Published in final edited form as:

Gen Hosp Psychiatry. 2011 ; 33(2): 123–134. doi:10.1016/j.genhosppsych.2011.01.001.

Enhancing the population impact of collaborative care interventions: Mixed method development and implementation of stepped care targeting posttraumatic stress disorder and related comorbidities after acute trauma

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Abstract

Objective—To develop and implement a stepped collaborative care intervention targeting PTSD and related co-morbidities to enhance the population impact of early trauma-focused interventions.

Method—We describe the design and implementation of the Trauma Survivors Outcomes & Support Study (TSOS II). An interdisciplinary treatment development team was comprised of trauma surgical, clinical psychiatric and mental health services “change agents” who spanned the boundaries between front-line trauma center clinical care and acute care policy. Mixed method clinical epidemiologic and clinical ethnographic studies informed the development of PTSD screening and intervention procedures.

Results—Two-hundred and seven acutely injured trauma survivors with high early PTSD symptom levels were randomized into the study. The stepped collaborative care model integrated care management (i.e., posttraumatic concern elicitation and amelioration, motivational interviewing, and behavioral activation) with cognitive behavioral therapy and pharmacotherapy targeting PTSD. The model was feasibly implemented by front-line acute care MSW and ARNP providers.

Conclusions—Stepped care protocols targeting PTSD may enhance the population impact of early interventions developed for survivors of individual and mass trauma by extending the reach of collaborative care interventions to acute care medical settings and other non-specialty posttraumatic contexts.

Keywords

PTSD; stepped collaborative care; acute care; population impact; traumatic injury

1. Introduction

Traumatic events are highly prevalent in the United States and are a major cause of medical and psychiatric morbidity [1-3]. Each year between 1.5-2.5 million American civilians require hospitalization for the treatment of traumatic physical injury [1,4-6]. Traumatic injury accounts for approximately 12% of medical expenditures in the United States [7]. From a global perspective, approximately 16% of the world's burden of disease is attributable to traumatic injuries [8].

Seriously injured patients are at high risk for developing posttraumatic stress disorder (PTSD) and related co-morbid conditions, such as depression and substance abuse/dependence [9-16]. Between 10-40% of physically injured American civilians may go on to develop symptoms consistent with a diagnosis of PTSD [9,17-20]. PTSD makes an independent contribution to posttraumatic functional limitations and diminished quality of

life above and beyond the impact of injury severity and medical conditions [9,20-24]. PTSD is associated with increased costs to society; these costs appear to be in part secondary to increased health care costs [2,25-27].

Effective trauma focused early interventions delivered in real world non-specialty mental health settings face the challenge of incorporating both patient-centered supportive care and evidence-based treatment targeting PTSD and related co-morbidities [28-33]. Efficacy research suggests that individuals with posttraumatic psychological symptoms, including injured trauma survivors, may respond to early cognitive behavioral psychotherapeutic (CBT) interventions [28,29,34-40]. Pharmacologic interventions may also be effective in the prevention and treatment of PTSD [39-42]. Therefore early interventions that target engagement of injured trauma survivors and the initiation of evidence-based PTSD treatments constitute an important investigative focus.

Few investigations have successfully delivered early psychotherapeutic and psychopharmacologic interventions to representative samples of acutely exposed disaster, injury, or combat survivors [43,44]. Using randomized effectiveness designs [45], mental health services researchers have demonstrated that combined collaborative care interventions can improve symptomatic outcomes for patients with depressive and anxiety disorders who are treated in primary care medical settings [26,46-55]. Commentary from the emerging field of dissemination/implementation research has encouraged enhanced focus on understanding intervention population impact and clinical trial generalizability as a means of furthering the translation of treatments to real world practice settings [56-62].

This design paper [52,63-67] outlines the development and implementation of the Trauma Survivors Outcomes and Support (TSOS II) investigation. The overarching goal of the research program was to expand the reach of collaborative care interventions to injured trauma survivors treated in the acute care medical setting. The specific aim of the TSOS II study was to test the effectiveness of an early combined intervention to improve the quality of mental health care for acutely injured trauma survivors who require primary care and community follow-up.

