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DOES SCREENING AND A RANDOMIZED BRIEF INTERVENTION AT A LEVEL 1 TRAUMA CENTER IMPACT ACUTE STRESS REACTIONS TO PREVENT LATER DEVELOPMENT OF POST TRAUMATIC STRESS DISORDER?

Stacey Stevens Manser, PhD[1], Katherine Houck, MSSW, LCSW[2], Mark D. Kramer, PhD[1], Irene A. Tabas, MPH[2], Carlos V.R. Brown, MD, FACS[2], Ben Coopwood, MD, FACS[2]

[1]University of Texas at Austin, School of Social Work

[2]Dell Seton Medical Center at The University of Texas

Corresponding Author

Stacey Stevens Manser, Ph.D.

University of Texas at Austin, School of Social Work

1717 W. 6th Street, Suite 310

Austin, Texas 78703

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ABSTRACT

BACKGROUND: Approximately 20-40% of trauma survivors experience posttraumatic stress disorder (PTSD). The American College of Surgeons Committee on Trauma report that early screening and referral has the potential to improve outcomes and that further study of screening and intervention for PTSD would be beneficial. This prospective randomized study screened hospitalized patients for traumatic stress reactions and assessed the effect of a brief intervention in reducing later development of PTSD.

METHODS: The Primary Care-PTSD (PC-PTSD) screen was administered to admitted patients. Patients with symptoms were randomized to an intervention or control group. The brief intervention focused on symptom education and normalization, coping strategies, and utilizing supports. The control group received a 3-minute educational brochure review. Both groups completed in-hospital interviews, then 45-day and 90-day telephone interviews. Follow up collected the PTSD Checklist-Civilian (PCL-C) assessment and qualitative data on treatment seeking barriers.

RESULTS: The PC-PTSD screen was successful in predicting later PTSD symptoms at both 45 (β = .43, p < .001) and 90 days (β = .37, p < .001) even after accounting for depression. Correlations of the intervention with the PCL-C scores and factor score estimates did not reach statistical significance at either time point (p =.827; p = .838) indicating that the brief intervention did not decrease PTSD symptomatology over time. Of those at or above the PCL-C cutoff at follow-ups, a minority had sought treatment for their symptoms (43.2%). Primary barriers included focusing on their injury or ongoing rehabilitation, financial concerns, or location of residence.

CONCLUSIONS: The PC-PTSD screen identified patients who later assess positive for PTSD using the PCL-C. The brief intervention did not reduce 45- and 90-day PTSD development. Follow up interviews revealed lack of treatment infrastructure in the community. It will be important for trauma centers to align with community resources to address the treatment needs of at risk patients.

LEVEL OF EVIDENCE: Level II

Prospective randomized controlled trial

Keywords: trauma, brief intervention, PTSD development

BACKGROUND

Each year in the United States, more than 30 million individuals present to acute care medical settings for the treatment of a traumatic physical injury with approximately 2.8 million of these Americans so severely injured that they require inpatient surgical hospitalization.[1,2] Exposure to such experiences can also result in the development of posttraumatic stress disorder (PTSD), characterized by symptoms of re-experiencing, avoidance, dysphoria, and hyper-arousal.[3] Recent investigations suggest 20 to 40 percent of acutely injured admitted patients present with traumatic stress symptomatology hours or days after a hospitalized injury, characterized as acute stress in the first 30 days post event, with 20 to 25 percent meeting full criteria for PTSD 12 months post admission.[4] Evidence shows that higher acute stress symptoms in the days immediately following an injury predict chronic PTSD and epidemiologic data indicates it may take years for trauma-exposed individuals to seek treatment due to health and functional impairments which often accompany the disorder.[10] As such, the psychological cost of surviving an injury can subsequently translate into significant and chronic financial burdens on healthcare systems as well as profound and prolonged poor health outcomes, with associated costs exceeding that of any other anxiety disorder.[11,12,13] Given these risk factors, early detection and intervention is imperative to prevent the development of PTSD amongst acutely injured patients at US trauma hospitals.

The American College of Surgeons' Committee on Trauma (ACS/COT) determines verification requirements for trauma facilities and develops best practice recommendations in national guidelines for trauma center care. There are no current mandates for PTSD screening and intervention from ACS/COT and studies show that acute posttraumatic distress is infrequently detected and treated in the inpatient setting.[1] In spite of evidence for brief validated

screening tools to identify symptoms and development of risk, such as the Primary Care-Posttraumatic Stress Disorder (PC-PTSD) for PTSD and the Posttraumatic Adjustment Scale (PAS) for PTSD and Major Depressive Episode (MDE),[14, 15] a recent survey reports only 7% of level I and II US trauma centers (n=391) routinely screen for acute stress compared to 23% screening for depression, 49% screening for suicide, and 90% screening for alcohol.[16] Standardized use of an effective screening tool could detect risk of a potentially preventable condition and provide opportunity for early intervention before chronic symptoms persist and PTSD develops.

