they said they were less likely to believe that transplantation improves survival for blacks than whites but, similarly, were likely to believe that transplantation improves quality of life. This may affect how they presented treatment options to blacks.[58]

Because implicit bias and other institutional barriers may not be obvious to providers,[59] HIT may be a promising way to eliminate nonclinical factors that influence clinical decision making. In a systematic literature review of studies of interventions focused on providers and organizations, Beach et al. found that favorable results were associated with automated processes, such as provider tracking and reminder systems, and the use of structured questionnaires that "bypass" the physician to offer preventive services directly to patients.[60] Computerized clinical decision support systems (CDSSs) within an EHR generate patient-specific recommendations for specific diseases or preventive care measures. Decision support can be provided via alerts/reminders that pop up on the interface screen to prompt clinical decision making. Recent research demonstrates that CDSSs improved practitioner performance in diagnosis, preventive care, guideline adherence in chronic disease management, drug dosing, and drug prescribing.[61–63] One study at a public hospital found higher rates of influenza and pneumococcal vaccines with computerized standing orders than with a physician reminder system.[64] The use of reminders with easy automatic referral for complex care plans are an important possible intervention. For example, there is evidence that blacks are not referred to renal transplantation but are instead placed on dialysis for nonclinical reasons.[57] To address this, an EHR could identify patients with severe chronic kidney disease and trigger an automatic reminder for a referral to a transplant nephrologist. Similar automatic reminders for referrals could be designed for disparity-proven clinical areas such as cardiovascular specialty care, referral to medical and surgical specialists, preventive care (for example, pneumococcal/influenza vaccination), and cancer screening. Such patient reminders are included in the Stage 1 set of meaningful criteria.[12]

In summary, several HIT functionalities may be harnessed to enhance the quality of care delivered and to mitigate the effects of subjectivity and bias through increasing standardization of clinical guidelines, automaticity of ordering, and connectivity among different providers.

Patient Factors

Recommendation 5. Include Input from Racial/Ethnic Minorities and Those with Limited English Proficiency in the Development of Patient HIT Tools to Address the Digital Divide. The digital divide also extends to how minorities access and use the Internet. Evidence shows decreased access and use of the Internet for health-related information across age and social and ethnic strata.[65–67] Persons who are older or poor, belong to a racial/ethnic minority, or have a low education level are less likely to use the Internet. In addition, uninsured and low-income patients are less likely to have a usual source of care, resulting in more fragmentation of medical records and follow-up.[68,69]

However, this digital divide is beginning to narrow with each passing year. For example, the most recent Pew Hispanic Survey demonstrates that from 2006 to 2008, Internet use among Latino adults increased from 54% to 64% (versus 61% to 63% for blacks and 72% to 76% for whites).[70] Some 77% of native-born, as compared with 52% of foreign-born, Latinos used the Internet. Finally, 83% of native-born home Internet users had a broadband connection in 2008, while the rate was 68% among the foreign-born. Such discrepancies must be addressed as HIT focuses on interventions that promote increasing patient participation in their care through the use of IT tools such as PHRs.

Although evidence for the effectiveness of PHRs for improving health outcomes is limited, they have considerable promise in improving care delivery by increasing patient access to their medical records, "activating" patients in their care, and increasing the patient-centeredness of medical care.[71–73] In a survey of Kaiser Permanente enrollees in Georgia, lower rates of PHR registration among blacks than whites were not explained by differences in education, income, and Internet access.[66] The survey also indicated that among those respondents with graduate degrees, blacks were less likely than whites to enroll in PHR access. Disparities may increase because of unequal access and use of PHRs. More research is needed to understand the barriers to IT use to adequately design interventions that will successfully improve health outcomes in these vulnerable populations, especially because the meaningful use criteria include provisions focused on providing patients with electronic access to their health records.[12]

However, it is important to emphasize that the current low HIT adoption by minority populations does not preclude future effective use. A survey of Type 2 diabetic patients who were not using the Internet demonstrated that although race and education were significant predictors of receptivity to technology adoption, the baseline interest was high in all groups of patients to benefit from advances in technology that facilitated information sharing with their physicians.[74] This finding suggests that the digital divide might not apply to the use of IT tools for chronic disease management. In addition, national survey data demonstrate that while patients with chronic diseases report

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lower rates of technology access overall, such patients who do attain access are more likely to seek out health information online, compared with those without a chronic condition,[75] and are more likely to use an electronic patient portal, even among patients at Federally Qualified Health Centers (FQHCs).[76]

The development of IT tools that interface with patients must be developed with patient input and continued feedback using user-centered design processes that closely involve end-users in the development process.[77] This should occur during the design and development phase and in the beta- or field-testing stage, in which cultural and linguistic needs can be matched with the proposed technology using end-user focus groups and individual in-depth interviews. End-user involvement must continue through the process of using the developed IT tool. Previous research has demonstrated that the appropriate and efficient use of IT tools requires in-person training and support.[78] Such training and support will need to be culturally and linguistically appropriate to maximize utilization of the IT tools. Importantly, racial and ethnic communities have additional barriers regarding mistrust, culture, literacy, and limited English proficiency that will need to be addressed in both research on IT adoption and implementation.

Mistrust and Cultural Barriers

Racial/ethnic minorities and those with language barriers are more likely to report lower-quality patient-provider interactions than whites.[1] Educating and training in cultural competence are an important strategy for improving care for culturally and linguistically diverse populations. ACA allocates five years of funding to aid the development and dissemination through a Web-based clearinghouse of model cultural competence training and education curricula.[11] Support is also provided for cultural competence training for primary care providers and home care aides.