The present investigation was informed by two small-scale pilot studies conducted by the investigative team [43,44]. Both studies demonstrated the feasibility of the combined early collaborative care intervention procedure for acutely injured trauma survivors and provided preliminary data on treatment effects. Patients recruited into the pilot trials were not required to have PTSD and only 20-30% of patients had symptoms consistent with a diagnosis of PTSD at any assessment point. Unlike prior investigations, in TSOS II we screened injured trauma survivors twice for high levels of PTSD symptoms. The investigation aimed to determine whether early stepped collaborative care could diminish PTSD symptoms and related co-morbid conditions among injured trauma survivors randomized to the intervention condition when compared to usual care controls.

2. Preliminary Work and Conceptual Frameworks Informing Collaborative Care Intervention Development

2.1 Overview

Organizational change agent models, clinical epidemiology and clinical ethnography are foundational methodological approaches for the acute care research program. These frameworks are discussed in separate sections.

2.2 Organizational Change Agent Model

Co-investigators on the intervention development team embodied an organizational “change agent” approach [45,68,69]. Members of the interdisciplinary treatment development team included trauma surgeons, psychiatrists, psychologists, biostatisticians, social workers, pediatricians, and other trauma center critical care providers, who simultaneously functioned as front-line providers, clinical investigators, health services researchers, and local and national trauma center policy change agents. Thus, team members developed and implemented clinical interventions while simultaneously addressing local organizational and national trauma center policy changes. As an example, the trauma surgical team members (GJ) have previously spearheaded national American College of Surgeons policy mandates for alcohol screening and intervention as a requisite for trauma center accreditation [45,70,71]. A central aim of the current investigation is to conduct a definitive trial of stepped collaborative care targeting PTSD that utilizes the same “policy fulcrum” of American College of Surgeons mandates to broadly implement mental health screening and intervention services as a requisite for trauma center accreditation. With regard to input/output assessments, the “change agent” interdisciplinary team approach may potentially yield more efficient intervention development and implementation, with ultimately greater population impact, when compared to other more traditional intervention development trajectories [72,73].

2.3 Clinical Epidemiology

Clinical epidemiologic methods constitute a foundational approach to acute care mental health intervention development and implementation [32,59-62]. Recent advances in clinical epidemiology have identified a fundamental interrelationship between effect size, reach, and population impact in randomized clinical trials [32,59-62]. This epidemiologic fact, derived from the weighted average rule of disease rates, states that the population impact of a preventive intervention is a function of two measurable factors: the proportion of the full population at risk that receives the intervention (i.e., intervention reach), and how large a risk reduction occurs in those who receive the intervention (i.e., intervention effect size) [32,59-62]. Population-based sampling frames in conjunction with mixed method treatment development research has the potential to elucidate an in-depth understanding of patient-, provider-, and setting-level factors that influence implementation of the collaborative care intervention, and ultimately patient outcomes in the acute care medical setting [32,74].

2.4 Influence of a “Clinical Ethnographic” Conceptual Framework on Intervention Development

The investigative team's clinical ethnographic method and employs multiple qualitative perspectives and applied approaches [43,74-90]. Team members have spent hundreds of hours immersed in participatory experiences as clinician-investigators in acute care settings. Intensive participant observation by front-line providers, coupled with the maintenance of field logs and collaborative team discussions has given the investigative group unique insight into patient-, provider-, and setting-level contextual factors relevant to acute care trauma focused intervention development and implementation. During the intervention development process, the principal investigator (DZ) met regularly with the team's expert qualitative methodologist to iteratively review methodological approaches and qualitative data [78,81-83]. Thus the intervention development process included the triangulation of patient concern narratives, field notes derived from interventionist immersive participatory experiences, and independent review by the expert qualitative methodologist. The clinician investigator's in-depth immersive participation in conjunction with collaborative team activity and expert consultant review, exemplifies the criteria of prolonged engagement and persistent observation that constitute crucial elements of quality and verification in qualitative research [87,91,92].

Initial prospective cohort investigations included a qualitatively informed method of assessing patients' posttraumatic illness experiences in the form of open-ended concern narratives [74]. Coding of concern narratives revealed that patient concerns spanned multiple domains that included and extended beyond PTSD [74,77]. These findings were used to modify care management procedures originally developed for primary care depression for early trauma-focused interventions in the acute care medical setting [43-45,48,52,93]. Longitudinal examination of concern narratives elucidated the impact of recurrent traumatic and stressful life events on post-injury PTSD symptom exacerbations [78,81-83,94]. Semi-structured exit interviews after pilot RCTs were conducted with research team members in order to better understand patient and provider experiences of participation in the collaborative care intervention. Results from interviewing providers and patients informed improvements in the intervention.

