

A Policy Relevant US Trauma Care System Pragmatic Trial for PTSD & Comorbidity (UH2 MH106338-01)

Douglas Zatzick, MD

Professor, Department of Psychiatry and Behavioral
Sciences

Harborview Level I Trauma Center

University of Washington School of Medicine, Seattle

Trauma Survivors Outcomes & Support (TSOS)



Trauma Surgery Policy Core

Gregory Jurkovich

Ron Maier

David Hoyt

Trauma Survivors Outcomes & Support (TSOS)



Bioinformatics Core

Erik Van Eaton

Cory Kelly

Firoozeh Mehri-Kalandari

Trauma Survivors Outcomes & Support (TSOS)



Biostatistics Core

Patrick Heagerty

Bryan Comstock

Joan Russo

Jin Wang

Trauma Survivors Outcomes & Support (TSOS)



Other Collaborators

Doyanne Darnell (Behavioral Interventions)

Larry Palinkas (Implementation Science)

Anurban Basu (Health Economics)

Lauren Whiteside (Emergency Medicine)

Jeff Love (Project Coordination)

Trauma Survivors Outcomes & Support (TSOS): Overview

- Background: US Trauma Care Systems
- Background: PTSD & Comorbidity
- Background: Policy Relevance
- UH3 Study Design & Implementation
- Dissemination Plan
- Questions & Discussion

Background: US Trauma Health Care Systems



Background: Injury Events & Trauma Care Systems

- 30 million US injury visits annually
- 1.5-2.5 million injury admissions
- Over 1000 US trauma centers
- Level I trauma centers set standards nationally

US Trauma Care Systems: Care Coordination



**Paramedic/
Pre-Hospital**



**Emergency &
Trauma Center**



**Primary
Care and
Community**



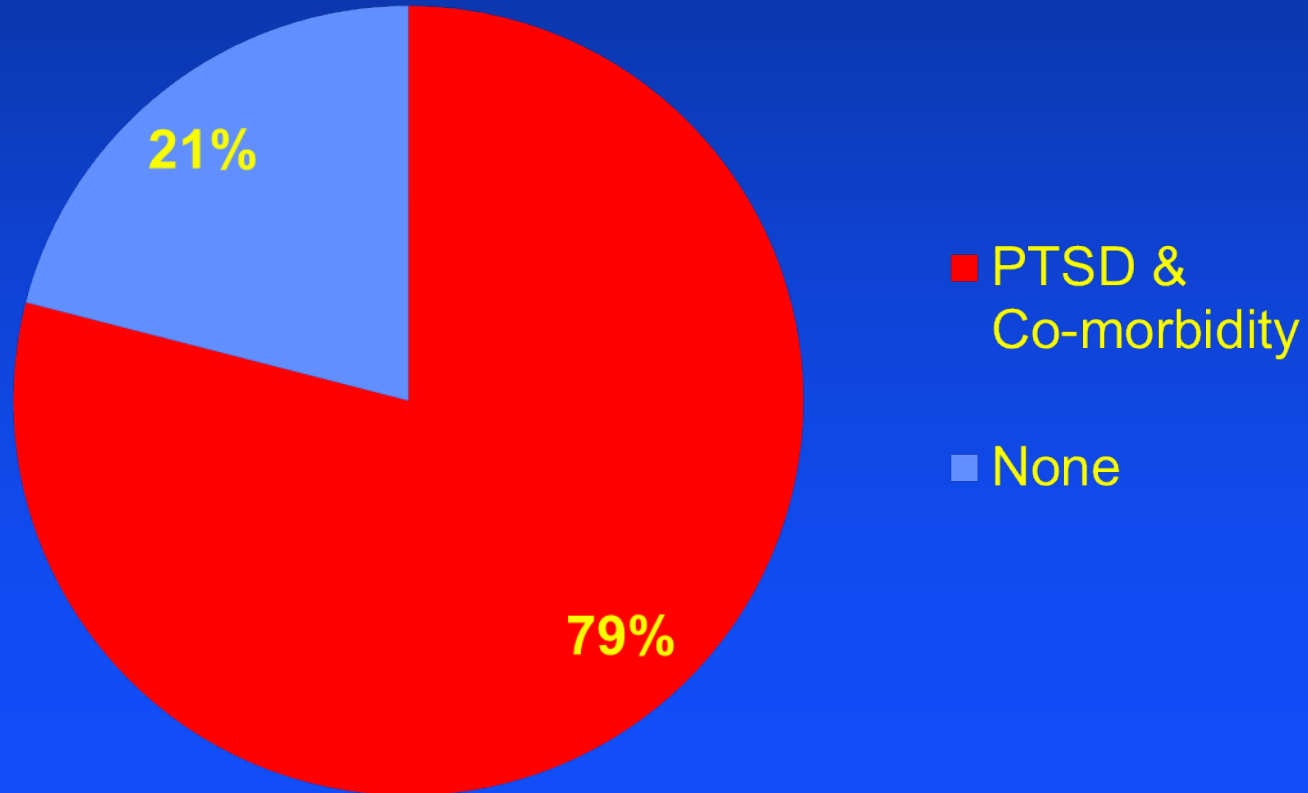
US Trauma Care Systems: Unique Service Delivery Context

- “Open entry” of injured patients
 - Diverse health plans
 - No single administrative database
- Remarkable heterogeneity
 - Patient SES & ethnocultural diversity
 - Providers (MD, RN, MSW)
 - Information technology capacity

Background: Posttraumatic Stress Disorder (PTSD) & Comorbidity Multiple Chronic Condition Framework



PTSD & Other Mental Health/Substance Disorders Among Randomly Selected Harborview Emergency/Trauma Surgery Patients (N=878)



PTSD & Comorbidity and the Multiple Chronic Condition Framework

- Mental health comorbidity: PTSD, depression and occult suicidal ideation (25-40%)
- Alcohol use problems (25%)
- Other substance use problems: Stimulants, opiates, benzodiazepines, MJ (20%)
- Chronic pain and somatic symptom amplification (10-20%)
- Traumatic Brain Injury (40-50%)
- Pre-injury chronic medical conditions (>50%)

Chronic Medical Condition Heterogeneity Among Admitted Injury Survivors (N = 76,942)

<u>Condition/System</u>	<u>Percentage</u>
Hypertension	33%
Heart Disease	24%
Pulmonary	16%
Diabetes	14%
Renal	6%
Hepatic	5%
Obesity	5%
Neoplasm	4%

Background: Prior Collaborative Care Trials Successfully Targeting PTSD & Comorbidity

- ↓ Alcohol use & recurrent injury (Annals of Surgery 1999)
- ↓ Alcohol use - 20 trauma center sites (Addiction 2014)
- ↓ Injury risk/weapon carrying (JAMA Pediatrics 2014)
- ↓ PTSD symptoms & Alcohol use (JAMA Psychiatry 2004)
- ↓ PTSD symptoms with IT enhanced collaborative care (Under revision)
- ↓ PTSD symptoms & improved physical function (Annals of Surgery 2013)

Background: Collaboratory Pragmatic Trial Methods - Research Partnerships



BMJ 2014;349:g6826 doi: 10.1136/bmj.g6826 (Published 1 December 2014)