Targeting research on HIT adoption and implementation among minority and low-SES providers and institutions will be essential. It is unclear if there are unique barriers to adoption and implementation in such settings. For example, it is well documented that some blacks express mistrust (which could lead to a lack of engagement with HIT tools) when interacting with the health care system.[79,80] Research will be needed to survey racial and ethnic minority communities and their physicians to better characterize how they view and would use HIT functionalities such as PHRs and secured electronic physician-patient communication. There may be complex cultural issues related to trust, privacy, economic status, and literacy that will need to be understood and overcome. IT patient interfaces will need to be designed to account for varying degrees of basic literacy, computer literacy, and health literacy, all of which may present barriers for vulnerable populations. Involving end-users in the design, testing, and certification process of these tools will be critical. One approach could be to implement Web-based clinical support tools in culturally competent care which are easily accessible to clinicians caring for diverse patients. For example, an online resource might provide information on specific health-related religious customs, tips on trust-building across cultures, and guidance on effective use of professional interpreters.

Limited English Proficiency

Limited English proficiency (LEP) is defined as the limited ability or the inability to speak, read, write or understand the English language at a level that permits the person to interact effectively in English, including communicating with health care providers. Language barriers affect all aspects of health care and could contribute to disparities in care, as well as in adverse events. Studies have shown that compared with English-speaking patients, LEP patients are more likely to fail to adhere with medication regimens,[81] and, like their physicians[82] (who often believe that they cannot provide care as efficiently or as reliably they would like), report higher rates of dissatisfaction with health care[83,84] and have more adverse events.[85] Because language barriers are a significant threat to patient safety and quality of care, IT systems should be designed to identify when a patient has language and interpretation needs. For example, EHR flags could be instituted to automate interpreter requests and improve clinical work flow, which is often impeded or delayed because of unrecognized interpretation needs. In addition, IT systems could include easy-click mechanisms for printing educational materials in a wide array of languages or for sending low-literacy, language-concordant videos for education and informed decision making. R/E/L data could also be linked to EHR alerts that ensure that the necessary ancillary services, such as interpreters, are provided when needed when LEP patients are being treated.

Challenges

Increased Barriers in Patient-Physician Communication

Research has demonstrated that minority patients, when compared with whites, report higher rates of dissatisfaction with their relationships with physicians, poorer communication with their providers, and poorer overall quality of care.[86,87] The impact of HIT on the patient-physician interaction is not neutral. Studies have shown that the increased use of EMRs during patient visits interfered with patient-doctor communication, leading to a

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negative impact on patient-centeredness.[88] Physicians' screen gaze has averaged one quarter of the time that they spent with their patients and was inversely related to their psychosocial questioning and emotional responsiveness.[89–91] Given these known challenges, it is important to research how HIT will affect the patient-physician interaction among minority patients.

HIT Use in High-Minority-Serving Health Care Settings

Research has shown a slow rate of HIT adoption rate in the United States, with generally less adoption in high-minority-serving settings. For example, in the case of EHR adoption, only 1.5% of hospitals in the United States have a comprehensive EHR system, and, depending on the definition used, between 8% and 12% of hospitals have a basic system.[92] Similarly, only 4% of ambulatory physicians report having an extensive, fully functional EHR, and 13% report having a basic system.[93]

Little is known about the adoption and use of HIT by providers who care for high numbers of minority patients. In general, safety-net providers are slower to adopt new technologies than non-safety-net providers.[94–96] Hing et al. have demonstrated that providers who cared for black and Hispanic patients who did not have insurance or with Medicaid coverage were 12% to 36% less likely to use EHRs than providers with privately insured non-Hispanic white patients.[97] In addition, FQHCs with high rates of uninsured patients were 47% less likely to adopt EHRs.[96]

Hospitals that disproportionately care for the poor (as defined by a hospital's Medicare disproportionate-share hospital [DSH] index) have slightly lower rates of adoption of either basic or comprehensive EHR compared with low-DSH-index hospitals.[98] Chronically underfunded safety-net providers and institutions that provide care in poor minority areas may be at disadvantage for HIT adoption. That is, they are less likely to have access to capital financing and the infrastructure support programs needed for the adoption and implementation of a comprehensive EHR.[98,99] There will likely need to be disproportionate allocation of federal funding for the purchase and implementation of HIT. The meaningful use incentive programs may have the unintended consequence of worsening disparities in the digital divide by excluding certain safety-net providers who serve large numbers of minority patients, thus leading to a slower rate of HIT among these providers. For example, some physicians at FQHCs and Rural Health Clinics have sufficiently low participation in Medicare and Medicaid to receive only limited financial incentives from Medicare. In addition, fiscal sustainability of HIT implementation and effective use in underresourced settings will be a long-term problem, given the limited time frame and monetary limits for the U.S. government's incentive programs.

Conclusion

The U.S. health care system is not well designed to provide equitable care, as evidenced by the prevalence of disparities in care by race, ethnicity, language, and social status. As the United States invests in the design and implementation of HIT, consideration must be given to the impact that these innovations have on the quality and cost of health care for *all* patients, including those who experience disparities.

Development of an HIT infrastructure should address disparities in care from the start. HIT alone will not eliminate disparities, but as we harness its full potential to improve quality, we should ensure that disparities are not simply an afterthought for HIT. Only a thoughtfully designed and implemented HIT system will be capable of improving health care quality for all—and in the process address disparities in health care. J

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