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Issue Brief 4

Health Information Technology for Engaging Patients in Diagnostic Decision Making in Emergency Departments

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Introduction

The National Academies of Sciences, Engineering, and Medicine (NASEM) report Improving Diagnosis in Health Care calls for healthcare professionals to engage patients in diagnostic decision making.[1] Patient engagement refers to the concept of patients being actively involved in their healthcare, including but not limited to engaging with medical providers and the health system in diagnosis, treatment, and overall disease management decisions.[2,3] An increasing body of research shows that patients engaged in their care have improved health outcomes and care experiences.[4,5]

The emergency department (ED) presents unique challenges to engage patients in the diagnostic process. Patients evaluated in the ED typically have no prior relationship with the care team. Engagement is further challenged in the unpredictable, chaotic environment where clinicians operate in time-constrained situations and care for multiple patients simultaneously. Finally, patients presenting to the ED may be critically ill, emotionally distressed, intoxicated, or otherwise unable to fully participate in their own care.

Health information technology (IT) is increasingly used to promote patient engagement by enhancing patient-provider communication, ensuring shared decision making, and enabling positive behavioral changes.[6-9] Health IT tools such as electronic patient portals, mobile text messaging, health applications (henceforth referred to as "apps"), and recent advancements in virtual environments offer new opportunities for patient engagement in the ED. This issue brief reviews the current state of health IT-based methods for engaging patients in the diagnostic process in the ED and outlines opportunities for further development.

Electronic Patient Portals

Patient portals have become more accessible over the last decade.[10] Patients can arrange appointments, review diagnostic test results, request prescription refills, communicate with clinicians, and access their medical records. In addition, portals typically allow proxy access for caregivers of children or older patients, thereby facilitating family engagement and oversight where appropriate. Patient portal use, especially in the primary care setting, has increased patient engagement, decreased costs, and improved communication and care coordination.[6,11-13]

Patients who are active users on healthcare portals can contribute to and potentially improve the ED diagnostic process in several ways. For patients seeking care in an ED that is not affiliated with their usual health network, access to their "home" portal may allow patients and their ED providers to review medical records from the external system, view previous test results, and access additional clinical details to guide the diagnostic process. Similarly, patients who are discharged from the ED without a definitive diagnosis can share ED provider notes and diagnostic testing results with their primary care provider (PCP).

Despite the obvious benefits of portal access and patient engagement, recent studies have shown relatively low portal use in the ED setting.[14] One study assessed portal use by ED patients at an academic medical center and found that less than 10 percent of all radiology and laboratory test results ordered in the ED were ultimately reviewed by patients via the portal.[14] Rates of portal use were higher among patients ages 18-60 years and patients who self-identified as Asian or Caucasian, compared with patients in other age groups and patients who self-identified as Black or Latinx.

The relatively low use of portals underscores the need to enhance the acceptability, accessibility, and usefulness of portals for use after ED visits. These results are also consistent with previous studies that have demonstrated disparities in portal use by underrepresented minorities and highlight the importance of future work to mitigate disparities in technology access and adoption.[15,16]

Several implementation and usability issues specific to ED portal use require further investigation.[15,17] For example, patients seeking emergency care outside of their primary healthcare system must be identified and expeditiously granted access to the portal when they visit the ED. In addition, portals should enable patients to directly share or forward information about test results and diagnoses from their ED visit with their PCP, if the PCP cannot access that system.

Other concerns relate to patients' ability to interpret test results and access their healthcare team to understand the implications of those results. For example, the ED is not structured in a way that allows postvisit followup, and research has shown concerns surrounding how patients understand and interpret both normal and abnormal test results communicated via a portal.[18,19]

Future research in ED portal use should address issues related to user access, usability challenges, interoperability between different electronic health record systems, and best practices for disclosing and explaining results of diagnostic testing given the constraints of the ED environment.[20]

Mobile Text Messaging

Another strategy to increase patient engagement is mobile text messaging. Research shows that text reminders can increase attendance at scheduled medical appointments[21] and can help increase daily medication adherence in patients with HIV, hypertension, and other chronic conditions.[6,22,23] Mobile text-based interventions have been used in ED care to engage patients in followup planning and encourage treatment adherence.[8,24,25]

In one randomized controlled trial, adolescent ED patients diagnosed with pelvic inflammatory disease were significantly more likely to follow up as recommended if they received personalized text messages compared with patients who received no message.[8] In a study of adult ED patients, text messaging reminders significantly increased the rate of adherence to post-ED followup appointments.[25]

Similarly, postdischarge texts from the ED could be used to evaluate and improve diagnostic safety. This concept was recently explored in one small randomized control trial assessing the use of text messaging to facilitate postdischarge conversations between patients and ED physicians.[26] Patients who received a followup text (which asked patients if they wanted to speak with a physician) 48 hours after ED discharge had lower rates of ED revisits compared with those who did not receive a text message. In addition, using text messages to solicit patient-reported diagnostic errors after ED discharge is in the preliminary phases of study.[27]

Although not yet studied, postdischarge texts could also be deployed to remind patients to review outstanding test results in their portal or prompt patients to follow up with their PCP for additional diagnostic testing if indicated. Finally, text messages after ED discharge might provide explicit instructions related to the diagnosis and relay important return visit precautions if the patient's condition fails to improve as expected.