Although PTSD is a potentially preventable condition, early prevention and interventions to alleviate stress reactions and link at risk individuals to treatment require further implementation and study.[17] Recent systematic reviews point to evidence for trauma-focused and exposure-based behavioral therapies accelerating recovery and preventing development of posttraumatic stress disorder.[18,19,20] These reviews also emphasize the need for further research to assess intervention effectiveness because of the variability in the timing of screening and follow up assessment, timing of the interventions, and characteristics of the target population.[18, 21] There is also the question of the feasibility of providing interventions at trauma centers or if referrals to community-based services after discharge is a more clinically and fiscally viable option.

To determine the feasibility and effectiveness of a screening and brief intervention with patients admitted to a Level I trauma center, this pilot study examined the following research aims: 1) to assess the utility of a four-item PTSD screen in predicting PTSD symptomatology at 45 and 90 days of follow up, 2) to assess the effectiveness of a brief preventive intervention to prevent or reduce later development of PTSD, and 3) to examine PTSD treatment seeking behaviors and treatment barriers among participants. We hypothesized that the brief preventive intervention would reduce later development of PTSD at 45 and 90 days when compared to the control group.

PATIENTS AND METHODS

Patient Population

Participants were adult trauma survivors admitted to Dell Seton Medical Center at the University of Texas (DSMCUT; formerly University Medical Center Brackenridge), an ACS-verified urban Level I academic trauma center. Each year DSMCUT admits approximately 3,000 physically injured patients over an 11 county area to the trauma service. Inclusion criteria for study eligibility were trauma patients admitted to the hospital, English or Spanish speaking, 18 to 89 years of age, residence in the state of Texas, able to provide at least one contact number for follow up, and had at least one symptom of acute stress based on screening with the PC-PTSD. Exclusion criteria were patients who presented with significant cognitive impairments, active psychosis, were an imminent risk for harm to themselves or others, had an injury that occurred more than 30 days prior to admission, or had a current diagnosis of PTSD. Of 4,622 admitted to trauma services over the 20 month course of the study, 1,581 (34.2%) were assessed for eligibility (Figure 1). The study was approved by the Seton Healthcare Family Institutional Review Board and informed consent was obtained from all participants.

Procedures

A Licensed Clinical Social Worker (LCSW) in the Trauma Services department and social work graduate research assistants conducted the screening, provided the intervention or care as usual, and completed the baseline, 45- and 90-day follow up interviews. The research assistants were trained and supervised by the LCSW. Training consisted of didactic instruction of the brief intervention concepts, presentation and effects of psychological trauma, development of clinical skills through role play, shadowing, and monitoring patient contact with feedback.

Problem solving of sensitive situations, complex clinical presentations and study protocol were addressed via daily supervision of study activities. Simultaneously, students were taking trauma specific courses in their graduate education.

We aimed to enroll a convenience sample of 150 patients based on the assumption that approximately 25% of 1500 trauma patients would screen positive. We predicted a little less than half of identified patients would screen positive. To identify potential participants, social work research assistants reviewed new trauma admissions in the trauma registry and eligible participants were added to a log to track and prioritize screening. Eligible patients were approached at least once and screened for symptoms of acute stress from their injury. The 4-item PC-PTSD screening tool was used to identify patients with any traumatic stress symptoms since the traumatic injury event (as opposed to symptoms in the last 30 days). Although one and two symptoms are deemed a negative screen on the PC-PTSD, follow up assessments allowed for symptom monitoring to determine if this subthreshold group was at-risk for PTSD development.[22] Patients with at least one positive symptom were randomized to the intervention or control group based on a computer-generated algorithm. Baseline interview assessments for the intervention and control groups were administered at the bedside.

