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Thank you to all those who lifted a candle for me when my world felt insurmountably dark, especially my mom, J, and J.

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Vita

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Analysis of Referrals to Trauma Psychology and Subsequent Development and Proof-of-Concept Study of Provider Mental Health Training at a Level I Trauma Center

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Table of Contents

List of Tables and Figures

Abstract

Introduction: Millions of people are traumatically injured each year, with a significant portion going on to develop negative mental health sequelae. Many Level I trauma centers are integrating psychologists to provide acute assessment and intervention to patients at risk for poor outcomes. However, medical providers receive very limited training in how to best refer patients to mental health services and may benefit from such education.

Objective: To characterize current patterns of referral to trauma psychology at a Level I trauma center and to develop, refine, and test proof-of-concept for a new training for referring providers.

Method: One year of patient data was reviewed retrospectively, and characteristics of patients referred to trauma psychology were compared to characteristics of those who were not. Next, an expert advisory committee was convened to develop a novel training for referring providers. The developed training was offered to participants who then completed measures of demonstrated and self-reported competence and confidence in referring patients to trauma psychology. Acceptability and feasibility were also assessed.

Results: Analysis of referred and unreferred patients revealed patterns generally consistent with the published literature. Trauma psychology was consulted for approximately 8.7% of admitted patients with an average of 2.5 follow up visits after a completed consult visit. The developed training was generally acceptable and feasible and demonstrated improvements in self-rated confidence and competence, but measures of demonstrated competence using clinical vignettes did not change from pre- to post-training.

Implications and Conclusion: Brief training for medical providers who refer patients to trauma psychology can be feasible and beneficial according to self-report, though measuring its efficacy is challenging.

Development and Proof-of-Concept for Provider Mental Health Training at a Level I Trauma Center

Each year in the United States, millions of people are injured traumatically in motor vehicle collisions, falls, and other accidental and intentional injuries, such as assaults and shootings. Injury is the leading cause of death for people ages one to 44 (CDC, 2022), and millions of people survive and go on to receive medical treatment, including inpatient hospitalization. Between 2011 and 2020, around 289 million injuries resulted in medical treatment, with nearly 33 million hospital admissions (DiMaggio et al., 2016). Beyond the human toll, the cost of trauma-related inpatient care in the decade prior in the United States was $240.7 billion, with the total increasing each year (DiMaggio et al., 2016), especially as modern medicine continues to improve in its ability to save the lives of severely injured patients.

Trauma Centers

For decades, the American College of Surgeons has established standards of care for trauma treatment in the United States to distinguish the capabilities of hospitals to manage acutely injured patients. Hospitals that seek to be recognized by the American College of Surgeons as trauma centers must be re-accredited every three years and are certified at four different levels of capacity, Levels I through IV. When emergency services encounter an injured patient, they engage in standardized rapid triage and assessment (VDOH, 2011) to identify the most critically injured patients in need of the most advanced care. The most critically injured patients are admitted to Level 1 Trauma Centers where they are expected to receive “total care for every aspect of injury” (ACS, 2022). Patients admitted to Level I trauma centers have experienced significant, often life-changing, events. They frequently have numerous injuries, including open and closed wounds, orthopedic fractures, acute organ injuries, and injuries to any

or all of the main body systems, requiring significant interdisciplinary care, involving numerous specialty services and providers (ACS, 2022). Depending on the severity of injuries, patients may be admitted to a trauma center for weeks or even months at a time, enduring multiple surgeries and extensive time in the Intensive Care Unit (ICU). Once a patient is released from the hospital, they are likely to require extensive rehabilitation and long-term work disability. Total cost may range into the millions of dollars pre-insurance adjustment (DiMaggio et al., 2016).

Traumatic Injury-Related Mental Health

Beyond physical injuries, many survivors of traumatic injury go on to develop negative mental health sequelae. These symptoms can present immediately following the trauma exposure and may last anywhere from a few moments to the rest of a person's natural life (Haagsma et al., 2011). Symptoms of trauma exposure are often idiosyncratic and vary with time, making diagnosis and accurate estimates of prevalence challenging (Kenardy et al., 2018; Sayed et al., 2015).

Risk Factors

Prior to examination of mental health sequelae, it is important to consider that many patients who are injured traumatically are already living with premorbid mental health conditions, which may recur or be exacerbated by a new traumatic injury, in addition to newly acquired mental health sequelae. A list of common risk factors is included in Table 1 below. Some of these risk factors may actually be related to specific injuries, such as a suicide attempt or driving under the influence resulting in a motor vehicle collision. As a result, it is important to highlight that many of these risk factors can be premorbid (pre-trauma) or may occur during the traumatic injury (peri-trauma) or subsequent hospitalization (post-trauma).

Table 1

Risk Factors for Negative Mental Health Sequelae following Traumatic Injury

	Risk Factor	**Mental Health Consequences**
Pre-Trauma	Female gender (as a proportion of injured patients; more men are injured traumatically overall)	● Nearly twice the rate of PTSD as among men and longer duration of PTSD symptoms (Ozer et al., 2003; Sayed et al., 2015) ● Increased rate of PICS (Colbenson et al., 2019) ● Increased persistence and severity of pain (Giummarra et al., 2019)
	Male gender	● Increased mortality of suicide attempt, predominantly accounted for by selection of more lethal means, especially firearms (Mathews et al., 2016)
	Lower education	● Increased rate of PTSD (deRoon-Cassini et al., 2010; Kim et al., 2022; Shih et al., 2010) ● Increased persistence and severity of pain (Giummarra et al., 2019) ● Increased pain-related distress and duration (Rosenbloom et al., 2013)
	Lower income/wealth	● Increased rate of PTSD (Bell et al., 2018; Chiu et al., 2011; Kim et al., 2022) ● Increased rate of delirium (Branco et al., 2011) ● Increased risk of suicidality (Temko et al., 2020) ● Increased persistence and severity of pain (Giummarra et al., 2019) ● Increased risk of repeat assaultive injury (Strauss et al., 2022)
	Black/African American race	● Increased rate of PTSD (Kim et al., 2022) ● Increased risk of repeat assaultive injury (Strauss et al., 2022)
	Premorbid PTSD	● Increased rate of PTSD (Breslau et al., 2008; Breslau & Peterson, 2010) ● Increased risk of suicidality (O'Connor et al., 2014)
	Premorbid Psychopathology	● Increased rates of PTSD, depression, and anxiety (Brewin et al., 2000; Kenardy et al., 2018; Powers et

		al., 2014; Shih et al., 2010; D. F. Zatzick, Rivara, et al., 2007) ● Increased risk of suicidality (O'Connor et al., 2014) ● Increased risk of repeat assaultive injury (Strauss et al., 2022)
	Older age	● Increased rate and severity of delirium (Angles et al., 2008; Branco et al., 2011; Rueden et al., 2017) ● Increased mortality as a result of suicide attempt (Mathews et al., 2016) ● Increased pain-related distress and duration (Rosenbloom et al., 2013)
Peri-Trauma	Substance use prior to and at time of injury	● Increased rates of PTSD and depression (Richmond & Kauder, 2000) ● Increased rate of delirium (Branco et al., 2011) ● Increased pain-related distress and duration (Rosenbloom et al., 2013) ● Increased risk of repeat assaultive injury (Strauss et al., 2022)
	Assaultive or Intentional Injury (trauma resulting from human intention, including rape, abuse, physical assault, and attempted murder)	● Increased rate and severity of PTSD (deRoon-Cassini et al., 2010; Herrera-Escobar et al., 2018; Ozer et al., 2003; Shih et al., 2010; Zatzick, Rivara, et al., 2007) ● Increased risk of suicidality (O'Connor et al., 2014) ● Increased pain-related distress and duration (Rosenbloom et al., 2013)
	Injury by gunshot wound	● Increased rate of PTSD (Powers et al., 2014) ● Increased likelihood of mortality from suicide attempt (Mathews et al., 2016)
	Perceived threat to life *Particularly if combined with assaultive trauma type	● Increased rate of PTSD (Ozer et al., 2003; Timmer-Murillo et al., 2022)
	Emotional exhaustion during Trauma	● Increased rate of PTSD (Carlier et al., 1997; Ozer et al., 2003)
	Dissociation during Trauma	● Increased rate of PTSD (Marmar et al., 1994; Ozer et al., 2003)

Post-Trauma	Perceived continuation of threat to life	• Increased rate of PTSD (Ozer et al., 2003; Sayed et al., 2015)
	Strong emotion in inpatient environment (tearfulness, emotional lability, anxiety, anger, frustration, fear, rumination)	• Increased rate of PTSD, depression, and anxiety (Kim et al., 2022; Wiseman et al., 2015) • Increased rate of post-injury substance abuse (Brown et al., 2022)
	Patient perception of injury severity	• Increased rate of PTSD and depression (Brasel et al., 2010)
	Intensive Care Unit admission	• Increased rate and severity of delirium (Angles et al., 2008; Davydow et al., 2008; Parker et al., 2015; Wade et al., 2013)
	Significant pain during admission	• Increased risk of PTSD (Archer et al., 2012; Macdonald et al., 2018) • Increased risk of suicidality (O'Connor et al., 2014) • Increased risk of depressive symptoms (Archer et al., 2012)

Note. The broader literature is clear that many of these risk factors are associated with worse outcomes in general and in other populations. However, this table is limited to findings specific to samples of traumatically injured patients.

Mental Health Sequelae

Post-injury mental health is a significant predictor of overall functioning following traumatic injury. For example, the development of posttraumatic stress disorder (PTSD) post-injury is associated with significantly worse outcomes compared to seriously injured patients who do not go on to develop PTSD, such as higher rates of comorbid disease, social impairment, and impaired ability to return to work (Michaels et al., 2000; Zatzick et al., 2008), perhaps accounting for as much as a 50% increase in burden of injury as calculated by Disability-Adjusted Life Years (Haagsma et al., 2011). Post-injury depression has similar impacts on long term functioning, including activities of daily living, return to work, and disability (Richmond et al., 2009), as well as overall health-related quality of life (Kendrick et al., 2017). Further,

although injury severity does not predict suicidal risk following traumatic injury, post-injury disability does (Ryb et al., 2006). Aside from injury severity, some of the strongest predictors of increased cost and length of stay for trauma patients are inpatient mental health concerns, such as delirium, stress disorder, depression, anxiety disorders, and drug dependence. One early study suggested that the presence of stress disorders alone accounted for an 80.7% increase in length of stay and a 79.1% increase in cost for trauma inpatients (Zatzick et al., 2000). These and other common sequelae are listed in Table 2.

Table 2

Common Mental Health Sequelae of Traumatic Injury

Sequela	**Description**	**Prevalence**
Posttraumatic Stress Disorder (PTSD)	Diagnosis of *Posttraumatic Stress Disorder* refers to reaction to a qualifying traumatic event^ that has lasted **at least one month** and must include one or more intrusion symptoms (intrusive memories, distressing dreams, dissociative reactions, intense distress in response to cues resembling the trauma, or physiological reaction to cues), one or more avoidance symptoms (avoidance of memories or thoughts, avoidance of external reminders of the trauma), two or more negative alterations in cognitions and mood (dissociative amnesia, negative beliefs about oneself, others, or the world, distorted self-blame or blame of others, persistent negative emotional state, anhedonia, feelings of detachment, persistent numbing to positive emotions), and two or more changes to arousal and reactivity (irritability or anger, reckless or self-destructive behavior, hypervigilance, exaggerated startle response, problems with concentration, sleep disturbance) (Association, 2013)	Approximately one third of seriously injured patients go on to meet criteria for PTSD (Bell et al., 2018; Giummarra et al., 2018; Herrera-Escobar et al., 2018; Shih et al., 2010), with rates as high as 60% after intentional injury (Herrera-Escobar et al., 2018)
Acute Stress Disorder (ASD)	Diagnosis of *Acute Stress Disorder* refers to reaction to a qualifying traumatic event^ that has lasted **between three days and one month**	24% at one week post-injury and 12 to 41% between one and two

	and includes at least nine of the symptoms of PTSD from any category (APA, 2013) **While PTSD cannot be diagnosed until at least a month, Acute Stress Disorder measures symptoms shortly after a trauma and can be used to assess trauma related symptoms more acutely**	weeks post-injury across five studies (Ophuis et al., 2018)
Depressive Symptoms	Depressed mood and related symptoms, such as anhedonia (loss of interest in previously enjoyed activities), weight or appetite changes, sleep changes, psychomotor agitation or retardation, fatigue, worthlessness or guilt, changes to attention, thoughts of death or suicidality Diagnosis of *Major Depressive Disorder* requires at least five symptoms lasting at least two weeks. (APA, 2013)	30 to 50% at any time point throughout the first year (Bell et al., 2018; Shih et al., 2010; Wiseman et al., 2015). Potentially higher among specific groups, such as survivors of traumatic brain injury, with a rate as high as 76% (Stéfan et al., 2016)
Adjustment Disorder	*Adjustment Disorder* refers to emotional or behavioral reactions to a stressor, not necessarily a qualifying traumatic event, **within three months** of the stressor occurring, with distress at a level above what would normally be expected and/or causing impairment at work, school, or in relationships. Not applicable to grief reactions (APA, 2013)	Very challenging to estimate prevalence due to overlap with other disorders and recent changes to diagnostic criteria (Casey, 2018; O'Donnell et al., 2016, 2019) but likely between 15 and 20% (Casey, 2018; O'Donnell et al., 2016, 2019)
Anxiety Symptoms	Anxiety symptoms occur within several disorders (e.g., *Generalized Anxiety Disorder, Specific Phobia, Panic Disorder)*. Generally, symptoms of anxiety include excessive fear and anxiety and related symptoms, such as excessive worry, restlessness, fatigue, difficulty concentrating, irritability, muscle tension, sleep disturbance, marked fear about an object or situation, or symptoms of panic disorder, which can include heart palpitations or pounding, sweating, trembling or shaking, shortness of breath, choking, chest pain, nausea, dizziness,	Potentially as high as 60% (Wiseman et al., 2015)

	chills or heat, numbness or tingling, derealization or depersonalization, fear of going crazy or losing control, fear of dying (APA, 2013)	
Post-ICU Syndrome (PICS)	Proposed construct accounting for new or worsening physical (anorexia, decreased dexterity, low exercise tolerance, weakness), cognitive (attention deficits, memory loss, executive function impairment), or mental health symptoms (anhedonia, anxiety, depression, PTSD) **following critical illness and persisting beyond hospitalization** (Lane-Fall et al., 2019)	Not yet a formal diagnosis, making prevalence challenging to estimate. At least 20% demonstrate deficits in multiple domains, and greater than 60% demonstrate symptoms in at least one domain (Kawakami et al., 2021; Lane-Fall et al., 2019)
Suicidality	Ideation, intent, plans, and suicide attempts that are often, but not always, connected to Major Depressive Disorder Suicide risk can be stratified with elevated risk predicted by previous ideation or attempt, set plan, access to means, access to firearms, preparatory behaviors, current and past psychiatric disorder, anhedonia, impulsivity, hopelessness, anxiety or panic, insomnia, command hallucinations, psychosis, family psychiatric or suicidal history, precipitating stressors (e.g., events leading to despair or shame, chronic pain, sexual or physical abuse, substance use, legal problems, lack of housing or social support, and perceived burdensomeness), or recent changes to treatment plan or setting (Posner et al., 2009)	Approximately 1-2% of patients are admitted as a result of a suicide attempt (Temko et al., 2020) with around 70-80% of these ultimately surviving their injuries (Mathews et al., 2016; Temko et al., 2020) Post-injury rates of suicidal ideation and attempt are multiple times the rate of the general population (CDC, 2022; Ryb et al., 2006) especially among survivors of traumatic brain injury (Stéfan et al., 2016) and spinal cord injury (CDC, 2022; North, 1999)
Agitation, Aggression, Irritability	Irritability, violent behavior, and verbal aggression, which may appear as components of other mental health sequelae and disorders (e.g., severe anxiety or acute/posttraumatic stress, psychosis, dementia, delirium, intermittent explosive disorder, traumatic brain injury,	High rates of agitation (meta-analytic mean of 46%, range 11 to 70%), aggression (25 to 39%), and irritability (29 to 71%) among survivors of

	borderline personality disorder, anxiety)	Traumatic Brain Injury (TBI; Stéfan et al., 2016) A recent meta-analysis demonstrated that an average of 67.3% of North American healthcare workers have experienced workplace violence (Liu et al., 2019). Internationally, rates of violence were particularly high for workers in Emergency Departments (79.4%) and for those working mixed shifts (72.8%) (Liu et al., 2019), both of which are components of trauma care
Delirium	*Delirium* refers to disturbance in attention and reduced awareness of the environment that develops quickly (a few hours to days), is a change from baseline functioning, and tends to fluctuate over time, plus an additional disturbance in cognition, such as memory deficit, disorientation, language, visuospatial ability, or perception. The disturbance is not the result of another neurocognitive disorder and is likely to be a physiological response to medical condition, substance intoxication or withdrawal, exposure to a toxin, or multiple of these factors. Can be hyperactive, hyperactive, or mixed (APA, 2013) Delirium is often disturbing for others to witness, especially family and staff, and may both mimic and/or mask other mental health sequelae, such as substance use, psychosis, mood disorder, acute anxiety, and neurocognitive disorder	As high as 60% while in the ICU (Angles et al., 2008). 24% of patients in intensive and intermediate care units may screen positive for delirium, including many who have never been in the ICU or mechanically ventilated (Rueden et al., 2017)
Substance Use	*Substance Use Disorder* (specified by substance of use) involves use of a substance that is	Rates of pre-injury substance use are high

	impairing to various aspects of a person's life. Symptoms may include greater use than intended, persistent but unsuccessful attempts to reduce use, significant time spent obtaining, using, and recovering from the substance, craving, impairment to other obligations as a result of use, continued use despite negative life consequences, giving up desire activities as a result of substance use, recurrent hazardous use, continued use despite negative health effects, tolerance, or withdrawal (APA, 2013)	for alcohol (54.2%), cannabis (50.2%), stimulants (25.7%), and opioids (9.8%) (Nguyen et al., 2022) Inpatient treatment can also exacerbate existing substance abuse challenges, especially for patients with a history of opioid abuse who then receive opioid pain management while hospitalized, are going through withdrawal from substances, or are experiencing significant anxiety (Bell et al., 2018; Brown et al., 2022)
Acute and Chronic Pain-Related Distress	Unpleasant and painful sensations. Acute pain has a discoverable cause, such as an injury, and lasts less than six months. Chronic pain continues beyond six months or without a clear cause and may be influenced by psychological and neurological changes (McAllister, n.d.) * Often closely tied to pain-related anxiety and avoidance	57% of patients report persistent or worsening pain up to two years following injury (Giummarra et al., 2019; McAllister, n.d.), and the vast majority of patients experience acute pain while hospitalized (Rosenbloom et al., 2013) Pain catastrophizing, pain-related anxiety, and low pain self-efficacy are strongly related with acute and chronic pain and are highly prevalent (Szeverenyi et al., 2018; Wang et al., 2018, 2022).
Grief	Distress related to the death or injury of a person, usually with a close relationship Sometimes death, especially when sudden or	Impairing and prolonged grief is found in approximately half of cases of unnatural death

	traumatic in nature, can prompt a psychological response akin to Acute Stress Disorder/PTSD, with the death as the precipitating event. This cluster of experiences has come to be known as Traumatic Grief *Persistent Complex Bereavement* may be diagnosed when symptoms of grief continue beyond twelve months past the death and remain significantly impairing (e.g., identity disruption, disbelief about the death, avoidance of reminders of the death, intense emotional pain, difficulty reintegrating into life, emotional numbness, feeling that life is meaningless, intense loneliness) (APA, 2013)	(Djelantik et al., 2020)

Note 1. ^ indicates disorders requiring a qualifying traumatic event, which is defined in the Fifth Edition Text Revision of the Diagnostic and Statistical Manual of Mental Disorders (2022) as "exposure to actual or threatened death, serious injury, or sexual violence in one (or more) of the following ways: 1. Directly experiencing the traumatic event(s); 2. Witnessing, in person, the event(s) as it occurred to others; 3. Learning that the traumatic event(s) occurred to a close family member or close friend. In cases of actual or threatened death of a family member or friend, the event(s) must have been violent or accidental; or 4. Experiencing repeated or extreme exposure to aversive details of the traumatic event(s) (e.g., first responders collecting human remains; police officers repeatedly exposed to details of child abuse)."
Note 2. Italicized items refer to diagnoses found in the Fifth Edition Text Revision of the Diagnostic and Statistical Manual of Mental Disorders (2022). Other items are collections of symptoms or other concerns.

Mental Health Services at a Level I Trauma Center

In recent years, medical oversight and guidance groups have begun to formalize procedures recognizing the significant role of mental health among trauma survivors, both in the acute environment, and beyond. The updated 2022 *Resources for the Optimal Care of the Injured Patient,* which will go into effect in 2023, requires "a protocol to screen patients at high risk for psychological sequelae with subsequent referral to a mental health provider" (American College of Surgeons Committee on Trauma, 2022, p.107), in addition to mandatory screening and intervention for alcohol misuse. Required Process Improvement and Patient Safety (PIPS)

meetings must also include review of the efficacy of screening procedures for psychological sequelae among patients (ACS, 2022). As these recommendations become more thorough and commonplace, researchers and policymakers have begun to mobilize resources, services, and providers at trauma centers around the world.

Where resources are available, some trauma centers have implemented formal screening measures to accurately identify mental health sequelae and appropriately refer patients (deRoon-Cassini et al., 2019). Typically, screening measures include PTSD and depression, as these conditions represent some of the most common and detrimental mental health sequelae in the traumatic injury population. Several screening measures are commonly used and have demonstrated utility in clinical samples (deRoon-Cassini et al., 2019; Jensen et al., 2022). As one example, the Injured Trauma Survivor Screen is a nine-item screener used to identify those at risk of developing PTSD and depression in the month following injury, correctly identifying 83.3% percent of PTSD cases and 93.8% of depression cases (ITSS; Hunt et al., 2017). However, administering screens to every patient and providing appropriate follow up can require significant personnel resources, which has been the main barrier to universal implementation of this approach across trauma centers (deRoon-Cassini et al., 2019). For example, trauma centers regularly treat multiple thousands of patients annually, and trials of the ITSS have highlighted pervasive risk for both depression and PTSD, with multiple trials estimating that just under half of patients who complete the ITSS screen positive for depression and/or PTSD (Hunt et al., 2017; Hunt et al., 2018; Hunt et al., 2021).

Given the resource burden necessary to implement in person screening, researchers have also begun to develop automated screening tools. One major effort by Russo and colleagues uses data from the electronic medical system to identify patient risk level through analysis of gender,

race, insurance type, tobacco use, positive blood alcohol content upon admission, intentional self-injury, admission to the ICU, previous hospitalization, and premorbid substance use disorder, PTSD, or other psychiatric disorders (Russo et al., 2013). The primary downside of such an approach is that it relies on the electronic medical record having complete data for every patient, which is rarely the case, since different healthcare providers in the United States do not necessarily share access to patient health records, so the risk of false negative is high (deRoon-Cassini et al., 2019). Research continues in this area, including into the utility of sending screening questions to patients' mobile phones (Price et al., 2014).

As of December 2022, universal screening of injured trauma patients is an ACS requirement: "all trauma centers must meet the mental health needs of patients by having a protocol to screen patients at high risk for psychological sequelae with subsequent referral to a mental health provider" (ACS, 2022, p. 109). However, few trauma centers have the resources to implement such a comprehensive screening process as that recommended by experts (deRoon-Cassini & Timmer-Murillo, 2022). For example, in the current climate of mandatory alcohol screening but only recommended PTSD screening, a recent survey of more than half of the Level I and II trauma centers in the United States indicated that more than 95% routinely screen and intervene for alcohol use, but only 28% of those centers routinely screen for PTSD (Bulger et al., 2022), well below the recommended target of 100% screening. With regard to formal assessment protocols, a survey of US Level I trauma centers revealed that only 25% had assessment protocols for PTSD, with a slightly higher rate of 36.17% among pediatric trauma centers (Guess et al., 2019).