Page 1 of 7

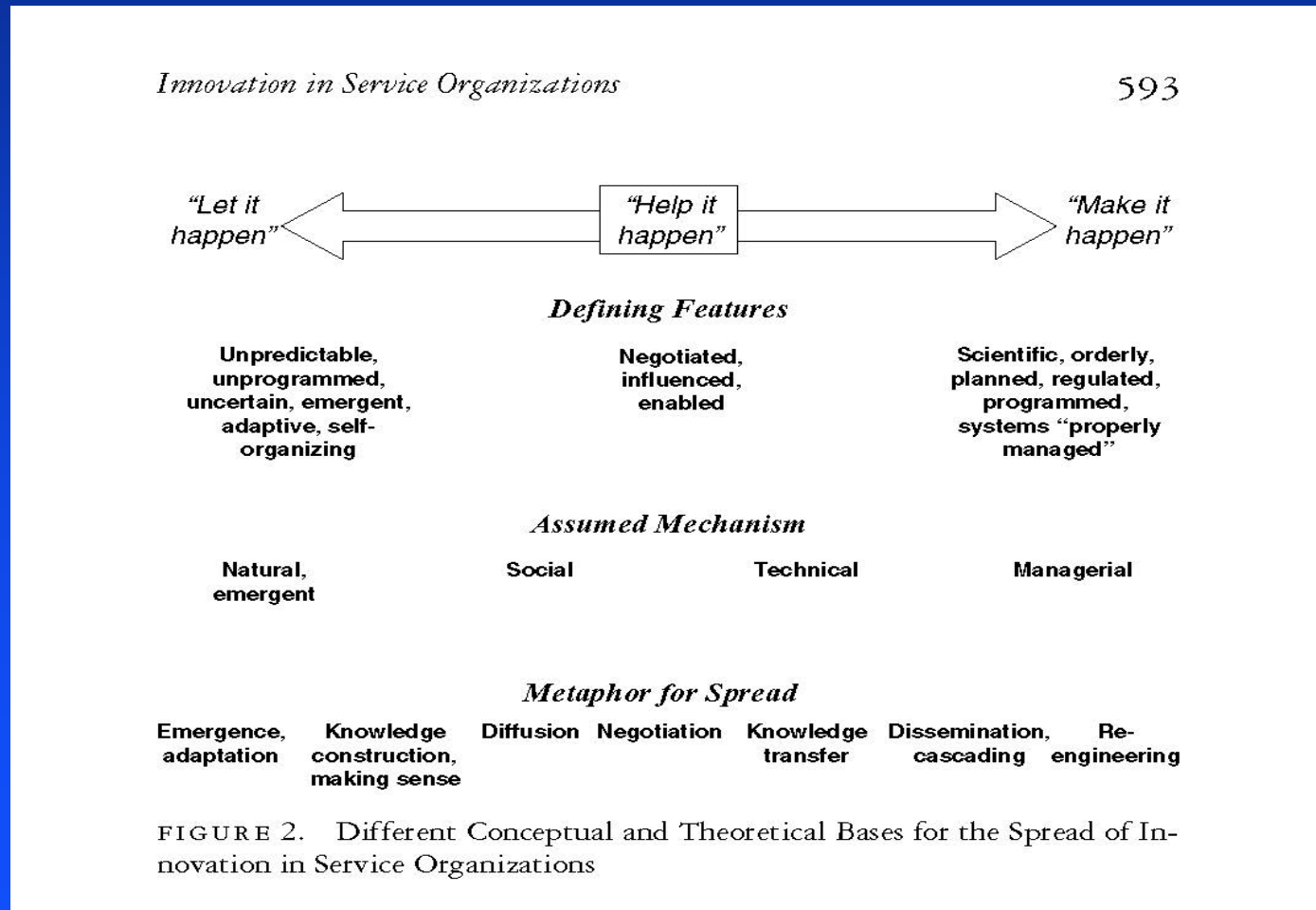
RESEARCH METHODS & REPORTING

A guide to research partnerships for pragmatic clinical trials

Karin E Johnson *research associate*¹, Chris Tachibana *scientific editor and writer*¹, Gloria D Coronado *senior investigator*², Laura M Dember *professor of medicine*³, Russell E Glasgow *associate director*⁴, Susan S Huang *associate professor and medical director of epidemiology and infection prevention*⁵, Paul J Martin *medical director*⁶, Julie Richards *project manager*¹, Gary Rosenthal *professor*⁷, Ed Septimus *medical director infection prevention and epidemiology*⁸, Gregory E Simon *senior investigator*¹, Leif Solberg *associate medical director for care improvement research*⁹, Jerry Suls *senior scientist*¹⁰, Ella Thompson *project manager*¹, Eric B Larson *vice president for research*¹

¹Group Health Research Institute, Seattle, WA 98101, USA; ²Kaiser Permanente Center for Health Research, Portland, OR 97227, USA; ³University of Pennsylvania Perelman School of Medicine, Philadelphia, PA 19104, USA; ⁴Colorado Health Outcomes Program, University of Colorado School of Medicine, Aurora, CO 80045, USA; ⁵University of California Irvine School of Medicine, Irvine, CA 92697, USA; ⁶Clinical Research Support, Fred Hutchinson Cancer Research Center, Seattle WA 98109, USA; ⁷Internal Medicine, University of Iowa, Iowa City, IA 52242, USA; ⁸Clinical Service Group, Hospital Corporation of America, Nashville, TN 374022, USA; ⁹HealthPartners Institute for Education and Research, Bloomington, MN 55425, USA; ¹⁰National Cancer Institute, Bethesda, MD 20892, USA

Implementation Science: “Make It Happen” Research to Policy Partnership with The American College of Surgeons (Greenhalgh et al 2004, Milbank Quarterly)



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PTSD

PTSD screening &
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US Trauma Care System Pragmatic Trial Generalizability

- Patient
- Provider
- Site (Trauma Center)

UH3 Research Plan



Trauma Survivors Outcomes & Support (TSOS) UH3 Aims

- 1) Conduct pragmatic trial
- 2) Understand trial implementation
- 3) Dissemination of results through Amer. College of Surgeons' policy

