

**Department of Veterans Affairs  
Quality Enhancement Research Initiative (QUERI)**



*Polytrauma/Blast-Related Injuries*

*Improving Care for Veterans with  
Polytrauma and Blast-Related Injuries*

**Strategic Plan  
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## Strategic Plan Executive Summary

**The mission** of the Polytrauma and Blast-Related Injuries (PT/BRI) QUERI is to promote the successful rehabilitation, psychological adjustment and community re-integration of individuals who have polytrauma and blast-related injuries.

**The scope** of the PT/BRI QUERI includes the full range of health problems, health care system and psychosocial factors represented in this mission. However, PT/BRI QUERI focuses on filling gaps and implementing research to improve health outcomes for two high priority and prevalent blast-related injuries that occur in the context of other combat injuries: Traumatic Brain Injury (TBI) and traumatic amputation.

Our efforts are focused primarily on enhancing the new and rapidly evolving Polytrauma System of Care which has targeted individuals whose combat injuries frequently include TBI. As amputation care becomes more integrated into the Polytrauma System of Care, PT/BRI will sharpen its focus on traumatic amputations.

PT/BRI QUERI has partnered closely with the newly designated Polytrauma Rehabilitation Centers (PRCs) which are charged with setting the standards for polytrauma care throughout the Polytrauma System of Care. Over time, our focus will include the full range of health care settings that serve individuals with polytrauma and blast-related injuries and the full spectrum of injury severity.

There is not a strong evidence base for best practice for rehabilitation of TBI with polytrauma. There are no clinical practice guidelines. To understand current practices and identify gaps, the PT/BRI QUERI conducted a qualitative study with PRC providers to assess their impressions of priority needs in the field. PRC providers identified the need for:

- 1) Databases that allow for access to information on specific patients and characterization of the patient population and outcomes.
- 2) Tools and strategies to facilitate care coordination across and within care systems.
- 3) Policies, protocols and tools to promote screening for TBI and other injuries in new veterans who may have been exposed to blasts during their combat deployments.
- 4) Education of VHA providers on polytrauma, blast-related injuries and rehabilitation.
- 5) Best practices, including multidimensional protocols and strategies, for rehabilitation of TBI with polytrauma. Across sites, providers stressed the immediate need for best practices for:
  - Patients at lower levels of cognitive functioning who may not be able to engage in standard acute rehabilitation therapies.
  - Caregivers/family members who have their own information and support service needs.
- 6) Care structures and processes to reduce PRC provider stress.

**PT/BRI QUERI's goals** are listed below. Goals to improve practice are listed by time frame. The first five goals will be our primary focus during this next fiscal year. However, we will also undertake activities to advance goal 6 this next year. Implementation science goals are not time dependent. We see these goals as integral to all our activities and undertake activities to advance these goals on an ongoing basis.

### Immediate Short-Term Goals to Improve Practice

1. Develop efficient, sustainable and valid data systems for identifying patients, their medical problems, service needs and outcomes.

2. Optimize care coordination and transitions across care systems and settings for patients with polytrauma and blast-related injuries.
3. Ensure that blast-exposed veterans receive screenings for high frequency “invisible” problems, including TBI, hearing loss, vision loss, pain, and mental health problems.
4. Optimize caregivers’/family members’ ability to provide supportive assistance to veterans with impairments resultant from polytrauma and blast-related injuries.
5. Promote identification and evaluation of potentially best practices for polytrauma rehabilitation.

#### Medium- to Long-Term Goals to Improve Practice

6. Improve treatment and outcomes for blast-related amputation.
7. Identify and test potentially fruitful strategies to improve self-management, including tele-rehabilitation, cognitive aids, augmentative communication and environmental controls.
8. Expand the evidence-base for treatment of mental health problems, including PTSD and substance use disorders, among individuals who have polytraumatic injuries.

#### Implementation Science Goals

- a. Develop and/or adapt and evaluate implementation and quality improvement strategies to clinical problems for which the evidence-base is not well developed.
- b. Promote the development of a community of evidence-based practice for polytrauma and blast-related injuries.
- c. Identify or develop strategies for evaluating the implementation readiness of new research evidence.