At all trauma centers, and especially those without a universal screening procedure, medical providers and other team members play a key role in identifying risk factors and

sequelae of concern among trauma patients. Once identified, these providers are also responsible for consulting additional resources, as they deem appropriate, and as such resources are available (deRoon-Cassini et al., 2019). In most cases, this involves a combination of consultation and referral to inpatient providers who can provide services in the inpatient setting. Inpatient providers may also oversee effective referral pathways for further care in the outpatient environment (deRoon-Cassini et al., 2019; Warren et al., 2014), which may or may not be provided by the same individuals working in the inpatient environment. Crucially, even trauma centers that have implemented universal screening measures still heavily rely on provider referrals, since screening measures are often limited in scope. For example, a screening measure for PTSD may effectively target that sample but miss other important mental health sequelae, such as a patient suffering acute anxiety around wound care or experiencing agitation in the setting of delirium. Nevertheless, many trauma centers are moving to a predominantly screening-based process.

Embedding Health and Trauma Psychologists in a Level I Trauma Center

Beyond screening, research continues to build supporting an active approach to managing mental health sequelae in the inpatient environment. As a result, researchers are working to develop best practices and ways to standardize and organize care with the ultimate goal of identifying a gold standard approach to the management of post-injury mental health sequelae, which can be used to target available resources and advocate for additional support and staffing. In order for trauma centers to move toward gold standard procedures of screening and referral to appropriate providers, it is necessary first that such providers be available to patients. The providers available for such consultation, treatment, and referral may in some cases be social workers, psychiatric nurses, or specialized advanced practice providers, but mental health-

specific providers include psychiatrists and clinical and rehabilitation psychologists (Warren et al., 2014), as well as other mental health professionals, such as counselors and social workers. Although psychiatry and psychology have significant overlap, each has a specific role. For one, psychiatrists working with trauma patients are typically consultative providers and are commonly consulted to address acute suicidality, delirium, and psychosis and provide medication recommendations, especially for withdrawal or acute conditions.

More recently, in addition to consulting psychiatrists, many trauma centers have begun embedding psychologists in trauma teams. For the purpose of this paper, a "trauma psychologist" will be defined as a psychologist that is embedded on a trauma surgery team. Most trauma psychologists have training both in clinical health psychology and in the assessment and treatment of PTSD and other trauma-related conditions. Clinical health psychology is an area of specialty emphasizing "the interrelationships among behavioral, emotional, cognitive, social, and biological components in health and disease to the promotion and maintenance of health," as well as "the prevention, treatment, and rehabilitation of illness and disability, and the improvement of the healthcare system" (American Board of Clinical Health Psychology, 2022). Further, psychologists have a unique role among other mental health providers, as in addition to direct clinical work with patients, psychologists are trained researchers and educators, allowing them to supervise doctoral and postdoctoral students, join in interprofessional education efforts, participate in clinical research and dissemination, and oversee program development and evaluation for broader efforts within the trauma center.

Following screening and/or provider referral, embedded trauma psychology providers are often best positioned to conduct timely, patient-centered assessments of need, given the complexity of patient concerns while in the acute care setting, which go far beyond the typical

span of conditions treated by trauma physicians and surgeons (Zatzick, Russo, et al., 2007). In addition to responding to referrals, embedded psychologists may attend medical rounds, participate in interdisciplinary care planning, and consult directly with staff members about patient functioning throughout a patient's stay. For instance, a trauma psychologist may receive a referral from a medical provider and go on to communicate regularly with the bedside nurse, engage in co-treatment sessions with physical therapy to address a patient's anxiety during painful activities, and discuss safety and behavioral concerns with staff and leadership. Once involved in a case, a trauma psychologist can conduct formal assessment, including a full mental status exam and relevant brief neurocognitive testing, assess psychiatric and psychosocial history, and thoroughly assess a patient's current functioning. Based on this professional assessment, trauma psychologists can then provide targeted intervention for numerous negative mental health sequelae, such as early PTSD symptoms, avoidance due to pain-related anxiety, behavioral disturbances, and other risky behaviors such as substance use or impulsive behavior. Finally, the inpatient trauma psychologist may refer patients to relevant outpatient mental health supports and/or to other inpatient supports.

Inpatient Referrals to Psychology

Within systems that rely either partially or fully on provider referral to identify patients in need of specialized mental health services, it is important that the existing patterns of referral be identified. However, to date, the details of provider referral patterns to mental health providers remain opaque, due to limited research in this area. Where empiric evidence is available, some trends have emerged. Referred patients tend to be disproportionately female, younger, and with less wealth (Chavez et al., 2021) and far more likely to be single, divorced, separated, or widowed (Posel & Moss, 1998). Violent injury is also overrepresented among patients referred

to consulting mental health providers, with Posel and Moss (1998) finding that 18.3% of referred patients were injured violently in comparison to 10.5% of all trauma patients. More specifically, Chavez and colleagues (2021) found major disparities among survivors of stabbing (15.8% referred vs. 4.8% all trauma inpatients) and firearm injury (9.5% vs 4.8%), with referred patients underrepresented among survivors of motor vehicle (23.2% vs 31.4%) and pedestrian/bike (0 vs 2.0%) collisions. Evidence is mixed, however, on the relationship between the severity of an injury and referral. One measure of injury severity, the Injury Severity Scale (Baker et al., 1974), presents a numeric count of injuries to various anatomical regions, with higher numbers indicating more severe and more widespread injury. Standardized Injury Severity Scale and referral have not been found to have a consistent relationship, with some studies showing lower injury severity among the referred group (Posel & Moss, 1998) and others showing higher injury severity among referred patients (Chavez et al., 2021). Chavez and colleagues (2021) further demonstrated that patients referred to mental health consulting providers in their sample were more likely to have been admitted to the intensive care unit (58.9% vs 41.2%) and more likely to have been ventilated (35.8% vs 11.7%). Where comparison is available, Chavez and colleagues (2021) demonstrated a rate of drug and alcohol use more than twice as high among referred patients (55.8 vs 25.8%). Further, some evidence suggests that the presence of clinical psychologists on trauma teams increases the likelihood of referral (Bertelson et al., 2011), as does close integration of a psychiatrist who attends medical rounds and specifically covers trauma patients (Findley et al., 2003**). In sum, referring providers are skilled at identifying many common risk factors, especially assaultive injury, substance use, and predictors of delirium, yet efforts to increase provider knowledge and collaboration with mental health providers have yielded additional and improved referrals, suggesting that additional**

understanding of risk factors and of the services that trauma psychologists can provide may further improve inpatient and follow-up management of mental health sequelae.

Evidence suggests that a combined inpatient-outpatient process can be efficient and effective. For example, when a physician provides a trauma patient with a referral, that patient is nearly eight times more likely to access mental health services (Wong et al., 2009). In order to maximize the impacts of available mental health support, referrals must reflect the field's best understanding of which risk factors are most likely to be associated with worse outcomes for patients, especially the development of PTSD and depression, given their demonstrated impacts on post-injury quality of life, service utilization, and disability. In Kim and colleagues (2022)'s machine learning assessment of predictors of posttraumatic stress symptoms six months following motor vehicle collision, more than half of the 30 strongest predictors were psychological, including expectations of recovery, perceived life threat, catastrophizing, and acute distress during hospitalization (Kim et al., 2022). Conversely, several factors predict resilience in the face of trauma exposure, including access to needed resources, positive social support, flexibility and optimism in post-trauma cognition, return to physical activity, and engaging in active posttraumatic growth to reaffirm meaning of life, which have all been associated with improved outcomes (Ozer et al., 2003; Sayed et al., 2015).

Inpatient Referrals to Additional Resources

In addition to psychologists, many Level I trauma centers have a variety of additional psychosocial and mental health supports available to trauma patients and their families to manage psychosocial distress related to traumatic injury. Currently, the ACS requires Level I trauma centers to have social work and psychiatry available to patients and encourages access to peer resources, such as the Trauma Survivors Network (ACS, 2022). The Trauma Survivors

Network and other ancillary services are presented in Table 3 and represent some of the many efforts to meet the ACS requirement for "an organized and effective approach to injury prevention" (ACS, 2022). Many ancillary programs and providers collaborate closely with trauma psychology in order to identify patients in need, cross-refer already identified patients, and provide the best available outpatient services. For example, some ancillary services may have access to their own outpatient counselors or case managers who target specific aspects of patient need following traumatic injury. The services included in Table 3 below represent those available at the trauma center investigated in this project.

Table 3

Examples of Ancillary Services Available to Trauma Patients

Service	**Description**	**Relevance/Need**
Trauma Survivors Network	Peer-led programs that emphasize injury prevention, reductions in retaliatory violence and traumatic reinjury, and general peer support aiming to reduce negative sequelae and encourage positive physical and psychosocial adjustment (Zwaiman et al., 2022). Similar programs include Trauma Recovery Services and Center for Trauma Survivorship, though Trauma Survivors Network is the most common, currently in 143 US trauma centers (Sinkler et al., 2022)	Need for positive social support, tangible support, and normalization to assist with adjustment (Sinkler et al., 2022; Zwaiman et al., 2022)
Violence Prevention	Brief violence interventions (BVI) and community case management target community violence, especially among young adults. Research into the effectiveness of violence prevention programs remains too limited for systematic or comparative assessment, but individual programs have	High rates of traumatic recidivism, a term for repeat violent traumatic injuries. A recent study of violently injured young adults (18 to 25) demonstrated a significantly higher out-of-hospital mortality rate (2.6% versus 0.5% for nonviolent injury) and high rates

	demonstrated successes, especially with reducing traumatic injury recidivism (Aboutanos et al., 2017; Walker et al., 2020) and mortality (Aboutanos et al., 2017)	of reinjury, including 24.9% being readmitted for a separate injury, 14.9% for two more injuries, and 8.0% for three or more injuries within five years of the first injury (Kao et al., 2019)
Domestic and Intimate Partner Violence Services	Education, crisis intervention, counseling, and provision of legal and tangible resources for survivors of intimate partner and domestic violence can reduce re-injury and mortality rates (Aboutanos et al., 2019)	A significant portion of people, especially women, admitted to trauma centers are experiencing domestic or intimate partner violence, regardless of whether that is the cause for their admission (Aboutanos et al., 2019)
Child Life	Child Life Specialists assist with developmentally appropriate patient needs, such as play, self-reflection, and positive coping (ACLP, 2016)	Although this project is focused on adult trauma patients, oftentimes older adolescents and teens are treated by the adult trauma service if they are over age 15
Child Life to Support Adults	More recently, some trauma centers have begun to identify a subset of Child Life Specialists who are primarily available to adult patients who care for young children at home. These children often need to be informed and educated about the injury that their loved one has experienced, and Child Life Specialists are uniquely skilled in preparing patients and families for the initial conversation and follow-up interactions with children (ACLP, 2016)	Many traumatically injured patients have important relationships with children in their lives
Music Therapy	Music therapy has been demonstrated to have positive impacts on PTSD in survivors of trauma living with PTSD (Landis-Shack et al., 2017) and to positively impact both psychological and physical measures of stress (Witte et al., 2019)	Music is often less stigmatized than psychological intervention and can be patient-specific; non-music therapists, such as nurses, can also often implement music interventions (Witte et al., 2019)

Art Therapy	Some evidence supports art therapy as a way to improve PTSD and post-injury depression (Schouten et al., 2015), though results remain preliminary	Can also be implemented in co-treatment or as an adjunct to other therapies (Schouten et al., 2015)
Spiritual Care	Significant literature supports spiritual care, also known as chaplain or pastoral care, as an important factor for patient and family spiritual well-being and involvement in shared decision making (Willemse et al., 2020)	Particularly helpful around issues of life and death decision-making and notification (Willemse et al., 2020)
Social Work	Provide basic mental health support, coordinate provision of inpatient and follow-up resources, and facilitate interdisciplinary coordination (Dhillon et al., 2022; Moore et al., 2016)	Social work involvement increases and improves interdisciplinary consultation and coordination (Dhillon et al., 2022)
Animal Therapy	Evidence has begun to support the benefits of human-animal interactions in the inpatient setting, based on a wealth of research supporting their benefits in general (Gee et al., 2021)	Positive human-dog interactions can benefit patient anxiety and stress and may also facilitate improved social connection with others (Gee et al., 2021)

Focus on Referring Providers

Medical providers are often on the front lines observing patient mental health concerns. For example, they may see a patient anxious prior to surgery or hear from a family member that a patient has a history of gunshot wound. Trauma providers are often some of the most skilled and highly trained in their respective professions but rarely have opportunities to cross-train, especially into mental health. For instance, a 2004 survey of 109 emergency medicine practitioners with mean experience of 15.7 years revealed that nearly 80% of them had received less than four hours of training in PTSD, and lack of training was associated with lower feelings of competency. Further, although over 90% of respondents rated themselves as at least

minimally competent to refer trauma patients to mental health providers, 55% reported that they refer no patients to mental health providers, and the mean referral rate was less than 1% (Lee & Saunders, 2004). In both this sample and a similar one presented by Alexander and Atcheson (1998), respondents reported strong interest in additional training. Respondents to Alexander and Atcheson's survey were also asked to reflect on certain "techniques" to manage trauma. Eleven percent reported that patients should be "encouraged to put the experience out of their mind", and 19% believed that educating patients about potential mental health symptoms makes their development more likely. Respondents were also uncertain about the effects of traumatic amnesia, social support, and past psychiatric history on the development of psychiatric symptoms, and only 2% of respondents correctly identified three of three symptoms of PTSD from a multiple-choice list of eight symptoms, with 33% identifying two correct symptoms, 56% identifying one, and 9% identifying no symptoms correctly (Alexander & Atcheson, 1998).

Despite their general lack of formal mental health training, trauma providers are also very sensitive to gaps in the services available at their hospitals. A 2020 survey by Ortiz and colleagues compiled survey results from 22 trauma surgeons at 22 different Level I trauma centers in the United States. These providers estimated numerous weekly admissions of patients with psychiatric comorbidity, and 24% estimated a reinjury rate due to psychiatric reasons among their patients of greater than 50%. Nearly half of respondents did not know how many psychiatry consultants were available at their institution, and more than half reported that there was no designated outpatient follow-up for trauma patients with identified psychiatric needs. Further, 73% percent of respondents reported that expanded psychiatric services were needed, with the highest need for outpatient follow-up and inpatient consultant availability (Ortiz et al., 2020). Similarly, a qualitative study in the United Kingdom of trauma providers' beliefs about

care provision revealed significant themes of the lack of access to adequate psychological support, despite strong provider belief in its necessity (Beckett et al., 2014). When asked, emergency physicians report that additional mental health providers would be particularly helpful to free up time for medical and surgical issues and to assist with patients who seem overwhelmed by their trauma and treatment (Findley et al., 2003). Additionally, although evidence is limited among trauma and acute care providers, research on the integration of behavioral health into primary care has demonstrated significant improvements to provider attitudes and knowledge of behavioral health following integration of mental health providers (Zallman et al., 2017). As a result, it is important to gain an understanding of current referral trends in order to develop relevant and efficient training to fill any identified gaps in referrals.

Improving the Referral Process through Training

Just like referrals between medical specialties, the most effective referrals are timely, often as early as practical, and include critical pieces of information about known risk factors that will enable the receiving provider to prepare for an efficient assessment. With the advent of the electronic medical record, referring providers can often quickly obtain a vast amount of information about an incoming patient. Such factors relevant to trauma psychology could include demographic features, the nature of ongoing medical treatment, names of involved family members, and what is known about the nature of the injury. However, crucially, what is not necessarily included in the electronic medical record is the information gathered by a referring provider that indicates a referral is necessary. This could include a patient's psychological or medical history, symptoms that they have shared with their provider, or other details that elevated the provider's concern about the patient. Specifically, providers should note specific risk factors relevant to a patient's presentation, such as history of substance use, previous or

current violent injury, or premorbid mental health concerns. Especially in a teaching hospital, feedback and review are normative. As a result, referring providers and trauma psychology are encouraged to engage in an iterative, collaborative process to identify and clarify successes and opportunities for improvement in the referral process and its outcome.

In order to improve the nature and frequency of mental health and psychosocial referrals, trauma mental health-specific training may offer the most efficient solution. Previous innovative efforts to train trauma providers in trauma-related mental healthcare have been effective, such as a program that paired surgery residents with psychiatry residents for two two-hour sessions. This program demonstrated improvements among surgery residents in perceived knowledge of the neurobiology of trauma, understanding of the connection between fear, trauma, and aggression, knowledge of trauma-informed approaches, and confidence delivering trauma-informed care (Buxton et al., 2022). Teams with an integrated behavioral health provider have also ultimately increased the variety of conditions identified as appropriate for mental health intervention compared to periods without an embedded provider (Findley et al., 2003).

Other interdisciplinary members of the trauma team can also benefit from increased training and exposure to mental health interventions. In addition to medical providers, many other members of the medical team have daily interactions with patients and are privy to key information about patient functioning. Specialized members of the treatment team may see a unique aspect of patient behavior, such as physical therapists viewing a patient's pain-related anxiety and self-limiting behaviors or dietitians observing the role of depression in a patient's lack of appetite. Coordination between trauma psychologists, medical providers, and interdisciplinary team members can allow for trauma psychologist-led mental health interventions in these challenging circumstances with the aim not only of reducing patient

suffering but of improving the effectiveness of specialty services. For example, a pilot cohort of trauma nurses trained in the delivery of brief, behavioral activation-based interventions targeting PTSD, which have previously been demonstrated to be effective when delivered in the inpatient trauma environment (Wagner et al., 2007), to counteract avoidance and withdrawal behavior among their patients, demonstrated generally good adherence and delivery (Darnell et al., 2018). The training implemented in this case was also brief and feasible to the team (Darnell et al., 2018).

Team-based training is also common in acute care settings, and single-session group simulation-based training has been demonstrated to improve knowledge and teamwork (George & Quatrara, 2018). A single-session training project aimed at improving provider-led brief alcohol interventions demonstrated significant change, as measured by standardized role plays, though this project also included weekly coaching sessions after the initial training (Darnell et al., 2019). Further, improved and more frequent communication between trauma team members is associated with decreased length of stay for patients (Chen et al., 2018), suggesting that maximizing communication and effective referrals could have tangible positive effects for patients and trauma centers.

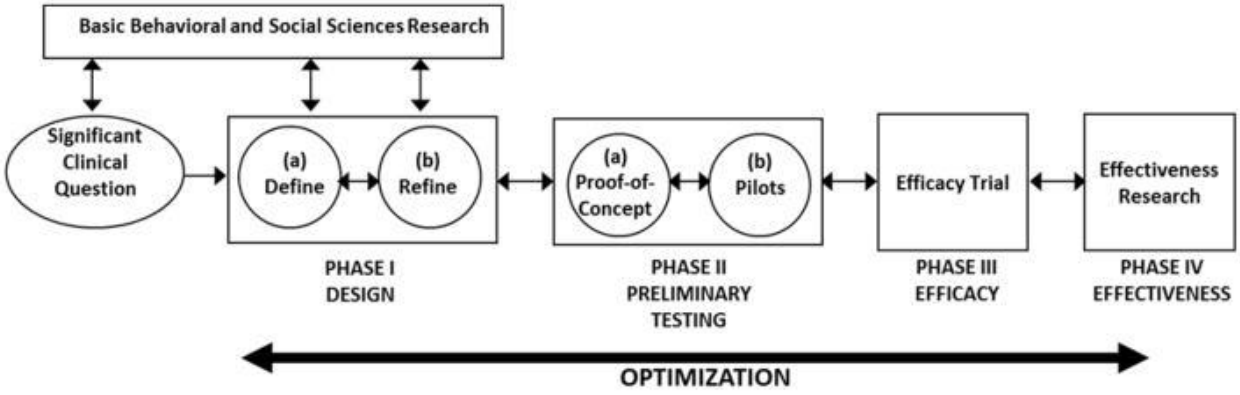
Development and Proof-of-Concept of a New Training for Referring Providers

The current study aims to develop and test a feasible, replicable, strengths-based training for referring medical providers and allied health team members at a large, level I trauma center. Development of this training will be based on the ORBIT model (Figure 1) with the goal of fulfilling phases Ia (Design), Ib (Refine), and IIa (Proof-of-Concept) (ORBIT Consortium, 2015) and in the hope of building evidence for future efforts to optimize, replicate, and assess similar trainings at a larger scale. Additionally, there will be an effort to capture a preliminary measure

of training efficacy, though this effort is beyond the scope of the initial ORBIT phases. The creation of this training will be guided in part by literature review on risk factors and sequelae, evidence-based interventions, and best practice principles of training identified in systematic reviews on acute care trainings (Buljac-Samardzic et al., 2020). However, the primary guiding force in the development of this training will be active and iterative engagement of key stakeholders in the form of an expert advisory committee comprised of interdisciplinary members of the trauma team with insight into existing referral patterns and practices and ideas for improvements.

Figure 1

The ORBIT Model for Behavioral Treatment Development



Although the current project is unable to directly tie participation in the training to specific patient outcomes or to report on actual provider referral behavior, these areas represent specific targets for future study that will be based on this proof-of-concept project. As the current effort is the first of its kind in this setting and potentially the first of its kind to be reported on in the published literature, feasibility and acceptability will also be briefly assessed in order to inform future efforts.

Statement of the Problem

Many injured patients are seen by medical providers, with the most seriously injured treated in Level I Trauma Centers, facilities which specialize in the expert care of the most seriously injured patients (American College of Surgeons, 2022). In addition to physical injuries, negative mental health sequelae are also common following traumatic injury, affecting approximately 30% of patients who are admitted to hospitals for their injuries and can include posttraumatic stress disorder (PTSD), depression, suicidality, and anxiety (Giummarra et al., 2018). Mental health sequelae following traumatic injury are associated with a myriad of negative outcomes, including physical, social, and work impairment beyond the impacts of the injury alone (Michaels et al., 2000; Zatzick et al., 2008). Given high prevalence rates of mental health sequelae, the inpatient environment has been identified as an opportunity to identify mental health risk factors and to provide intervention around the significant distress and disability that comes from PTSD and other mental health sequelae following serious injury (Zatzick et al., 2001).

The American College of Surgeons Committee on Trauma has recently required that all Level I Trauma Centers "screen patients at high risk for psychological sequelae with subsequent referral to a mental health provider," with these requirements going into effect in September 2023 (ACS, 2022, p.107). Although trauma centers have various psychosocial staff members, such as social workers and psychiatrists, many trauma centers have moved towards hiring clinical psychologists with training in health psychology and trauma to implement screening and intervention. Clinical health psychologists are well trained to intervene in the inpatient environment with issues such as pain, adjustment, behavioral concerns, delirium, and early traumatic stress reactions, and to refer patients to appropriate outpatient care (McBain, 2019).

While universal screening of all trauma patients is the gold standard for identifying mental health sequelae (deRoon-Cassini et al., 2019), inpatient medical providers on the front lines during a patient's hospital admission often have unique perspectives on patients' behaviors and adjustment difficulties as they adjust to injuries, and they are a critical resource in identifying and referring patients to available mental health providers (Guess et al., 2019).

In an environment of limited resources, effective targeting of available resources is a critical priority for patient care and system effectiveness. The limited studies currently available about provider referral behavior suggest that providers can identify many common risk factors (Chavez et al., 2021), and referral patterns mirror trends in the development of PTSD following traumatic injury (Sayed et al., 2015), suggesting that referring providers are often able to accurately identify at-risk patients. The presence of a referral has also been demonstrated to increase the likelihood that a traumatically injured patient will follow up with outpatient mental health services (Wong et al., 2009), despite generally low rates of mental health service access and use among traumatically injured patients (Trusz et al., 2011; Wong et al., 2009).

However, the positive, though limited, evidence about effective provider referrals is remarkable, given the sparse formal training that medical providers receive in mental healthcare (Lee & Saunders, 2004), despite high interest (Alexander & Atcheson, 1998; Lee & Saunders, 2004). Surveys of providers consistently reflect limited actual and perceived knowledge about trauma-related mental health (Alexander & Atcheson, 1998; Lee & Saunders, 2004) and high rates of provider interest in additional resources (Beckett et al., 2014; Findley et al., 2003; Ortiz et al., 2020; Zazzali et al., 2007). Various models of brief trainings for providers have been effective, including pairing trauma residents with psychiatry residents (Buxton et al., 2022), embedding a psychiatrist to educate medical teams about a broader range of mental health

diagnoses (Findley et al., 2003), training bedside nurses to deliver brief, evidence-based behavioral activation interventions (Darnell et al., 2018), and coaching providers to engage in more collaborative decision making with patients (Etingen et al., 2020).