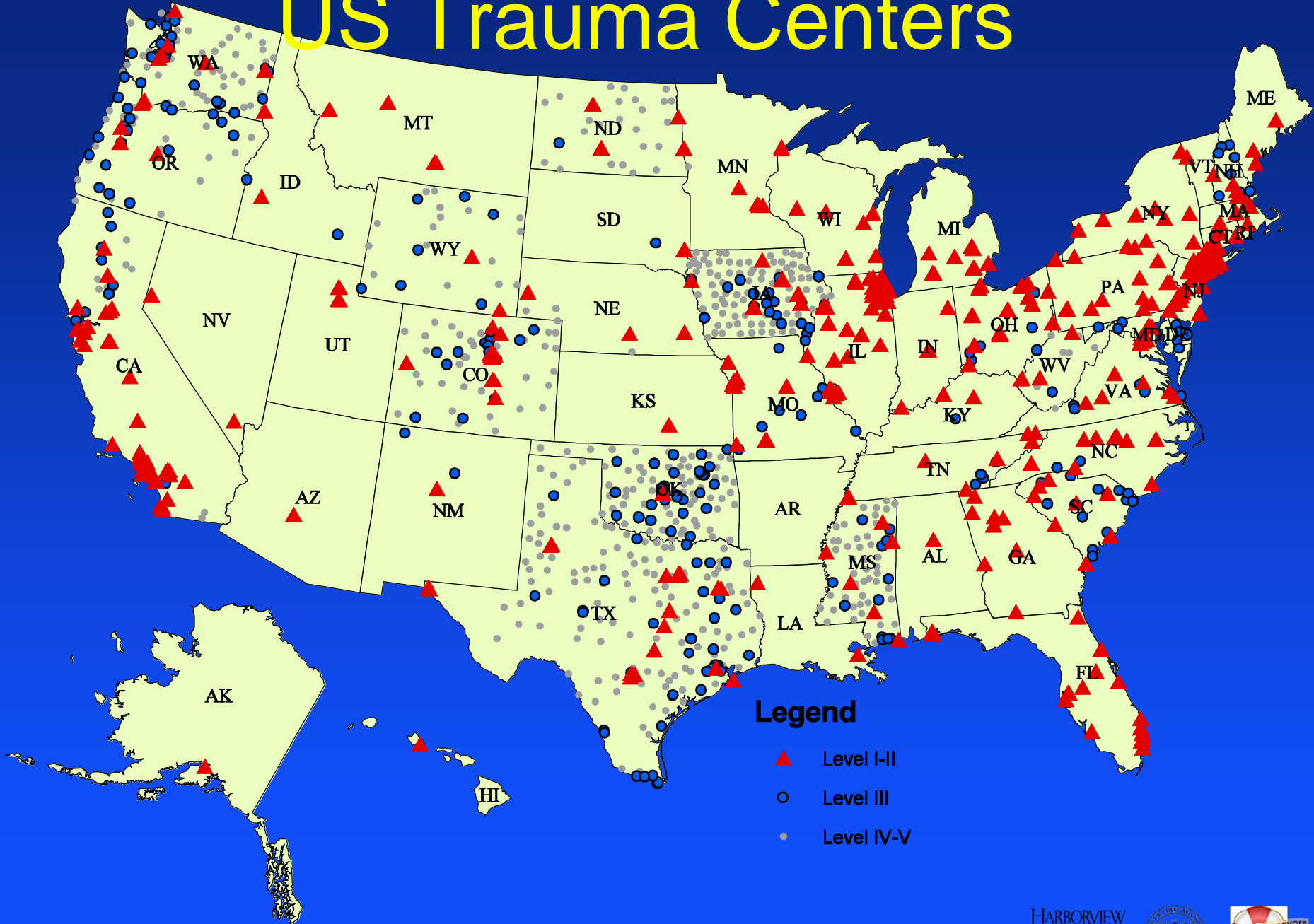
UH3 Study Design

- Cluster randomized trial
- 24 US trauma centers
- Stepped wedge design
- All sites begin recruiting controls
- Intervention “turned on” at each site
- 40 patients per site (960 patients total)
- Baseline PTSD & comorbidity assessment
- 3, 6 and 12 month follow-up interviews

UH2-UH3 Hypotheses: Aim 1

- The intervention group when compared to the control group will demonstrate:
 - 1) ↓ PTSD symptoms (primary hypothesis)
 - 2) ↓ Depressive symptoms
 - 3) ↓ Alcohol use problems
 - 4) Improved post-injury physical function
- Exploration of intervention effects in patients with/without chronic medical conditions & TBI
- Exploration of intervention effects on other conditions (e.g., chronic pain, drugs of abuse)

