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A feasibility pilot study on the use of text messages to track PTSD symptoms after a traumatic injury

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ABSTRACT

Objective: Monitoring posttraumatic stress disorder (PTSD) symptoms after a traumatic injury is beneficial for patients and providers. Text messages can be used to automatically monitor symptoms and impose minimal burden to patients and providers. The present study piloted such a strategy with traumatic injury patients.
Method: An automated daily text message was piloted to evaluate PTSD symptoms after discharge from the hospital. Twenty-nine patients who experienced a traumatic injury received 15 daily texts and were then followed up at 1-month and 3-months after discharge.
Results: 82.8% of the sample responded at least once and the average response rate per participant was 63.1%. Response rates were correlated with PTSD symptoms at baseline but not at any other time. Patient satisfaction with this approach was high.
Conclusion: Text messages are a viable method to monitor PTSD symptoms after a traumatic injury. Such an approach should be evaluated on a larger scale as part of a more comprehensive early intervention for traumatic stress.

Approximately 23–31% of adults exposed to a traumatic injury will meet criteria for a psychiatric diagnosis, the most common of which are posttraumatic stress disorder (PTSD) and depression [1,2]. These rates underscore the need for low-cost screening mechanisms that can connect high-risk patients to needed mental health resources. Despite the utility of screening instruments [3], few measures can identify those at greatest risk at the time of the trauma. In the absence of such tools, repeated symptom assessment through telephone follow-up, self-report diaries, and in-person visits are often used to identify those at high risk and facilitate continuity of care [4–7]. Repeated assessments, referred to as "watchful waiting", have also been associated with a reduction in psychological distress in the months following a traumatic event [4].

Despite the potential benefits of watchful waiting, it also can impose a significant burden on patients and acute care centers. Patients report that their primary concerns after a traumatic injury are related to their physical health and social functioning as opposed to their mental health [8]. Therefore, patients may have low motivation to complete repeated assessments on mental health shortly after a trauma. Second, patients often are faced with numerous responsibilities in the aftermath of a traumatic injury. Such responsibilities include attending physical rehabilitation, adhering to medication schedules, managing insurance claims, and navigating potential legal matters. Including psychological assessments in this early period may impose additional burden. Third, the stigma associated with mental health conditions is related to reduced use of mental health care [9] and reduced symptom monitoring in those with PTSD [10]. Therefore, those at greatest risk may also be the least likely to engage in repeated assessments.

Acute care centers face barriers in conducting follow-up as well. Comprehensive follow-up assessments require significant resources that may not be available to all trauma centers [11]. For example, a randomized clinical trial used systematic outreach services to screen and treat high-risk patients months after a trauma [12]. Patients were contacted by telephone 3–21 days after discharge and given a standardized telephone assessment. High-risk patients were invited for an in-person clinical assessment for further evaluation and then randomized to a treatment condition. This process involved approximately 7 hours of telephone assessment per patient enrolled in treatment [12]. These estimates corresponded to 2,394 hours of clinical work to provide care to the 342 high-risk patients in the study. In response to this demand, the authors stated that evaluation programs were costly and should be reserved only for exceptionally traumatic events such as natural disasters.

The use of a single assessment telephone assessment to determine risk, a strategy that has been used in other studies [4,6], may also miss

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important fluctuations in symptoms [13]. Repeated assessments are preferred, but places increased burden on healthcare providers. A collaborative care treatment that began at a patient's bedside after a traumatic event and continued for a year reported that case managers spent a median of 13.2 hours (IQR=13.3) per trauma patient [14]. This rate would require approximately 1 full time staff member per 200 admitted patients per year. These data indicated repeated assessments are time intensive and costly.

Healthcare Information Technology solutions have the potential to address many of these issues [15]. These benefits include asynchronous communication, increased privacy, and the potential for automated communication to reduce provider burden [16]. Solutions that leverage widely available technologies and existing infrastructure, such as text messages, are ideal for conducting repeated assessment after a trauma. Texting allows for brief and asynchronous communication between two individuals via a mobile device. Systems are available to automate the transmission of text messages and record responses to facilitate data collection [17]. Furthermore, text messages are used by 92–97% of adults under age 50 [18], a segment of the population that is at greater risk for PTSD [2,19]. Thus, a text message assessment strategy could be used to conduct repeated assessments of PTSD symptoms after trauma exposure at minimal burden to patients and providers. However, patient willingness to use such a strategy is unknown.

Consistent with recent recommendations [20,21], the present study sought to pilot a post-trauma repeated assessment strategy through the use of text messages. The aims of the study were to determine the proportion of trauma patients that would consent to receiving daily text messages assessing mental health, determine response rates to daily text messages among trauma patients, identify predictors of higher rates of responding, assess patient satisfaction, and determine provider burden.