Participants in the control group received care as usual via provision of a NIH educational flyer[23] on PTSD and a general mental health resource listing. Participants in the intervention group received a 60-minute bedside consult focusing on engagement, symptom education and normalization, emotional safety coping strategies and an individualized referral, if desired, to a community mental health provider who offered trauma treatment. The standardized brief intervention drew from Psychological First Aid and Seeking Safety concepts.[24,25] The purpose of the Psychological First Aid approach is to reduce initial distress and promote adaptive

functioning and coping in the hours and early days following acute emergency events.[24, 26] Each session topic in Seeking Safety includes safety-oriented skill building relevant to PTSD. For the brief intervention used in this study, safety, symptom normalization, adaptive coping, treatment options and resource linkage were topics of focus.[25,27]

For both groups, follow up telephone interviews occurred at two time points within a 2-week window of time beginning one week before 45- and 90-days from admission. During the telephone interview, the PCL-C was administered and if results indicated a participant met criteria for PTSD, this was discussed with participants along with probes regarding treatment seeking behavior, access to treatment, and barriers to treatment. Regardless of met criteria, both groups were offered referrals for mental health treatment at each follow up interview according to their location, insurance, language and self-pay status. The *Psychology Today* website was utilized to locate local resources for participants with insurance while federal, county and sliding scale mental health programs were relied upon for indigent participants.

The CONSORT diagram (Figure 1) presents the flow of participants through the randomized trial and inclusion in this study.

Data Collection

Data were collected directly from patients at bedside, during a 45- and 90-day phone interview, and secondarily from the trauma registry database.

Measures

The Primary Care PTSD Screen (PC-PTSD) is a 4-item measure that takes less than 1 minute to administer with a positive screen indicated by endorsement of at least three of four items (with a score range of 0 to 4).[28] It has been validated in veteran and civilian primary care

and substance use treatment settings and has demonstrated sensitivity in inpatient trauma hospital settings.[14,22, 28-31] At initial bedside screening, participants were asked to respond to items based on their experience of symptoms since the traumatic injury that precipitated admission and because we examined risk of later PTSD development, endorsement of any of the four items met criteria for study enrollment.

The Post Traumatic Adjustment Scale (PAS) is a 10-item scale validated in Level 1 trauma centers and identifies risk for development of PTSD (PAS-P) and major depressive episode (PAS-D).[15] The 10-item PAS was administered at baseline as a comparison to the PC-PTSD to determine the utility of the 4-item PC-PTSD in assessing risk of later PTSD development in comparison to the lengthier PAS. Risk for PTSD is calculated by summing all 10 items with a summary score of 16 or above representing high risk for the later development of PTSD (with a PAS score range of 0 to 40). Risk for MDE is calculated by summing 5 of the 10 items. A summary score of 4 or above represents high risk for the later development of MDE.[15]

The 17-item PTSD Checklist - Civilian Version (PCL-C) reflects DSM-V symptoms of PTSD and has been validated for use as a PTSD screening, diagnostic assessment of PTSD, and monitoring change in PTSD symptoms in clinical and research setting.[30,32-35] The PCL-C was administered during 45- and 90-day interviews with participants instructed to answer items based on their experience of symptoms in the past 30 days. A total symptoms severity score is calculated by summing scores from response options to each of the 17 items that range from 1 = "not at all" to 5 = "extremely." For the IMPACT study, a total score of 36 was used as the clinical cutoff for a positive assessment based on use of the PCL-C in specialized medical clinics.[36] A reduction of five points in total score is considered the minimum threshold for

responding to treatment and a change of 10 points is demonstrative of clinically meaningful change.[36]

To collect descriptive information on treatment seeking behavior during phone interviews, participants were asked if they had sought treatment since discharge from the hospital during the 45-day interview and if they had sought treatment since the last interview during the 90-day interview, with responses recorded as yes or no. For either yes or no responses, research assistants asked a follow up question: if the participant had concerns about barriers or had experienced barriers to accessing treatment. Responses were recorded in open text fields. Finally, a referral to treatment was offered if the participant desired and recorded as a yes or no response.

Data Analysis

Our first research aim was to determine if the four-item PC-PTSD screen would predict PTSD symptomatology at both time points above and beyond depression symptoms as measured by the PAS. The four items of the PC-PTSD screener corresponding to those in the PCL-C were removed from the PCL-C total score in order to reduce criterion contamination and this score at 45- and 90-day time points was regressed, using multiple linear regression, on gender, age, depression score, and the PTSD screen. In this manner, the predictive validity of the PC-PTSD screen was assessed after controlling for these other variables. The analysis speaks to the utility of including a PTSD screen in a short assessment battery in trauma settings.