US Trauma Centers



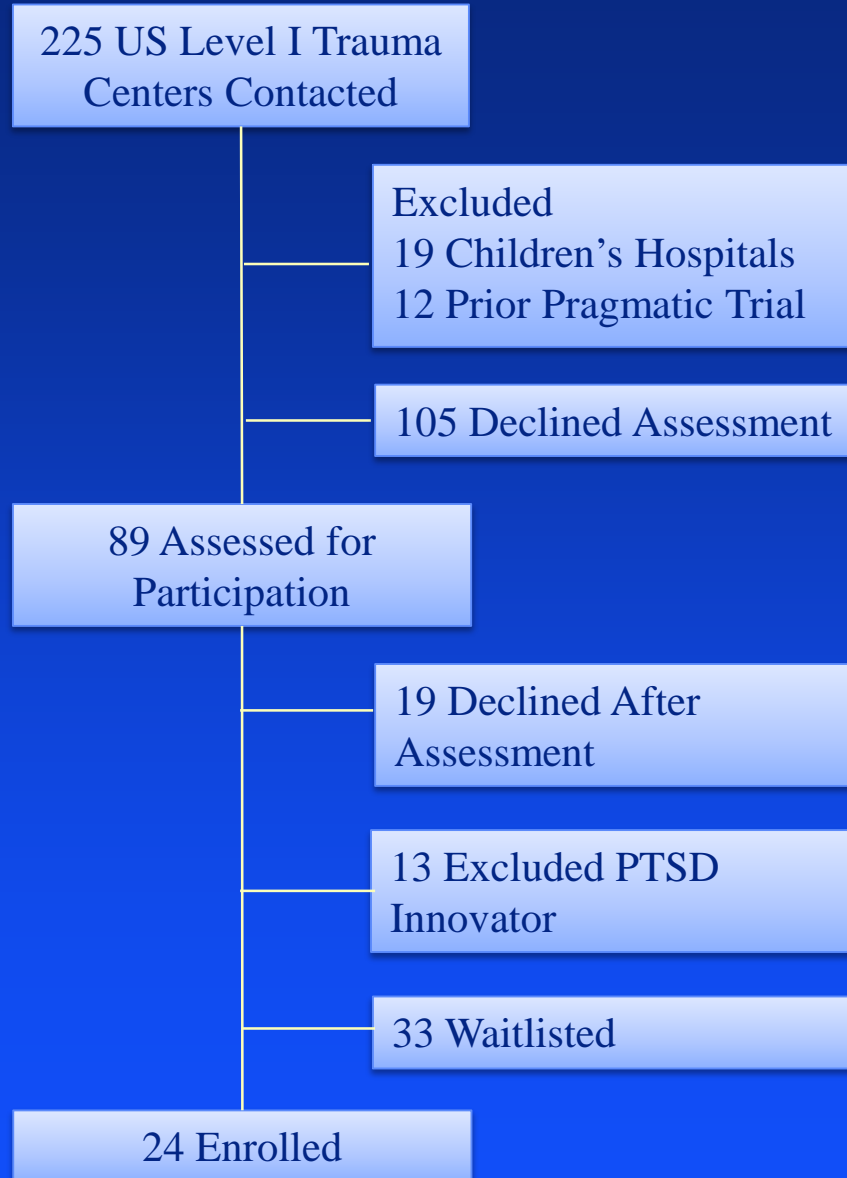
Legend

- ▲ Level I-II
- Level III
- Level IV-V

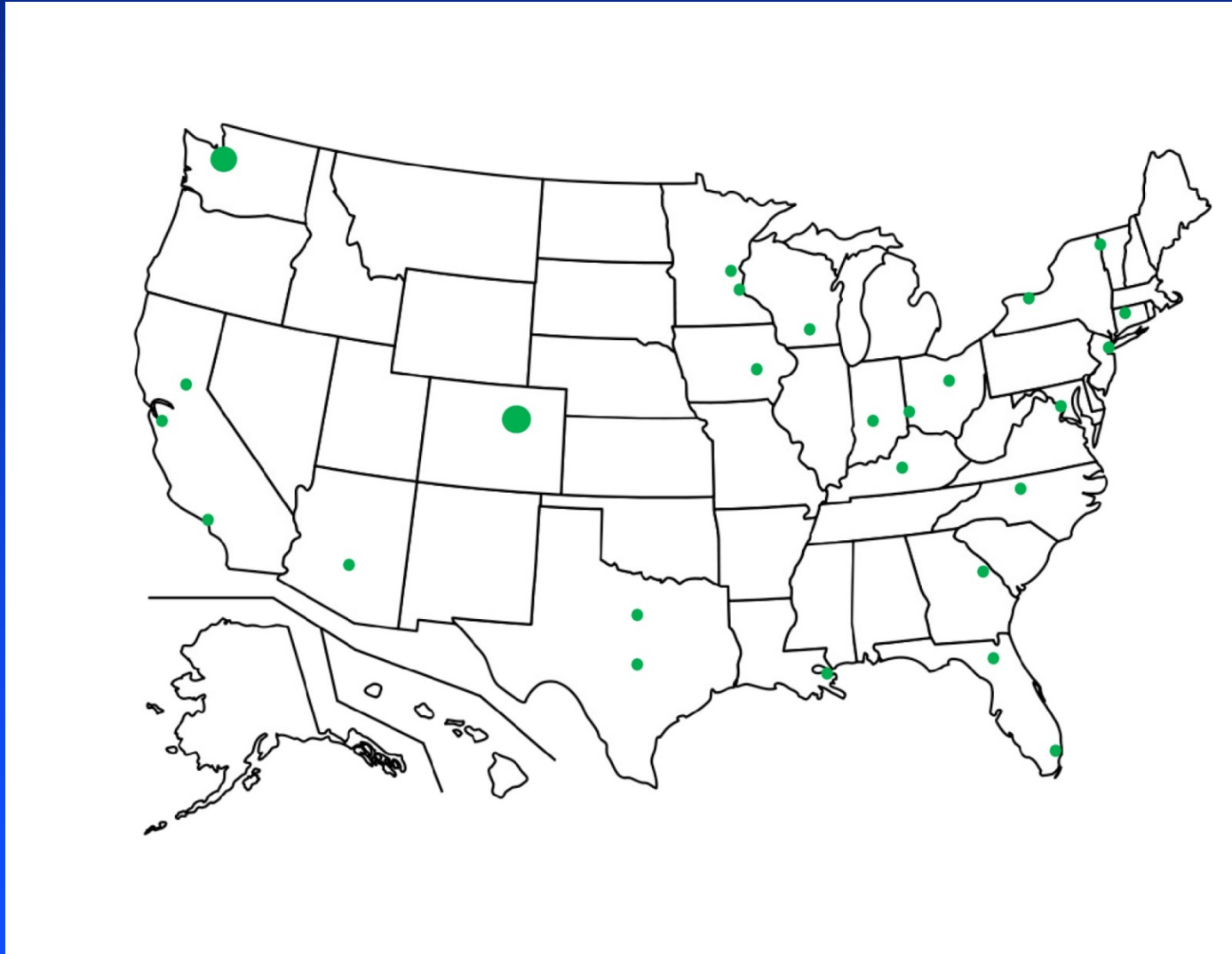
Trauma Center Site Selection Criteria

- Exclude child trauma centers (age < 18)
- RFA: No research network
- Not currently routinely screening or intervening for PTSD (Exclude “Innovators” < 10% of US sites)
- Availability of Champions:
 - Trauma surgery
 - PTSD intervention
 - Information technology

CONSORT: Trauma Center Recruitment



TSOS US Level I Trauma Center Sites (N =24)



Comparison of Trauma Centers Participating in the Trial with Those Not Participating

	<u>TSOS</u> (n = 24)	<u>Others</u> (n = 221)	<u>P</u>
US Region			0.16
Midwest	28.0%	32.5%	
South/SE	24.0%	14.2%	
Northeast/East	16.0%	32.5%	
West	16.0%	14.2%	
Central	16.0%	6.6%	
Rural	12.0%	12.2%	1.0
Teaching hospital	92%	82%%	0.27
Population served			0.02
Adult	28.0%	46.7%	
Adult & pediatrics	72.0%	41.1%	
Pediatrics	0.0%	11.7%	
Hospital beds (median)	559	533	0.43

Variability in TSOS Trauma Center Characteristics (N =24)

- PTSD prevalence
 - Violent injury admissions
 - ICU
- Recruitment rates
 - Trauma center admit volume
- Follow-up rates
 - Substance use
 - Homelessness

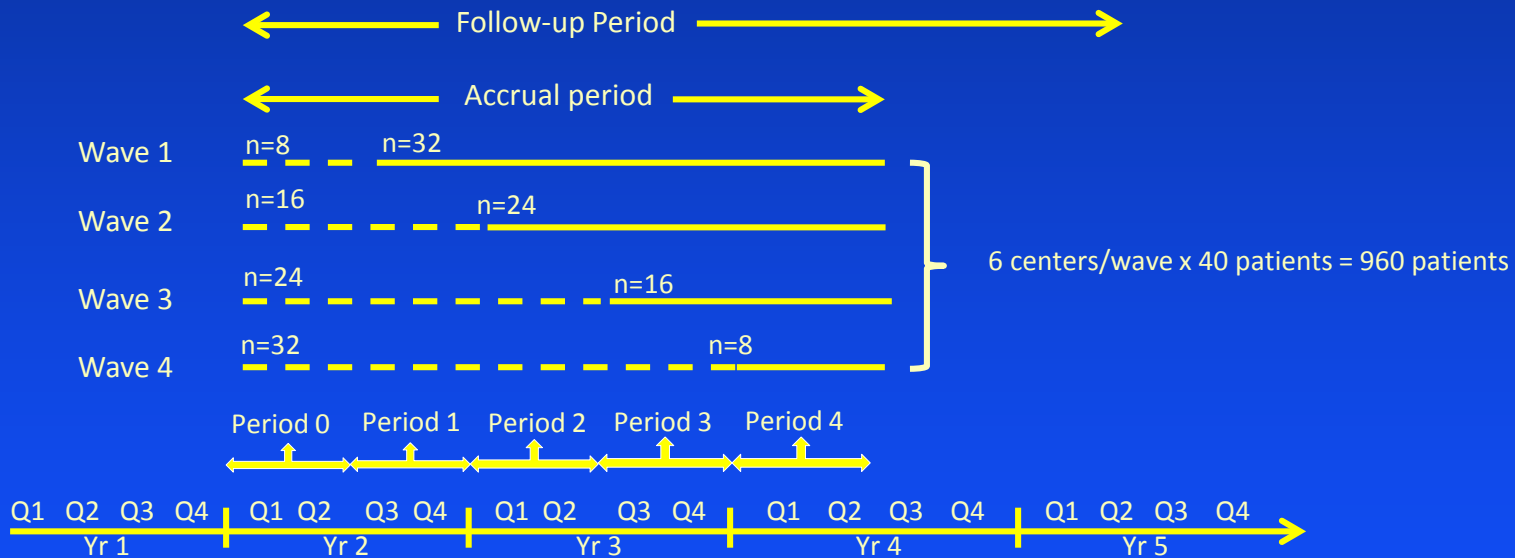
Stepped Wedge Design

- Sites recruit control & intervention
- 24 sites randomized to 4 waves
- Begin with control recruitment
- Turn on intervention midway