Future studies should explore the role of text messaging in the post-ED discharge diagnostic process. They should also examine the effectiveness of text-based interventions and patient preferences about types of messaging desired, including educational, motivational, or informational.[28] Barriers to using this method of communication, such as costs to patients (based on mobile carrier plan) and concerns about patient privacy when disclosing sensitive medical information via mobile texting, require further investigation.[29,30] Codesigning the technologies with patients and soliciting input regarding intent, frequency, and content of the communication prior to widespread deployment in the ED are paramount.

Health Applications for Synchronous and Asynchronous Communication

Mobile and web-based apps, accessed via smartphones, electronic tablets, or desktops, have recently emerged as another method to increase patient engagement. Apps designed to monitor symptoms and self-management of chronic conditions have shown promise in improving health outcomes in patients with diabetes and chronic lung disease.[31-37] ED patients who track and trend important symptoms or key variables (blood sugar, weight, etc.) via an app may be able to provide a more reliable history and better participate in the diagnostic process.

Recent studies have reported on the use of apps as a tool for ED clinicians to directly engage patients in diagnosis and decision making at the point of care.[38,39] One study described the development and testing of a novel app developed to engage caregivers of young febrile infants in shared decision making related to diagnostic testing (particularly lumbar puncture).[38] Both clinicians and caregivers perceived the app to be useful in augmenting communication. Caregivers provided high ratings of the app's usability and expressed preference for an internet-based app over paper-based materials.

Another study investigated the use of an app to facilitate communication about diagnostic testing in adult patients presenting to an ED with minor head injuries.[39] The app integrated a patient decision aid with an established clinical decision rule to communicate an individualized risk assessment and guidance related to head computed tomography (CT). Use of the app resulted in increased patient knowledge and was associated with high trust in the physician, low CT use, and no adverse patient events. Both patients and clinicians found the app to be helpful and easy to use.[39]

Importantly, both applications were based on robust scientific evidence and codesigned iteratively by teams of clinicians and patients. With over 100,000 health-related applications available for general public use, better guidance is needed when selecting and implementing these tools due to the significant variability in quality and the degree to which different applications rely on or render evidence-based recommendations.[40-44]

Currently, the Food and Drug Administration only regulates health-related apps that function as medical devices (glucose monitoring, electrocardiograms, etc.). The Agency has little oversight of the many other apps focusing on patient education, self-management of chronic conditions, and patient data collection.[45] Further review, development, implementation, and study of health-related apps for use in ED settings represents a significant opportunity to affect health behaviors and facilitate shared decision making and patient engagement.

Emerging Technologies

Emerging technologies, including virtual reality (VR), where the individual is completely immersed in a virtual environment, and augmented reality (AR), where the real world is augmented by digital images, are increasingly being applied in ED settings.[46] For example, a recent application of AR aims to enhance communication in speech- and language-impaired individuals. These and similar nontraditional approaches may enhance patient engagement and communication during the ED patient encounter related to the diagnostic process.[47] Thus, several opportunities exist for future development, implementation, and evaluation of these emerging technologies.

Future Directions and Research Priorities

The use of health IT to enhance patient engagement in diagnostic decision making in the ED is still evolving and requires future research to inform and optimize its development and implementation. A sociotechnical approach, which has been effectively applied to address other safety and quality challenges, should be incorporated to guide design, implementation, and evaluation of such health IT applications. This type of approach will address barriers, additional areas for research, and regulatory changes to ensure applications are evidence based, unbiased, safe, and effective (Table 1). In addition, Figure 1 suggests several areas where health IT applications can be integrated within the diagnostic process based on a recently proposed framework.[48,49]

We suggest codesigning these applications with ED team members and patient representatives so that they are user friendly, easily accessible, and affordable. In addition, applications must be rigorously evaluated to ensure they are effective in achieving patient engagement. Similar to other settings, disparities related to the access and use of health IT applications in EDs should be addressed. Diagnostic processes that are specifically ready for intervention include timely communication of test results, communication regarding diagnostic uncertainty, and shared decision making with patients and caregivers about diagnosis and subsequent testing and treatment options.