Our second research aim was to evince if the intervention group would demonstrate less PTSD symptomatology than the control group at both 45- and 90-day follow-up points and was tested using point-biserial correlations between the dummy-coded intervention vs. control variable and total and factor scores on the PCL-C. DSM-V PTSD symptomatology has

consistently demonstrated a four-factor structure,[3,37] which has also been shown to be invariant over time.[38] This structure was specified in a strong measurement invariance model across the two time points,[39] and factor scores from the model were estimated and correlated with the intervention/control variable. A well-fitting strong invariance model indicates that endorsement of individual items is accounted for by the latent factors of the model at each time point, and additionally that change over time can be accounted for by changes in the mean levels of each of the factors. . We assessed the fit of this model using the root mean square error of approximation (RMSEA) and comparative fit index (CFI), with RMSEA of < .05 and CFI > .95 reflecting excellent fit, and RMSEA of < .08 and CFI > .90 reflecting adequate fit. [40, 41]

Our third aim descriptively examined treatment seeking behaviors recorded during 45- and 90-day interviews to determine if there were particular barriers to accessing treatment for trauma symptoms and need from trauma survivors' perspective of treatment due to traumatic stress incurred from their injury. Categories emerged during data analysis rather than using pre-determined categories and these were organized into major themes.

Chi-square and t-test analyses were used to determine if the control and intervention groups were equivalent on the demographic factors of sex, age, race/ethnicity and on other variables such as length of stay in the hospital, ISS score, or baseline PC-PTSD and PAS scores.

Study data at baseline and the follow up interviews were collected and managed using REDCap electronic data capture tools hosted at DSMCUT.[42] All analyses were conducted using SPSS version 24 and Mplus version 7.

RESULTS

Participants

There were 673 acute care trauma patients approached between September 1, 2015 and April 30, 2017 for the study. Of these 673 patients, 26% (n=174) were eligible based on the

positive screen of at least one symptom at the bedside. Among the eligible positive patients, 80% (n=140) agreed to enroll in the study. Of those 140 enrolled participants, 90 participants who completed both follow-up time interview time points were included for this analysis. The mean age was 40 (SD=15.82), 58.9% were male, and 74.4% were white, non-Hispanic. The average injury severity score (ISS) was 10.74 (SD=7.78) and length of stay in the hospital was 10.24 days (SD=11.49). Table 1 presents the study population demographics by assignment to the intervention or control and also presents the total study population to admitted patients who were screened and ineligible for participation.

Symptoms of PTSD at 45 day and 90 day follow up

Changes in symptoms of PTSD were assessed with a sample of participants who had complete 45 and 90-day PCL-C assessments (n=76), meaning all 17 items of the PCL-C had a response which allowed for a total score to be calculated. At 45 days, 62% of participants met criteria for PTSD (PCL-C score of 36 or above) and at 90 days, 49% of participants met criteria for PTSD (PCL-C score of 36 or above). This indicates lessening of symptoms for some participants over time. Figure 2 presents the percentages of participants meeting PTSD criteria at 45 and 90 day follow up by the number of PC-PTSD symptoms at the bedside.

Utility of the PC-PTSD screen in predicting PTSD symptomatology at follow up

We examined whether the 4-item PTSD screen would predict PTSD symptomatology 45 and 90 days later. The four items comprising the screen were removed from the PCL-C total score prior to analysis. Additionally, we included demographic variables of gender and age in the regression analyses, and added depression as measured by the PAS to evaluate whether the

PTSD screen was predictive of PTSD symptoms above and beyond depression symptoms. The PTSD screen was successful in predicting later PTSD symptoms, at both 45 days (β = .43, p < .001) and 90 days (β = .37, p < .001) (Table 2). Importantly, depression symptoms were also predictive of later PTSD symptomatology, at both 45- (β = .33, p = .002) and 90-day (β = .38, p < .001) time points, but the PC-PTSD screen was effective in predicting later PTSD symptoms after accounting for depression. Overall, the models accounted for 33% of the variance in PTSD symptomatology at both time points (Table 2). When separating the control and intervention groups, there was some evidence for increased prediction in controls relative to the intervention group at 45 days, but comparable prediction of the screener across the two groups at 90 days (Table 2). Additionally, the point-biserial correlations between the PC-PTSD screen scores and a positive PTSD screen of ≥ 36 were r = .36, p < .001 and r = .30, p = .003 at 45 and 90 days, respectively.

Effectiveness of the brief intervention in preventing or reducing development of PTSD

We fit the strong measurement invariance model across the 45-day and 90-day measurements of PTSD using the PCL-C. This four-factor model fit the data reasonably well, with a root mean square error of approximation of .068 and a comparative fit index of .913. The means of the four factors changed only slightly over time, with standardized estimates of -.27, .05, -.09, and -.15 for the Reexperiencing, Avoidance, Dysphoria, and Hyperarousal factors, respectively, none of which reaching statistical significance. Modeling controls and participants in the intervention group separately, controls demonstrated reductions in these factors of -.16, -.01, -.06, and -.17, all non-significant. The intervention group showed changes of -.39, .06, -.18, and -.13 standard deviation units on the four factors, respectively, also non-significant. We then

correlated the intervention variable with the PCL-C total scores and factor score estimates for each of the four factors. No correlation reached statistical significance at either time point (Table 3). This suggests that our hypothesis that the brief intervention would decrease PTSD symptomatology over time was not supported.