The present study aims to develop and test a brief, targeted training for interdisciplinary trauma providers to assess pre-training provider mental health knowledge, increase provider mental health knowledge and self-reported confidence, and ultimately improve referral processes following the framework of the ORBIT Model for Behavioral Treatment Development (ORBIT Consortium, 2015) through phases 1a (Define), 1b (Refine), and 2a (Proof-of-Concept). The development of the training will be guided by an expert advisory committee comprised of key interdisciplinary members of the trauma care team, and measures of acceptability and feasibility for the proof-of-concept training will be considered. Analysis of the most recent year of data on patients seen by the trauma psychology service will also be provided as context for referral patterns prior to this training, with careful attention paid to future directions for research and acquisition of funding necessary to support such initiatives.

Objectives

1. Analyze the relationship between known risk factors and their relationship with referral status to determine whether existing referrals match known risk factors
    a. Present descriptive analysis of patient demographics (e.g., age, race, gender, and marital status), tobacco use, alcohol use, substance use, length of stay, primary medical diagnosis/es, comorbid medical diagnosis/es, mechanism of injury, injury severity, discharge destination, services consulted, time elapsed to referral, count of visits from trauma psychology, and diagnoses given by trauma psychology
    b. Compare relevant factors and referral status among a sample of one year of all trauma patients and the subset referred to trauma psychology in that year
2. Convene expert advisory committee to: 1) determine gaps in existing trauma team member mental health knowledge, 2) identify preferences for delivery of education to trauma team, and 3) guide development of a training to meet gaps and delivery goals
    a. Recruit one to two advanced practice provider(s), one nurse clinician, one bedside nurse, and one to two allied health team member(s) to comprise 4-6 person committee
    b. Host two one-hour meetings to guide development of training, one prior to draft development, and one following draft development for committee approval
3. Develop and deliver mental health training resource(s) for trauma team members based on model developed and approved by expert advisory committee
    a. If including other psychosocial support resources available to trauma patients (Trauma Survivors Network, Violence Prevention, Domestic and Intimate Partner Violence Services, Child Life, Child Life to Support Adults, Music Therapy, Art

Therapy, Spiritual Care, Social Work, and Animal Therapy), meet with these services in order to obtain a shared understanding of services offered and patient characteristics that would best match with each service

b. Engage in targeted literature review to flesh out training resource(s) based on stakeholder guidance

4. Conduct and analyze proof-of-concept delivering training resource(s) in format approved by stakeholder committee to trauma team members
    a. Coordinate with trauma team leadership to deliver training during already established team meeting times to ensure maximum sample size and avoid selection bias
    b. Assess interdisciplinary team member demonstrated competence and self-reported confidence with identifying common mental health sequelae, their risk factors, and appropriate intervention using pre- and post-training assessments
        i. Collect information from referring providers about their training, experience, and beliefs related to trauma-related mental health, generally, and the trauma psychology service, specifically
        ii. Assess demonstrated team member competence and insight into trauma-related mental health via a case vignette and follow-up assessment
        iii. Assess relationships between team member characteristics and self-reported confidence with demonstrated competence
        iv. Quantify changes in provider demonstrated competence and self-reported confidence through repeat case vignette and follow-up assessment

5. Determine the feasibility and acceptability of this proof-of-concept training intervention using qualitative and quantitative means
    a. Quantify participation in training and completion of associated measures, including level of data completion and interpretability
    b. Capture logistical and technological challenges with identified training format and procedures
    c. Analyze brief qualitative feedback from participants using narrative coding following completion of all training delivery (not iterative within this project)
    d. Summarize numeric feedback about novelty, quality, and overall experience

Methods

Setting

Level I Trauma Center

Virginia Commonwealth University (VCU) Health operates a Level I trauma center in Richmond, Virginia and is the primary destination in the region for critically injured patients. VCU Health was also the first designated trauma center in the Commonwealth, maintaining its certification since 1981 (Kuttenkuler, 2001). Currently, VCU Health sees around 4,000 trauma patients annually and has eleven physicians who are dually board-certified in Trauma and Critical Care (VCU, 2022).

Trauma Psychology

At the time of this project, VCU Health had one full-time faculty-level psychologist (since expanded to two full-time faculty-level psychologists), who also oversaw clinical services provided by doctoral students, predoctoral interns, and postdoctoral fellows, when available. The faculty psychologist was responsible for clinical service, research efforts, training and supervision, and integration with other parts of the trauma team. Previous studies of the trauma psychology service in 2019 have reported an annual total of 376 patients treated with an average of 2.9 visits per patient (Broering, 2019). Of these patients, 49.2% self-reported psychiatric history, 31.6% self-reported substance use history, 16% were also seen by psychiatry, 12% were also seen by substance abuse psychiatry, and 6.1% required suicide precautions (Broering, 2019). In a separate sample of 245 patients, consultation timing and consultation timing as a proportion of length of stay were both predictors of length of stay, such that earlier consultation to the trauma psychology service at VCU Health was associated with shorter length of stay, accounting for as much as 22% of the variance in length of stay (*unpublished*, Jackson et al., 2019).

Sources of Data

Data was collected in four main types: 1) targeted literature review; 2) secondary review of clinical data; 3) interviews with an expert advisory committee; and 4) primary collection of data from interdisciplinary team members.

Data Type One: Targeted Literature Review

Significant literature was reviewed during the design of this project. This literature review revealed evidence-based summaries of risk factors for negative mental health sequelae, characteristics of mental health sequelae, and available resources to manage these sequelae in traumatically injured patients across the published literature. The results of this literature review were used to inform both Objective 1, as an organizing tool to analyze the baseline characteristics of the trauma psychology service, and Objective 2, as a framework for the expert advisory committee to develop their recommendations for a training intervention for the trauma team.

Data Type Two: Secondary Review of Clinical Data

Participants

Sampling Procedure. One year of patient data was collected and aggregated, encompassing all patients admitted to the trauma service from December 15th, 2021 to December 15th, 2022 and further identifying the subset of patients seen by the trauma psychology service during this time. These dates were selected as the health system upgraded to a new electronic medical record system on December 1st, 2021, which significantly streamlined and systematized data collection and validation.

Eligibility. The overall sample of trauma inpatients was comprised of all patients over 18 who were admitted to the hospital by the Adult Trauma Surgery service, regardless of whether

the admission ultimately included a surgical intervention. Although the Adult Trauma service also treats patients ages 15 to 18, these cases were excluded to abundantly protect their privacy. The subset of patients referred to Psychology was identified by the presence of a referral to these services and/or by a consult note written by the service in the absence of a formal consult, which was taken to indicate the presence of a verbal referral. If a consult was requested but the consult visit was not completed by the time the patient discharged, this patient was not counted as having been seen by trauma psychology. Patients who declined to participate in a consult visit were included. By cross-validating using both consult notes and system referrals, it was hoped that a reliable and complete sample of patients referred and/or seen by trauma psychology would be captured.

Materials

National Trauma Registry. Significant data was already housed in the trauma registry, which is a collection of standardized data points for each trauma patient treated at the institution. The registry is managed independently by each institution and then submitted to the American College of Surgeons where it is compiled into the National Trauma Registry. The data captured in the registry include patient age, race, gender, patient substance use, length of stay, primary medical diagnoses, comorbid medical diagnoses, mechanism of injury, injury severity, discharge destination, and whether the patient was referred to trauma psychology or the psychiatry and/or substance abuse consult and liaison services. Please see Table 4 for more detail about data types.

Table 4

Sources and Types of Data

Patient Data	**Data Source**	**Data Range/Type**
Age	Registry	*Numeric* to whole year

Race	Registry	*Categorical:* White, Black or African American, Asian, American Indian, Native Hawaiian or Other Pacific Islander, Other, Unknown/Not Documented
Gender	Registry	*Categorical:* Male, Female
Marital status	Chart review	*Categorical:* Single, partnered/living together, Married, Separated/Divorced, Widowed
Tobacco Use	Registry	*Yes/no* for smoking cigarettes in last year
Alcohol Abuse	Registry	*Yes/no* for diagnosis of alcohol abuse in chart
Substance Abuse	Registry	*Yes/no* for diagnosis of substance abuse in chart
Length of stay	Registry	*Numeric* to whole day
Primary medical diagnosis/es	Registry	*Categorical* ICD-10 Diagnoses
Comorbid medical diagnosis/es	Registry	*Yes/no*: bleeding disorder, disseminated cancer, current chemotherapy, CHF, cirrhosis, anticoagulant therapy, cardiac history, COPD, CVA with neurological deficits, dementia, diabetes, hypertension, MI in last six months, PAD/PVD, pregnant, and renal failure
Mechanism of injury	Registry	*Categorical:* Water, suspected abuse, stab, sports, smoke inhalation, pinned, pedestrian struck, hit by object, motor vehicle accident, moped accident, motorcycle accident, machine, high fall (20 feet or more), fall (1 to 20 feet), ground level fall, hanging, gunshot wound, explosion, drown, cut, burn, bicycle accident, all-terrain vehicle accident, assault, animal, and other
Mechanism of injury: Burn	Registry	*Categorical:* Chemical, Electrical, Flame, Scald
Injury severity	Registry	*Numeric* score on Injury Severity Scale, a standardized measure of injury severity with scores ranging from 1 to 75, with higher scores reflecting more serious or more widespread anatomical injuries (Baker at al., 1975)
Discharge destination	Registry	*Categorical:* Against Medical Advice, Skilled Nursing Facility, Inpatient Rehabilitation, Psychiatric Hospital or Psychiatric Unit, Death, Long Term Acute Care Hospital, Jail, Intermediate Care Facility, Hospice Care, Transfer to Another Acute Care Hospital, Home with no home services, Home Health Services, Other facility not defined

		elsewhere, Transfer to Acute Burn Center, Homeless (burn only), Alternate Caregiver (burn only), Foster Care (burn only)
Consult services	Registry	*Yes/no* consults to trauma psychology, psychiatry, substance abuse
Time elapsed to referral	Chart review	*Numeric* calculated to whole day
Trauma psychology visit count	Chart review	*Numeric* count of discrete visits from trauma psychology service documented in electronic medical record
Diagnoses by trauma psychology	Chart review	*Categorical:* DSM-5 Diagnoses

Electronic Medical Record. Additional data was acquired through targeted chart review. Among the subset of patients referred to trauma psychology, chart review was conducted to identify the time elapsed between admission and referral, the number of documented discrete visits from trauma psychology, and the primary diagnoses given to the patient by trauma psychology.

Procedure

Missing Data. As the aim of the analysis of this data is mainly descriptive, missing data were not imputed, so as not to skew true findings.

Data Type Three: Interviews with Expert Advisory Committee

Participants

Sampling Procedure. Identified experts were contacted individually by email and invited to participate. When any identified participant was unable or unwilling to take part, alternative individuals were contacted, one at a time, with the goal of maintaining the designed interdisciplinary composition of the committee.

Eligibility. Committee members were key stakeholders with varied perspectives on mental health needs and available support for trauma inpatients. Each expert was identified based on their active engagement with the trauma service, familiarity with trauma psychology, and availability to attend two, one-hour meetings on a volunteer basis. The aim was to recruit one to two advanced practice provider(s), one nurse clinician, one bedside nurse, and one to two allied health team member(s) who would comprise a four-to-six-person committee. In consenting to participate, participants also consented to having the meetings be audio recorded and transcribed.

Procedure

Two, one-hour meetings were convened with all members of the expert advisory committee and the primary investigator. Each meeting was audio recorded and transcribed. The first meeting had three primary goals: 1) determine gaps in existing trauma team member mental health knowledge, 2) identify preferences for delivery of education to trauma team, and 3) guide development of a training to meet gaps and delivery goals. The Primary Investigator facilitated a conversation to elicit perspectives on the best method and material to provide to the trauma team to improve their competence and confidence identifying and referring patients to trauma psychology and other available resources.

Following the first meeting, the Primary Investigator sought out additional information and collaboration from other available services, both through literature review and engagement with ancillary services.

At the second meeting, the Primary Investigator presented a draft version of a training informed by the committee's recommendations and follow up preparation conducted by the Primary Investigator. The expert advisory committee was then asked to provide feedback on the training developed by the Primary Investigator and ultimately approved a final version.

Data Type Four: Primary Data Collection from Providers

Participants

Sampling Procedure. All interdisciplinary trauma team members (e.g., nurses and nurse leaders, advanced practice providers (nurse practitioners and physician assistants), resident physicians, attending physicians, allied health staff (occupational, physical, speech, respiratory, and recreational therapists), trauma social workers and care coordinators, spiritual care providers, and auxiliary providers (Trauma Survivors Network, Injury and Violence Prevention Program, Child Life, Helping Children of Adult Patients, music therapy, art therapy, spiritual care, Dogs on Call, etc.) were invited to attend a training session. One open session was advertised by email, posters, and word of mouth. The majority of training and assessment meetings were scheduled during blocks of time already reserved for educational programming for certain subgroups of trauma team members, such as the monthly didactic meeting for surgery residents.

Eligibility. Any employee or student who had provided at least one month of services to trauma surgery service patients and was either currently providing or had provided services within the last year was eligible to complete the research portion of this training, since referrals for services are often passed to referring providers by interdisciplinary team members.

Procedure

Participants who arrived for a training session were provided a unique link to a HIPAA-compliant survey platform, REDCap, which was accessible by mobile phones or computers. Participants were encouraged to use a personal device, if one was available to them, for additional privacy. They were first asked to give their informed consent, as approved by the Virginia Commonwealth University Institutional Review Board (ID: HM20025752), with special emphasis placed on the protocols in place to ensure privacy and to protect participants from any

retaliation or employment consequences based on their responses. After giving informed consent, participants then completed pre-training surveys on the same online platform.

After completing the provider information survey, participants viewed a case vignette and follow up questions. Two case vignettes were developed with identical scoring and intended to be similar in difficulty. Some training sessions received Vignette A first, and others received Vignette B first, with the aim of roughly half of participants completing each vignette first. Unfortunately, as this is a group intervention, randomization by individual was not possible, since participants may have spoiled each other's responses during conversation. The two case vignette options appear in Appendix 3. Providers were asked not to discuss the case out loud while completing the survey. Once these questions were complete, participants saw a prompt instructing them to stop and set down their device to indicate that they were finished.

Once all participants completed the initial survey, the primary portion of the training meeting involved training led by the Primary Investigator, following the model developed and approved by the expert advisory committee. Topics included common negative mental health sequelae, risk factors, and opportunities for intervention in the acute, inpatient environment, as well as how trauma psychology and other mental health support services can best be consulted, including details about appropriate referral timeline, patient selection, and key information to convey in a referral request.

Following this training presentation, participants were instructed to reopen their individual survey link to complete a final survey composed of the other patient vignette and the same follow up questions as prior to the training, allowing them to demonstrate any changes in their competence and self-reported confidence referring patients to services to assist with negative mental health sequelae of traumatic injury. This portion of surveys also included a brief,

five-item assessment of the acceptability and feasibility of this intervention, which is viewable in Appendix 4.

At the conclusion of the training meeting, attendees received summary resources, as proposed and approved by the expert advisory committee. Possible iterations could have included a handout, a laminated badge hanger/pocket guide, online resources, or workroom posters. These materials were developed to accord with best practices for training aides and trigger guides developed via meta-analysis of acute care training efforts (Buljac-Samardzic et al., 2020) and with the participation and approval of the expert advisory committee.

Materials

Team member information. Participants completed an 11-item questionnaire on various topics including their personal and professional background (demographic features, training, exposure to psychology in training) and experiences working with trauma psychology.

Provider competence and comfort. Two case vignettes developed in accordance with recommendations published in 2015 by authors involved in the ICD-11 Mental and Behavioural Disorders Field Studies Coordination Group and the World Health Organization (WHO) Department of Mental Health and Substance Abuse (Evans et al., 2015) were presented to participants, along with follow-up questionnaires. Vignette responses were scored on a ten-point scale with two points awarded for correctly identifying risk factors, five points for identifying each of five symptoms correctly, and three points for referring the patient to appropriate services. Two additional items were included in the follow-up questionnaire to assess details of participant confidence about their ability to "access/consult these services in a timely manner" and "meet the patient's needs." The vignettes are depicted in Appendix 2, and the follow-up questionnaire is visible in Appendix 3.

Feasibility and Acceptability. Three numeric questions and two open-ended qualitative questions assessed the feasibility and acceptability of this training intervention. These questions are in Appendix 4. Feasibility was determined grossly by the ability to conduct training sessions with attendance by relevant trauma team members, with more than half of attendees completing formal questionnaires.

Analyses

All project data was collected either from the Trauma Registry or through a HIPAA-compliant survey platform, stored on a HIPAA-compliant encrypted network, and analyzed using IBM SPSS Version 29. All analyses were assessed at the .05 level of significance. Prior to analysis, all data were cleaned and assessed for normality to meet the data assumptions of the analyses being applied. For the training objective, an a priori power analysis was conducted using G*Power for a matched pairs t-test, the primary analysis, and revealed a necessary sample size of 45 individuals for sufficient power at the 0.95 level for a large effect size. At the 0.80 level, only 27 individuals were required. A post-hoc power analysis was conducted to reflect actual power, given demonstrated effect size. Every effort was made to increase sample size to account for the unknown expected effect size of this proof-of-concept intervention.

Characterizing the Trauma Psychology Service and Existing Referral Practices

Descriptive analysis. Aggregate patient and service data were summarized numerically, including patient demographics (age, race, gender, and marital status), tobacco use, alcohol use, substance use, length of stay, primary medical diagnosis/es, comorbid medical diagnosis/es, mechanism of injury, injury severity, discharge destination, services consulted, time elapsed to referral, count of visits from trauma psychology, and primary diagnoses given by trauma psychology.

Comparative analysis. Comparisons between patients referred to trauma psychology and the overall trauma patient sample were calculated using Chi squared and t-test analyses for categorical and continuous variables, respectively, with particular attention to known risk factors.

Assessing Provider Competence and Confidence Pre– and Post-Training

Descriptive analysis. Aggregate results were collected on team member demographic factors, training level, previous exposure to trauma psychology, self-reported competence and confidence, and demonstrated competence on the pre-training case vignette.

Relational analysis. Multiple linear regression was used to assess the relationship between participant characteristics and self-reported competence and confidence with demonstrated competence. Specifically, previous mental health training and previous exposure to trauma psychology were entered stepwise into a multiple linear regression with demonstrated competence as the outcome. Similarly, self-reported competence and confidence were entered simultaneously into a model with demonstrated competence as the outcome.

Predictive analysis. The effectiveness of the training was evaluated both through analysis of self-reported confidence on the post-intervention survey and through analysis of demonstrated competence on the second case vignette. First, a repeated measures t-test was used to assess the impact of the training on demonstrated competence. Next, a second repeated measures t-test was conducted to assess changes in self-reported confidence from pre- to post-training. Finally, changes in self-reported confidence were assessed as a mediator of the change in demonstrated competence using linear regression.

Determining Feasibility and Acceptability

Quantitative analysis. Means and standard deviations were calculated for scores on participant responses to acceptability questions, such as novelty, quality, and overall experience.

Additionally, details on level of data completion and interpretability were observed and logistical and/or technical challenges with the identified training format and procedures were noted.

Qualitative analysis. Themes from brief qualitative feedback were summarized and presented.

Results

Objective One

Analyze the relationship between known risk factors and their relationship with referral status to determine whether existing referrals match known risk factors

a. Present descriptive analysis of patient demographics (e.g., age, race, gender, and marital status), tobacco use, alcohol use, substance use, length of stay, primary medical diagnosis/es, comorbid medical diagnosis/es, mechanism of injury, injury severity, discharge destination, services consulted, time elapsed to referral, count of visits from trauma psychology, and diagnoses given by trauma psychology

b. Compare relevant factors and referral status among a sample of one year of all trauma patients and the subset referred to trauma psychology in that year

In the calendar year of 2022, there were 3,546 trauma patients admitted to Virginia Commonwealth University Health and tracked in the National Trauma Registry. The information in the tables below reflects descriptive analysis of the 3546 patients. The average age of admitted trauma patients was 50.4 years old, with ages ranging from 18 to 101, and most patients were men (63.4%). Although the VCU Health trauma service treats adolescents aged 15 or older, these cases were omitted to protect their privacy. No patients were entered into the registry as non-binary, agender, two-spirit, or other gender-diverse categories. As captured via the National Trauma Registry, the majority of patients were either White (50.4%) or Black/African American

(37.0%), with smaller numbers of patients identified in the medical record as Asian (0.9%), Native American/Indian (0.2%), Hawaiian/Pacific Islander (0.1%), or multi-racial (0.0%). Additionally, 5.1% of patients were identified as Other Race, 4.4% of patients were of unknown race, and 1.9% had no racial identification recorded in the medical record. Substance use was coded based on charted medical diagnoses for Tobacco Use disorder (21.7%), Alcohol Use Disorder (5.8%), and all other substance use disorders combined (7.4%). Marital status was not able to be reliably extracted from reviewed charts and was thus excluded.

Beyond patient characteristics, the National Trauma Registry also captures aspects of a patient's injury, hospital stay, and discharge (Table 5). Scores on the Injury Severity Scale (Baker at al., 1974) ranged from 1 to 75, which is the complete range of the scale, with a mean score around 10. On average, admitted patients remained hospitalized for 7.4 days, though the range extended from 1 to 380 days. The majority of patients discharged to their homes (65.7%), but significant minorities discharged to Skilled Nursing Facilities (10.3%), or inpatient rehabilitation facilities (6.3%). Additionally, 5.2% of admitted trauma patients died in the Emergency Department, and an additional 5.0% died after being moved to the medical floors. The most common mechanism of injury was motor vehicle crash (25.7%) followed by ground level fall (17.9%), burn of any type (11.3%), fall (10.4%), and gunshot wound (8.5%). Other injuries each accounted for less than 5% of all admissions. In addition to the injury for which patients presented to the hospital, many also suffer from comorbid conditions, which are also tracked in the National Trauma Registry. The five most common comorbid conditions were hypertension (32.9%), diabetes (14.7%), cardiac history (12.4%), coagulant therapy (10.5%), and being functionally dependent (8.3%).

Table 5

Characteristics of Injury, Hospital Stay, and Discharge for All Admitted Trauma Patients (n = 3546)

	n/M(SD)	%/Range
Injury Severity Scale (ISS)	9.9 (10.0)	1-75
Total Length of Stay	7.4 (13.0)	1-380
Discharge Destination		
Home	2329	65.7%
Skilled Nursing Facility (SNF)	367	10.3%
Death in Emergency Department	184	5.2%
Morgue	177	5.0%
Inpatient Rehabilitation Facility (IPR)	115	3.2%
VCU-affiliated Inpatient Rehabilitation Facility (IPR)	110	3.1%
Transfer within VCU Health MCV Hospital	48	1.4%
Left Against Medical Advice (AMA)	37	1.0%
Prison	26	0.7%
Psychiatric Hospitalization	24	0.7%
Occupational Therapy Follow-Up	18	0.5%
Hospice	17	0.5%
Transfer to Another Hospital	16	0.5%
Long-term Acute Care Hospital (LTACH)	10	0.3%
Veterans Affairs (VA) Hospital	3	0.1%
Unknown	3	0.1%
Missing	63	1.8%
Mechanism of Injury		
Motor Vehicle Collision/Crash	913	25.7%
Ground Level Fall	634	17.9%
Burn (all types combined)	400	11.3%
Burn - Flame	*206*	*5.8%*
Burn - Scald	*110*	*3.1%*
Burn - Chemical	*31*	*0.9%*
Burn - Electrical	*11*	*0.3%*
Burn - Unspecified	*42*	*1.2%*
Fall 0-19 Feet	370	10.4%
Gunshot Wound	300	8.5%
Motorcycle Collision/Crash	146	4.1%
Assault	135	3.8%
Pedestrian Struck	123	3.5%
Stab	61	1.7%

Hit by Object	59	1.7%
Machine	56	1.6%
Bicycle Collision	52	1.5%
Fall 20+ Feet	43	1.2%
Animal	41	1.2%
Smoke Inhalation	36	1.0%
Cut	35	1.0%
All-Terrain Vehicle (ATV) Collision/Crash	29	0.8%
Pinned	23	0.6%
Moped Collision/Crash	21	0.6%
Sports	18	0.5%
Explosion	12	0.3%
Unknown	8	0.2%
Hanging	4	0.1%
Water	4	0.1%
Airplane Collision/Crash	2	0.1%
Other	21	0.6%
Missing	1	0.0%

The National Trauma Registry also records the presence of a consult to trauma psychology, Consultation and Liaison Psychiatry, or Addiction Medicine. The most frequently consulted service was trauma psychology, followed by Psychiatry and Substance Abuse Psychiatry. Of note, in many cases, trauma psychology was consulted in addition to one of the Psychiatry services, and in four cases, all three consult services were requested. Details on consult patterns appear in Table 6.

