mHealth: Improving Patients’ Health
Before, During, and After an Acute Care Visit

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This executive brief showcases how mHealth strategies may help to address the behavioral and health literacy issues that can result in poor patient outcomes. A growing body of literature supports mHealth’s role in improving patients’ health before, during, and after an acute care visit. The overarching goals are to improve “throughput” (ED flow) and post-discharge health outcomes. Achieving these goals should effectively increase revenue, avoid penalties, and improve patient satisfaction scores.

Emergency Department (ED) as Entry Point - Unscheduled Visits and High Risk Patients

Issue:

- Emergency departments (EDs) serve as the entry point for most unscheduled hospital admissions in the United States.
- The Emergency Department is the source of care for the highest-risk patients. Yet, the vast majority of ED patients are referred to the ED by their primary care physician. [RAND Corp]
- ED patients have the same prevention needs as primary or urgent care centers. The ED is often the “only” or “best” place to deliver these care needs. Increasingly, EDs are serving as “observation units” for patients with complex health needs and are expected to deliver routine inpatient preventive services as part of the observation stay.
- Many studies suggest that public health interventions in the ED (e.g. smoking cessation; thoughtful discharge planning for patients with multiple comorbid conditions; mental health screening) can be effective in changing long-term health trajectories.
- Such interventions are difficult, if not impossible, to implement in real-time due to time pressures on
- ED providers and lack of ancillary services resources (case managers, social workers, etc.).
- Research suggests that emergency departments are successfully decreasing rates of hospital admission for many chronic conditions by optimizing post-visit care including actively linking frequent ED users to community health workers and applying intensive ambulatory care models.
- ED patients are sicker on average than patients presenting to other health care settings. Patients have a higher frequency of substance abuse, mental health issues, lower health literacy, and chronic and comorbid conditions.
- Decisions made in the ED have profound downstream financial- and health-related consequences.
- The growth in Accountable Care Organizations (ACOs) makes it essential that healthcare organizations maximize the health status of ED patients upon discharge.

Needs:
mHealth strategies may help to address the behavioral and health literacy issues that can result in poor patient outcomes. A growing body of literature supports mHealth’s role in improving patients’ health before, during, and after an acute care visit. The overarching goals are to improve “throughput” (ED flow) and post-discharge health
Achieving these goals should effectively increase revenue, avoid penalties, and improve patient satisfaction scores. mHealth can help achieve these goals by facilitating patients’ decision whether to visit the ED, improving communication during a visit, and improving health literacy and behavior change after a visit. Specifically, mHealth offers the potential for:

- **Appropriate patients triage**, possibly before they cross the ED threshold. The Emergency Medical Treatment and Labor Act (EMTALA) mandates that once a patient enters an ED or its vicinity a patient cannot be turned away from care, regardless of insurance status.

- **Improved patient triage prior to ED arrival**:  
  - Telehealth services between the ED and skilled nursing facilities, prisons, group homes and other defined and controlled populations, to make a more informed decision about who might require a costly ED transport.  
  - Patient self-triage via mHealth applications (e.g. “iTriage”)  
  - Remote home monitoring that transmits the early signs that suggest a patient needs a higher level of care.

- **Real-time patient and caregiver communications including diagnostic testing, diagnosis, and plan.** A mHealth-facilitated conversation has many potential benefits: directly engages a patient/caregiver in their care plan, and establishes pertinent follow-up interaction expectations between a patient/caregiver and their PCP. Reasonable expectations include:
  - Enhanced patient outcome and improved satisfaction from improved comprehension and communication between the patient and their usual caregivers.  
  - Improved health literacy and patient self-efficacy.  
  - Improved discharge planning. mHealth can facilitate appropriate communication of a comprehensible discharge plan for patients discharged from the Emergency Department or other acute care setting. It can provide a linkage to appropriate community services. Most importantly, it can facilitate the delivery of appropriate, evidence-based behavior change plans.
    - Integration with a patient's usual source of care (primary care provider, specialist, psychological counselor) or to other appropriate community services.  
    - Delivery of evidence-based, appropriate behavior change plans including improved new medication regimen compliance, increased likelihood of smoking cessation, and provide social support for isolated patients.  
    - Encourage compliance with medical care plans and result in decreased readmissions. A comprehensive mobile discharge toolkit can improve discharge instructions comprehension and empower patients to manage their own care more effectively. Decreasing readmissions allows hospitals to avoid readmission penalties and gives patients the opportunity to better manage their chronic conditions.

**Case Studies:**

**Example 1:** Text messaging has been successfully used to improve satisfaction scores for an urban, high-volume emergency department:

A high-volume Midwestern hospital (~90,000 emergency department patients annually) traditionally tried to contact discharged patients by telephone. After instituting SMARTworks® EffectiveResponse (Standard Register Healthcare, Dayton, OH; SEE FIGURE BELOW) to check on wellbeing and service issues, the hospital achieved the 99th percentile for satisfaction. The data needed to follow-up with patients originates from a daily EHR extract and resides in a HIPAA-complaint cloud server.
29% of all patients reply electronically with 62% of those replying to text messages and the remainder reply to email queries. If a patient reports feeling worse than they did in the ED (~2% of patients), the charge nurse is immediately alerted. If a patient reports a medication or follow-up issue (4% of patients), the on-duty case manager is emailed. The staff collaboration and improved patient outcomes around these wellbeing checks were recently recognized with a 2014 Emergency Care Innovation of the Year Award. Service issues (as reported by 6% of patients) are relayed to the appropriate administrative staff and built-in workflow tools simplify complaint management and email follow-up with patients to address concerns.