The intervention group did have a significantly greater improvement in PCL-C scores from 45- to 90-day interview, $t(40) = 3.08$, $p = .004$ (a 3.76 score reduction) than the control group, $t(34) = 1.42$, $p = .164$ (a 2.97 score reduction), however the reduction was not clinically meaningful.[32]

PTSD treatment seeking and treatment barriers

We examined treatment seeking behaviors and barriers to treatment among participants in the intervention and control groups who had a positive PCL-C cutoff score (36 or higher), indicating clinical diagnosis for PTSD, at 45-day (n = 51) and 90-day (n = 44) follow up interview. At 90 days of follow up, when participants were asked whether or not they had sought psychological treatment since leaving the hospital, 43.2% of participants responded yes. Additionally, when participants were asked whether or not they would like a treatment referral for psychological resources for their trauma, 48% answered yes. Most participants reported multiple, related barriers that were similar across the interview time points (Table 4).

Participants most commonly reported that trauma treatment had not been accessed because of continued focus on physical impairments from their traumatic event (52.9% at 45-day and 45.7% at 90-day interview) and financial concerns (35.3% at 45-day and 40.0% at 90-day interview). Other complex issues were identified during the interviews such as substance use disorders and loss of employment due to injury.

DISCUSSION

Out of the 673 participants screened, 26% (n=174) screened "positive," according to our definition for identifying those at risk, with at least one PC-PTSD symptom at the bedside. This overall prevalence of 26% supports the use of the threshold PCL-C cut-off score of 36 or higher.[36] Among the initial 140 enrolled participants, our final analysis included 90 participants with 90 day follow up.

In our analysis, 62% of participants met PTSD criteria at 45 days and 49% at 90 days. Results of our study suggest that patients with any positive responses on the PC-PTSD, rather than just a positive response to three or four items, should be considered at-risk for later development of PTSD, which is similar to results of a study by van Dam and colleagues.[22] Furthermore, a study by Warren and colleagues[2] revealed that patients without symptoms at baseline met PTSD criteria at 6 months of follow up. For this reason, further investigation and follow up is needed in the subpopulation of patients who present without symptoms acutely but then develop delayed PTSD. The integration of a screening tool at multiple time points after injury, for example in post trauma follow up appointments or outpatient clinics, may serve as an effective strategy for capturing delayed symptoms which emerge post hospitalization.

While the bedside intervention did not significantly reduce or prevent PTSD development when compared to the control group, this could be due to the timing or frequency of the intervention or possibly the focus of the intervention itself. The literature regarding timing of an intervention after a traumatic event remains inconclusive. Moreover, since our intervention was intentionally brief and focused on the aspect of perceived emotional safety and positive coping mechanisms, considered a first-stage therapeutic intervention for acute traumatic stress,[24-27] our expectations for preventing later PTSD development may have been ambitious.

Evidence from PTSD screening and intervention research suggest that clinical practice guidelines from the ACS/COT could improve outcomes for patients with this disorder.[1,4] However, staff at Level I and II trauma centers operate under heavy demands so there is also an urgent need to identify screening and interventions that can be readily incorporated into regular practice while limiting administrative burden. Establishing feasible and effective models of screening and intervention will be needed in order for ACS/COT to develop national guidelines for implementation of PTSD screening and intervention at trauma centers.[16]

Several limitations should be noted for this study. First, a screen at the bedside was not offered to every eligible patient due to study staffing shortages during different periods of the year. The study design was also limited by the grant funding period to three time points for data collection that spanned 90 days (baseline, 45- and 90-days). Although a formal PTSD diagnosis should be made 30 days or more after a traumatic event has occurred[5], other research and epidemiologic studies examining the rates of PTSD after injury have shown the amount of time for PTSD to develop may take six months to one year.[2,14,22,43] The additional time points would be valuable in revealing whether or not participants who received a referral to providers in the community received treatment, and if so, if that treatment was effective in reducing PTSD symptomatology. Additionally, this study did not enroll negative screens. This warrants further investigation with enrollment of negative patients, along with an extended follow up period. There also may be value in screening family members of trauma patients. Other studies have noted how family members exhibit acute stress when their loved ones have been involved in life threatening situations.[44,45] Lastly, the small number of participants in the intervention and control groups limited the analyses conducted. Additional participants may have allowed us to examine

the outcomes of the intervention and control participants based on the number of symptoms identified at baseline using the PC-PTSD and based on other participant characteristics.