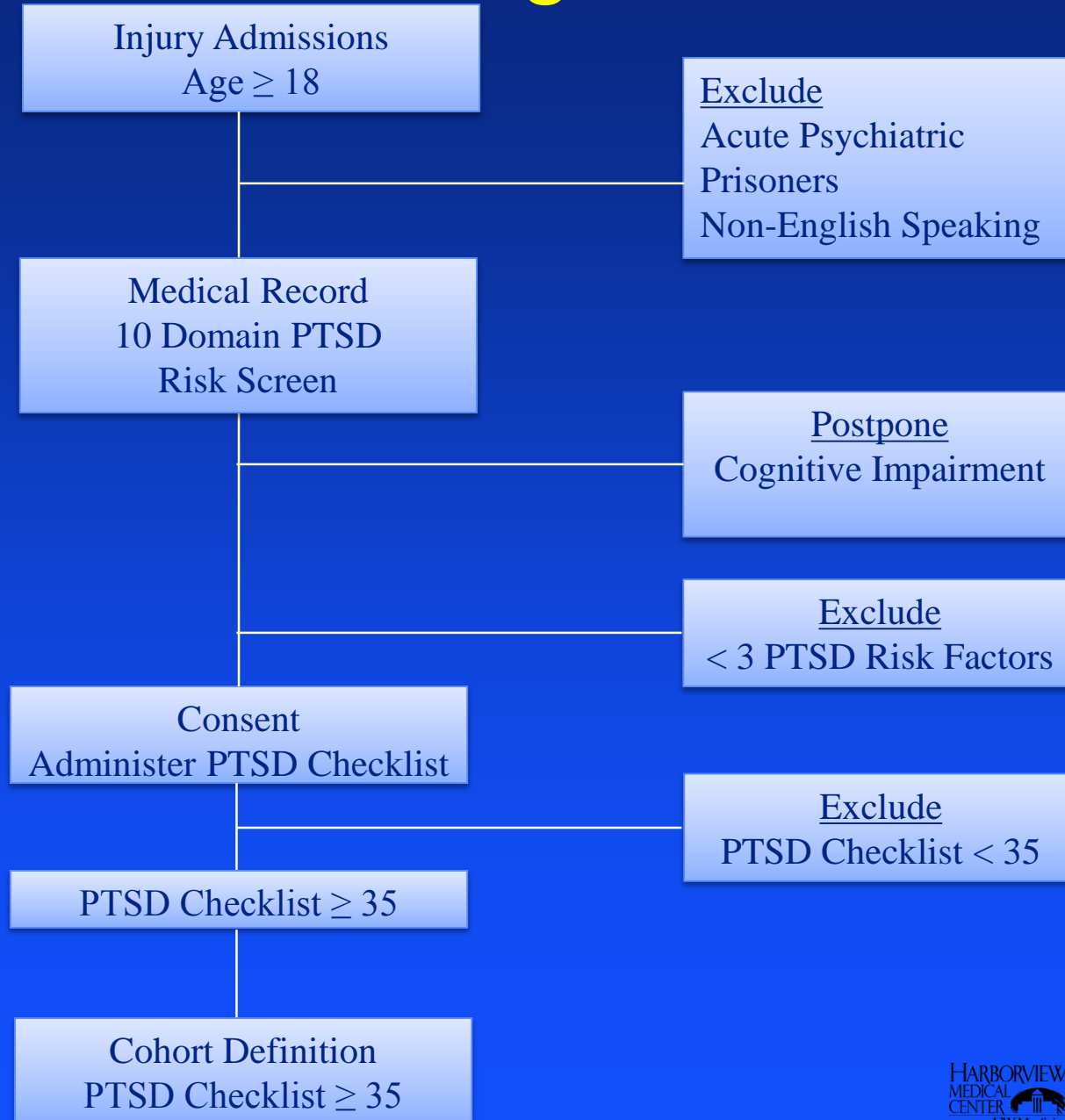
Stepped Wedge Cluster Randomized Design

--- Patients Unexposed to intervention (n = 480)

— Patients Exposed to intervention (n = 480)



Patient Flow Through UH3 Protocol



Medical Record 10 risk domain PTSD Evaluation



Contents lists available at SciVerse ScienceDirect

General Hospital Psychiatry

journal homepage: <http://www.ghpjournal.com>



The development of a population-based automated screening procedure for PTSD in acutely injured hospitalized trauma survivors

Joan Russo, Ph.D.^a, Wayne Katon, M.D.^a, Douglas Zatzick, M.D.^{b,*}

^a Department of Psychiatry and Behavioral Sciences, University of Washington School of Medicine, Seattle, WA 98104, USA

^b Department of Psychiatry and Behavioral Sciences, Harborview Injury Prevention and Research Center, University of Washington School of Medicine, Seattle, WA 98104, USA

ARTICLE INFO

Article history:

Received 21 September 2012

Revised 26 April 2013

Accepted 30 April 2013

Available online xxx

Keywords:

PTSD

Screening

Injury

EMR

Information technology

ABSTRACT

Objective: This investigation aimed to advance posttraumatic stress disorder (PTSD) risk prediction among hospitalized injury survivors by developing a population-based automated screening tool derived from data elements available in the electronic medical record (EMR).

Method: Potential EMR-derived PTSD risk factors with the greatest predictive utilities were identified for 878 randomly selected injured trauma survivors. Risk factors were assessed using logistic regression, sensitivity, specificity, predictive values and receiver operator characteristic (ROC) curve analyses.

Results: Ten EMR data elements contributed to the optimal PTSD risk prediction model including *International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM)* PTSD diagnosis, other ICD-9-CM psychiatric diagnosis, other ICD-9-CM substance use diagnosis or positive blood alcohol on admission, tobacco use, female gender, non-White ethnicity, uninsured, public or veteran insurance status, E-code identified intentional injury, intensive care unit admission and EMR documentation of any prior trauma center visits. The 10-item automated screen demonstrated good area under the ROC curve (0.72), sensitivity (0.71) and specificity (0.66).

Conclusions: Automated EMR screening can be used to efficiently and accurately triage injury survivors at risk for the development of PTSD. Automated EMR procedures could be combined with stepped care protocols to optimize the sustainable implementation of PTSD screening and intervention at trauma centers nationwide.

Published by Elsevier Inc.