Rapid Assessment Procedures (RAP) in ethnography also influenced the interdisciplinary team's clinical ethnographic approach [79,80,88,95,96]. RAP is method for quickly developing an understanding of local clinical systems from brief qualitative assessments conducted by multidisciplinary field teams. Participant observation, field notes, key informant discussions, and data derived directly from clinician logs can all contribute to RAP assessments. Team interaction and discussion is also central to the iterative process of data collection.

3 Methods

3.1 Overview of Trauma Survivors Outcomes and Support II Study Design

TSOS II was a randomized controlled trial, designed to test the effectiveness of an early combined intervention targeting PTSD and related co-morbidities among acutely injured trauma survivors (Figure 1). Subjects for the study were recruited from the University of Washington's Harborview level I trauma center (Harborview). Each year Harborview admits approximately 6000 physically injured patients. Like many US level I trauma centers, Harborview is a teaching hospital with a university affiliation located in an urban setting [70].

All study procedures were approved by the University of Washington Institutional Review Board prior to the initiation of the protocol. Between April 2006 and September 2009, injured trauma survivors admitted to Harborview were randomly approached and, after providing informed consent, were systematically screened for high PTSD symptom levels while in the inpatient ward, and again one to two weeks after discharge. Two-hundred seven patients who screened positive were randomized to the stepped collaborative care intervention or usual care control conditions. One, 3, 6, 9, and 12 months after the acute care hospitalization, both intervention and control groups patients received blinded follow-up evaluations of PTSD, depression, and substance use symptoms, as well as post-injury functional impairment and health service utilization outcomes.

Patients randomized to the intervention condition received care from the trauma center based mental health research study team for 12 months post-injury. The collaborative care intervention team included MSW, BA and ARNP care managers. The team received 1-2 hours of weekly supervision from the principal investigator (DZ) and also participated in ongoing monthly one-hour consultation with two Ph.D. level expert clinicians: one motivational interviewing expert (CD) and one CBT expert (AW). The intervention included care management (i.e., post-injury case management, motivational interviewing, and behavioral activation), as well as evidence-based pharmacotherapy and exposure based early PTSD intervention CBT components [35,37,39,40] (Figure 1). All intervention team members delivered the care management and motivational interviewing intervention

components. The ARNP was the clinical team member responsible for the delivery of the pharmacotherapy, while the MSW and BA level interventionists delivered CBT.

The intervention team worked collaboratively with acute and primary care providers in an effort to link physical and mental health care longitudinally through outpatient follow-up and community rehabilitation. Intervention patients were given a choice of initial treatments and the intervention team shared information and deliberated [97] treatment decisions with patients in an effort to individually tailor the stepped care intervention. Stepped, higher intensity care including CBT was available for patients with persistent or recurrent symptoms of PTSD and comorbidities at critical post-injury junctures.

3.2 Inclusion and Exclusion Criteria

In order to maximize intervention population impact and trial generalizability, exclusions were kept to a minimum [59-62]. The investigators screened English speaking women and men ages 18 and older who presented to Harborview with injuries so severe that they required inpatient surgical admissions. Patients who had suffered head, spinal cord, or other severe injuries that prevented participation in the inpatient ward interview were excluded from the study. Patients who required immediate intervention (i.e., self-inflicted injury, active psychosis) were referred for evaluation to the inpatient psychiatric consult service. Patients who were currently incarcerated or who had recent histories of severe violence were also excluded. Patients living at great distances from the trauma center (i.e., > 50-100 miles) were excluded as the investigative team anticipated difficulty in long distance care coordination activities. Of note, the investigative team is developing protocols for trauma center to community linkage for rural injury survivors living at great distances from the trauma center [98]. In addition, to enhance the population impact of investigative results, all substance abusing or dependent patients, including patients who screened positive for and/or endorsed stimulant and opiate abuse, were eligible for study inclusion.