In summary, our results contribute to the research in a variety of ways. Our study shows there may be value in providing follow up to injured patients admitted to acute care who have one or two symptoms at the bedside. Although the National Center for PTSD (U.S. Department of Veterans Affairs) recommends that three or four symptoms is indicative of a positive screen, our results may be of critical importance in reassessing what it means to screen "positive" in trauma centers. While the original purpose of the PC-PTSD was to identify veterans at-risk of having fully developed PTSD post deployment, our investigation revealed the tool's potential to identify civilians' at-risk for future development of PTSD in a trauma hospital setting. From an efficiency standpoint, patients with at least one symptom could be provided with early intervention, education and treatment linkage for improved health outcomes.

This study also gives insight into the variety of complicated barriers which prevent patients from seeking psychological treatment for their trauma recovery post injury. This also displays the importance for further follow up or study of patient reported outcomes and quality of life. That said, it will be imperative for trauma centers to identify where the responsibility lies in addressing these barriers and whether or not it is the responsibility of the trauma center to provide behavioral health resources to admitted patients during their stay and/or at follow up clinics, as well as how to make trauma-informed providers in the community accessible resources to referred patients.

Author Contribution

Stacey Stevens Manser, Ph.D., Co-PI – study design, data analysis, results, data interpretation, literature search, writing.

Ben Coopwood, M.D., FACS, PI – study design, data interpretation, critical revision

Katherine Houck, MSSW, LCSW, Clinical Coordinator – study design, data collection, writing, critical revision

Mark Kramer, Ph.D. – data analysis, results

Irene A. Tabas, MPH, Research Coordinator – literature search, writing, critical revision

Carlos V.R. Brown, M.D., FACS – data interpretation, critical revision

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Figure 1. IMPACT enrollment and participant flow diagram

Figure 2. Percentage of Participants Meeting PTSD Criteria at 45 and 90 Day Follow up by PC-PTSD Symptoms at Bedside