1. Methods

1.1. Participants

A total of 31 participants were recruited from a Level 1 Trauma Center. Participants were predominantly male (n=17; 54.8%), partnered (n=20, 64.51%), had self-reported race and ethnicity consistent with the surrounding area (White: n=15, 48.4%; African American: n=11, 35.5%; Hispanic: n=2, 6.5%; Pacific-Islander: n=1, 3.2%; Other: n=2, 6.5%), and had a mean age of 37.1 years (S.D.=9.8). Education status varied such that 13 (41.9%) did not complete high school, 4 (12.9%) completed high school, 8 (25.8%) completed some college, and 6 (18.4%) completed college. The majority of participants had private insurance (n=17, 54.8%), 10 (32.3%) had Medicare or Medicaid, and 4 (12.9%) denied having insurance.

1.2. Measures

1.2.1. Interviews

The Standardized Trauma Interview (STI; [22]) is a 41-item interview on relevant aspects of the trauma and related demographic information. The STI was administered in the hospital to determine if the trauma met criterion A for a diagnosis of PTSD. The MINI International Neuropsychiatric Interview for the *DSM-IV* (MINI; [23]) was administered at the 3-month assessment by a licensed clinical psychologist to determine if patients met *DSM-IV* criteria for PTSD and major depressive disorder.

1.2.2. Self-report measures

The Posttraumatic Symptom Scale Self-Report Version (PSS; [24]) is a 17-item self-report measure that corresponds to the *DSM-IV* criteria for PTSD. Symptoms were rated on a 0–3 scale with total scores ranging from 0–51. Internal consistency ranged from fair to excellent (α=.66–.93). The Patient Health Questionnaire 8 (PHQ; [25]) is an 8-item self-report measure that assesses symptoms of depression on a 0–3 point scale with total scores ranging from 0 to 24. The PHQ-8 uses the same items as the PHQ-9, but removes the item assessing suicidality. Internal consistency ranged from fair to good (α=.71–.89). The Illness Intrusiveness Rating Scale Intrusiveness Rating Scale (IIR; [26]) is a 13-item self-report measure that assesses the extent an illness interferes with important life activities on a 1–7 point scale with total scores ranging from 13 to 91. The domains were linked specifically to the traumatic event for which the participant presented to the hospital. Internal consistency ranged from good to excellent (α=.87–.94). The emotional/information support subscale of the Medical Outcomes-Social Support Scale (MOSSS; [27]) was used due to its association with reductions in PTSD symptoms in prior work [28]. The MOSSS subscale is an 8-item self-report measure assessing perceived caring and empathy from others on a 1–5 point scale with total scores ranging from 8 to 40. Internal consistency ranged from good to excellent (α=.88–.97).

1.2.3. Hospital variables

Injury severity score (ISS) and length of hospital stay were extracted from medical charts.

1.2.4. Text messages

Short messaging service (SMS) content (i.e., text messaging content) was developed iteratively with the feedback of 14 experts in the field of traumatic stress, including clinical psychologists, acute care physicians, and nurses. An initial discussion identified five domains for assessment based on the empirical literature: re-experiencing, avoidance, hyperarousal, pain, and social support [29–31]. A set of initial items was drafted by the lead author and sent to the panel for review. Feedback was obtained on 5 iterations of the questions before the final item content was selected (Table 1). Items were tailored to fit within a single text message (i.e., were at most 160 characters in length). A five-item self-report survey also was developed to assess patient satisfaction with the messages. Items assessed satisfaction with regard to frequency of messages (prefer more or less than 1 per day), length of text period (prefer more or less than 15 days), helpfulness of the texts (1: not very helpful–7: very helpful) and extent to which texts bothered them (1: extremely bothersome–4: not bothersome).

1.3. Procedure

1.3.1. Recruitment

Participants were recruited from the recovery ward of a Level 1 trauma center. A clinical psychologist reviewed the daily census of patients admitted through the trauma service. Patients who presented for an injury that would satisfy criterion A of the *DSM-IV* PTSD diagnostic criteria (e.g., motor vehicle crash, gunshot wound, stabbing) were approached at bedside. Exclusion criteria included

Table 1
Content of text messages to assess symptoms after a traumatic injury.

Domain	Item
Social Support	How supported, close, and/or connected to friends & family have you felt today? (1=not at all; 7=completely)
Hypervigilance	How much did you feel overly alert, jumpy, and/or have difficulty concentrating today? (1=not at all; 7=all the time)
Avoidance	How much have you avoided people, places or activities that may remind you of the trauma today? (1=not at all; 7=completely)
Re-experiencing	How often did you have negative memories or thoughts about the trauma today? (1=none at all; 7=a lot)
Pain	How much physical pain were you in today? (1=none; 10=a lot)