3.3 Two Staged PTSD Symptom Screening Procedure

The two-staged screening procedure simultaneously aimed to optimize population impact/generalizability, patient beneficence, and the need to develop an ecologically valid and readily implementable acute care screening procedure. The investigative group's prior early intervention and clinical epidemiologic studies informed the two-staged PTSD screening procedure [18,43,44,99]. In previous studies, approximately 50% of inpatients received one or more supportive bedside visits from social workers or other trauma center psychosocial providers. Between 73-89% of acutely injured trauma survivors also attended an initial acute care outpatient appointment in the days and weeks immediately following hospital discharge [100]. Data from a previous trial revealed that a subgroup of distressed patients with high PTSD symptom levels demonstrated symptomatic improvement after supportive bedside care management visits [43]. The American College of Surgeons has mandated alcohol screening and intervention for all injured patients admitted to accredited trauma centers. Based on this mandate, it appears that many trauma centers are providing usual care psychosocial bedside visits targeting alcohol screening and intervention to injured patients [70]. Human subjects considerations also suggested that patients screening into the study with initial high PTSD symptom levels would receive maximum benefit from an initial bedside care management visit.

The protocol began with population-based PTSD screening (Figure 1). An MSW intervention care manager was available for a bedside visit to all patients who screened into the study with high PTSD symptom levels. This visit was designed to occur in the inpatient surgical services prior to randomization. Given the desire to recruit and retain patients who were highly symptomatic with PTSD, the protocol included a second PTSD screen that was

administered after discharge, approximately two weeks post-injury. The screen was administered either in-person at a surgical outpatient appointment or over the telephone. The two staged screening procedure was designed to naturalistically mirror acute care service delivery patterns; it facilitated randomization of patients with persistent high PTSD symptoms who did not demonstrate symptom reductions after an initial bedside supportive care visit.

In order to implement the screening procedure, each weekday morning a research associate (RA) downloaded a list of all admitted injured patients from the electronic medical record. The RA then assigned random numbers for approach to all patients who met study eligibility criteria. After obtaining informed consent, the RA administered the PTSD Checklist Civilian Version (PCL-C) to each patient in the surgical inpatient ward. On average, the first screen occurred 7.1 days (Standard Deviation (SD) = 14.9 days) after the surgical inpatient admission. The second PCL screen was completed on average 20.0 days (SD = 16.8) after the surgical inpatient admission.

In prior investigation [18,43,44,99], any patient with a PTSD checklist scale score of ≥ 45 had a greater than 75% probability of developing symptoms consistent with a diagnosis of PTSD over the course of the 12 months after the injury admission. Therefore, any patient who scored ≥ 45 on the first and second PTSD checklist screen was retained and randomized. Also, previous study demonstrated that a PTSD checklist scale score of 35 [101] was shown to simultaneously optimize the area under the ROC curve, sensitivity and specificity for symptoms consistent with a diagnosis of PTSD at the one month post-injury time point [18,43,44,99]. Therefore, any patient who scored ≥ 45 on the first PTSD Checklist screen and ≥ 35 on the second PTSD Checklist screen was also randomized. Finally, patients who initially scored 35 between 44 on the first PTSD Checklist screen and demonstrated symptom elevation on the second screen were included in the investigation.

3.4 Randomization

Randomization occurred in a 1:1 ratio according to a statistician prepared computer generated random assignment sequence. We used a single stratifying factor: alcohol or drug abuse and dependence. Within each stratum, we generated a random series of blocks of either 4 or 6 patients using a random number generator. Another random process generator was used to assign an equal number of control and intervention participants within each block. Research associates conducting baseline screening assessments were blinded to intervention and control group assignments thus insuring allocation concealment [102].

3.5 Usual Care Control Condition

Prior investigation suggests that usual posttraumatic care includes routine outpatient surgical, primary care, and emergency department visits as well as the occasional use of specialty mental health services [44]. Patients assigned to the usual care arm of the protocol were encouraged to proceed using all resources available to them. All patients, including those randomized to usual care, received a resource list that included numbers of local mental health, case management and crisis care agencies.