TSOS DECISION SUPPORT TOOL

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10 Item Screen

Question	Yes	No
1 Any Chart ICD-9CM Diagnoses of Current or Past PTSD	<input type="radio"/>	<input checked="" type="radio"/>
2 Any other Chart ICD-9CM Current or Past Psychiatric Disorder	<input checked="" type="radio"/>	<input type="radio"/>
3 Uninsured and/or Veteran Status	<input type="radio"/>	<input checked="" type="radio"/>
4 Any Alcohol or Drug use problem as indicated either by a ICD-9CM diagnosis or a positive blood alcohol or urine/blood drug toxicology screen	<input type="radio"/>	<input checked="" type="radio"/>
5 Tobacco use as identified by ICD9-CM or other chart record	<input type="radio"/>	<input checked="" type="radio"/>
6 Intentional injury inflicted by individual other than self (e.g. injury e-code)	<input checked="" type="radio"/>	<input type="radio"/>
7 Any prior inpatient hospitalization for medical, surgical or psychiatric conditions	<input type="radio"/>	<input checked="" type="radio"/>
8 Female Gender	<input checked="" type="radio"/>	<input type="radio"/>
9 Non-White Race/Ethnicity	<input checked="" type="radio"/>	<input type="radio"/>
10 ICU Admission	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Cancel

Save



Cohort Definition: Patient Reported Outcome

- PTSD Checklist: 17 item DSM PTSD
- PTSD Checklist score ≥ 35 included
- All comorbidities included



Control Condition

- Usual trauma center care
- Infrequent PTSD intervention
- Poor trauma center to community linkage – fragmented care common
- Inconsistent attention to comorbidity

Evidenced-based Intervention: Stepped Collaborative Care (6 mo.)

- Combined disease management
 - Care management
 - Pharmacotherapy
 - Motivational interview & CBT elements
- Multidisciplinary teams
 - Care management (MSW, RN)
 - Mental health providers (e.g., PhD)
 - Medical & surgical providers (MD)

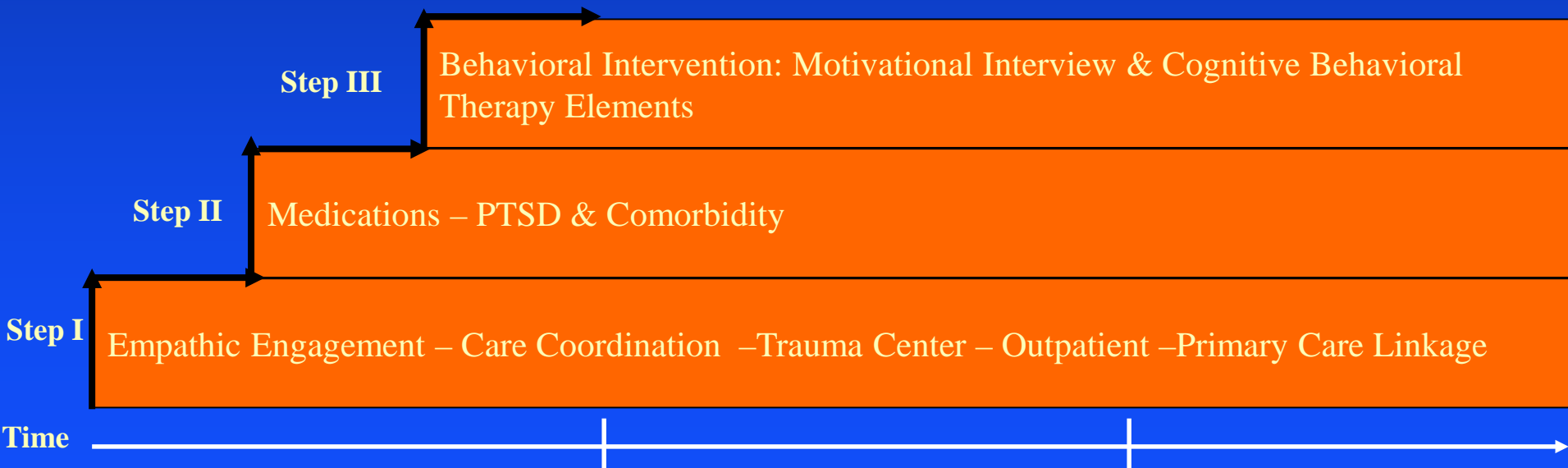
Stepped Collaborative Care: Readily Implementable Elements



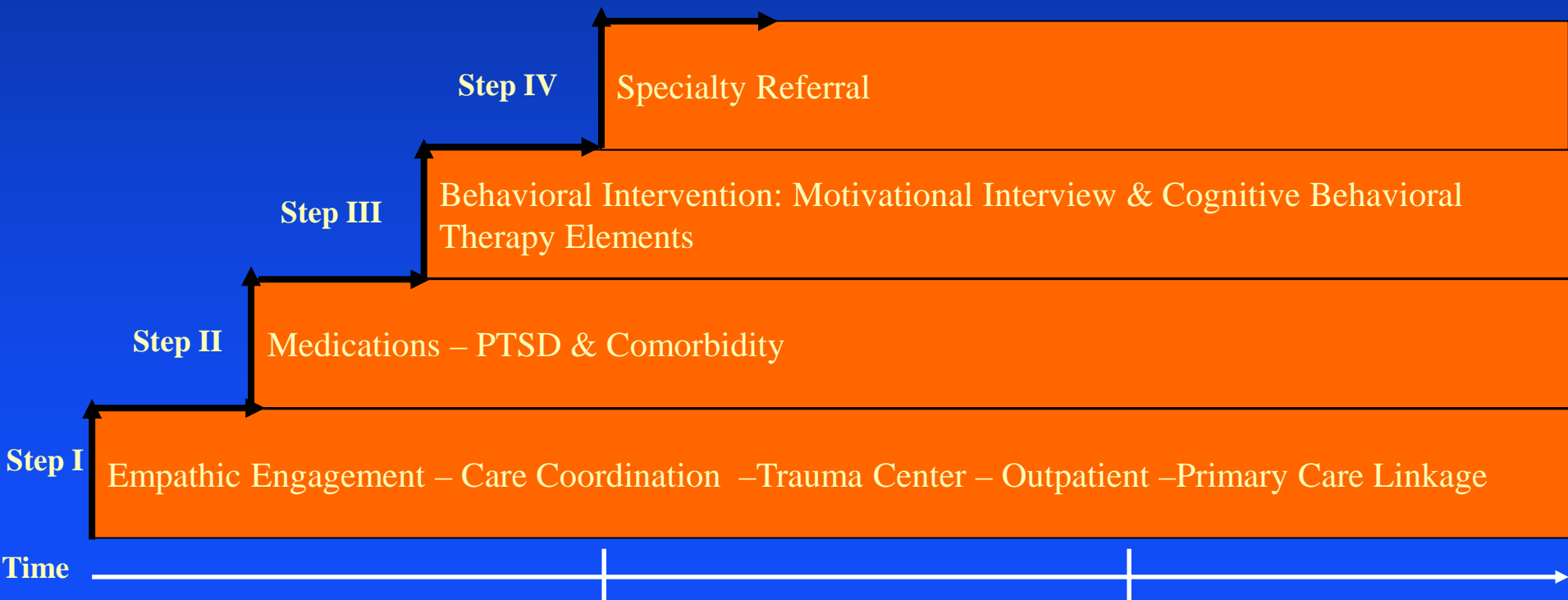
Stepped Collaborative Care: Readily Implementable Elements