Figure 1

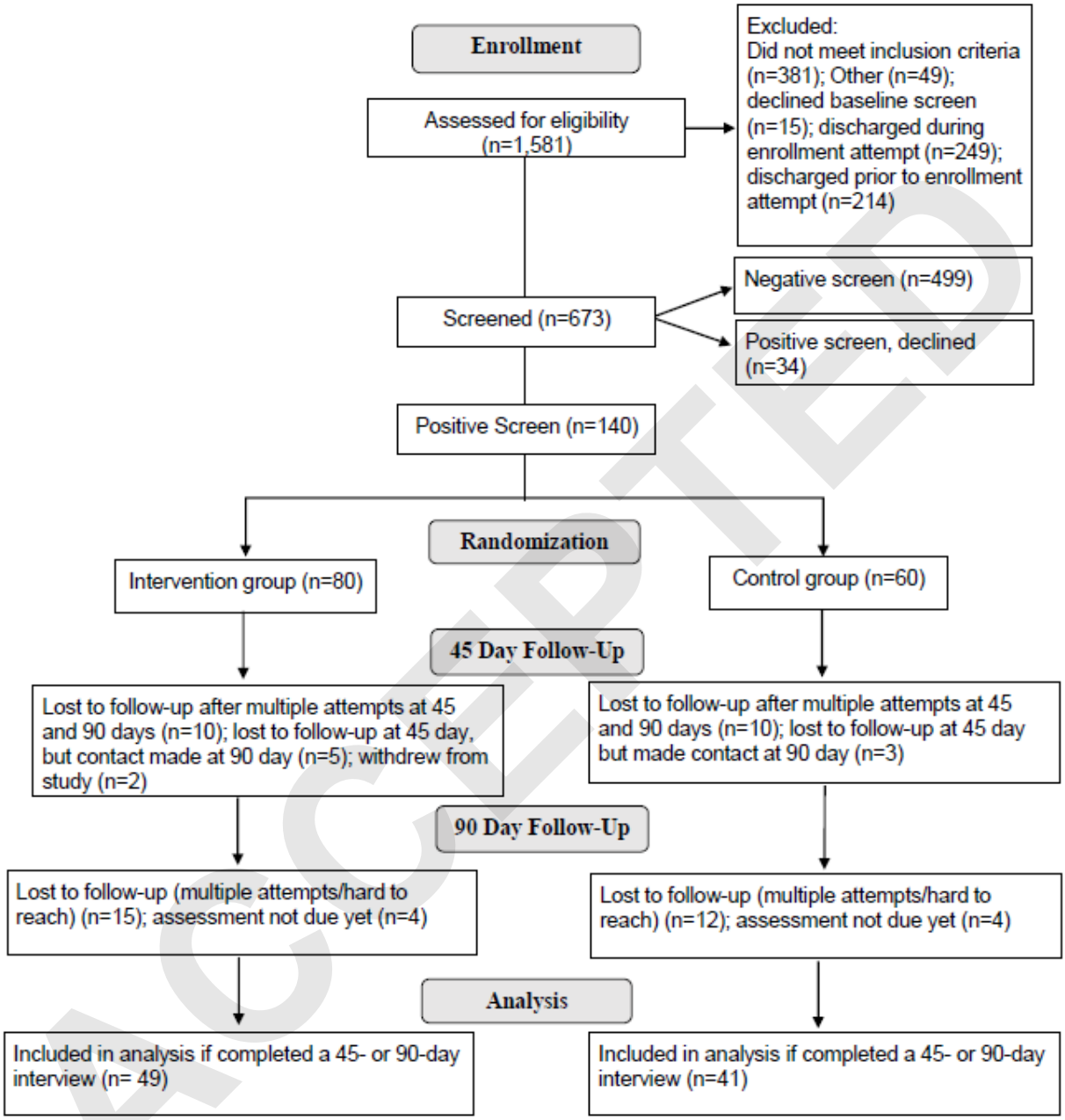

Figure 2

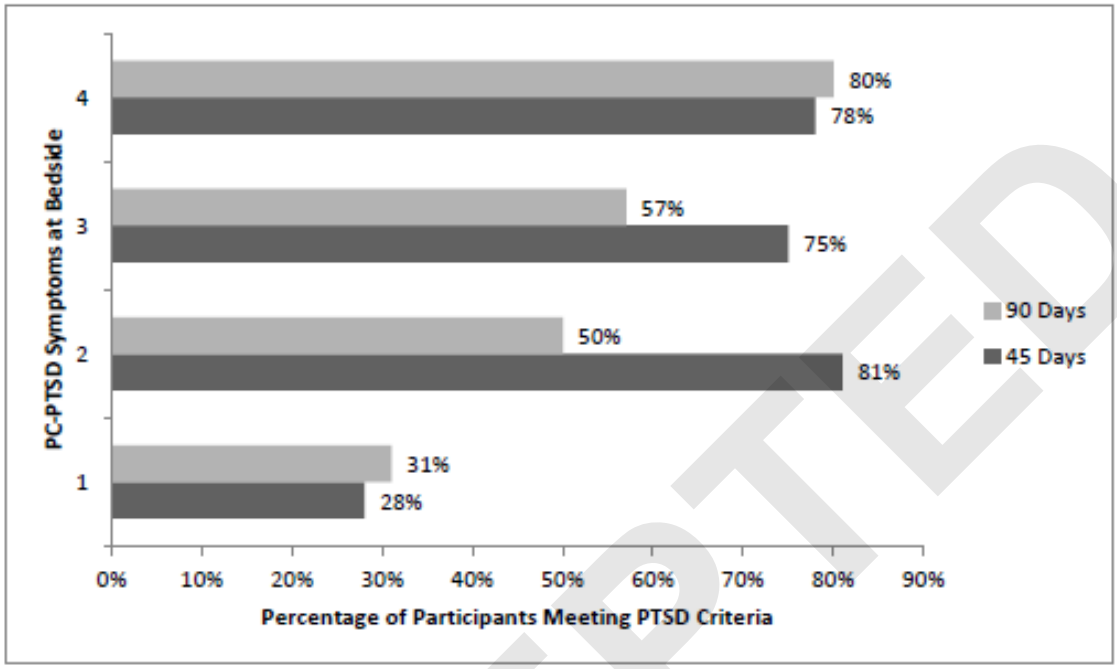

Table 1. Demographics of Study Participants and Negative Screens (Ineligible)*

	Intervention (n = 49)	Control (n = 41)
Males, %	69.4 (34)	46.3 (19)
Age, mean (SD)	39.53 (15.80)	40.56 (16.03)
Race % (n)		
White	77.6 (38)	80.0 (32)
Black or African American	14.3 (7)	15.0 (6)
Other	3 (6.1)	2.50 (1)
Asian/Pacific Islander	1 (2.0)	2.50 (1)
Hispanic % (n)	28.6 (14)	22.0 (9)
ISS, Median	10.00	9.00
Length of Hospital Stay, Median	7.00	6.00
Baseline PC-PTSD, mean (SD)	2.16 (1.01)	2.12 (1.01)
Baseline PAS, mean (SD)	18.92 (5.93)	19.00 (6.97)
	All Study Participants (n = 140)	Negative Screens (Ineligible) (n = 460)
Males, %	59.7 (83)	67.2 (309)
Age, mean (SD)	39.36 (15.12)	46.47 (19.05)
Race % (n)		
White	78.7 (107)	82.5 (378)
Black or African American	11.8 (16)	8.3 (38)
Other	8.1 (11)	7.4 (34)
Asian/Pacific Islander	1.5 (2)	1.7 (8)
Hispanic % (n)	32.6 (45)	22.7 (104)
ISS, Median	9.00	9.00
Length of Hospital Stay, Median	6.00	5.00

Note. ISS is the injury severity score; PC-PTSD is the 4-item primary care–posttraumatic stress disorder screen (a sum score of 3 or 4 indicates a positive screen); PAS is the 10-item post traumatic adjustment scale (a sum score of 16 or higher indicates a positive screen). *Negative screens (ineligible) patients had no symptoms (score=0) on the PC-PTSD screen during the 20 month study period, this includes those with data in the trauma registry.

Table 2. Regression Predicting PTSD Symptoms

	45 days (N = 80)				90 days (N = 87)			
Overall	*r*	*β*	*p*	R^2	*r*	*β*	*p*	R^2
Gender	.12	-.02	.808	.33	.09	-.04	.641	.33
Age	.06	-.07	.459		-.06	-.17	.070	
Depression	.38	.33	.002		.41	.38	.000	
PTSD screen	.49	.43	.000		.45	.37	.000	
Controls	45 days (n = 38)				90 days (n = 41)			
Gender	.19	-.14	.337	.44	.20	-.14	.413	.34
Age	.17	-.11	.464		-.06	-.22	.135	
Depression	.43	.34	.026		.37	.34	.033	
PTSD screen	.58	.58	.001		.47	.49	.005	
Intervention	45 days (n = 42)				90 days (n = 46)			
Gender	.04	.05	.736	.26	-.03	.01	.924	.36
Age	-.05	-.09	.547		-.07	-.16	.250	