Table 6

Referrals to Mental Health Consult Services (n = 3546)

	n	%
Trauma Psychology	308	8.7%
Psychiatry	184	5.2%
Addiction Medicine	123	3.5%
Trauma Psychology and Psychiatry	42	1.2%
Trauma Psychology and Addiction Medicine	23	0.6%

Psychiatry and Addiction Medicine	21	0.6%
Trauma Psychology, Psychiatry, and Addiction Medicine	4	0.0%

As noted above, the National Trauma Registry recorded consults to trauma psychology in 308 cases. After chart review and cross-validation, a total of 314 unique consults to trauma psychology were identified in the year 2022. Complete data was not able to be obtained for 16 of the 314 cases. Reasons included corrupted data (4 cases), locked patient files (4 cases), consults for patients that admitted and discharged without trauma psychology staff on site (4 cases), and cases where trauma psychology was not successful at the initial consult attempt and was then unable to follow up again before patient discharged (4 cases). Following continued data cleaning and targeted chart review, viable data was extracted from 298 unique trauma psychology consults, which included 5 consults for readmitted patients, yielding a total of 293 unique patients seen by trauma psychology during their admission. The vast majority of consults were completed (92.3%), with the most frequent reason for an incomplete consult being a patient declining service (4.0%). The mean time to referral was 6.4 days (median = 4.0 days; 1.0 day), based upon the time at which a referral was placed by a medical provider. The length of consult visits ranged up to 80 minutes, with a mean of 31.3 minutes (median = 30.0 minutes; mode = 30.0 minutes). Following the consult visit, patients received a mean of 2.5 follow-up visits (median = 2.0 visits; mode = 0 visits), with a range up to 25 follow-up visits. The mean number of total follow-up minutes combined across all follow-up visits was 50.1 (median = 25 minutes; mode = 0 minutes), with a range up to 555 minutes total. No follow-up visits were attempted for 24.2% of referred patients.

Following the initial visit, members of the trauma psychology team document a primary billing diagnosis for each patient, which is then co-signed by the faculty psychologist (Table 7).

In many cases, this diagnosis refers to acute concerns, such as Adjustment Disorder (78.1%), Depression (3.0%), Anxiety (1.0%), Traumatic Brain Injury (1.3%), Delirium (0.7%), or other medical diagnoses. Occasionally, a combination of the patient's self-report, chart review, and initial assessment revealed likely chronic diagnoses, which were also documented by trauma psychology. However, as thorough assessment for chronic or pre-morbid mental health was not universally completed, only diagnoses based on acute assessment were included in analysis.

Table 7

Diagnoses Given by Trauma Psychology (n = 298)

	n	%
Acute	-	-
Adjustment Disorder with anxiety	101	33.9%
Adjustment Disorder with depressed mood	25	8.4%
Adjustment Disorder with mixed anxiety and depressed mood	77	25.8%
Adjustment Disorder, unspecified	26	8.7%
Adjustment Disorder with mixed disturbance of emotions and conduct	4	1.3%
Depression, Unspecified	9	3.0%
Anxiety, Unspecified	3	1.0%
Traumatic Brain Injury	4	1.3%
Delirium	2	0.7%
Functional Neurological Disorder	1	0.3%
Medical Diagnosis Only - Not Burn	17	5.7%
Medical Diagnosis Only - Burn	3	1.0%
Chronic Diagnosis Only	16	5.4%
Patient Declined	5	1.7%
Consult Incomplete	4	1.3%
None Given	17	5.7%

For comparative analysis between unreferred and referred patients, sample size was based on the total of charted consults to trauma psychology (308) plus the five readmissions noted above. Of note, Injury Severity Scale (ISS) scores were not able to be calculated for the five readmissions. Bonferroni-corrected Chi Squared tests and One-Way ANOVAs identified

significant differences. In totality, 8.7% of trauma patients were referred to trauma psychology. Table 8 depicts the demographic characteristics of all patients, comparing by referral status. The referred group differed from the unreferred group by age and race, but not by gender. Referred patients had a younger mean age (39.9 vs. 51.3), and overall racial group proportions varied by referral status. Further, post-hoc z tests identified specific differences for the proportions of white and Black/African American patients, as well as patients who declined to self-identify their race (Unknown). Substance use disorders did not differ by referral status.

Table 8

Comparing Demographic Characteristics and Substance Use Disorders of Unreferred and Referred Patients

	Unreferred Patients (n = 3238)		Referred Patients (n = 313)		
	n/M (SD)	%/range	n/M (SD)	%/range	*p* value
Age	51.3 (21.4)	18-101	39.9 (16.5)	18-85	<.001
Gender	-	-	-	-	0.1
Male	2048	63.2%	205	65.5%	-
Female	1127	34.8%	108	34.5%	-
Unknown	1	0.0%	0	0.0%	-
Missing	62	1.9%	0	0.0%	-
Race	-	-	-	-	<.001
White	1656	51.1%	132	42.2%	<.05
Black/AA	1176	36.3%	142	45.4%	<.05
Hawaiian/Pac. Islander	2	0.1%	0	0.0%	-
Asian	31	1.0%	2	0.6%	-
Native Amer./Indian	6	0.2%	1	0.3%	-
Multi-Racial	1	0.0%	0	0.0%	-
Other	168	5.2%	13	4.2%	-
Unknown	133	4.1%	23	7.3%	<.05
Missing	65	2.0%	0	0.0%	-
Substance Use Disorders	-	-	-	-	-
Tobacco Use Disorder	697	21.5%	73	23.3%	0.46
Alcohol Use Disorder	187	5.8%	19	6.1%	0.83

Substance Use Disorder	232	7.2%	31	9.9%	0.08

Abbreviations: AA (African American); Pac. (Pacific); Amer. (American)

With regard to characteristics of injury, hospital stay, and discharge, differences between unreferred and referred patients were evident across many domains, as noted in Table 9, via Bonferroni-corrected ANOVAs and Chi-squared Tests. Injury Severity was significantly worse for patients referred to trauma psychology (15.1 vs. 9.2), and length of stay was also significantly longer (19.3 vs. 6.3 days). Discharge destination also differed by referral status, and additional post-hoc *z*-tests revealed the specific categories that differed. Patients who were referred to trauma psychology were less likely to die in the Emergency Department (0.6% vs. 5.6%) or medical floor (Morgue; 0.3% vs. 5.4%) and more likely to discharge to further treatment at a VCU-affiliated (10.9% vs. 2.3%) or unaffiliated (5.4% vs. 3.0%) inpatient rehabilitation facility. Referred patients were also more likely to leave against medical advice (2.2% vs. 0.9%), to be recommended to have outpatient follow-up services (1.6% vs. 0.4%), or to be discharged to a long-term acute care hospital (1.0% vs. 0.2%).

Similarly, mechanism of injury differed by referral status, and specific differences were illuminated via post-hoc *z*-tests. As compared to unreferred patients, patients referred to trauma psychology were proportionally more likely to have been injured by a flame (9.9% vs. 5.4%), scald (6.4% vs. 2.8%), or chemical (1.9% vs. 0.8%) burn, or a gunshot wound (22.4% vs. 7.2%), stabbing (3.5% vs. 1.5%), or airplane crash (0.3% vs 0.0%), though this latter category only included two total individuals. Comparisons are presented at the maximum possible level of granularity for this project, though several categories are likely not meaningfully distinct for external comparison and could be collapsed for dissemination. Referred patients were significantly less likely to have survived a motor vehicle collision (32.9% vs. 25.0%), a fall (2.9% vs. 11.1%) or ground-level fall (0.6% vs. 19.5%), or to have been injured by a machine

(0.0% vs. 1.7%). Finally, cases were reviewed for differences by referral status based on comorbid medical conditions, and no significant group differences emerged.

Table 9

Comparing Injury and Hospitalization Characteristics of Unreferred and Referred Patients

	Unreferred Patients (n = 3238)		Referred Patients (n = 313)		
	n/M (SD)	%/range	n/M (SD)	%/range	*p* value
Injury Severity Scale (ISS)	9.2 (9.4)	1-75	15.1 (19.6)	1-75	<.001
Total Length of Stay	6.3 (11.2)	1-380	19.3 (22.0)	1-216	<.001
Discharge Destination	-	-	-	-	<.001
Home	2125	65.6%	207	66.1%	-
SNF	341	10.5%	26	8.3%	-
Death in ED	182	5.6%	2	0.6%	<.05
Morgue	175	5.4%	1	0.3%	<.05
IPR	98	3.0%	17	5.4%	<.05
VCU-affiliated IPR	76	2.3%	34	10.9%	<.05
Transfer within Hospital	47	1.5%	1	0.3%	-
Left AMA	30	0.9%	7	2.2%	<.05
Prison	23	0.7%	4	1.3%	-
Psychiatric Hospitalization	22	0.7%	2	0.6%	-
OT Follow-Up	14	0.4%	5	1.6%	<.05
Hospice	17	0.5%	0	0.0%	-
Transfer to Another Hospital	13	0.4%	3	1.0%	-
LTACH	7	0.2%	3	1.0%	<.05
VA Hospital	3	0.1%	0	0.0%	-
Unknown	2	0.1%	1	0.3%	-
Missing	63	1.9%	0	0.0%	<.05
Mechanism of Injury	-	-	-	-	<.001
MVC	810	25.0%	103	32.9%	<.05
Ground Level Fall	632	19.5%	2	0.6%	<.05
Burn - Flame	175	5.4%	31	9.9%	<.05
Burn - Scald	91	2.8%	20	6.4%	<.05
Burn - Chemical	25	0.8%	6	1.9%	<.05
Burn - Electrical	9	0.3%	2	0.6%	-
Burn - Unspecified	37	1.1%	5	1.6%	-
Fall 0-19 Feet	361	11.1%	9	2.9%	<.05

Gunshot Wound	233	7.2%	70	22.4%	<.05
Motorcycle Collision/Crash	132	4.1%	14	4.5%	-
Assault	127	3.9%	8	2.6%	-
Pedestrian Struck	109	3.4%	14	4.5%	-
Stab	50	1.5%	11	3.5%	<.05
Hit by Object	58	1.8%	1	0.3%	-
Machine	56	1.7%	0	0.0%	<.05
Bicycle Collision	49	1.5%	3	1.0%	-
Fall 20+ Feet	40	1.2%	3	1.0%	-
Animal	40	1.2%	1	0.3%	-
Smoke Inhalation	33	1.0%	3	1.0%	-
Cut	35	1.1%	0	0.0%	-
ATV Collision/Crash	28	0.9%	1	0.3%	-
Pinned	21	0.6%	2	0.6%	-
Moped Collision/Crash	21	0.6%	0	0.0%	-
Sports	18	0.6%	0	0.0%	-
Explosion	11	0.3%	1	0.3%	-
Unknown	8	0.2%	0	0.0%	-
Hanging	4	0.1%	0	0.0%	-
Water	4	0.1%	0	0.0%	-
Airplane Collision/Crash	1	0.0%	1	0.3%	<0.5
Other	20	0.6%	1	0.3%	-
Missing	0	0.0%	1	0.3%	-

Abbreviations: SNF (Skilled Nursing Facility); ED (Emergency Department); IPR (Inpatient Rehabilitation; AMA (Against Medical Advice); LTACH (Long-term Acute Care Hospital); OT (Occupational Therapy); VA (Veterans Affairs); MVC (Motor Vehicle Crash/Collision); ATV (All-Terrain Vehicle)

Objective Two

Convene expert advisory committee to: 1) determine gaps in existing trauma team member mental health knowledge, 2) identify preferences for delivery of education to trauma team, and 3) guide development of a training to meet gaps and delivery goals

a. *Recruit one to two advanced practice provider(s), one nurse clinician, one bedside nurse, and one to two allied health team member(s) to comprise 4-6 person committee*

b. Host two one-hour meetings to guide development of training, one prior to draft development, and one following draft development for committee approval

An expert advisory committee was convened and composed of three advanced practice providers (two nurse practitioners and one physician assistant), one social worker, one physical therapist, and one nurse clinical coordinator. Two meetings were held, each lasting one hour over the course of three weeks. At the first meeting, committee members discussed their experiences with referring patients to trauma psychology and other referral-based services, their comfort in accessing referral-based services, and their perspectives on how to best educate other staff about the services available. Conversation was guided by the use of discussion questions, which were shared with all participants on printed agenda documents. The discussion facilitator had a specific research objective-guided goal or goals for each question, which are noted below each question in *italics* and were not shared with participants. Summative participant responses are listed below each question in **bold**.

1) What are the factors that most often lead you to refer a patient to Trauma Psychology? What aspects of a patient's history might influence you to refer them to Trauma Psychology?
   a) Assess what risk factors/symptoms they are able to identify
      i) Behavioral issues, cumulative trauma, major trauma, gunshot wound, assaultive or recurrent trauma, aggression, anxiety, lost trust with medical team, significant burns, premorbid mental health, pain, stalling or avoiding ambulating, emotional outbursts, patient tearfulness, family coping, patient withdrawal

2) Which patient concerns do you feel are best or most appropriately managed by a referral to Trauma Psychology? What do you think that Trauma Psychology does to manage these concerns?
    a) *Assess what risk factors/symptoms they are able to identify*
        i) **In addition to above, patient coping concerns, patient concerns leading to delays in care, pain management, anxiety**
    b) *Assess awareness of what trauma psychology does*
        i) **Teach coping skills like deep breathing, discuss and teach nonpharmacologic pain management techniques**
3) How effective do you feel that you and your coworkers are at identifying and treating PTSD? Depression? Anxiety? Other concerns?
    a) *Assess awareness of common symptoms/diagnoses*
        i) **Generally able to "pinpoint when something's not right" but not usually thinking through a list of symptoms; "it's all experience;" "not as much as I'd like;" "it was probably in my textbook in school"**
        ii) **Additional symptoms: insomnia, anxiety, tearfulness, pain out of proportion to injuries, not cooperating with medical team, exaggerated startle response, patient identifying triggers (e.g., strong smells after burn injury)**
4) Which patient concerns do you feel least prepared to manage and how does Trauma Psychology support those efforts?
    a) *Identify specifics for differential between services*

   i) **Trauma Psychology is able to recognize and normalize patient concerns, label behaviors ("call it out"), teach coping skills, "hold space," collect background to assist with coping, coordinate/mediate with Psychiatry teams**

5) What do you think that Trauma Psychology does to treat PTSD in the inpatient environment? How does this differ from support provided by other services/teams?
   a) *Assess awareness of what we do; differential between services*
   b) **Trauma Psychology strengths: "understand patient population better," "nonpharmacologic" (vs. Psychiatry); "more present" (e.g., available to cotreat); ongoing consultant (vs. discrete consults without desired follow-up); part of the clinical leadership/managing team; "very specialized" training; can start bridge to outpatient treatment; continuity for patients throughout their hospitalization leads to stronger patient trust (vs. providers changing when a patient changes unit); "holistic practice" approach; helpful when delivering difficult news; "effective collaboration," particularly by collaborating before, during, and after consult completion**
6) Which other services do you consider when you consider referring a patient to Trauma Psychology? What factors play into your differential decision?
   a) *What other services are they aware of? How do they decide?*
   b) **"We always call trauma psych first;" participants described significant dissatisfaction with other services and suggested that they typically consult other services based primarily on recommendations from trauma psychology; aware of most ancillary services**
7) How have you learned about the Trauma Psychology service?

   a) *Understand how it works now to identify opportunities for improvement (orientation? Guidebook? SharePoint? Word of mouth?)*
   b) **Differs widely by role/discipline. Mostly in new provider training and annual training requirements**

8) When you have questions about Trauma Psychology, how do you find answers?
   a) *Identify gaps in available information – specifically for a badge hanger or poster*
   b) **"Send a message to [trauma psychology]"**

9) What are common questions that you hear your coworkers ask about Trauma Psychology? How do you answer them or direct them to answers?
   a) *Identify FAQs in order to provide answers*
   b) **Participants not generally able to identify specifics; noted that knowledge about trauma psychology is usually passed through word of mouth**

10) If you were starting out as a new provider, what information about the Trauma Psychology service would be most helpful to know? In what form would you like to receive that information?
   a) *Clarify format for training*
   b) **Develop a "pocket guide" or include a section in the trauma service pocket guide, include in monthly Department of Surgery newsletter, have trauma psychology be a part of the monthly orientation for residents rotating onto the trauma service, one-pager signs hung around unit, annual training for all residents, include as part of orientation checklist for interdisciplinary staff on units that have a large portion of trauma patients**

11) What related topics might it be useful to include in training or information about the Trauma Psychology service?

a) Other goals, as time allows

b) Participants spent significant time brainstorming contacts and strategies that could be implemented to standardize training. For example, several suggested creating a video-based version of the training that could be included in annual training requirements for all staff. Participants also expressed strong desire to automate the referral process to trauma psychology, such as by using a flag in the electronic medical record or by requiring consideration of a referral as a part of required daily documentation.

In summary, after the first meeting, Expert Advisory Committee members coalesced around a plan that an in person, one-hour training would likely be a good starting point. They also suggested that written materials be developed for distribution, since it is naturally difficult to convene all staff at any one time. Specifically, they were very interested in two documents: a longer, booklet-length document and a much shorter, one-page sign that could be hung around units. There was also some consideration of making a video version of the training that could be completed by staff on their own time, but committee members ultimately determined that an in-person version would best reflect the importance of the material and would provide the best opportunity for staff to ask questions and to meet with members of the trauma psychology team.

At the second Expert Advisory Committee meeting, draft written materials were presented to members of the committee for their edits and approval (depicted below), with the proposed plan to model the training around the written materials, so as to assist staff who attended the training in sharing the knowledge that they gained with other staff members, using the written materials.

Expert advisory committee members identified several opportunities for increased clarity and visual interest in the written materials, which were implemented prior to the training sessions and distribution of written materials. Overarching themes of desired changes were to make the materials more visually interesting and to reduce the amount of content on the specifics of trauma psychology interventions. One participant stated, “you don’t need to teach anybody how to be a trauma psychologist.” Below (Figure 2) are images of some of the draft materials, which include notes made during group deliberation.

Figure 2

Draft Training Booklet

TRAUMA PSYCHOLOGY 101

Most predictive risk factors:

- Past mental health issue
- Perceived threat to life
- Intentional Injury
- Repeat traumatic injury

Risk is cumulative!

Key early symptoms that predict later depression and/or PTSD:

- Emotional detachment
- Emotional lability
- Restlessness/vigilance
- Changes to worldview

Dr. Katy Maher (Licensed Clinical Psychologist, Attending) and team

- Part of Trauma Surgery; **only available to Trauma service patients/teams**
- **Assess** inpatients and provide non-pharmacological intervention for coping and acute concerns; deliver early PTSD treatment, as relevant
- **Intervene** with patients, loved ones, and team to reduce patient distress, improve treatment adherence, and improve acute and future mental health
- Facilitate **referrals** to outpatient services (internally and externally)

(epic order)

OTHER CONSULT SERVICES

- **Social Work** - unit-specific; order in Epic; page ___ for urgent need
- **Spiritual Care** - order in Epic; page ____
- **Consult & Liaison Psychiatry** - order in Epic; page _____; 24/7
- **Addiction Medicine** - order in Epic; page ____
- **Trauma Survivors Network (TSN)** - email _____
- **Bridging the Gap (IVPP)**- email ____
- **Project Empower** - email ___
- **Child Life, Helping Children of Adult Patients (HCAP)** - page ____ →SLP
- **Music, Art Therapy** - email ___ or page ___ →SLP
- **Recreation Therapy** - email __ or page ___
- **Dogs on Call** - 804-827-7297 or page #6134 or email chai@vcuhealth.org

OTHER CONSULT SERVICES

*all are hospital-wide except TSN and Bridging the Gap

- **Social Work** - unit-specific; order in Epic; page ___ for urgent need
  - Coordinate resources for patients upon discharge and during stay
  - Collaborate closely with and support family and loved ones
- **Spiritual Care** - order in Epic; page ____
  - Interdenominational; available 24/7; some unit-based, some at-large
  - Especially grief, end of life decision making, patient codes, palliative
- **Consult & Liaison Psychiatry** - order in Epic; page _____; 24/7
  - Required consult for any suicide attempt; assess acute SI and HI
  - Medication management, especially for acutely impaired patients (delirium, TBI, substance withdrawal, psychosis, mania, agitation)
  - Assess for transfer to Inpatient Psychiatry, as relevant
- **Addiction Medicine** - order in Epic; page ____
  - Assessment, treatment, and referral for substance use; offer MAT
  - Can initiate new treatment or continue/bridge existing treatment plan
- **Trauma Survivors Network (TSN)** - email _____
  - National peer support network with VCU chapter
  - Community support groups and bedside volunteer visitors
- **Bridging the Gap (IVPP)**- email ____
  - For survivors of community violence, esp. age 10-24 GSW survivors
  - Opportunities for patients to be paid research participants
- **Project Empower** - email ___
  - For survivors of domestic and sexual violence of any gender
  - Offer counseling, legal support, shelter, practical needs (e.g. clothes)
- **Child Life, Helping Children of Adult Patients (HCAP)** - page ____
  - For teens and immature adults, as well as hospitalized parents of kids
  - Can provide age-appropriate activity carts, toys, treats, crafts
  - Assist with age-appropriate communication of complex medical issues
- **Music, Art Therapy** - email ___ or page ___
  - Hospital-wide services to inpatients to help with coping
- **Recreation Therapy** - email __ or page ___
  - Adaptive and leisure equipment for patients of any age
- **Dogs on Call** - 804-827-7297 or page #6134 or email chai@vcuhealth.org

WHAT IS PTSD?