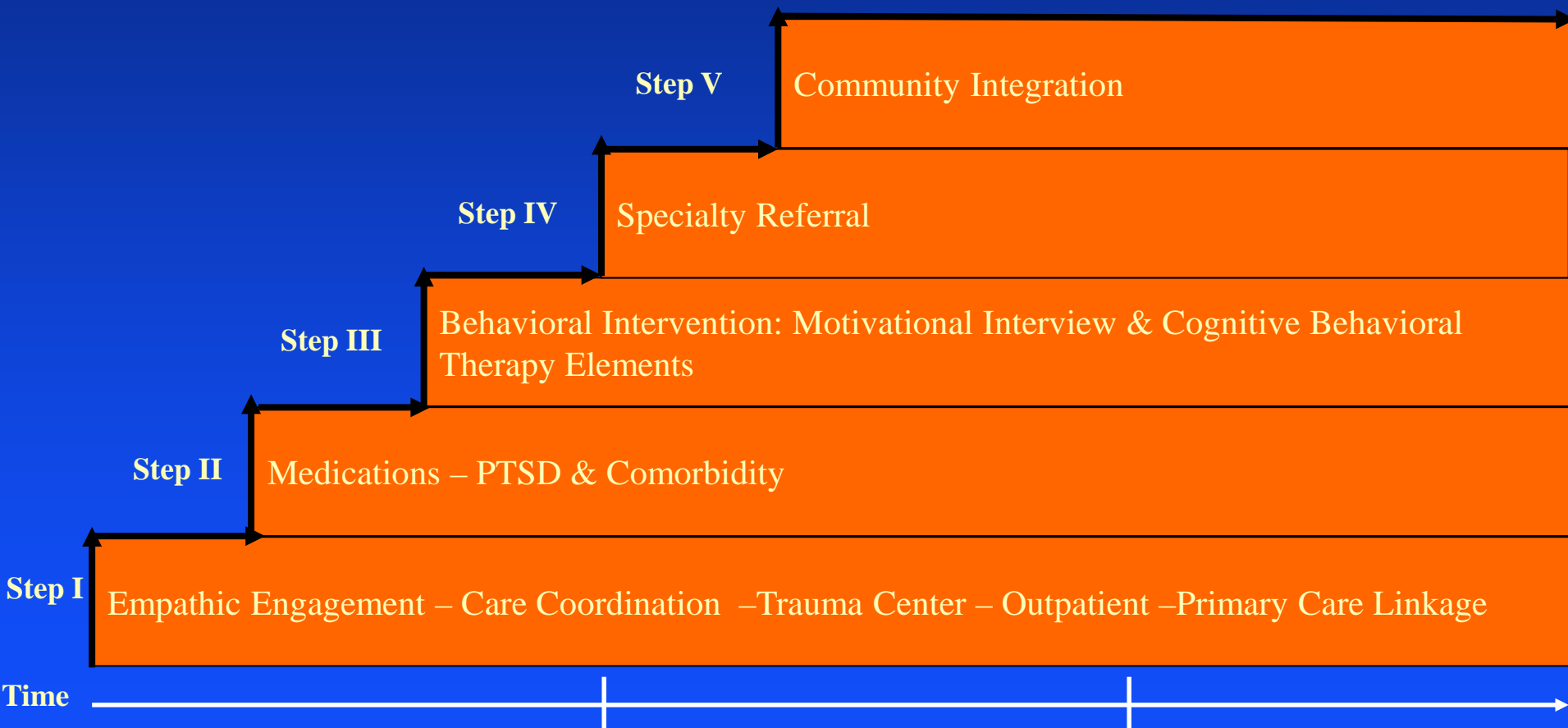
Stepped Collaborative Care: Readily Implementable Elements



Stepped Collaborative Care: Readily Implementable Elements



Stepped Collaborative Care: Readily Implementable Elements



Intervention Training

- Front-line trauma providers
- 1 day on-site trauma center training
- Ongoing feedback and coaching using TSOS decision support tool

Trauma Center IT Considerations

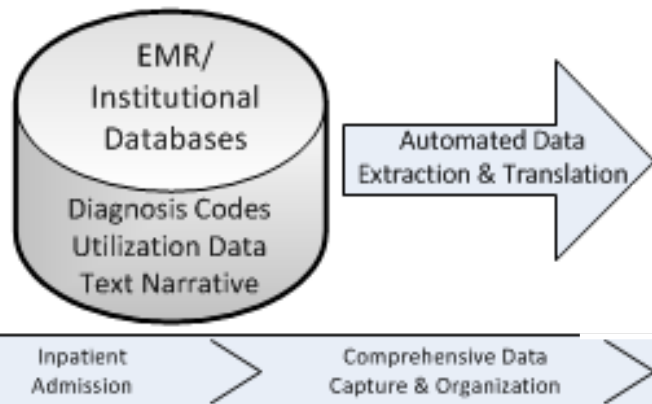


The Informatics Goal

- Leverage site IT capacity for trauma patient data extraction

Figure 1. Comprehensive Trauma Center Screening, Intervention & Quality Documentation for PTSD & Comorbidity

1) Institutional EMR & Administrative Databases – Real-time Extract



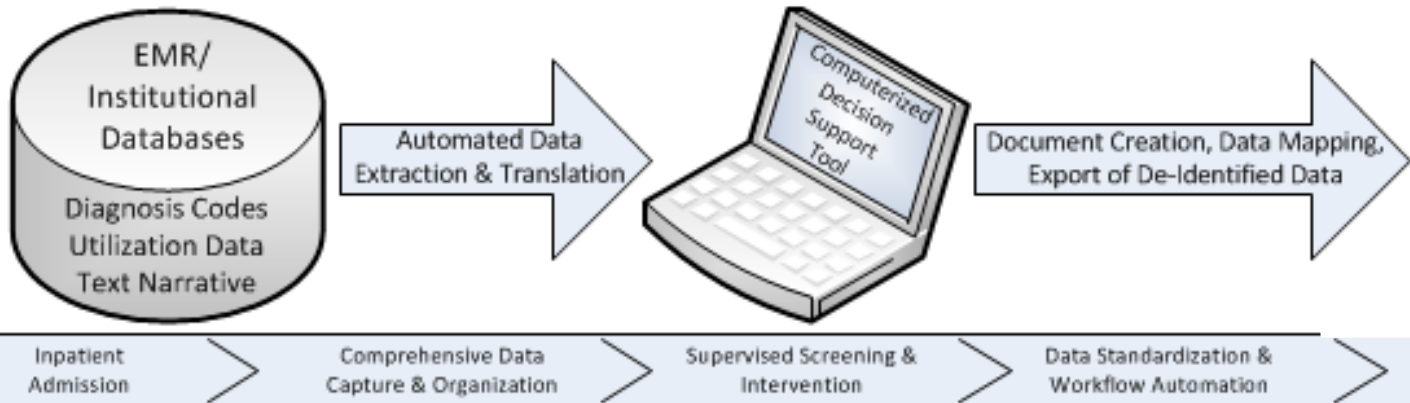
The Informatics Goal

- Provide a real-time, workflow-integrated decision support tool

Figure 1. Comprehensive Trauma Center Screening, Intervention & Quality Documentation for PTSD & Comorbidity

1) Institutional EMR & Administrative Databases – Real-time Extract

2) Computerized Decision Support for PTSD & Comorbidity: Workflow-integrated Screening & Intervention



The Informatics Goal

- Align to existing methods for distributed research networking

Figure 1. Comprehensive Trauma Center Screening, Intervention & Quality Documentation for PTSD & Comorbidity

- 1) Institutional EMR & Administrative Databases – Real-time Extract 2) Computerized Decision Support for PTSD & Comorbidity: Workflow-integrated Screening & Intervention 3) Standardized Quality, Outcomes, & Research Outputs



Inpatient Admission Comprehensive Data Capture & Organization Supervised Screening & Intervention Data Standardization & Workflow Automation Quality, Outcomes, Research Data

The Informatics Challenge: Infrastructure Variability

A Nationwide Survey of Trauma Center Information Technology Leverage Capacity for Mental Health Comorbidity Screening



Erik G Van Eaton, MD, FACS, Douglas F Zatzick, MD, Thomas H Gallagher, Peter Tarczy-Hornoch, MD, FACMI, Frederick P Rivara, MD, MPH, David R Flum, MD, MPH, FACS, Roselyn Peterson, BA, Ronald V Maier, MD, FACS

BACKGROUND: Despite evidence that electronic medical record (EMR) information technology innovations can enhance the quality of trauma center care, few investigations have systematically assessed United States (US) trauma center EMR capacity, particularly for screening of mental health comorbidities.