Providers receive statistically valid satisfaction metrics and patient comments on a monthly basis; the response rate to the text-message survey is much higher than that for traditional paper-and-pencil discharge surveys.

Lastly, upon completing the wellbeing survey on a smart device, patients are linked to the hospital’s patient portal – an engagement strategy that is critical to attainment of the Meaningful Use Stage 2 View/Download/Transmit objective.

**Example 2: Text messaging has been shown to improve appointment adherence and patient self-efficacy, even in high risk ED populations**

- A large randomized controlled trial was recently published showing that SMS appointment reminders are feasible, acceptable, and increase a high-risk population’s compliance with appointments. The study was conducted at a large West Coast safety-net hospital. Patients were eligible for the study if they were English- or Spanish-speaking, being discharged home, and had a follow-up appointment in the county health system within the next 30 days. Among eligible patients, 77% consented to receive an automated SMS appointment reminder. This reminder was sent three times prior to the appointment, and confirmed date, time, location, and clinic name. Intervention patients who received the SMS reminders were 10.5% more likely to keep their follow-up appointments (p = 0.045). The intervention showed greater effect in patient groups with lower baseline rates of follow-up.


- A recent pilot study was completed with frequent ED users in New York City. In this study, case managers used Sense Health to bolster their care management services with tailored text message health interventions delivered to patients. The messages were moderated by case managers. Compared to case management alone, participation in the text-message program significantly improved patient activation constructs (e.g. 18% relative increase in confidence to follow medical treatments at home; 21% relative increase in motivation to improve health; 24% relative increase in knowledge about medication benefits). It also significantly improved patient

adherence to recommended care plans, and both case manager and client perceptions of their connectedness.  


**Example 3:** Longitudinal text messaging can be used to change risky behaviors and improve treatment compliance even among “high risk” and “vulnerable” Emergency Department patients.

Multiple recent studies have shown that longitudinal text messaging can change risk behaviors among high-risk patients. One recent peer-reviewed study, and one study in progress, demonstrates that text messaging also works for a random selection of high-risk emergency department patients. Using only regular care and a longitudinal, automated text-message intervention:

- At four large hospitals in Pennsylvania, researchers’ enrolled young adults (age 18-25) reporting hazardous alcohol consumption into a three-arm randomized controlled trial of a text message alcohol intervention. The active arm consisted of weekly assessments and feedback. The study showed a small, but statistically significant, decrease in binge drinking and weekly drinks among the assessment and feedback arm. This study showed that interventions on sensitive behavioral topics are feasible, acceptable, and may change drinking patterns in high-risk emergency department patients.


- At a large urban hospital in Rhode Island, researchers have developed a patient-centric depression prevention intervention tool for high-risk teens utilizing user-centric design principles. Eligible teens are identified in the course of usual care for any chief complaint in the ED, and in the eventual dissemination trial, it is expected that the teens would be identified as part of normal psychosocial risk factor screening. Once deemed eligible, teens (and their parents) are assented/consented for a brief in-ED introduction to the intervention, followed by an eight-week daily assessment and tailored feedback. Preliminary results from the trial show high acceptability, high retention, high feasibility, and a trend toward decreased depressive symptoms with the help of an automated text-message intervention.


**What is needed to facilitate the use of mHealth in the Acute Care setting?**

With proper IT support and integration into the EHR, it appears that a variety of mHealth tools can be accepted, feasible, and effective. Early studies support increased plan and medication compliance, increased patient satisfaction, decreased ED return visits, and decreased patient risky behaviors can be realized but more research needs to be done. In order to fully realize the mHealth benefits for ED and acute care patients, hospitals must identify and/or provide the following:

- Evidence-based mHealth solutions with which clinicians and administrators can feel comfortable. Without evidence, mHealth risks being viewed as “snake oil” and is the critical, necessary step to disseminate mHealth.
• **IT support** for providers wishing to use digital health. Many have trouble installing new software on their institutional devices.

• **ED EHR Integration** is necessary for providers to view patient results and document recommended programs.

• Privacy/security legal clearance is necessary due to fears about HIPAA and HITECH compliance. Currently, many hospital systems ban the use of patient-facing SMS and/or apps.

• **Provider workflow/buy-in** is necessary considering the emotional scars from previous EHR implementations. Most possess significant reticence to be subjected to more technology of questionable benefit to patients, which they believe will add to their daily workload. Demonstrating mHealth’s benefits to patients’ and providers’ well-being, especially in the acute care environment where time is of the essence for all parties,

• **mHealth reimbursement models** that compensate healthcare providers for the time spent remotely reviewing results and prescribing programs are more likely to create advocates for mHealth integration and use.

• **Curated lists of evidence-based mHealth solutions** for acute care patients and providers to facilitate selecting the best solution.

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