PTSD can only be diagnosed more than one month after the event

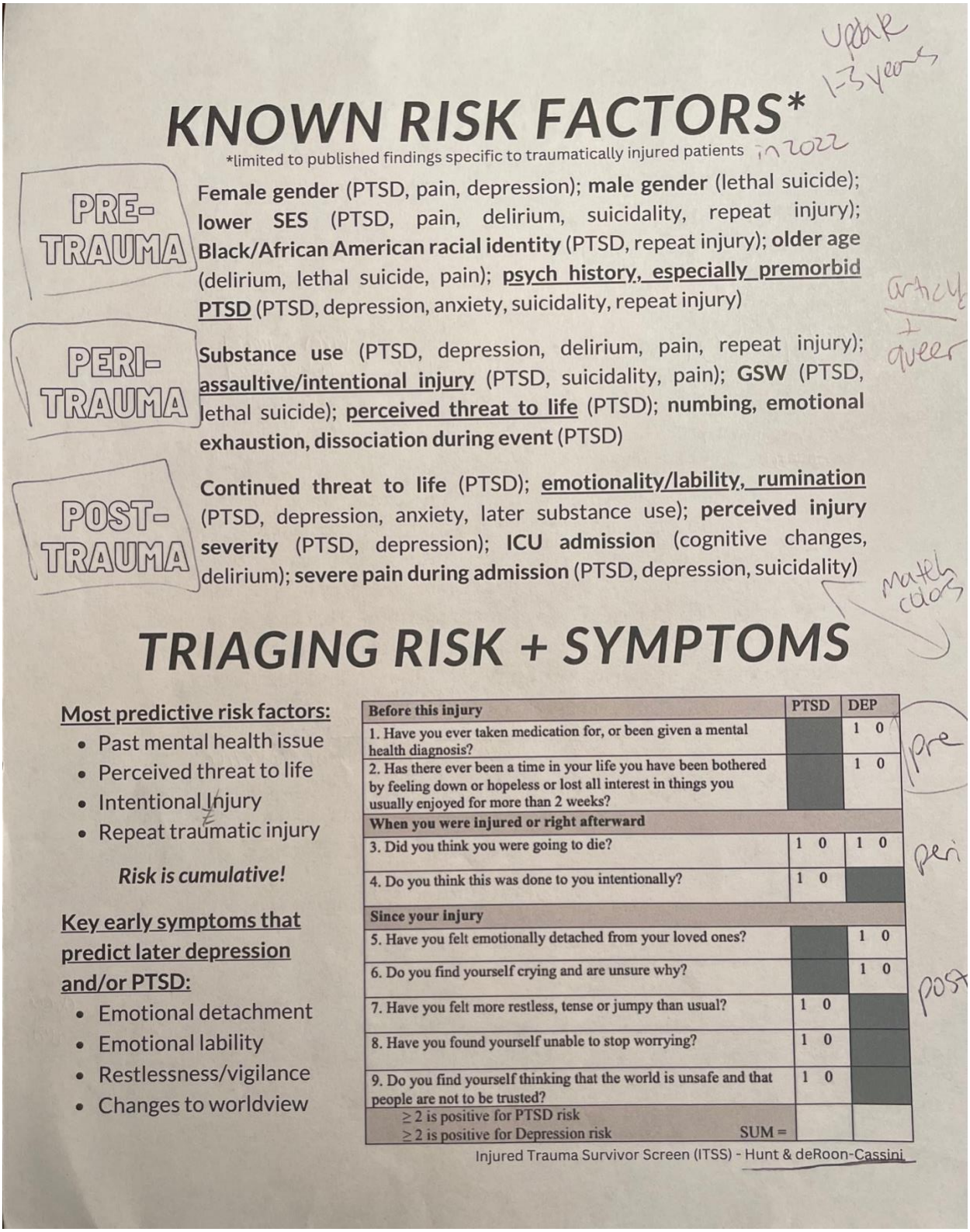
- **Acute Stress Disorder** = 9+ PTSD symptoms 3-30 days after
- **Adjustment Disorder** = impairing symptoms within months

PTSD Symptoms:

- Intrusion
  - intrusive memories; distressing dreams; dissociative reactions; intense distress in response to cues resembling the trauma; physiological reaction to cues
- Avoidance
  - avoidance of memories or thoughts; avoidance of external trauma reminders
- Negative alterations in cognitions and mood
  - dissociative amnesia; negative beliefs about oneself, others, or the world; distorted self-blame or blame of others; persistent negative emotional state; Anhedonia; feelings of detachment; persistent numbing to positive emotion
- Arousal and reactivity
  - irritability or anger; reckless or self-destructive behavior; hypervigilance; exaggerated startle response; problems with concentration; sleep disturbance

HOW DOES TRAUMA PSYCH PREVENT AND TREAT PTSD?

- Provide normalizing and supportive psychoeducation about common reactions to serious trauma and injury ("Wow, I thought I was going crazy")
- Education about the body's natural trauma response and how this relates to the development of PTSD (e.g. fight/flight/freeze, impaired memory making)
- Create supportive environment for patients to process and share their feelings and experiences with Trauma Psychology and also with loved ones
- Identify and amplify unique patient strengths and existing coping resources
- Intervene with specific symptoms to reduce distress and impact on medical treatment while hospitalized and to reduce likelihood of developing PTSD
  - Gold standard treatments such as CPT, PE, and Psychological First Aid
- Assist patients in recruiting social support and finding outpatient resources



KNOWN RISK FACTORS*

*limited to published findings specific to traumatically injured patients

PRE-TRAUMA

Female gender (PTSD, pain, depression); **male gender** (lethal suicide); **lower SES** (PTSD, pain, delirium, suicidality, repeat injury); **Black/African American racial identity** (PTSD, repeat injury); **older age** (delirium, lethal suicide, pain); **psych history, especially premorbid PTSD** (PTSD, depression, anxiety, suicidality, repeat injury)

PERI-TRAUMA

Substance use (PTSD, depression, delirium, pain, repeat injury); **assaultive/intentional injury** (PTSD, suicidality, pain); **GSW** (PTSD, lethal suicide); **perceived threat to life** (PTSD); **numbing, emotional exhaustion, dissociation during event** (PTSD)

POST-TRAUMA

Continued threat to life (PTSD); **emotionality/lability, rumination** (PTSD, depression, anxiety, later substance use); **perceived injury severity** (PTSD, depression); **ICU admission** (cognitive changes, delirium); **severe pain during admission** (PTSD, depression, suicidality)

TRIAGING RISK + SYMPTOMS

Most predictive risk factors:

- Past mental health issue
- Perceived threat to life
- Intentional injury
- Repeat traumatic injury

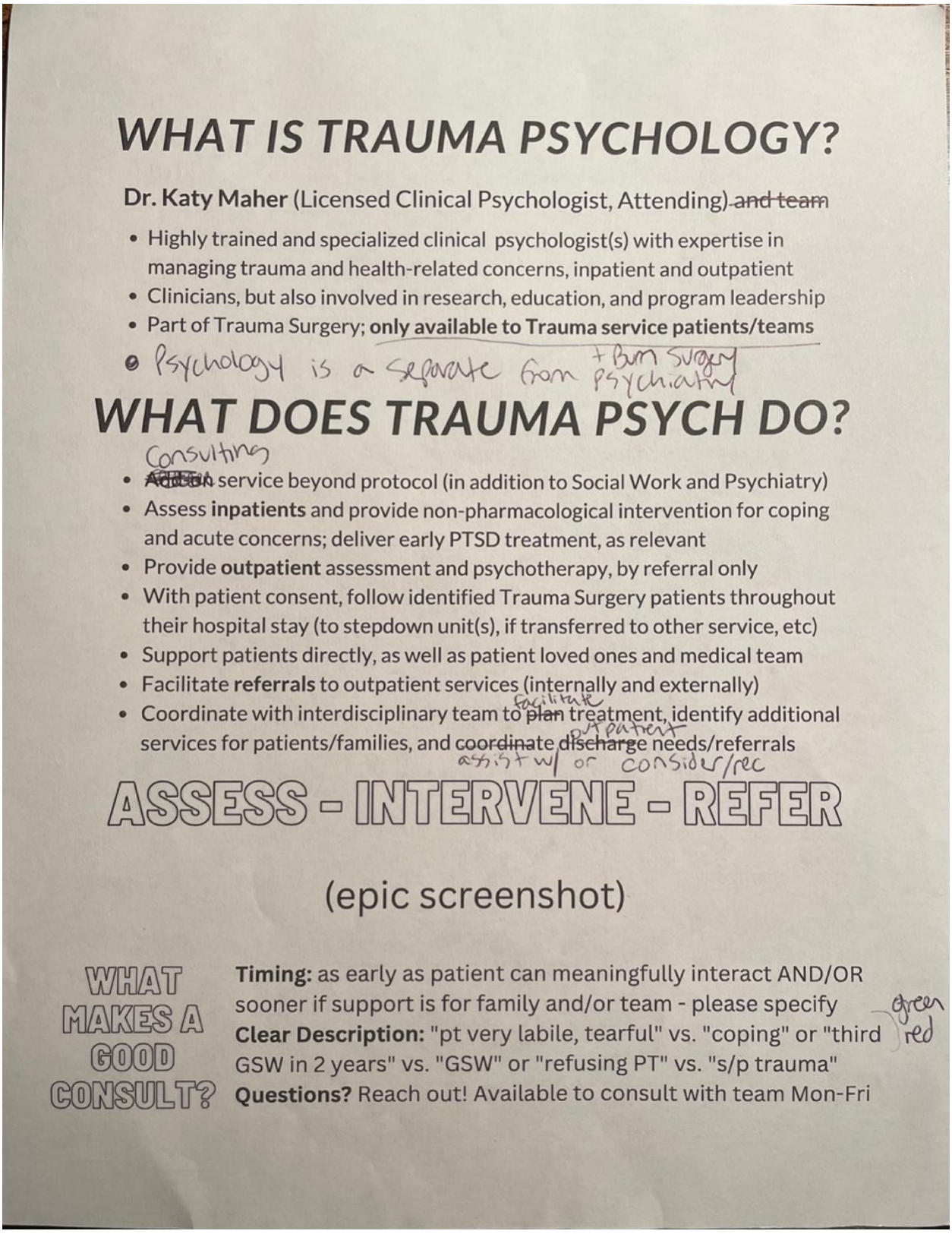
Risk is cumulative!

Key early symptoms that predict later depression and/or PTSD:

- Emotional detachment
- Emotional lability
- Restlessness/vigilance
- Changes to worldview

Before this injury	PTSD	DEP
1. Have you ever taken medication for, or been given a mental health diagnosis?		1 0
2. Has there ever been a time in your life you have been bothered by feeling down or hopeless or lost all interest in things you usually enjoyed for more than 2 weeks?		1 0
When you were injured or right afterward		
3. Did you think you were going to die?	1 0	1 0
4. Do you think this was done to you intentionally?	1 0	
Since your injury		
5. Have you felt emotionally detached from your loved ones?		1 0
6. Do you find yourself crying and are unsure why?		1 0
7. Have you felt more restless, tense or jumpy than usual?	1 0	
8. Have you found yourself unable to stop worrying?	1 0	
9. Do you find yourself thinking that the world is unsafe and that people are not to be trusted?	1 0	
≥ 2 is positive for PTSD risk ≥ 2 is positive for Depression risk SUM =		

Injured Trauma Survivor Screen (ITSS) - Hunt & deRoon-Cassini



WHAT IS TRAUMA PSYCHOLOGY?

Dr. Katy Maher (Licensed Clinical Psychologist, Attending) ~~and team~~

- Highly trained and specialized clinical psychologist(s) with expertise in managing trauma and health-related concerns, inpatient and outpatient
- Clinicians, but also involved in research, education, and program leadership
- Part of Trauma Surgery; **only available to Trauma service patients/teams**
- Psychology is a separate from + Burn Surgery Psychiatry

WHAT DOES TRAUMA PSYCH DO?

- Consulting ~~Action~~ service beyond protocol (in addition to Social Work and Psychiatry)
- Assess **inpatients** and provide non-pharmacological intervention for coping and acute concerns; deliver early PTSD treatment, as relevant
- Provide **outpatient** assessment and psychotherapy, by referral only
- With patient consent, follow identified Trauma Surgery patients throughout their hospital stay (to stepdown unit(s), if transferred to other service, etc)
- Support patients directly, as well as patient loved ones and medical team
- Facilitate **referrals** to outpatient services (internally and externally)
- Coordinate with interdisciplinary team to ~~plan~~ facilitate treatment, identify additional services for patients/families, and ~~coordinate~~ outpatient ~~discharge~~ needs/referrals assist w/ or consider/rec

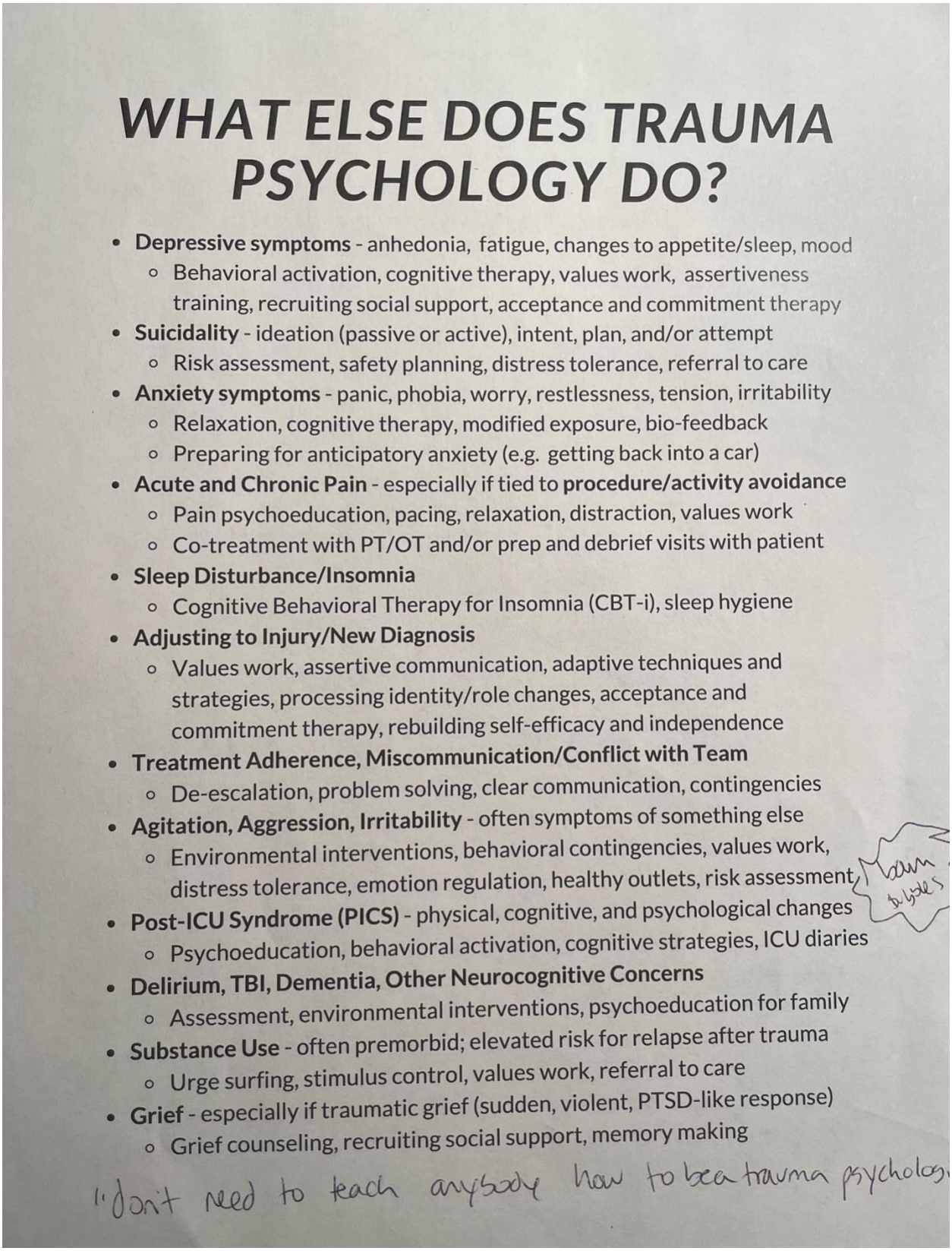
ASSESS - INTERVENE - REFER

(epic screenshot)

WHAT MAKES A GOOD CONSULT?

Timing: as early as patient can meaningfully interact AND/OR sooner if support is for family and/or team - please specify
Clear Description: "pt very labile, tearful" vs. "coping" or "third GSW in 2 years" vs. "GSW" or "refusing PT" vs. "s/p trauma"
Questions? Reach out! Available to consult with team Mon-Fri

green red



WHAT ELSE DOES TRAUMA PSYCHOLOGY DO?

- **Depressive symptoms** - anhedonia, fatigue, changes to appetite/sleep, mood
  - Behavioral activation, cognitive therapy, values work, assertiveness training, recruiting social support, acceptance and commitment therapy
- **Suicidality** - ideation (passive or active), intent, plan, and/or attempt
  - Risk assessment, safety planning, distress tolerance, referral to care
- **Anxiety symptoms** - panic, phobia, worry, restlessness, tension, irritability
  - Relaxation, cognitive therapy, modified exposure, bio-feedback
  - Preparing for anticipatory anxiety (e.g. getting back into a car)
- **Acute and Chronic Pain** - especially if tied to **procedure/activity avoidance**
  - Pain psychoeducation, pacing, relaxation, distraction, values work
  - Co-treatment with PT/OT and/or prep and debrief visits with patient
- **Sleep Disturbance/Insomnia**
  - Cognitive Behavioral Therapy for Insomnia (CBT-i), sleep hygiene
- **Adjusting to Injury/New Diagnosis**
  - Values work, assertive communication, adaptive techniques and strategies, processing identity/role changes, acceptance and commitment therapy, rebuilding self-efficacy and independence
- **Treatment Adherence, Miscommunication/Conflict with Team**
  - De-escalation, problem solving, clear communication, contingencies
- **Agitation, Aggression, Irritability** - often symptoms of something else
  - Environmental interventions, behavioral contingencies, values work, distress tolerance, emotion regulation, healthy outlets, risk assessment
- **Post-ICU Syndrome (PICS)** - physical, cognitive, and psychological changes
  - Psychoeducation, behavioral activation, cognitive strategies, ICU diaries
- **Delirium, TBI, Dementia, Other Neurocognitive Concerns**
  - Assessment, environmental interventions, psychoeducation for family
- **Substance Use** - often premorbid; elevated risk for relapse after trauma
  - Urge surfing, stimulus control, values work, referral to care
- **Grief** - especially if traumatic grief (sudden, violent, PTSD-like response)
  - Grief counseling, recruiting social support, memory making

I don't need to teach anybody how to be a trauma psycholog

Objective Three

Develop and deliver mental health training resource(s) for trauma team members based on model developed and approved by expert advisory committee

a. If including other psychosocial support resources available to trauma patients (Trauma Survivors Network, Violence Prevention, Domestic and Intimate Partner Violence Services, Child Life, Child Life to Support Adults, Music Therapy, Art Therapy, Spiritual Care, Social Work, and Animal Therapy), meet with these services in order to obtain a shared understanding of services offered and patient characteristics that would best match with each service

b. Engage in targeted literature review to flesh out training resource(s) based on stakeholder guidance

In addition to the expert advisory committee process, significant effort was made to reach out to the additional referral-based resources available in the hospital. In person appeals and a formal email request, with follow-up emails as needed, were sent to each of the identified additional resource teams/individuals in order to collect information about their services in their own words, and to ensure that contact information and referral processes were reflected accurately. Responses were received from all but one additional resource listed in Table 3, in addition to Consult & Liaison Psychiatry and Addiction Medicine. Additionally, multiple service directors expressed strong appreciation for being included in the development of such tools.

Following the second meeting of the expert advisory committee and consultation with allied services, training materials were heavily edited, finalized, and printed for distribution. The final products were a one-page poster (11x17 inches) that was laminated and, after the training sessions, posted in 14 locations around the hospital, including nurses' stations, provider work

rooms, and unit secretary desks on units that see high volumes of trauma patients. The poster is below in Figure 3.

Figure 3

Training Poster

SERVICES AVAILABLE TO TRAUMA PATIENTS

Trauma and Burn Surgery Psychology - order in Epic; Epic chat Katy Maher; page 9291; M-F 9-5

- Assess and intervene to improve patient coping and functioning, especially depression, traumatic stress, and care-interfering behaviors such as avoidance, pain, anxiety, insomnia, aggression, and cognition; grief counseling
- Follow up inpatient throughout admission; refer to outpatient therapy, both internally and externally
- **This service is also available to Burn Surgery patients**

Injury & Violence Prevention Program -

- **Project Empower – page 2375; email projectempower@vcuhealth.org; call (804) 628-3361**
  - Support individuals and families who experience sexual, domestic, intimate partner violence, and trafficking
  - Crisis response, medical and forensic accompaniment, safety planning, advocacy, and counseling
  - **This service is Hospital-Wide, not restricted to Trauma Surgery patients**
- **Bridging the Gap - email BridgingtheGap@vcuhealth.org; call (804) 628-4352**
  - Combined hospital-community violence intervention program designed to reduce the risk of re-injury including bedside intervention and numerous follow up resources (mental health, job coaching, housing, etc)
- **Emerging Leaders Program**
  - Community workshop series for 14-18 year olds; call (804) 828-8012 to register - patients self-refer/register

Trauma Survivors Network (TSN) – email TSN@vcuhealth.org to request a peer visit

- Inpatient peer visits from trauma survivor volunteers by request; rounds on most patients by medical student volunteers to provide TSN Handbook and personal care items and relaxing activities (e.g., stress balls, coloring books)
- Outpatient support groups for survivors and caregivers; facilitate survivors' connections to other local resources

SERVICES AVAILABLE TO ALL PATIENTS

Social Work – unit-specific; order in Epic; chat in Epic

- Assess patients for biopsychosocial needs and Social Determinants of Health and provide appropriate referrals and resources; conduct SBIRT and provide brief intervention; coordinate internal resources and plan for discharge/placement (IPR, SNF, LTACH, CSU, Medical Respite, substance use facilities)
- Assist family and patient with "paperwork" - Disability, FMLA, Worker's Comp, Advance Directives, LNOK; guide goals of care conversations with palliative and other services

Spiritual Care – order in Epic; page 6140 for on-call chaplain; 24/7

- Interdenominational; provide comfort and companionship; especially supportive with grief (patient and loved ones), end of life decision making, patient codes, and palliative needs

C-L Psychiatry – order in Epic; chat in Epic; page 9268; 24/7

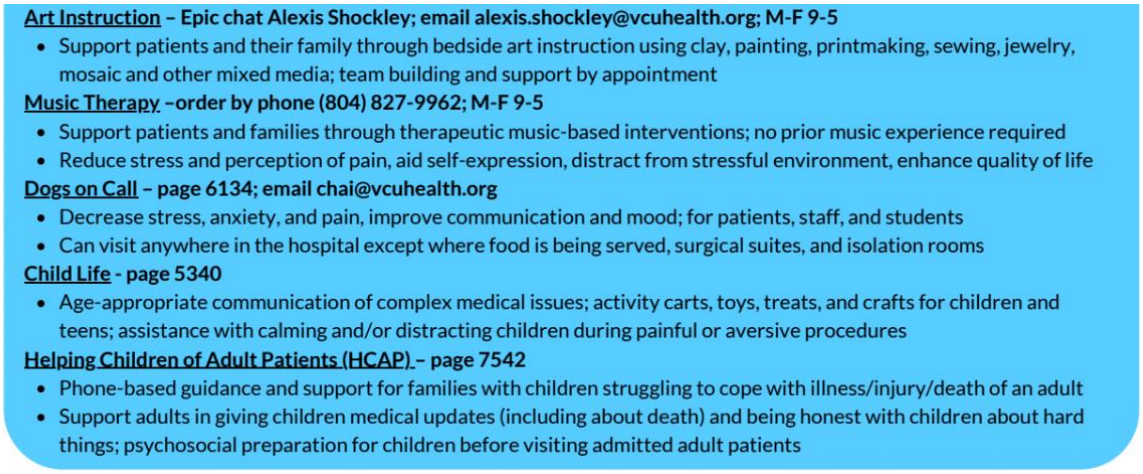
- Perform psychiatric consultations and provide treatment recommendations and disposition management; engage with teams to provide personalized psychiatric care for patients requiring both medical and psychiatric stabilization
- Refer patients to outpatient services, including therapy and medication management, both internally and externally

Addiction Medicine –order in Epic; page 9951; M-F 8-4

- Collaborate with teams to provide comprehensive care for patients with a broad range of addiction and related issues
- Medication-Assisted Treatment (MAT) for opioids, alcohol, and other substances; withdrawal management
- Assist with referrals to the MOTIVATE outpatient clinic or other facilities for higher level of care

Recreation Therapy - order in Epic; Epic chat Shannon Mitchell; page 5094

- Provide and orient patients to hands-on tools to manage stress; integrative wellness and quality of life
- Adaptive and leisure equipment for patients of any age, especially for supporting social connections, improving communication, and promoting independence/sense of control (Tobii eye gaze tablet, sip and puff, communication boards, gaming and streaming systems with paid subscriptions, crafts, games, etc, including voice-controlled systems)



In addition to the poster, a 14-page booklet was created, printed, and distributed following the training interventions to the same areas of the hospital as the posters, including provider workrooms, nurses' stations, and unit secretary desks. Additional information included in the booklets came from targeted literature review to identify the latest evidence on topics included. Images of the final version of the booklet are below in Figure 4.

Figure 4

Training Booklet

TRAUMA AND BURN SURGERY PSYCHOLOGY

101

TRAINING MATERIALS DEVELOPED BY
SAMANTHA MLADEN, M.S.
AS PART OF OF HER DOCTORAL DISSERTATION IN
CLINICAL PSYCHOLOGY (2023)

WHO IS TRAUMA PSYCHOLOGY?