In conclusion, health IT offers several promising opportunities for engaging patients in the diagnostic process in the ED. Current opportunities include:

- Optimization of the health portal for reviewing test results and personal health information,
- Text messaging to promote behavioral change,
- Efforts to support self-management,
- Enhanced education for patients about their health problems, and
- Applications to facilitate shared decision making and patient-provider communication.

Additional research and implementation efforts should focus on addressing key barriers and optimizing use of health IT to improve diagnostic safety and patient engagement.

Table 1. Health IT and patient engagement in the ED

Health IT Modality	Current Applications	Potential Barriers	Research Agenda
Electronic Health Record Patient Portals	• Reviewing test results • Requesting prescription refills • Communicating with ED care team • Accessing medical records • Accessing diagnostic test results • Enhancing family engagement in care	• Patient accessibility • Patient acceptability • Limited health or tech literacy • User-friendliness • Age and racial/ethnic disparities • Patient understanding of results	• Best practices for communicating test results • Followup guidance for abnormal test results • Ways to optimize usability, accessibility, and user-centric design • Reduction of disparities
Text Messaging	• Increasing medication adherence • Promoting behavioral changes • Educating patients • Ensuring appropriate followup • Issuing appointment reminders	• Privacy issues • Financial cost to patient • Need for a device with texting capabilities	• Effectiveness of postdischarge messaging • Patient perceptions on healthcare messaging via text • Role in diagnostic safety, such as followup of uncertain diagnoses
Apps	• Monitoring symptoms to aid diagnosis • Educating patients • Facilitating shared decision making (SDM) • Communicating treatment options after the initial diagnosis	• Variable quality • Financial cost to patient • User-friendliness • Age and racial/ethnic disparities • Limited health or tech literacy	• Developing high-quality, evidence-based apps • Studying effectiveness and patient perceptions of SDM via newly designed apps and other emerging technologies, including virtual and augmented reality

Figure 1. Potential applications of health technology and patient engagement in the ED diagnostic process
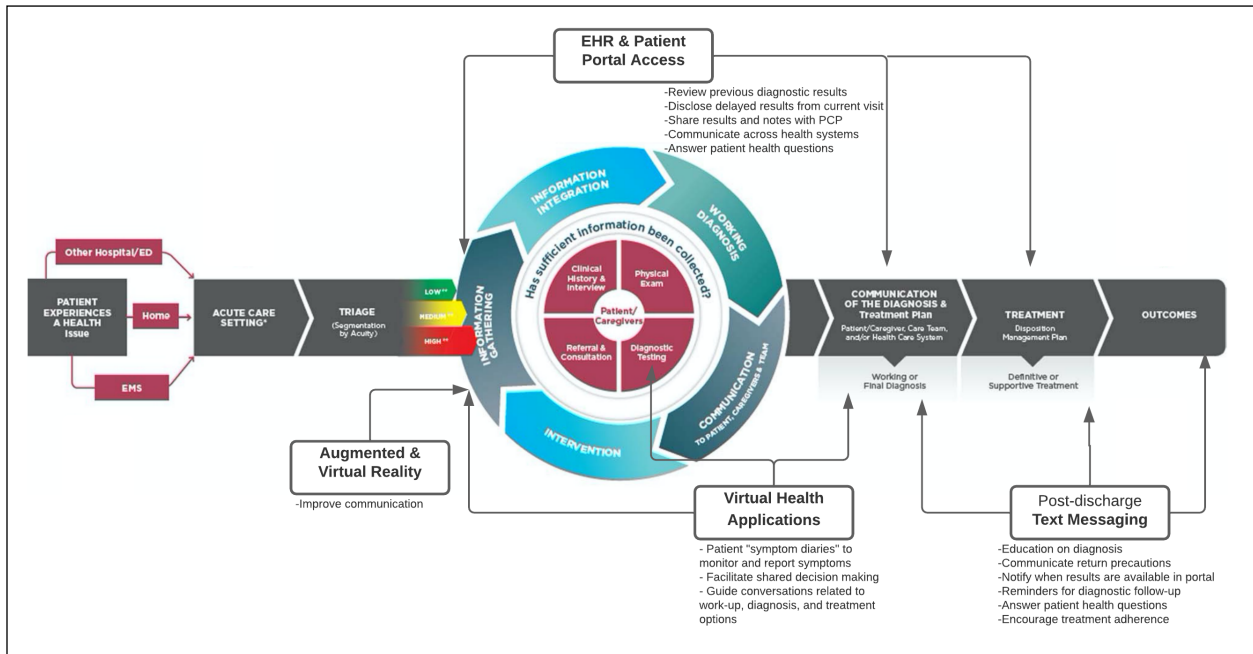
Source: Adapted from Mahajan, et al.[49]

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