3.6 The Stepped Care Intervention

The stepped collaborative care intervention was based on the model developed by Katon and colleagues [26,46,48,52,54,93] and tailored for the acute care setting through pilot intervention trials by members of the interdisciplinary team [43,44]. The intervention included trauma focused care management, and an initial choice of starting with either evidence-based pharmacotherapy or CBT targeting PTSD and related co-morbidities (Figure 1).

The care management component of the intervention was multifaceted and included a combination of trauma-focused case management, motivational interviewing, and behavioral activation (Figure 2). The motivational interviewing intervention was designed to target ambivalence about participating in elements of the stepped collaborative care procedure and changes in high risk behaviors, such as problematic alcohol use, that risked recurrent injury [44,103-105]. Behavioral activation (BA) is a behavioral intervention targeting anxious avoidance or depressive symptoms by increasing overt behaviors likely to bring patients into contact with reinforcing environmental contingencies [106,107]. In the current protocol, the BA component was designed to directly target PTSD symptoms by addressing anxious avoidance. BA included an assessment of avoidance behaviors and orientation to the role of avoidance in maintaining PTSD, followed by a targeted intervention that could include homework such as activity planning. All BA interventions were delivered as part of the “on the fly” care management intervention procedure, and did not involve formal office-based sessions.

The BA care management intervention component also served as an element in a more systematic CBT readiness assessment procedure [108]. Prior investigation demonstrated difficulties advancing acute care patients to multi-session office based CBT [106]. Therefore, the BA delivery served as an initial “CBT litmus test” of the patients' ability to engage in behavioral therapy elements and procedures. The ability to complete homework assignments served as an indicator of a patient's potential for entry into the full CBT protocol. BA embedded within the care management intervention had the distinct advantage of being able to target PTSD and depressive symptoms, even when there were barriers that prevented entry into multi-session CBT [108].

Patients randomized to the intervention condition discussed PTSD treatment preferences with the collaborative care team which informed delivery and timing of CBT, medication or combined treatment interventions. If patients presented with overwhelming pain, insomnia, or other posttraumatic emotional or behavioral states that prevented or limited verbal interchanges/psychotherapy, medications were offered as a first line intervention. Also, because current alcohol abuse/dependence is a clinical barrier to the initiation and completion of CBT [108], patients who were actively drinking and required PTSD treatment were offered motivational interviewing and pharmacotherapy for PTSD rather than CBT.

3.7 Training and Supervision

Preparatory training for the care management, MI, BA, CBT, and medication components consisted of didactics focusing in on the treatment manual, role plays with standardized patients (SP), and individual preceptorship sessions with MI, CBT, and pharmacotherapy trainers. Weekly 1-2 hour team supervision sessions were led by the principal investigator (PI).

For the MI intervention component, role plays with the SP were reviewed by the MI trainer, and trainees were given individualized feedback and coaching. Trained coders also scored each role play using the Motivational Interviewing Treatment Integrity 3.0 (MITI) coding instrument; interventionists were required to meet “Beginning Proficiency” MITI score thresholds established by Moyers et al. (All global MI Ratings ≥ 3.5 on 7-point scale and counts of ≥ 1 for Reflection-to-Question Ratio and $\geq 50\%$ Open Questions) [109,110].

For CBT and BA, prior investigations by the investigative group determined that few highly symptomatic patients with PTSD actually entered CBT secondary to lack of engagement and multiple CBT barriers [106]. Therefore, the expert CBT supervisor listened to each CBT session and provided ongoing individual feedback and coaching to the interventionists. The

BA intervention component was manualized and the expert CBT supervisor provided individual supervision on BA cases as well.

The medication intervention component aimed to initiate and ensure adequate follow-up of psychopharmacological treatment targeting PTSD and related comorbidities such as depression. Patients were advanced to and maintained on guideline-level therapeutic doses of anti-depressant agents (e.g., sertraline 75-200mg, paroxetine 10-50mg) [24,26]. Medications targeting specific symptoms (e.g., insomnia) were added on an as needed basis. The ARNP intervention team member prescribed medications under close supervision from the study psychiatrist. After collaborative team consultation and initiation of medications, all attempts were made to have patients receive follow-up pharmacotherapy from primary care providers.