Dr. Katy Maher
Licensed Clinical Psychologist

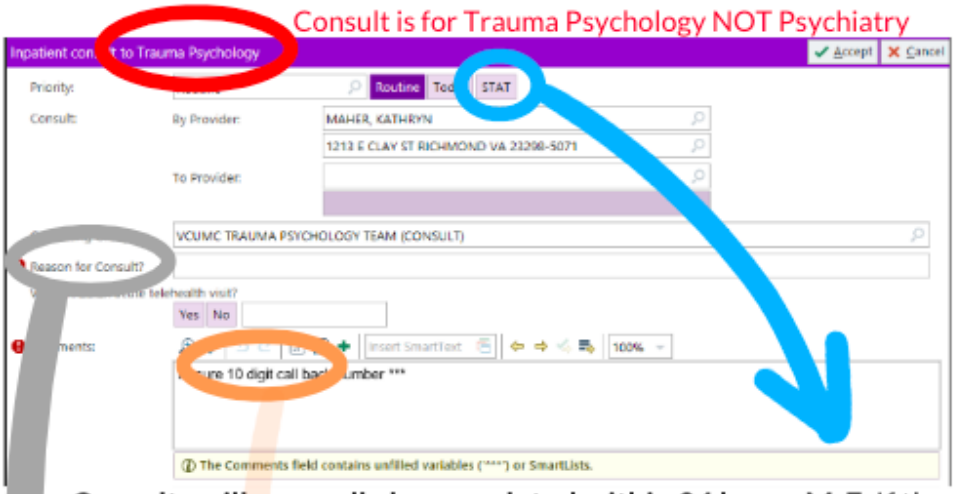
- Clinical psychologist(s) specializing in managing trauma and health-related concerns
  - Trainees include advanced doctoral students, interns, postdoctoral fellows, etc
  - Involved in research, education, and program leadership

WHAT DOES TRAUMA PSYCHOLOGY DO?

- **Available to Trauma and Burn Surgery patients/teams**
- Consult-based service
- **ASSESS:** Initial consult visit identifies background mental health history, assesses for PTSD and depression, identifies other acute concerns, and determines the need for follow up visits
- **INTERVENE**: Deliver nonpharmacological treatment for behavioral and mental health concerns identified in assessment; patients are generally seen 2-4 times
  - Support patients and visitors and coordinate with interdisciplinary medical team
  - Can follow identified patients throughout their hospital stay (to stepdown unit(s), if transferred to other service, etc)
- **REFER**: Facilitate referrals to outpatient mental health services in the community and Trauma Psychology clinic

ASSESS - INTERVENE - REFER

HOW TO PLACE A CONSULT?



Consults will generally be completed within 24 hours M-F. If the consult is more urgent, please communicate this directly to the team and/or list consult as "STAT" in the order; otherwise, all consults will be triaged and completed as soon as possible.
Examples of STAT consults: patients trying to leave AMA, planning to discharge that day, acutely decompensating, or otherwise in need of rapid assistance

Mention any additional relevant information here, such as patient awareness of upcoming procedures (e.g. likely amputation), fatalities in the incident, etc

WHAT MAKES A GOOD CONSULT?

Timing: as early as patient can meaningfully interact AND/OR sooner if support is for family and/or team - *please specify which in request*
Clear Description: "pt very labile, tearful" vs. "coping" or "third GSW in 2 years" vs. "GSW" or "refusing PT" vs. "s/p trauma"
Questions? Reach out! Available to complete consults and meet with staff Mon-Friday 9-5

PTSD AND DEPRESSION IN TRAUMA PATIENTS

The American College of Surgeons continues to expand its recommendations and requirements for Trauma Centers to systematically screen for and treat PTSD and depression

Compared to similarly injured patients, those who go on to develop PTSD:

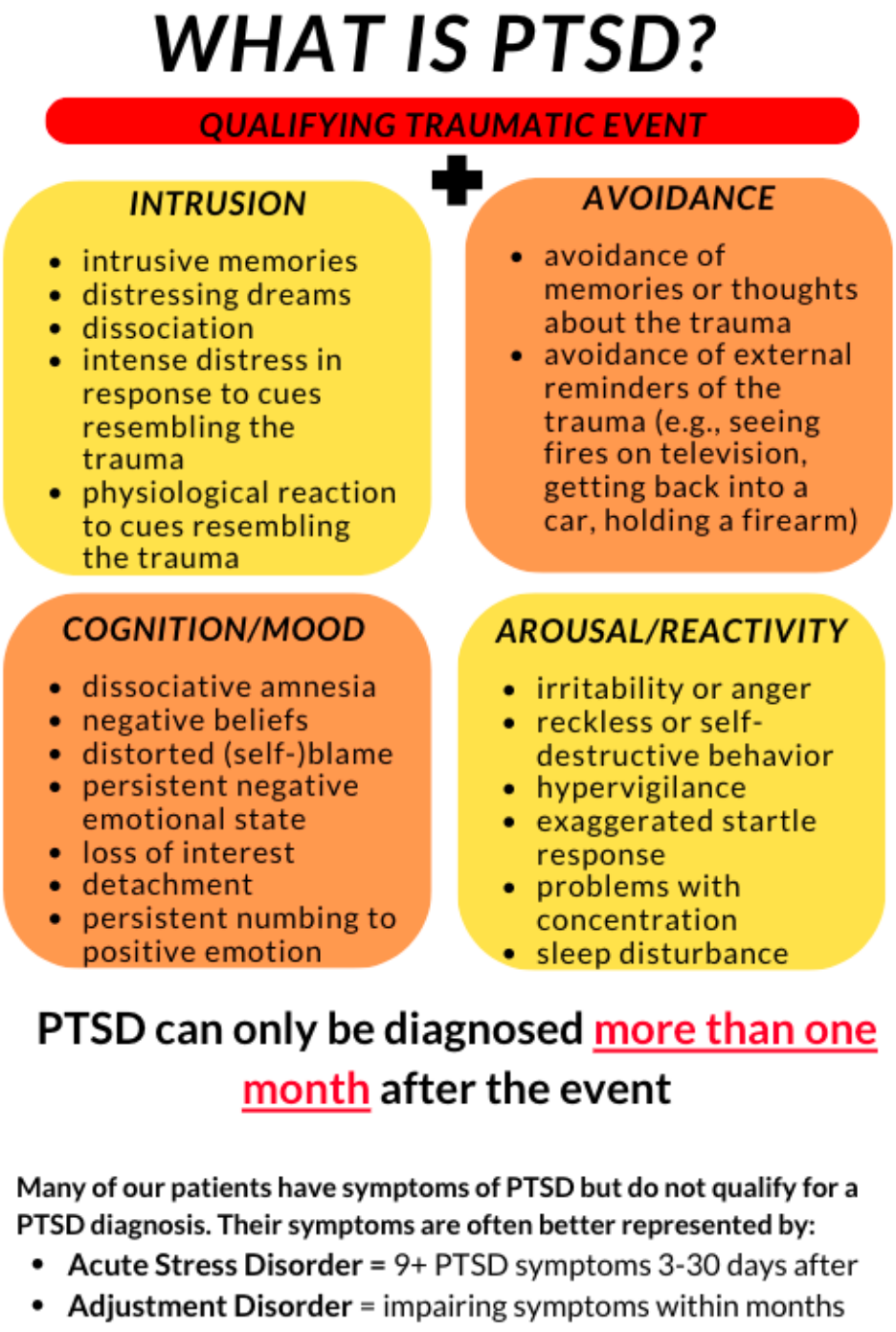
- have higher rates of comorbid disease
- have more impaired return to work
- have greater social impairment
- have up to 50% greater burden of injury in Disability-Adjusted Life Years

Compared to similarly injured patients, those who go on to develop depression:

- have worse overall health-related quality of life
- have greater impairment in social and work outcomes

Stress disorders and depression are highly associated with increased cost and length of stay for trauma patients

Early and effective intervention can reduce patient distress, provider burnout, and system load


WHAT IS PTSD?
QUALIFYING TRAUMATIC EVENT
INTRUSION
intrusive memories
distressing dreams
dissociation
intense distress in response to cues resembling the trauma
physiological reaction to cues resembling the trauma
AVOIDANCE
avoidance of memories or thoughts about the trauma
avoidance of external reminders of the trauma (e.g., seeing fires on television, getting back into a car, holding a firearm)
COGNITION/MOOD
dissociative amnesia
negative beliefs
distorted (self-)blame
persistent negative emotional state
loss of interest
detachment
persistent numbing to positive emotion
AROUSAL/REACTIVITY
irritability or anger
reckless or self-destructive behavior
hypervigilance
exaggerated startle response
problems with concentration
sleep disturbance
PTSD can only be diagnosed more than one month after the event
Many of our patients have symptoms of PTSD but do not qualify for a PTSD diagnosis. Their symptoms are often better represented by:
Acute Stress Disorder = 9+ PTSD symptoms 3-30 days after
Adjustment Disorder = impairing symptoms within months

*KNOWN RISK FACTORS FOR WORSE OUTCOMES**

*limited to published findings specific to traumatically injured patients. Many other risk factors are suspected but not yet confirmed in this specific sub-population

PRE-TRAUMA

- **Female gender** (PTSD, pain, depression)
- **Male gender** (lethal suicide)
- **Lower SES** (PTSD, pain, delirium, suicidality, repeat injury)
- **Black/African American racial identity** (PTSD, repeat injury)
- **Older age** (delirium, lethal suicide, pain)
- **Psych history, especially premorbid PTSD** (PTSD, depression, anxiety, suicidality, repeat injury)

PERI-TRAUMA

- **Substance use** (PTSD, depression, delirium, pain, repeat injury)
- **Assaultive/intentional injury** (PTSD, suicidality, pain)
- **GSW** (PTSD, lethal suicide)
- **Perceived threat to life** (PTSD)
- **Numbing, emotional exhaustion, dissociation during event** (PTSD)

POST-TRAUMA

- **Continued threat to life** (PTSD)
- **Emotionality/lability, rumination** (PTSD, depression, anxiety, later substance use)
- **Perceived injury severity** (PTSD, depression)
- **ICU admission** (cognitive changes, delirium)
- **Severe pain during admission** (PTSD, depression, suicidality)

HOW CAN WE IDENTIFY THOSE AT HIGHEST RISK FOR PTSD AND DEPRESSION?

Most predictive risk factors:

- Past mental health issue
- Perceived threat to life
- Intentional injury
- Repeat traumatic injury

ACS and evidence-based recommendations

Risk is cumulative!

Key early symptoms that predict later depression and/or PTSD:

- Emotional detachment
- Emotional lability
- Restlessness/vigilance
- Changes to worldview

	Before this injury	PTSD	DEP
PRE-TRAUMA	1. Have you ever taken medication for, or been given a mental health diagnosis?		1 0
	2. Has there ever been a time in your life you have been bothered by feeling down or hopeless or lost all interest in things you usually enjoyed for more than 2 weeks?		1 0
	When you were injured or right afterward		
PERI-TRAUMA	3. Did you think you were going to die?	1 0	1 0
	4. Do you think this was done to you intentionally?	1 0	
	Since your injury		
POST-TRAUMA	5. Have you felt emotionally detached from your loved ones?		1 0
	6. Do you find yourself crying and are unsure why?		1 0
	7. Have you felt more restless, tense or jumpy than usual?	1 0	
	8. Have you found yourself unable to stop worrying?	1 0	
	9. Do you find yourself thinking that the world is unsafe and that people are not to be trusted?	1 0	
	≥ 2 is positive for PTSD risk ≥ 2 is positive for Depression risk SUM =		

Injured Trauma Survivor Screen (ITSS) - Hunt & deRoon-Cassini

CONDITIONS TREATED

- **Posttraumatic Stress -** PTSD, Acute Stress, Adjustment Disorder
- **Depressive symptoms** - loss of interest, fatigue, changes to appetite/sleep/mood
- **Suicidality** - ideation (passive or active), intent, plan, and/or attempt; do not manage precautions or psych admission
- **Anxiety symptoms** - panic, phobia, worry, restlessness, tension, irritability
- **Grief** - especially if traumatic grief (sudden, violent loss often followed by a PTSD-like response)

- **Substance Use -** often premorbid; elevated risk for relapse after trauma
- **Acute and Chronic Pain** - especially if tied to **procedure/activity avoidance**
- **Sleep Disturbance/Insomnia**
- **Adjusting to Injury/New Diagnosis**
- **Treatment Adherence**
- **Miscommunication/Conflict with Team**

- **Agitation, Aggression, Irritability** - often symptoms of something else
- **Post-ICU Syndrome (PICS)** - physical, cognitive, and psychological changes following prolonged ICU stay
- **Delirium, TBI, Dementia, and Other Neurocognitive Concerns**
- **Safety and Post-Discharge Planning**

TREATMENT APPROACHES

Address Traumatic Stress

- Educate about and normalize trauma reactions (fight/flight/freeze, distorted memory, trigger responses)
- Grounding, positive imagery
- Prepare for return to site/mechanism of injury
- Build motivation for outpatient treatment

Prevent Conflict/Violence

- De-escalation
- Establish contingencies
- Environmental interventions
- Emotion regulation
- Healthy emotional outlets
- Suicide risk assessment and safety planning

Aid in Adjustment

- Adaptive techniques and communication strategies
- Process identity/role changes
- Rebuild self-efficacy, perceived control, independence

Respond to Neuro Concerns

- Environmental interventions
- Adaptive skills and cognitive strategies

Manage Hospital Distress

- Distress tolerance skills
- Co-treat with PT/OT/wound care and/or prep/debrief visits with patient
- Relaxation and distraction
- Modified bio-feedback

Boost Positive Coping

- Values work (ACT)
- Behavioral activation
- Recruit social support
- Assertiveness training

Provide Psychoeducation

- CBT for insomnia (CBT-i)
- Normalize hospital stress
- Pain (Pacing, Gate Control Theory)

Support Families

- Psychoeducation
- Grief counseling
- Support/problem solving
- ICU diaries

Tackle Substance Use

- Urge surfing
- Stimulus control

TRAUMA SURGERY-SPECIFIC SERVICES

Trauma and Burn Surgery Psychology - order in Epic; Epic chat Katy Maher; page 9291; M-F 9-5

- Assess and intervene to improve patient coping and functioning, especially depression, traumatic stress, and care-interfering behaviors such as avoidance, pain, anxiety, insomnia, aggression, and cognition
- Follow up inpatient throughout admission; refer to outpatient therapy

IVPP - email BridgingtheGap@vcuhealth.org; call (804) 628-4352

- **Bridging the Gap**: combined hospital-community violence intervention program designed to reduce the risk of re-injury including bedside intervention and numerous follow up resources (MH, housing, etc)
- **Emerging Leaders Program**: community workshop series for 14-18 year olds; call (804) 828-8012 to register - patients self-refer/register

Trauma Survivors Network (TSN) – email TSN@vcuhealth.org

- Inpatient peer visits from trauma survivor volunteers and rounds by medical student volunteers who provide TSN Handbook and personal care items and relaxing activities such as stress balls and coloring books
- Outpatient support groups for survivors and caregivers; facilitate survivors' connections to other local resources

HOSPITAL-WIDE SERVICES

Social Work – unit-specific; order in Epic; chat in Epic

- Assess patients for biopsychosocial needs and Social Determinants of Health and provide appropriate referrals and resources; conduct SBIRT
- Coordinate internal resources and plan for discharge/placement (IPR, SNF, LTACH, CSU, Medical Respite, substance use facilities)
- Assist family and patient with "paperwork" - Disability, FMLA, Worker's Comp, Advance Directives, LNOK; guide goals of care conversations with palliative and other services

Spiritual Care – order in Epic; page 6140 for on-call chaplain; 24/7

- Interdenominational; provide comfort and companionship
- Especially supportive with grief (patient and loved ones), end of life decision making, patient codes, and palliative needs

HOSPITAL-WIDE SERVICES CONT'D

C-L Psychiatry – order in Epic; chat in Epic; page 9268; 24/7

- Perform psychiatric consultations and provide treatment recommendations and disposition management
- Engage with teams to provide personalized psychiatric care for patients requiring both medical and psychiatric stabilization
- Refer patients to follow up outpatient services, including therapy and medication management, both internally and externally

Addiction Medicine –order in Epic; page 9951; M-F 8-4

- Collaborate with teams to provide comprehensive care for patients with a broad range of addiction and other medical issues
- Medication-Assisted Treatment (MAT) for opioids, alcohol, and other substances; guidance on withdrawal management
- Assist with referrals to the MOTIVATE outpatient clinic or other facilities for higher level of care

Project Empower – page 2375; email projectempower@vcuhealth.org; call (804) 628-3361

- Support individuals and families who experience sexual, domestic, intimate partner violence, and trafficking
- Crisis response, medical and forensic accompaniment, safety planning, advocacy, and counseling for patients and staff/students

Recreation Therapy - order in Epic; Epic chat Shannon Mitchell; page 5094

- Hands-on tools to manage stress; integrative wellness and quality of life
- Adaptive and leisure equipment for patients of any age, especially for supporting social connections, improving communication, and promoting independence/sense of control (Tobii eye gaze tablet, sip and puff, communication boards, gaming and streaming systems with paid subscriptions, crafts, games, etc, including voice-controlled systems)

Art Instruction – Epic chat Alexis Shockley; email alexis.shockley@vcuhealth.org; M-F 9-5

- Support patients and their family through bedside art instruction using clay, painting, printmaking, sewing, jewelry, mosaic and other mixed media; team building and support by appointment

Music Therapy –order by phone (804) 827-9962; M-F 9-5

- Support patients and families through therapeutic music-based interventions; no prior music experience required
- Reduce stress and perception of pain, aid self-expression, distraction from stressful environment, enhance quality of life

HOSPITAL-WIDE SERVICES CONT'D

Dogs on Call – page 6134; email chai@vcuhealth.org

- Decreases stress, anxiety, and pain, improves communication and mood
- Can visit anywhere in the hospital except where food is being served, surgical suites, and isolation rooms; for patients, staff, and students

Child Life - page 5340

- Activity carts, toys, treats, and crafts for children and teens
- Age-appropriate communication of complex medical issues

Helping Children of Adult Patients (HCAP) – page 7542

- Phone-based guidance and support for families with children struggling to cope with illness/injury/death of an adult loved one
- Psychosocial preparation for children before visiting patient
- Support adults in giving children medical updates (including about death) and being honest with children about hard things

WANT TO LEARN MORE?

American College of Surgeons - Committee on Trauma. (2022). Resources for Optimal Care of the Injured Patient.

deRoon-Cassini, T. A., Hunt, J. C., Geier, T. J., Warren, A. M., Ruggiero, K. J., Scott, K., ... & Brasel, K. J. (2019). Screening and treating hospitalized trauma survivors for PTSD and depression. *The Journal of Trauma and Acute Care Surgery*, *87*(2), 440.

Giummarra, M. J., Lennox, A., Dali, G., Costa, B., & Gabbe, B. J. (2018). Early psychological interventions for posttraumatic stress, depression and anxiety after traumatic injury: A systematic review and meta-analysis. *Clinical Psychology Review*, *62*, 11-36.

National Center for PTSD *(ptsd.va.gov)*
-PTSD Coach - Free Mobile and Desktop Self-Help App
-PTSD Decision Aid - info about different evidence-based treatments for PTSD

The National Child Traumatic Stress Network *(nctsn.org)*
-Training in Trauma-Focused CBT (TF-CBT), Psychological First Aid (PFA), and Skills for Psychological Recovery (SPR)
-Handouts, videos for children and families

Objective Four

Conduct and analyze proof-of-concept delivering training resource(s) in format approved by stakeholder committee to trauma team members

a. *Coordinate with trauma team leadership to deliver training during already established team meeting times to ensure maximum sample size and avoid selection bias*
b. *Assess interdisciplinary team member demonstrated competence and self-reported confidence with identifying common mental health sequelae, their risk factors, and appropriate intervention using pre- and post-training assessments*
    i. *Collect information from referring providers about their training, experience, and beliefs related to trauma-related mental health, generally, and the trauma psychology service, specifically*
    ii. *Assess demonstrated team member competence and insight into trauma-related mental health via a case vignette and follow-up assessment*
    iii. *Assess relationships between team member characteristics and self-reported confidence with demonstrated competence*
    iv. *Quantify changes in provider demonstrated competence and self-reported confidence through repeat case vignette and follow-up assessment*

Three training sessions were held in accordance with suggestions from the expert advisory committee for ideal audiences. The first training session was held during the mandatory morning meeting for trauma surgery physicians, residents, medical students, advanced practice providers, and clinical coordinators, thus capturing a rough cross-section of the breakdown of medical providers present on any given day to care for trauma patients. It is common practice for this meeting to be occasionally dedicated to a didactic topic, so the insertion of this training was

not disruptive to standard clinical or educational routines for the trauma service. Similarly, the second training was held during a weekly didactic lunch hour reserved for new nurses working in the trauma intensive care unit (ICU). Finally, an open training was advertised and held at 3PM, targeting allied health providers, many of whom work from 7AM to 3 or 4PM. News of the training being offered also spread organically via word of mouth, as some individuals who were not included in targeted advertising attended and indicated that the invitation had been shared with them "through the grapevine."

At all three trainings, participants completed questionnaires about their own background and exposure to mental health training in general, and to trauma psychology, in particular (see Appendix 1). One participant's data was removed from analyses due to having answered yes to every question on the pre-test and no to every question on the post-test. Most participants were women (75.9%) and had a mean age of 38 years old. Self-reported tenure on the trauma service ranged from three weeks to 19 years. In accordance with pre-determined eligibility criteria, any participants endorsing less than one month of experience with the trauma service and/or no work with the trauma service within the last year were eliminated from analyses. As a result, five participants were eliminated. Three of five were medical students, one was an occupational therapist from a non-trauma unit, and one did not report their role or education. Once these participants were removed, the eligible group of participants remained mostly women (77.6%) with a mean age of 38.9 years old. Participants were relatively widely dispersed across both level of education and role (Table 10). Self-reported length of previous mental health training ranged significantly, from 0 hours (7 individuals; 14.3%) to more than 500 hours (2 individuals; 4.1%). Self-rated understanding of trauma psychology, as rated on a scale from 0 to 10, ranged from 1 to 10, with 5/10 as the mode and 5.3 as the mean. Similarly, self-rated confidence in

selecting patients to refer to trauma psychology ranged from 0 to 10 with a mode of 5/10 and a mean of 5.5. Estimate of frequency of previous referrals to trauma psychology ranged from 0 (4 individuals; 8.2%) to 100 (6 individuals; 12.2%).

Table 10

Characteristics of Training Participants (n = 49)

	n/M (SD)	%/range
Role	-	-
Associates	4	8.2%
Bachelors	14	28.6%
Masters	12	24.5%
Post-Masters	1	2.0%
Medical Student	1	2.0%
MD	11	22.4%
PhD	5	10.2%
Missing	1	2.0%
Role	-	-
Medical Student	1	2.0%
Resident Physician	6	12.2%
Attending Physician	5	10.2%
Advanced Practice Provider	5	10.2%
Nurse	14	28.6%
Nurse Manager	2	4.1%
Nurse Clinician	2	4.1%
Clinical Coordinator	3	6.1%
Physical or Occupational Therapist	4	8.2%
Pharmacist	1	2.0%
Social Worker	3	6.1%
Other	2	4.1%
Missing	1	2.0%
Understanding of Trauma Psychology Services	-	-
0/10	0	0.0%
1/10	2	4.1%
2/10	7	13.0%
3/10	6	13.0%
4/10	2	4.1%

5/10	9	18.4%
6/10	3	6.1%
7/10	5	10.2%
8/10	4	8.2%
9/10	3	6.1%
10/10	4	8.2%
Missing	4	8.2%
Confidence Selecting Patients for Trauma Psychology	-	-
0/10	1	2.0%
1/10	0	0.0%
2/10	5	10.2%
3/10	4	8.2%
4/10	4	8.2%
5/10	12	24.5%
6/10	2	4.1%
7/10	7	14.3%
8/10	4	8.2%
9/10	3	6.1%
10/10	3	6.1%
Missing	4	8.2%

Performance on vignette-based assessment was mixed. The first training group received Vignette A in their pre-training assessment, which read as follows:

> Vignette A: The patient is a 24-year-old woman who was injured during an altercation at a bar two nights ago. There was gunfire at the scene, but the patient's injuries are more consistent with blunt trauma, including contusions and rib fractures. Although she does not have significant injuries to her lower extremities, she has been refusing to mobilize with physical therapy, citing extreme pain and distrust of the rationale and often crying heavily during their visits. At each assessment with the medical team, the patient is guarded and speaks mainly about her pain and the fact that "it's impossible to sleep here." The charge nurse for the floor has also indicated that the patient is often disruptive to other patients on the floor, frequently yelling for her nurse, rather than using the call

bell. During casual conversations with the team, the patient has mentioned that she used to be an artist. During a chart review, you also see an assault in 2020 by her partner at the time.