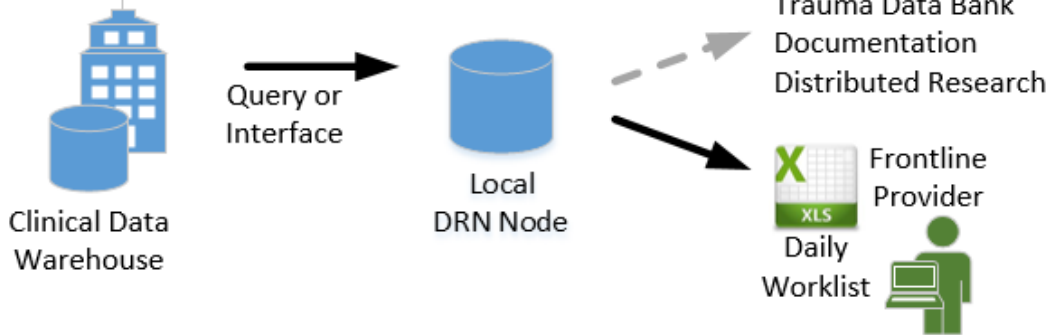
STUDY DESIGN: Trauma programs at all US level I and II trauma centers were contacted and asked to complete a survey regarding health information technology (IT) and EMR capacity.

RESULTS: Three hundred ninety-one of 525 (74%) US level I and II trauma centers responded to the survey. More than 90% of trauma centers reported the ability to create custom patient tracking lists in their EMR. Forty-seven percent of centers were interested in automating a blood alcohol content screening process; only 14% reported successfully using their EMR to perform this task. Marked variation was observed across trauma center sites with regard to the types of EMR systems used as well as rates of adoption and turnover of EMR systems.

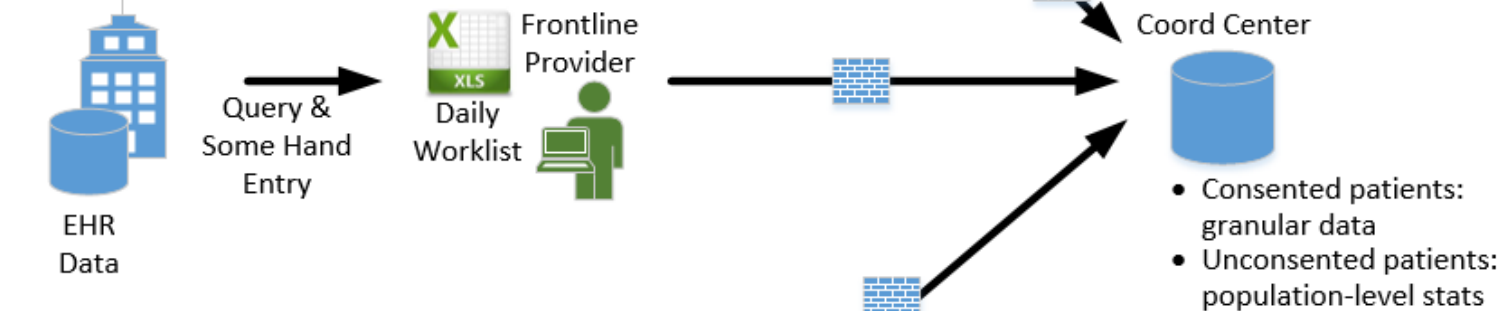
CONCLUSIONS: Most US level I and II trauma centers have installed EMR systems; however, marked heterogeneity exists with regard to EMR type, available features, and turnover. A minority of centers have leveraged their EMR for screening of mental health comorbidities among trauma inpatients. Greater attention to effective EMR use is warranted from trauma accreditation organizations. (J Am Coll Surg 2014;219:505–510. © 2014 by the American College of Surgeons)

Solution: Flexibility, and ...

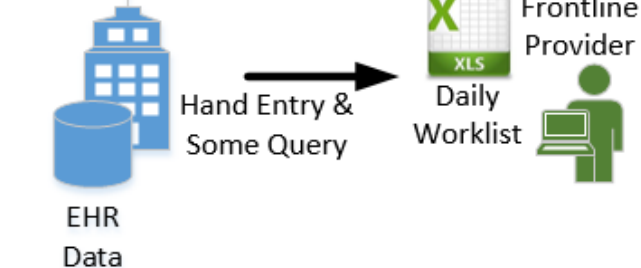
Advanced Capacity




Middle Majority



Low Capacity



... Structure

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TSOS DECISION SUPPORT TOOL

Patient Logs Reports

Patient Summary (Jane Doe)

Basic Information	Edit
<p>Record/Patient Status : Active First Name : Jane Last Name : Doe Middle Name : A Alias : Birth Date : 1/1/1950 Admission Date : 11/25/2012 MRN(s) : A1234567 Gender : Female Race : Caucasian/White 10 Item Screen : 5 Injury Date : 11/25/2012 Room Number : Unit 7E, Room 123, Bed 1 Estimated Discharge Date and Time : 12/2/2012 11:00 am Injury Description : Injury Type : Gunshot Exclusions Prior To Approach :</p>	
Approach Notes	Add
Contacts	Add
Interview Notes	Add
Medications	Add

... Structure



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TSOS DECISION SUPPORT TOOL

Intervention Care Management Note

Patient : Jane Doe

* Status :

* Date :

Total Time Spent : 30

* Mode :

* Patient Location :

Note :

Patient Concerns

Time Spent (minutes) :

Concerns

Concern :

Elicited? :

Addressed? :

Note :

Blinded Assessments 3-, 6- & 12-months Post-injury: Patient Reported Outcomes

- PTSD (PTSD Checklist)
- Depression (PHQ-9)
- Alcohol use problem (AUDIT)
- Physical function (SF-36 PCS)
- Anticipated 75-80% 12-month f/u

Analyses

- Intervention vs. Control Comparisons
 - PTSD (Primary)
 - Alcohol
 - Depression
 - Physical function
 - Pre-injury Medical Conditions (ICD)
 - Traumatic brain injury (ICD)
- Health economic assessment
- RE-AIM assessment of implementation and sustainability

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Dissemination Year 5 American College of Surgeons Policy Summit

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PTSD

PTSD screening &
intervention best
practice guideline
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PTSD

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recommendation

Patient Reported
Outcome 17 item
PTSD Checklist
Recommended

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Next Steps

“The incorporation of routine trauma center based screening and intervention for PTSD and depression is an area that could benefit from the ongoing integration of emerging data and evolving expert opinion”

Questions & Discussion