3.8 Analyses and Measures

The investigation will test the hypothesis that intervention patients will improve symptomatic, functional and health service utilization outcomes when compared to controls. The primary hypothesis is the intervention group patients will demonstrate clinically and statistically significant reductions in PTSD symptom ratings when compared to controls. Data analysis will use mixed method regression models to identify and interpret any group by time interaction effect with regard to PTSD symptom diminishments [44]. Secondary outcomes include ratings of substance use and functional outcomes.

The two measures used to assess PTSD were the PTSD checklist (PCL) [111,112] and the clinician-administered PTSD scale (CAPS) [112,113] (Table 1). All RAs were trained in the administration of the baseline ward and follow-up interviews. Training included attendance of training workshops, watching training CDs/videos, group and individual practice interviews, and real time co-ratings with senior study personnel during in-person interviews. Additional training was required for the administration of the CAPS structured clinical interview. Interviews were coded, and interviewers received feedback and coaching until they consistently attained 100% reliability on CAPS PTSD diagnostic criteria when compared to the “gold standard” of an expert rater (AW). During the course of the study, 5% of RA CAPS interviews were recorded in real time and coded by expert raters in order to minimize drift from the standardized assessment procedure; a Kappa of 0.83 was attained for CAPS rating comparisons between study RAs and expert raters.

The investigation also assessed cumulative pre-injury trauma burden and recurrent and stressful life events over the course of the year after the injury (Table 2). Planned secondary analyses will examine the impact of recurrent stressful and traumatic life events as a time dependent covariate with regard to intervention effects. Planned secondary analyses will also assess the extent to which the treatment was effective in patients with and without traumatic brain injuries. Twelve month outcome analyses for the investigation have yet to be completed.

Power analyses were conducted to determine the appropriate number of patients for the study using PASS software [114]. With 100 patients in each group ($N = 200$), alpha set to 0.05, the power is greater than 0.9 to detect a difference of 4 points for the PTSD group by time interaction effect.

4. Results

4.1 Baseline Characteristics of Patients Included in the Trial

A total of 878 patients were screened for PTSD symptoms with the PCL; 345 patients were screened positive. Of these 345 patients, 71 could not be reached for the second screen, and

19 were excluded for other reasons (e.g., incarceration). Of the 255 patients available for the second PCL screen, 48 patients were screen negative, leaving 207 screen positive patients for randomization.

The two staged screening procedure successfully recruited patients with high lifetime cumulative trauma burden and high early PTSD symptom levels. The mean PTSD checklist scale score for patients included in the TSOS II study was 50.6 (SD = 10.5) and on average patients had 5.8 serious lifetime traumas that occurred prior to the initial injury. In contrast to the pilot TSOS I trial that did not screen injured patients on a second occasion, the PTSD checklist score (50.6 vs. 34.6, $t(325) = 13.0$, $p < 0.001$), and number of prior trauma (5.8 vs. 3.4, $t(325) = 7.8$, $p < 0.001$), were significantly greater in the TSOS II patients. The 207 patients recruited into the trial in the two-stage screening procedure were significantly more likely to be female, intentionally injured, and blood alcohol positive, when compared to the population of patients admitted for injuries to Harborview during the time period of the study (Table 2). These significant differences in clinical and demographic characteristics are consistent with previously identified PTSD risk factors [119].

5. Conclusion

The TSOS II study is the largest early PTSD stepped collaborative care intervention trial to date. Multiple theoretical and applied frameworks have informed the development and implementation of the stepped collaborative care procedure, including clinical epidemiologic and clinical ethnographic conceptual frameworks as well as organizational change agent models. Two-hundred seven acutely injured trauma survivors with high early PTSD symptom levels were recruited into the study. The study innovatively incorporated motivational interviewing and behavioral activation into an initial care management intervention component in order to address the broad spectrum of PTSD and related co-morbid symptoms seen in injured trauma survivors. Stepped collaborative care elements integrated care management with evidence-based pharmacotherapy and cognitive behavioral therapy targeting PTSD. Stepped care procedures were feasibly implemented by front-line MSW and ARNP trauma center providers and appear to be acceptable to populations of patients cared for at acute care centers. Ultimately, the trial aims to influence acute care policy by informing American College of Surgeons guidelines for PTSD screening and intervention procedures at US trauma centers nationwide.

Acknowledgments

This work was funded by grants MH073613 & MH086814 from the National Institute of Mental Health. The authors thank Jeffrey Love, B.A. for his assistance with the preparation of the manuscript.