The first training group then received Vignette B in their post-training assessment:

Vignette B: The patient is a 72-year-old man who was involved in a head-on collision where he was the driver of a motor vehicle that struck a guardrail eight days ago. Bystanders reported that the vehicle was drifting between lanes before striking the guardrail, and the patient had elevated EtOH. The patient remains in the ICU because although he is generally oriented during the day, night staff have reported that he becomes difficult to understand or direct. One of the patient's main injuries is an open wound on his leg that requires daily wound care. To date, the patient has become so distressed by this wound care that he has been requiring sedation daily and taking scheduled Seroquel for agitation. Bedside nurses have also reported that the patient sometimes provides varying descriptions of how the accident occurred and seems to be thinking and talking about it frequently. Few details of the patient's history are available beyond that he has a pet dog, since his next of kin is an estranged adult sibling, and the patient declines to answer questions beyond stating that "the VA has all that." When you press him about his understanding of his injuries, he replies, "that's all up to God." As you leave his room, you notice that the patient had evidently been twisting his bedsheets in his hands during your conversation, as they quickly unravel as you leave, and he lets go.

Participants in the second and third training received the vignettes in the opposite order, with Vignette B before the training and Vignette A after the training. Responses were collected via

yes/no questions to a list of potential risk factors, symptoms, or consult services. Answers to each question, split by order of vignettes received and by pre- and post-training scores, are depicted in Tables 11 and 12 below.

Table 11

Performance on Vignettes A (Pre) and B (Post)

		Pre-Training (n = 19)		Post-Training (n = 16)	
		n	%	n	%
Vignette A	Pre-Trauma Risk Factor: Gender	14	73.7%		
	Peri-Trauma Risk Factor: Assaultive Injury	15	78.9%		
	Post-Trauma Risk Factor: Inpatient Emotionality	15	78.9%		
	Symptom 1: Procedural Anxiety	15	78.9%		
	Symptom 2: Acute Pain	16	84.2%		
	Symptom 3: Irritability/Aggression	10	52.6%		
	Symptom 4: PTSD (Nightmares)	16	84.2%		
	Consult 1: Trauma Psychology	19	100.0%		
	Consult 2: Trauma Survivors Network	15	78.9%		
	Consult 3: Volunteer Services (Art)	1	5.3%		
Vignette B	Pre-Trauma Risk Factor: Substance Use			14	87.5%
	Peri-Trauma Risk Factor: Premorbid PTSD			6	37.5%
	Post-Trauma Risk Factor: ICU Admission			9	56.3%
	Symptom 1: Delirium			10	62.5%
	Symptom 2: Procedural Anxiety			11	68.8%
	Symptom 3: Acute Pain			7	43.8%
	Symptom 4: Anxiety			10	62.5%
	Consult 1: Trauma Psychology			16	100.0%
	Consult 2: Spiritual Care			10	43.5%
	Consult 3: Dogs on Call			12	75.0%

Table 12

Performance on Vignettes B (Pre) and A (Post)

	Pre-Training (n = 24)		Post-Training (n = 21)	
	n	%	n	%

Vignette A	Pre-Trauma Risk Factor: Gender			12	57.1%
	Peri-Trauma Risk Factor: Assaultive Injury			14	66.7%
	Post-Trauma Risk Factor: Inpatient Emotionality			15	71.4%
	Symptom 1: Procedural Anxiety			13	61.9%
	Symptom 2: Acute Pain			15	71.4%
	Symptom 3: Irritability/Aggression			12	57.1%
	Symptom 4: PTSD (Nightmares)			17	81.0%
	Consult 1: Trauma Psychology			19	90.5%
	Consult 2: Trauma Survivors Network			14	66.7%
	Consult 3: Volunteer Services (Art)			4	19.0%
Vignette B	Pre-Trauma Risk Factor: Substance Use	18	75.0%		
	Peri-Trauma Risk Factor: Premorbid PTSD	8	33.3%		
	Post-Trauma Risk Factor: ICU Admission	17	70.8%		
	Symptom 1: Delirium	14	58.3%		
	Symptom 2: Procedural Anxiety	15	62.5%		
	Symptom 3: Acute Pain	11	45.8%		
	Symptom 4: Anxiety	16	66.7%		
	Consult 1: Trauma Psychology	24	100.0%		
	Consult 2: Spiritual Care	17	70.8%		
	Consult 3: Dogs on Call	19	79.2%		

Vignette-based measurement of demonstrated competence did not reveal an effect from training in any of the three domains assessed, even after split-half adjustments were made (Table 13). Post-hoc power analysis of the 37 participants eligible for pre-post comparison revealed that the sample size would have required an effect size of 0.55 to be adequately powered. Qualitative review of participant answers indicated potential threats to data validity, perhaps indicative of lack of attention or precision. For example, two individuals selected gunshot wound as a risk factor for a case vignette about a patient who fell, and several individuals listed race, education, or wealth as risk factors, despite the fact that none of these factors were presented in either vignette.

Self-reported confidence did improve significantly from pre-training to post-training for both assessed topics: “Based on the services that you identified in the question above, how confident are you in your ability to access/consult these services in a timely manner?” and “How confident do you feel that the plan you developed for referral services will meet the patient's needs?” Mean scores increased, as depicted in Table 13. This analysis was powered at 0.998, given an estimated effect size of 0.75, for confidence accessing resources and at 0.957, given an estimated effect size of 0.56 for confidence that consults would meet the patient’s need.

Table 13

Pre-Training and Post-Training Demonstrated Competence and Self-Reported Confidence

	Pre-Test		Post-Test		*p* value
	M (SD)	Range	M (SD)	Range	
Competence Identifying:	-	-	-	-	-
Correct Risk Factors (3)	2.0 (0.9)	0-3	1.7 (1.0)	0-3	0.16
Correct Symptoms (4)	2.6 (1.1)	0-4	2.6 (1.2)	0-4	0.91
Correct Consults (3)	2.2 (0.7)	1-3	2.0 (0.8)	1-3	0.47
Confidence in:	-	-	-	-	-
Accessing Consult Resources	5.7 (1.9)	2-10	7.2 (2.1)	2-10	<.001
Consult(s) Meeting Need	6.4 (1.9)	2-10	7.5 (2.0)	2-10	.001

Neither past mental health training nor past referrals to trauma psychology was associated demonstrated competence (p = .40). However, both previous mental health training ($F(1,43)$ = 4.1, p = .04) and previous exposure to trauma psychology ($F(1,42)$ = 7.4, p = .002) were correlated with self-reported understanding of trauma psychology, with exposure adding an additional 17.3% of variance explained. For the outcome of self-reported confidence in identifying patients for trauma psychology, previous mental health training did not reach a statistically significant level of correlation with the outcome ($F(1,43)$ = 3.0, p = .09), but when previous exposure was entered into the regression without the initial step of previous mental

health training, the model was significant ($F(1,42) = 6.6$, $p = .003$). Self-rated understanding and confidence were not related to demonstrated competence ($F(2,33) = 1.0$, $p = .90$).

Objective Five

Determine the acceptability and feasibility of this proof-of-concept training intervention using qualitative and quantitative means

a. *Quantify participation in training and completion of associated measures, including level of data completion and interpretability*
b. *Capture logistical and technological challenges with identified training format and procedures*
c. *Analyze brief qualitative feedback from participants using narrative coding following completion of all training delivery (not iterative within this project)*
d. *Summarize numeric feedback about novelty, quality, and overall experience*

This training was offered in multiple formats, including in two captive audience meetings and one open meeting that was advertised to staff. The first captive audience training was held during the morning huddle for the trauma surgery team, which is a mandatory gathering of the medical students, residents, attending physicians, nurse practitioners, physician assistants, and nurse leaders covering the trauma service for that day. Thirty-three individuals who attended that meeting elected to participate in the voluntary online data collection, as indicated by completing at least some portion of a RedCap survey. Next, a training was offered to the cohort of new nurses working in the trauma ICU during their prescheduled weekly didactic training hour. Thirteen individuals submitted data from this group. Finally, the open training included data from 14 individuals. Further details on drop-out points for each training group are presented in

Table 14 below. Of note, one individual who attended the morning huddle and submitted complete data was then removed from analyses due to marked concerns with data validity. Otherwise, the below numbers reflect completion rates without excluding participants who were ineligible for the training assessment due to limited tenure on the trauma service as a measure of feasibility outside of the exclusion criteria for internal validity for measures of the training efficacy.

Table 14

Survey Completion by Training Session

	Morning Huddle	New Nurse Didactic	Open Training
Survey Started	27	13	14
Pre-Test Complete	23	12	12
Post-Test Complete	20	11	10

Based on observations, verbal commentary from participants, and review of submitted surveys, several individuals had difficulty accessing and completing the survey instrument on RedCap. At least two individuals at the open training reported that they were able to submit their Pre-Test but that they then closed the window without writing down the return code and were thus unable to submit linked Post-Test data. With regard to attendance at the training itself, the morning huddle presented the most significant, though not unexpected, challenge. Multiple providers received urgent pages during the training and were forced to leave the room, and some had to attend to clinical concerns on their cell phones, preventing them from completing the surveys.

Nineteen individuals responded to the question, “If this training were to become a regular offering, how often, in what format, and to whom do you think it should be given?” Responses

about frequency included annually (five participants; 13.2%) and twice annually (one participant; 2.6%). With regard to format, three participants (7.9%) noted preference for in person training, and one (2.6%) suggested that a video version could be created to be included in required video trainings. Finally, responses about the ideal audience for this training were varied, with seven (18.4%) suggesting that it be offered to new staff and/or trainees and nine (23.7%) suggesting that it be required for all staff working with trauma patients.

Although all participants were invited to leave qualitative comments of any length in response to the question, "What suggestions, comments, or critiques do you have about this experience as a whole?", most (24 participants; 63.2%) did not leave any comment. One participant (2.6%) typed "none" as their commentary, and nine (23.7%) indicated some version of "great job" without any substantive commentary about details of the presentation. Two comments were more detailed positive feedback: "very helpful" and "Very nicely done. Good information and well organized." An additional two comments offered constructive feedback, including one about follow up resources ("potentially having a SharePoint site [internal website] or teams page with all the resources you said are in the booklet") and one about the training itself ("scenarios a little long; some difficulty focusing on survey in room with talking"). Given the brevity and limited quantity of these qualitative responses, additional qualitative coding was not conducted.

Numeric feedback on the training experience was provided by 35 eligible individuals across three questions, each on a 11-point Likert-type scale. The results, summarized in Table 15 below, indicate that most participants enjoyed the training and its quality, though the content was not entirely new for all participants.

Table 15

Numeric Training Feedback (n = 54)

	Mean (SD)	Range
Overall Experience	9.1 (1.2)	4-10
Quality of Learning	9.1 (1.2)	5-10
Newness of Information	7.5 (2.0)	3-10

Discussion

This project has shed light on the existing patterns of referral to trauma psychology within a Level I Trauma Center, including by comparing characteristics of referred patients to unreferred patients. It also presents evidence for the feasibility, acceptability, and efficacy for additional training about trauma psychology for referring providers, though these results suggest that gains were subjective and not objective. This section will provide interpretations, implications, limitations, and recommendations for the future.

Summary, Interpretation, and Specific Limitations

Objective One

Data collected and analyzed from the National Trauma Registry summarized the 3,546 trauma patients admitted to a Level I Trauma Center in 2022. When compared to Census data for the city in which the trauma center is located, admitted patients were more likely to be male (47.4% Census vs. 63.4% admitted patients), though other demographic characteristics roughly mirrored Census data (United States Census Bureau, 2023), with patient races coded as "Missing," "Other," or "Unknown" likely representing Hispanic or Latine patients and patients who identify as multiracial. Currently, the National Trauma Registry does not capture ethnicity, nor does it code Hispanic/Latine as a racial category, reflecting a limitation of the available data. Details of injury severity, mechanism of injury, comorbid conditions, and discharge destination recorded for this sample are in line with similar published data sets (Bell et al., 2014; Bertelson,

Bravel, & deRoon-Cassini, 2011; Chavez et al., 2021; Palmu et al., 2011), suggesting at least a moderate level of generalizability for the current findings as a representative example of a Level I Trauma Center's annual admissions.

Reported substance use was also in line with national averages (Cornelius et al., 2020; SAMHSA, 2021), though likely undercounted since it is only coded in the National Trauma Registry in the presence of a medical diagnosis. Especially for patients who were admitted to the hospital in critical or acute condition, a full history of their substance use is routinely and appropriately deferred, or even omitted, in favor of life-saving interventions. It is thus challenging to meaningfully compare the substance use of admitted patients to estimates of population use. One potential resolution to this difficulty is the standard practice at many trauma centers to obtain toxicology for all admitted patients. Doing so is the recommended practice of the American College of Surgeons (ACS, 2022), but this data is not systematically extracted for the National Trauma Registry. Additionally, although use at time of injury is a significant risk factor for worse outcomes (Richmond & Cauder, 2000), even systematic toxicology screening would likely miss many patients who do routinely use substances but were not using actively at the time of their injury or shortly before.

Referral frequency was captured for trauma psychology, Consult and Liaison Psychiatry, and Addiction Medicine. When comparing these rates to other published data, comparison is made challenging by the scarcity of data on the practice of dedicating psychology or psychiatry clinicians to trauma teams. Where data exist for comparison, rates in the current sample were lower (Frank et al., 2017; Erdoğan and Delibaş, 2020; Findley et al., 2002; Perez-Jimenez et al., 1994). Of note, trauma psychology, staffed by one full-time faculty psychologist and rotating trainees, fielded more consults than the other two mental health consult services combined, both

of which serve a larger, hospital-wide, patient pool but are also staffed by multiple providers and, in the case of Consult and Liaison Psychiatry, have providers available 24/7.

Descriptive analysis of the trauma psychology service in 2022 indicated high acceptability of the service to patients, with only 4.0% of patients declining to engage, and many patients engaging in multiple follow-up visits. Overall, 92.3% of referred patients were successfully seen for a full consult visit, with 3.0% unable to participate in the consult in addition to the 4.0% who declined and two (0.9%) inappropriate consults that were not attempted. Most referred patients were seen within 24 hours of the consult being placed. Overall, this suggests that the trauma psychology service, which was staffed by the equivalent of approximately 2 full-time clinicians over this period, was able to meet the need as requested by referring providers. However, the overall referral rate of 8.7% falls far below estimates of the proportion of trauma patients in need of mental health services (Giummarra et al., 2018). Given the close nature of collaboration between trauma psychology and many referring providers and in the absence of a formal screening process or additional resources, it is hypothesized that referring providers may have taken it upon themselves to limit the number of patients that they referred to trauma psychology out of awareness of the limited person power available. For instance, multiple of the participants in the Expert Advisory Committee explicitly stated that they try to self-limit the number of referrals that they make to trauma psychology out of an awareness of the need to prioritize with limited resources.

Consultation by trauma psychology includes standardized assessment of acute concerns, with a diagnosis applied primarily for billing purposes. Descriptive analysis of assigned diagnoses reveals some of the known challenges of diagnosing psychological disorders in the presence of acute physical stressors (O'Donnell et al., 2016). In this sample, 78.1% of patients

were diagnosed with a form of Adjustment Disorder, most commonly with anxiety. Of note, no patients were diagnosed with Acute Stress Disorder, which is the other primary stressor-related disorder that can be assigned within 30 days of a Criterion A event. These two diagnoses have significant overlap and could likely, in many cases, be appropriately interchangeable for the same clinical presentation, though recent diagnostic system changes have sought to clarify potential overlap (O'Donnell et al., 2019). The clinical practice of trauma psychology to diagnose Adjustment Disorder in lieu of Acute Stress Disorder likely reflects more variability on the part of the clinician assigning the diagnosis than on the part of the clinical symptoms being evaluated. For some clinicians, the context of current hospitalization, including potential anesthesia and/or narcotic use, should preclude the assignment of any potentially more stigmatizing diagnosis, and symptoms of traumatic stress cannot be reliably separated from effects of medication. In addition to adjustment disorders, some patients were diagnosed with unspecified anxiety or depression, and others exclusively with medical diagnostic codes, such as Traumatic Brain Injury, Delirium, or a specific traumatic injury. In one unique case, Functional Neurological Disorder was diagnosed after extensive review of records and consultation outside of the normative diagnostic process. In another potential quirk of clinical preference or habit, some patients were not designated any diagnosis, including no medical diagnosis. One potential explanation is that a proportion of visits were conducted by trainees and thus not billed, relieving the necessity to assign a diagnosis for medical coding and billing purposes.

In addition to diagnoses reflecting acute conditions, patient self-report and chart review often support chronic or by history diagnoses, but in the absence of standardized measure or interview, the trauma psychology clinician is forced to rely on patient self-report and/or the electronic medical record, both of which are known to be unreliable (Smith et al., 2008).

Additionally, the circumstances of each consult visit may have contributed to variable likelihood of the clinician obtaining an exhaustive understanding of a patient's premorbid mental health. For instance, if a patient is critically injured and/or acutely distressed, the clinically appropriate decision may be to obtain an abbreviated history and prioritize the delivery of intervention, rather than emphasizing the collection of a complete history. Third, as above, accurately capturing every premorbid condition may not be relevant or impactful for billing, especially if the premorbid condition was not relevant during the session, leading to the clinician prioritizing documentation of the clinical concern being actively treated during the visit, most commonly an acute diagnosis. As a result, non-primary diagnoses and diagnoses clearly based on patient history, rather than current presentation, were not included in analysis. Although not analyzed formally in this project, the lack of formal diagnosis of other conditions should not be conflated with an assumption that patients are not systemically assessed for premorbid conditions likely to impact their current and future functioning or an assumption that patients may not be impacted by premorbid mental health. Even if not documented, assessing for history is a standard and emphasized part of the trauma psychology assessment and intervention process, and there is a strong body of literature suggesting high rates of premorbid mental health concerns among trauma patients (Brewin et al., 2000; Kenardy et al., 2018; Powers et al., 2014; Shih et al., 2010; Zatzick, Rivara, et al., 2007). Future study in this area could prioritize more exhaustive review and confirmation of premorbid mental health concerns.

Comparing the subset of patients referred to trauma psychology to the majority of patients who were not referred revealed several notable trends. First, referred patients were younger, a frequently observed phenomenon in the literature, where older trauma patients are more likely to be the survivors of falls or accidents, rather than violent or interpersonal trauma

(Chavez et al., 2021). Although older patients are at higher risk for delirium and pain-related distress (Angles et al., 2008; Branco et al., 2011; Rosenbloom et al., 2013; Rueden et al., 2017), younger patients are frequently at higher overall risk due to other co-occurring risk factors, such as violent injury. Black/African American patients and patients of unknown race were also overrepresented among referred patients, with white patients underrepresented, most likely reflecting the well-documented effects of racialized poverty on violent crime. Overall, racial group composition varied significantly between unreferred and referred patients, adding to decades of research reflecting racialized disparities in violence and traumatic injury, especially assault and gunshot wound, in the United States (Henry et al., 2023; Moore et al., 2013).

Unlike in other similar studies (Chavez et al., 2021), substance use did not vary by referral status. In this sample, this is likely attributable to the presence of a specialized Addiction Medicine consult service, to which many patients with substance use concerns were referred and to whose experience trauma psychology often frequently deferred. Aspects of injury, including calculated Injury Severity Scale (ISS) totals, lengths of stay, and discharge locations, all varied by referral status, such that referred patients were more severely injured, remained hospitalized longer, and were more likely to discharge to higher levels of treatment post-hospitalization. The discrepancy in length of stay was particularly notable, with referred patients staying on average more than three times as long as unreferred patients. In combination with the two other measures that tend to correlate strongly with injury severity (ISS and discharge location), this suggests that patients that were referred to trauma psychology were simply more severely injured. It is also possible that longer length of stay increases the likelihood that a patient will develop symptoms or display poor coping which are then noticed by care providers. Although outside the scope of the current project, some research suggests that the proactive involvement of trauma psychology

can shorten length of stay (unpublished, Jackson et al., 2019). Other notable differences in discharge destination included an underrepresentation of deceased patients in the referred group, which is highly logical, given that a mental health consult service is unlikely to be prioritized for a patient who is imminently at risk of death and may not be conscious. Unreferred patients were also less likely to leave against medical advice (AMA). Since many patients leave AMA due to psychosocial distress (Ugarte et al., 2023), it makes sense that these patients would be more likely to trigger a referral to trauma psychology. Another follow-up analysis that is outside the current scope could be to determine whether involving trauma psychology can reduce the likelihood of patients ultimately leaving AMA once they have threatened to do so.

As expected, mechanism of injury also varied significantly between unreferred and referred patients, in line with existing literature (Chavez et al., 2021). Referred patients were more likely to have survived an interpersonal injury, such as a stabbing or gunshot wound and also more likely to have survived a burn or collision. Injury types less likely to be the result of assaultive violence were also significantly underrepresented among referred patients, especially low falls and ground level falls, the latter of which represented 19.5% of unreferred patients but only 0.6% of referred patients. Finally, the presence of documented comorbid medical conditions was compared by referral status but did not systematically differ. The National Trauma Registry does collect mental health diagnoses as comorbid conditions, but when this data was reviewed, it was determined to be flawed beyond recovery and was not included in analyses. In addition to the challenges with capturing premorbid mental health diagnoses listed above, the coders for the National Trauma Registry rely on mental health diagnoses charted by medical providers, many of which are often incorrect, outdated, or missing.

Objective Two

The convening of an Expert Advisory Committee was a highly successful and critical component of the subsequent development of the training intervention. Participation was voluntary and enthusiastic. However, by intentionally recruiting providers who were known to be effective users of the trauma psychology service, the perspectives shared and used to model the training were likely overly positively tinged. For instance, staff and trainees who are not as informed about or as invested in trauma psychology services available for their patients were not selected and thus not included in the shaping of the intervention. It is thus possible that the mixed level of participation in the eventual training, discussed below, was not able to be addressed and prevented by intentionally seeking the perspectives of these individuals. On the other hand, many of the participants with questionable data were students and trainees, many of whom work for less than a month at a time with the trauma team, inherently limiting their knowledge about and exposure to trauma psychology. For this reason, rotating trainees were not intentionally recruited for the expert advisory committee, as they were not anticipated to be expert in the subject at hand. Perhaps in future, multiple expert advisory committees could be convened, specifically targeting high likelihood referrers, low likelihood referrers, and trainees. This would be made challenging, however, by the inability to reliably link referrers to referral patterns, discussed in detail below.

Objective Three

The process of obtaining information from ancillary services largely proceeded according to design and ended up yielding the product that was most useful to staff, according to anecdotal reports. By consolidating brief descriptions of each service, along with the best way to contact/refer to that service, it is hypothesized that many referring providers experienced

reduction in stress and may have even increased their referral frequency. However, as noted elsewhere, it is outside of the scope of this project to confirm this hypothesis. An additional soft benefit of this objective was increased goodwill between the ancillary services, as evidenced by expressions of genuine and generous appreciation for the effort demonstrated by this project to accurately represent each service. It is hoped that in the future, trauma program leadership will prioritize maintaining this resource with up-to-date information, not only as a way to maximize the use of available services, but as an expression of enacted belief in the value of these services. Future study in this area could include exploring whether referrals to ancillary services increased and/or improved following the development and dissemination of this tool. Additionally, further exploration would be merited into processes of referring patients between ancillary services.

Objective Four

Once developed and approved by the expert advisory committee, the novel training was presented to three groups of trauma staff and trainees. Participants were mainly female and averaged 38 years of age. The breakdown of participants by education and by role was fairly diverse, including participants at every educational level from Associates to PhD, and with a plurality of nurses (25.9%), followed closely by physicians (20.4%). Participants in roles that are enabled by the electronic medical record system to directly place consults to trauma psychology (resident physicians, attending physicians, and advanced practice providers) comprised 29.7% of all participants. Although less than one third of the total group, this breakdown actually overrepresents providers in the context of all staff in the trauma service and reflects the reality that although referrals can only be placed by certain staff, many times other staff are the true source of the referral by recommending that a provider place a referral. This reality is anecdotally well known, but the data available for the current project were unable to confirm this

supposition. However, since only six participants denied ever having placed a consult, it is clear that participants of various roles and disciplines consider themselves to have placed consults, even if the consult is not captured in the electronic medical record using their name.