Depression	.34	.35	.024		.46	.46	.001	
PTSD screen	.38	.35	.022		.42	.33	.015	

Note. Depression was measured using the Post Traumatic Adjustment Scale (PAS); posttraumatic stress disorder symptoms were measured using the PTSD Checklist-Civilian (PCL-C) version less the four items of the PC-PTSD screen. The Pearson product-moment correlation (*r*) determines the strength and direction of a linear relationship between two continuous variables. The coefficient of determination ($R^{2)}$ measures the proportion of variation in the dependent variable that is explained by variations in the independent variable. *β* is the amount of variance in the dependent variable for each level increase of the independent variable.

Table 3. Correlations between Dummy-coded Control (0) vs. Intervention (1) Group and PTSD Symptomatology (45-day N = 81; 90-day N = 94)

	PCL-C **45 days**	Reexperiencing **45 days**	Avoidance **45 days**	Dysphoria **45 days**	Hyperarousal **45 days**
Intervention (0 1)	.02	-.03	-.02	.01	-.04
p value	.827	.828	.848	.959	.718

	PCL-C, **90 days**	Reexperiencing **90 days**	Avoidance **90 days**	Dysphoria **90 days**	Hyperarousal **90 days**
Intervention (0 1)	-.02	-.03	.01	.00	.00
p value	.838	.748	.924	.984	.932

Note. Reexperiencing, Avoidance, Dysphoria and Hyperarousal correspond to the four factors of the PCL-C and were estimated through confirmatory factor analysis; [3] PCL-C total scores were observed and not estimated; PCL-C = PTSD Checklist-Civilian version

Table 4. Reported barriers to PTSD treatment at 45- and 90-day interview for those who meet criteria of PTSD (PCL-C of 36 or higher)

Treatment Barrier Categories	45-day interview (n=51)	90-day interview (n=44)
Focus on injury or ongoing rehabilitation	52.9%	45.7%
Financial concerns: Lack of insurance or other funds/Cost of treatment for physical injury	35.3%	40.0%
Location of residence: No providers/No transportation	19.6%	20.0%
Do not feel treatment is needed/Symptoms will subside	7.8%	2.9%
Lack social support to seek treatment	5.9%	11.4%
Skeptical of therapy/Poor past experience with therapy	5.9%	8.6%