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Figure 1. TSOS II Trial design

Figure 2. Care management intervention components

Table 1
PTSD Checklist (PCL) screening cutoff scores for study inclusion

Surgical Ward PCL Screen	Outpatient/telephone PCL Screen	Number (%) of All Randomized Patients (N=207)
≥45	≥45	106 (51%)
≥45	≥35	38 (19%)
≥35 & <45	Increased symptom levels on second PCL screen	62 (30%)

Table 2
Trauma Survivors Outcomes and Support study assessments

Domain Assessed	Scale	Schedule (Months)									
		0	1	3	6	9	12				
<u>Self-report</u>											
Demographics	Age, gender, ethnicity, income [33]	X									
PTSD symptoms	PTSD Checklist- Civilian Version (PCL-C) [103,104]	X ^a	X	X	X	X	X				
PTSD diagnosis	Clinician-Administered Posttraumatic Stress Disorder Scale [105,106]		X		X						
Depressive symptoms	Patient Health Questionnaire 9 (PHQ-9) [107]	X	X	X	X	X	X				
Recurrent trauma stressful life events	National study on costs and outcomes of trauma [108]; Stressful Life Events adapted from [109]	X	X	X	X	X	X				
Alcohol use	Alcohol Use Disorders Identification Test-C [110,111]	X	X	X	X	X	X				
Alcohol abuse/dependence diagnosis	Composite International Diagnostic Interview (CIDI), version 1 [112,113]; National study on costs and outcomes of trauma [108]	X	X		X						
Drug use	Composite International Diagnostic Interview (CIDI), version 1, screening items [112,113]	X	X	X	X	X	X				
Level of consciousness	Glasgow coma scale [114]; Mini Mental Status Exam [115]	X									
CBT and medication willingness	Treatment preferences [116]	X									
Violence	Conflicts Tactics Scale 2 [117]	X									
Baseline pain rating	McGill Pain Scale [118,119]	X									
Functioning and quality of life	12-Item Short-Form Health Survey [120]; 36-Item Short-Form Health Survey [120, 121]	X									
Disability	Sheehan Disability Scale [122]	X	X	X	X	X	X				
Working status & medical, medication and mental health services utilization	National study on costs and outcomes of trauma work & service use [108]	X	X	X	X	X	X				
Satisfaction with care	Satisfaction items [123, 124]	X	X	X	X	X	X				
Posttraumatic concerns	Posttraumatic items [63]	X	X	X	X	X	X				
Legal involvement	Legal items [125]	X	X	X	X	X	X				
Social support	Social support item adapted from [126]	X	X		X	X	X				
Posttraumatic growth	Posttraumatic Growth Inventory [127, 128]										
Stigma	Stigma questionnaire [129, 130]										
Research ethics	Reactions to Research Participation Questionnaire [131]										
<u>Automated Records Data</u>											
Health services utilization	Harborview Medical Center trauma registry, inpatient and emergency medical chart records; Washington State Hospital Admissions Records	X	X	X	X	X	X				
Incarceration and jail data	Washington State Jail Records (King, Snohomish and Pierce Counties)										
		</									

Ongoing

Ongoing

Administered on ward and 2 weeks post discharge_a

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Table 3
Clinical, injury, and demographic characteristics of study patients compared to all other inpatients admitted to the Harborview level I trauma center 04/21/06-9/30/09

Variable	Study Sample (<i>n</i> = 207) <i>N</i> (%)	All Others (<i>n</i> = 17291) <i>N</i> (%)	χ^2 (df)	<i>P</i>
Female	98 (47.3)	4985 (28.8)	34.0 (1)	<0.001
Mechanism of Injury Intentional	26 (12.6)	1264 (7.3)	8.2 (1)	0.004
Blood Alcohol			26.5 (2)	<0.001
Negative	110 (53.1)	9888 (60.1)		
Positive	73 (35.3)	3476 (21.1)		
Not tested	24 (11.6)	3097 (18.8)	<u>t (df)</u>	
Age	38.4 (13.1)	45.5 (19.8)	7.7 (217)	<0.001
ISS ^a	13.7 (9.9)	16.1 (12.6)	3.4 (214)	0.001

^aISS = Injury Severity Score