Self-reported understanding of trauma psychology and confidence referring to trauma psychology both ranged widely among participants, with the median and mode for both at approximately 5/10. Although not an exact comparison, this mixed level of subjective understanding and confidence fits with published surveys of provider knowledge about mental health services (Beckett et al., 2014; Ortiz et al., 2020).

In addition to development and proof-of-concept for this training, an additional aim of this project was to test whether a short training intervention could increase both subjective and objective ability and confidence effectively referring patients to trauma psychology. Unfortunately, without an ability to tie attendance at the training to actual clinical behaviors, a proxy measure for demonstrated competence was required. The vignettes designed, which were used in a split-half design across different sessions, represented an imperfect attempt to measure objective confidence, and it is likely that the vignettes may not have been equivalent in difficulty due to differing word lengths. Although they were designed in consultation with resources (Evans et al., 2015), the inconsistency of responses provided by participants, both before and after the training, and on both vignettes, suggests that the form of the vignette and related assessment was far from ideal. Even items that were expected to be constants or checks of participant effort and attention revealed varied responses among more than a few outlier participants. Additionally, given the high rate of ineligibility of participants, the sample size was not adequate to fully power a comparison. As a result, it is proposed that the manner of measuring learning may have failed to identify a true effect of the training on learning, yielding a

false negative. Although not a direct proxy for objective outcomes, self-reported confidence did increase significantly for both confidence accessing resources and confidence that the resources would meet patient need, offering further support for the possibility of the current results representing a false negative finding. However, it is, of course, also possible that there was no effect of the training on objective competence, or that there was a ceiling effect to performance on the vignettes, with the current results reflecting a true negative. Without repetition and/or improved measures of competence, it is impossible to determine which was the case. Further consultation and investigation of alternatives would be a high priority for any future replication or expansion, especially since measuring efficacy becomes more important in future phases of intervention development.

In a similar pattern, neither prior mental health training nor past experience referring patients to trauma psychology was correlated with performance on the vignette-based assessment, but both were associated with self-reported understanding, explaining an additional 18.4% of the variance in self-reported understanding scores. Previous exposure to trauma psychology was also significantly related to self-reported confidence identifying patients for trauma psychology, in line with hypotheses, and offering potential additional evidence for the possibility that the vignette-based assessment failed to identify a true change in learning from the training. It may also be that participants over-estimated changes to their self-assessed competency and confidence that resulted from the training, due to recency bias and other inter- and intrapersonal biases, with self-assessed improvements not translating to improvements in objective performance.

Objective Five

Overall, the training intervention was acceptable and feasible as delivered. It was anticipated that clinical need might require some participants to leave the training early or be intermittently attentive, but this possibility was determined to be less important than the value of testing a training that would fit into existing clinical educational practices. Rates of survey completion were higher at the two training sessions where participants had coverage for their clinical responsibilities during the time of the training, but this will not always be possible, justifying the flexibility of the current approach. Further, even with some deficits in participation during the session that participants were on call, survey completion was still high, and participants reported positive reactions to the training. However, it must be noted that the presence of some unreliable survey data may reflect a certain subset of participants for whom the training was not acceptable or feasible, despite overall positive responses. Unfortunately, these individuals generally did not leave qualitative responses, so further exploration of their experiences is not possible.

Some additional technical and logistical barriers were faced, particularly with accessing the survey platform. Several participants who attended and verbally reported enjoying the training were unable to access the qualitative and quantitative surveys due to various technical issues, primarily having to do with the hospital firewall. High priority was placed on privacy for participants, especially against any perception of risk to employment, so all data was collected through an anonymous online survey platform. As a result, the facilitator was unable to link or reconnect data once anonymized or submitted, even though some participants who were unable to submit complete data through the IRB-approved process offered to engage in an effort to identify their data in order to complete it. A potential solution to this issue could be the use of a

paper-and-pencil back-up, though this was ruled out during study design in order to maximize patient privacy.

Qualitative and quantitative ratings of the training were very good, with mean ratings of overall experience and quality of learning over 9/10. Ratings for newness of information were slightly lower, averaging 7.6/10, but this is understood to be an appropriate balance, given the wide range of participant education and experience. Further, although limited in quantity and severely limited in length, qualitative free responses were nearly universally positive and very much in favor of making this training a routine part of clinical education for trauma staff and trainees. It is possible, however, that responses were somewhat inflated by the fact that the training facilitator was known to participants and the further knowledge that this training represented the facilitator's dissertation project. It must be assumed that at least some portion of participants either withheld negative or constructive feedback or inflated their positive feedback out of a desire to be supportive to a colleague they had known for several years. Additionally, qualitative responses were not sufficient in quantity to permit narrative coding, significantly weakening any conclusions that can be drawn from these responses.

Implications

These results build on existing evidence of trends in patient factors associated with referral to trauma psychology. Although the current project was not able to quantify the impact of trauma psychology on outcomes for referred patients, it does strongly suggest that referring providers see a need for the service and are generally consistent in the types of patient presentations that they refer. Further, several of these factors align with identified research-based risk factors for worse outcomes following traumatic injury, suggesting that referring providers are able to effectively identify at least some of their patients at greatest risk.

Although the ultimate aim of developing a training that would improve both demonstrated and subjective competence was not met, the developed training did correlate with significantly improved subjective competence and was assessed to be acceptable and feasible, which was the primary aim of this phase of its development. As a result, it is reasonable to propose that further study, especially with improved methods of measuring changes in demonstrated competence, may ultimately support the dissemination of this training to other trauma centers and to larger sample sizes. Participant responses also clearly confirm the desire from interdisciplinary providers to know more about and have greater access to specialized mental health service for traumatically injured patients. Future study should seek to more effectively link provider training to actual provide clinical behavior, discussed further below.

The data contribute to a broader understanding of what remains a somewhat novel practice: integrating specially trained trauma psychologists into trauma centers to provide services to acutely injured patients. Although generalizability between trauma centers is not perfect, nor is generalizability between trauma psychology services, the current results should be taken as an example of one trauma center's approaches to managing the mental health needs of its trauma patients and may serve as a valuable comparison for similar explorations at other trauma centers.

While previous research has primarily focused on reporting the effects of various trauma psychology programs and approaches, the current project sought to go a step further and capture data from an initial proof-of-concept trial of a training for referring providers to improve their collaboration with trauma psychology. It is hoped that this project will be but the first of a series of research attempts to develop education around trauma psychology as a service and as an effective intervention and to connect such education to patient outcomes. Additionally, as universal screening becomes more commonplace across trauma centers, providers will need to

have updated education on the role of screening in identifying patients for care, as well as the continued importance of providers identifying patients for services and making direct referrals independent of a screening process. For example, although universal screening processes may better capture patients suffering from depression or signs of posttraumatic stress, currently used screeners do not systematically assess for delirium, pain, activity avoidance, grief, family conflict, injury adjustment, or any number of other areas of concern with which trauma psychologists can effectively intervene. As the landscape continues to change, providers will continue to require and seek additional and up-to-date training.

General Limitations

In addition to the specific limitations discussed above for each objective, several general limitations are important to consider. First, the primary and overarching limitation of this project is its inability to link objective data about clinical practice to individual referring providers, thus restricting any measurement of provider learning or improvement to a proxy measure, such as the vignettes used. As mentioned above, the electronic medical record system used in this setting restricts which individuals are able to actually place an electronic consult to staff providers (physicians and advanced practice providers). Additionally, many of these providers work in teams where it is common practice for one provider to serve as the scribe for all other providers present, making it impossible to identify which provider was actually the source of the referral. Further, beyond providers themselves, many other members of the interdisciplinary team reach out to providers to suggest that a consult be placed. In those instances, the name recorded in the medical record is whichever provider placed the consult, not the interdisciplinary team member who identified the patient need. For these logistical reasons, as well as a desire to protect the privacy of staff members from any potential employment-related consequences of this research,

the current study is not able to link provider behavior (presence of a referral) to provider background, provider training, provider discipline, or any other patient- or system-related factors. The complexity of such a research design is likely a primary explanation for the remarkable lack of published similar literature. Although a few authors have reported on referral patterns, others have described training approaches, and yet others have surveyed or assessed competence in providers, none has combined all three components into a single project. The current project represents a significant step in this direction but falls substantially short of such a goal.

As a retrospective project, the current study is also limited, as is all research, by the data available for analysis. The advent of the electronic medical record has opened some new possibilities for systematic data collection and analysis, such as machine learning (deRoon-Cassini, 2019), but any such effort remains hamstrung by the vast quantity of errors in clinical data, such as out of date diagnoses, missing diagnoses, missing or incorrect demographic information, and artifacts of simple human error. Any effort to capture details of diagnosis and practice in a clinical setting faces a decision between internal and external validity. Whereas detailed patient interviews by trained interviewers with cross-validation would potentially offer more accurate information about patient background and symptoms, such an undertaking would be nearly impossible to accomplish at scale and as a result would minimize the dramatic variety in patient presentation to a more or less representative sample.

A similar theme applies to the efforts of this project to develop and implement a training within an existing educational and clinical framework. Although doing so eliminated many options that might have ultimately led to more internally valid data, the end result was a product that was tested “in the real world,” albeit with mixed results. Here it is important also to reflect

on the true purpose of any research-based undertaking. In the current case, external validity was intentionally given preference above internal validity due not only to available resources and opportunities but also due to the researcher's desire to provide a necessary and sought after service and to then measure its effects, rather than prioritizing more perfect measurement of an artificial service created solely for the purpose of research. Further, the researcher (this author) was not an objective party to the research being conducted. By serving as the researcher, the trainer, and a primary figure in the clinical service being assessed, this writer inhabited not only dual, but triple roles. Although every effort was made to ensure the legitimacy and validity of the research process, it is nearly certain that expectancy effects are present, if not in the data, then in their interpretation. On the other hand, the near total absence of research of this kind in the literature speaks to the importance of such an endeavor, even a potentially flawed one.

Recommendations

The opportunities for further study in this area are nearly endless. First, further research is needed to establish the factors that influence providers to refer patients to consult-based services and to determine whether these factors are fixed or fluid. It would also be valuable to consider these factors across several domains, namely patient factors, provider factors, and systemic factors (Chen et al., 2016), in order to target further research and further intervention to appropriate levels.

Overall, the field will need to continue to build a base of evidence in favor of several premises: 1) that psychological intervention during acute care following traumatic injury leads to better outcomes; 2) that targeted rather than universal psychological intervention is more effective and/or efficient; 3) that identifiable factors allow for effective targeting of resources; 4) that referring providers are able to correctly and reliably assess these factors among their

patients; 5) that providers are able to appropriately and consistently refer patients to services; and 6) that referring providers can be taught about how best to utilize mental health services; 7) that providers who are trained improve their referral practices; and 8) that improved referral practices lead to improved patient outcomes. Evidence of varying quantity and quality exists for all of these premises, but the overall theoretical pathway remains largely hypothetical, or at least based on assumptions of the mechanisms of change at work. Research in this area will also be required to adjust as universal screening becomes the norm, including to identify remaining gaps in screening procedures and how additional processes can fill these gaps.

One section of this theoretical pathway that has now accumulated a meaningful body of literature is the first: that early intervention after traumatic injury can be effective at managing, and even preventing, PTSD. Both Psychological First Aid and Skills for Psychological Recovery are recommended by the World Health Organization's Mental Health GAP Intervention Guide, an effort by the World Health Organization to create evidence-based, user-friendly guides to managing mental health concerns in medical settings worldwide (WHO, 2013). The World Health Organization Guide also includes recommendations for more intense management of stress reactions, such as PTSD. Additionally, the International Society for Traumatic Stress (ISTSS) has identified and assessed several types of intervention with strong evidence for their ability to treat PTSD when administered less than three months post-injury and when administered at any time (ISTSS, 2020). Although an exhaustive review of all literature demonstrating the impacts of such approaches is outside the scope of this project, Giummarra and colleagues' 2018 meta-analysis of treatment provided during the first three months post injury demonstrated positive effects of psychologist-led interventions, with the strongest effects

on depression, PTSD, and anxiety coming from intervention that began within the first four weeks after injury.

Another underlying premise that is firmly supported in the literature is that only a small portion of patients in need are estimated to successfully access care (Herrera-Escobar et al., 2018), despite demonstrated high rates of negative sequelae (Giummarra et al., 2018). Trauma patients tend to have limited utilization of outpatient mental health services in general, especially if they already have a history of trauma and PTSD (Trusz et al., 2011). Known barriers to such access are patient unfamiliarity, mental health stigma, and functional barriers like limited resources for transportation (Davis et al., 2008; Trusz et al., 2011; Wong et al., 2007), as well as the limited availability of trained providers in trauma centers (McBain et al., 2019; O'Donnell et al., 2008) and disparities in care access and quality available to members of minoritized groups (Wasserman et al., 2019). As a result, effective targeting of inpatient mental health resources may serve as an effective bridge to connect more patients with services that have historically not been accessible.

In light of the combination of this fragmented evidentiary base and the well-evidenced unmet need for psychological treatment of traumatically injured patients, many clinical settings have chosen to implement models of intervention proactively and to then follow up by testing their impacts. For example, some hospitals have more formally integrated systems to best serve patients and direct appropriate care to them. One model of this form of treatment is known as the Multi-tier Approach to Psychological Intervention after Traumatic injury (MAPIT; Hunt et al., 2018). MAPIT offers a general flow procedure for effective use of an initial screening measure, follow up assessment, and, when appropriate, full assessment and intervention by specially trained inpatient mental health providers who can provide referrals to outpatient providers, as

well. Another similar approach to organizing and delivering care is known as stepped or collaborative care, a creative, hybrid model designed to take advantage of treatment opportunities in inpatient and outpatient settings, whereby patients at risk for negative mental health sequelae are identified in the inpatient environment and then receive case management following their hospital stay, which directs them to brief intervention, more extensive psychotherapy, and/or pharmacotherapy, based on patient functioning over time (O'Donnell et al., 2012; Zatzick et al., 2001). Similar interventions have also been successfully implemented among special populations, such as burn survivors (Fauerbach et al., 2020) and neuroscience ICU patient-caregiver dyads (Vranceanu et al., 2020). The results of a major trial of stepped collaborative care at 25 Level I trauma centers in the United States revealed significant reductions in PTSD at six months but not twelve months, with greater improvements associated with worse baseline risk and higher intervention fidelity (Zatzick et al., 2022). This trial further demonstrated some success in reducing reported suicidal ideation (Engstrom et al., 2022) and carriage of firearms in the six months after firearm injury (Nehra et al., 2021). Novel research into telehealth approaches to similar models is also proliferating (deRoon-Cassini et al., 2019), especially following discharge (Price et al., 2014). Although outside of the scope of this project, and occurring following its conclusion, the current trauma center assessed has since implemented a universal screening process.

Finally, future research in this area would be strengthened by including focus on provider well-being, as an outcome. While appropriate referrals may help target better patient care, they may also support provider wellbeing as well. Medical providers, especially in Level I Trauma Centers, not only treat survivors of trauma, but they are also often witnesses to significant trauma, which can lead to secondary traumatic stress and burnout at higher rates than the general

population (Dyrbye et al., 2008; Dyrbye & Shanafelt, 2016; Jackson et al., 2017, 2019; Mladen et al., 2019; Shanafelt et al., 2009; Zhang et al., 2018). Among surgeons in particular, high distress and even mental health diagnoses are common (Jackson et al., 2017).

Despite high exposure to stressful situations, some solutions are available for trauma providers. For example, systemic improvements that make provider workflow more efficient can save providers time and help them to feel more productive and effective (Bodenheimer & Sinsky, 2014), especially given the high number of competing demands placed especially on trainees in acute care environments (Bobel et al., 2021). Improving processes that connect patients with mental health services may also reduce provider burnout and secondary trauma by reducing provider distress (e.g., witnessing their patients go without appropriate mental health support), reducing conflict between providers and patients and between providers themselves (e.g., addressing substance abuse, clarifying the way a patient's history may be impacting their presentation), and improving patient ability to engage in co-management and planning with their providers (e.g., facilitating patient self-advocacy and breaking down medical mistrust) (Pastores et al., 2019). Similarly, increased exposure to mental health providers and services may help to normalize and validate the challenges that trauma providers face on a daily basis and encourage them to seek services, both for their patients and themselves, both of which are highly recommended by working groups addressing these issues (Pastores et al., 2019). In return, improved provider quality of life may result in improved patient outcomes overall, as provider burnout has been associated with decreased work productivity (Dewa et al., 2014), reduced executive functioning (Deligkaris et al., 2014), and deficits in thinking and attention (Sokka et al., 2016). By offering trauma providers ways to support the mental health of their patients, and by improving provider understanding of team-specific referral processes, providers may

experience less frustration with systems. They may also be better able to see and value their positive impacts on patients' mental health, in addition to their physical health, leading to improved overall well-being.

In summary, nearly every facet of this topic merits additional research, as well as increased emphasis and support from healthcare leaders and systems to prioritize the need to seek such answers. The current project was designed to meet phases Ia (Design), Ib (Refine), and IIa (Proof-of-Concept) of the ORBIT model (see Figure 1; ORBIT Consortium, 2015). Thus, the development of evidence for acceptability and feasibility was prioritized and was largely successful. Future research should likely return to phase Ib (Refine) before proceeding to phase IIb (Pilot) and beyond with the aim of solidifying evidence for this training model's efficacy through repeated trial and larger sample sizes with superior methods of measuring change. A vast increase in trained clinicians and researchers is also necessary. Although the American College of Surgeons requires that trauma centers have psychiatry and social work available, psychologists or other mental health providers are not yet required (ACS, 2022). However, in recent years, increased attention has been paid to the need to further develop this specific workforce (McBain et al., 2022) and to prepare and advocate for changes to the ACS requirements in the future (deRoon-Cassini & Timmer-Murillo, 2022). The American Psychological Association has also placed increased emphasis on interdisciplinary skills and training in consultation with interprofessional providers (Cook et al., 2019), but few clinical psychology training programs provide both specialized training for working in healthcare environments and with health-specific patient concerns, known as Health Psychology, and trauma psychology education, despite the strong overlap in these areas, with only about 20% of Clinical Psychology training programs offering trauma psychology courses (Cook et al., 2017). It

is hoped that additional research in this area will lead to increased development of resources, including human resources, to best meet patient need.

Conclusion

The current project represents a first attempt to combine evidence from the literature, analysis of actual clinical practices, and perspectives from an expert advisory committee to develop and test a novel training for healthcare providers working in trauma centers and referring patients to trauma psychology. Retrospective analysis of one year of admitted patients revealed rates of referral similar to those supported by the literature and in line with the limited published evidence about patterns of characteristics of referred patients at other programs with similar referral-based services. Although significantly limited by challenges with the main outcome measure for learning, evidence for acceptability and feasibility is strong, and engagement was high. After attending the training, participants reported improved self-rated competence and confidence in their ability to effectively refer patients to trauma psychology. As hypothesized, these subjective ratings were also significantly correlated with previous exposure to trauma psychology. It is proposed that future research in this area may be able to better measure learning, especially by tying it to actual clinical practice, and build further evidence for the need for and benefit of a standardized training for trauma providers referring trauma patients to trauma psychology, based in understanding of the literature and the realities of clinical practice.

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Appendix 1. Provider Information

1. What is your gender? ___
2. What is your age? ___
3. What is your level of education? ___
4. What is your role on the trauma service? ___
5. How long (in months and years) have you worked with the trauma service? ___
6. When was the last time that you worked with a patient from the trauma service? ___
7. Approximately what percentage of the patients that you serve are on the trauma service?

The following questions ask you to rate your **experience** and **comfort** with using the trauma psychology service.

1. How many hours of training in psychology/mental health would you estimate that you have received in your career? ___
2. How many times in your career would you estimate that you have referred a patient to trauma psychology? ___
3. How would you rate your understanding of the services offered by trauma psychology?

   1 2 3 4 5 6 7 8 9 10

   Limited Excellent

4. How confident do you feel about your understanding of which patients would be well served by trauma psychology?

   1 2 3 4 5 6 7 8 9 10

   Not at all confident Very confident

Appendix 2. Vignettes

Vignette A: The patient is a 24-year-old woman who was injured during an altercation at a bar two nights ago. There was gunfire at the scene, but the patient's injuries are more consistent with blunt trauma, including contusions and rib fractures. Although she does not have significant injuries to her lower extremities, she has been refusing to mobilize with physical therapy, citing extreme pain and distrust of the rationale and often crying heavily during their visits. At each assessment with the medical team, the patient is guarded and speaks mainly about her pain and the fact that "it's impossible to sleep here." The charge nurse for the floor has also indicated that the patient is often disruptive to other patients on the floor, frequently yelling for her nurse, rather than using the call bell. During casual conversations with the team, the patient has mentioned that she used to be an artist. During a chart review, you also see an assault in 2020 by her partner at the time.

Vignette B: The patient is a 72-year-old man who was involved in a head-on collision where he was the driver of a motor vehicle that struck a guardrail eight days ago. Bystanders reported that the vehicle was drifting between lanes before striking the guardrail, and the patient had elevated EtOH. The patient remains in the ICU because although he is generally oriented during the day, night staff have reported that he becomes difficult to understand or direct. One of the patient's main injuries is an open wound on his leg that requires daily wound care. To date, the patient has become so distressed by this wound care that he has been requiring sedation daily and taking scheduled Seroquel for agitation. Bedside nurses have also reported that the patient sometimes provides varying descriptions of how the accident occurred and seems to be thinking and talking about it frequently. Few details of the patient's history are available beyond that he has a pet dog,

since his next of kin is an estranged adult sibling, and the patient declines to answer questions beyond stating that “the VA has all that.” When you press him about his understanding of his injuries, he replies, “that’s all up to God.” As you leave his room, you notice that the patient had evidently been twisting his bedsheets in his hands during your conversation, as they quickly unravel as you leave, and he lets go.

Appendix 3. Provider Competence/Confidence Survey

1. What **risk factors** for poor mental health outcomes do you see in this case? Please select all that apply.
    a. Patient gender
    b. Patient education
    c. Patient income/wealth
    d. Patient race
    e. Patient age
    f. Premorbid PTSD
    g. Premorbid mental health concerns
    h. Substance use
    i. Assaultive or intentional injury
    j. Injury by gunshot
    k. Patient-perceived threat to life
    l. Emotional exhaustion during trauma
    m. Dissociation during trauma
    n. Patient-perceived continuation of threat to life
    o. Strong emotion in inpatient environment
    p. Patient perception of exaggerated injury severity
    q. ICU admission
    r. Significant pain
2. What **mental health symptoms** is this patient currently experiencing? Please select all that apply.

a. Symptoms of posttraumatic stress (PTSD symptoms too early for diagnosis)
b. Depressive symptoms
c. Adjustment disorder
d. Anxiety symptoms
e. Post-ICU Syndrome
f. Suicidality
g. Agitation, aggression, irritability
h. Delirium
i. Substance use
j. Acute pain
k. Pain-related anxiety and avoidance
l. Grief

3. Which of the following **services** would you plan to consult for this patient? You may choose multiple.
    a. Psychiatry
    b. Trauma psychology
    c. Spiritual Care (Chaplain)
    d. Social Work
    e. Dogs on Call
    f. Helping Children of Adult Patients (HCAP)
    g. Child Life
    h. Volunteer Services
    i. Trauma Survivors Network

4. Based on the services that you identified in the question above, how confident are you in your ability to **access/consult these services in a timely manner**?

   1 2 3 4 5 6 7 8 9 10

   Not at all confident Very confident

5. How confident do you feel that the plan you developed for the previous question will **meet the patient's needs?**

   1 2 3 4 5 6 7 8 9 10

   Not at all confident Very confident

Appendix 4. Acceptability and Feasibility

1. How would you rate your **overall experience** with this training today?

   1 2 3 4 5 6 7 8 9 10

   Terrible Excellent

2. How would you rate the **quality of your learning** today?

   1 2 3 4 5 6 7 8 9 10

   Limited Excellent

3. How **new** was the information that you learned today, as a whole?

   1 2 3 4 5 6 7 8 9 10

   Nothing New Everything New

4. If this training were to become a regular offering, how often, in what format, and to whom do you think it should be given?
5. What suggestions, comments, or critiques do you have about this experience as a whole?