**To fulfill its mission and achieve its goals**, PT/BRI QUERI is developing and coordinating a broad network of: (a) investigators from the VA (including HSR&D and RR&D Centers of Excellence), DoD and academic institutions, (b) consumers (patients and their caregivers), (c) clinician experts, and (d) managers and VHA leaders. In addition, PT/BRI QUERI is adapting the QUERI 6-step process to reflect the fact that the system of care is not static, literature reviews may not be the primary source of information on best practices for polytrauma, and potentially better practices may need to be adapted and tested in local contexts rather than through RCTs. That is, PT/BRI QUERI is modifying the QUERI process to include a focus on the contextual nature of evidence for best practice.

## 1.1 Clinical Focus and Scope.

**The mission** of the Polytrauma and Blast-Related Injuries (PT/BRI) QUERI is to promote the successful rehabilitation, psychological adjustment and community re-integration of individuals who have polytrauma and blast-related injuries. Consistent with the VHA definition of polytrauma,<sup>1</sup> PT/BRI QUERI defines polytrauma as two or more injuries to physical regions or organ systems, one of which may be life threatening, resulting in physical, cognitive, psychological, or psychosocial impairments and functional disability.

**The scope** of the PT/BRI QUERI includes the full range of health problems, health care system and psychosocial factors represented in this mission. The PT/BRI QUERI, therefore, is not limited to one medical problem. Instead, this QUERI focuses on the complex pattern of co-morbidities and related functional problems and health care needs among the combat-injured.

Despite the breadth of this focus, we have identified two **priority clinical foci**: traumatic brain injury (TBI) with polytrauma and traumatic amputation with polytrauma. That is, our clinical priorities are TBI and traumatic amputation in the context of injuries to other body structures and organs. Both TBI and traumatic amputation are priority areas for VHA and of increased prevalence due to the Global War on Terror (GWOT).<sup>2-4</sup> The cohort that is the primary target of our activities is Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) VA patients, many of whom remain on active duty during their initial course of treatment in the VA. However, QUERI activities will benefit all VA patients with polytraumatic injuries, regardless of service era and mechanism of injury.

Because the health care system that is the target of our activities is the VHA Polytrauma System of Care, PT/BRI QUERI has partnered closely with the newly designated Polytrauma Rehabilitation Centers (PRCs) which are charged with setting the standards for polytrauma care throughout the VA. As a result, we have focused most intensely on inpatient rehabilitation for severe combat injuries. Over time, our focus will include the full range of health care settings that serve individuals with polytrauma and blast-related injuries and the full spectrum of injury severity. This expansion of our focus from PRC inpatient rehabilitation for the severely injured to outpatient and home based facilities for those with milder injuries parallels the roll out of the Polytrauma System of Care.

**Other QUERI Overlap:** Other QUERIs also focus on improving health outcomes for OIF/OEF veterans. Coordination of research efforts involving new veterans is crucial, particularly for PT/BRI QUERI given the relatively small size of the target population. PT/BRI QUERI looks forward to collaboration with other QUERI Centers on cross-cutting projects. The PT/BRI QUERI Implementation Research Coordinator is responsible for initiating communication with other QUERI Centers to ensure adequate coordination of research that cuts across QUERI conditions and that involves new veterans.

## 1.2 Significance and Consequence: Epidemiology, Morbidity/Mortality, Quality of Life and Costs.

During the GWOT, America's Armed forces are sustaining new and complex patterns of blast-related injuries.<sup>3-5</sup> As of November 20, 2006, 22,722 service members have sustained non mortal injuries during Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF, in and around Afghanistan), 10, 533 of whom did not returned to duty within 72 hours, presumably because of the severity of their injuries.<sup>6</sup> In this era of modern warfare, the majority of combat

injuries are blast-related.<sup>7-9</sup> In combat, sources of blast injury include artillery, rocket and mortar shells, mines, booby traps, aerial bombs, improvised explosive devices and rocket propelled grenades. The severity and pattern of blast injuries depends on the explosive composition and amount of material involved, surrounding environment, delivery method, distance between the victim and the blast, and presence of intervening protective barriers or environmental hazards.<sup>10</sup> Due to improvements in body armor, as well as in battle site and acute trauma care, more individuals are surviving beyond the acute phase of blast injuries.<sup>4,11</sup> Consequently, the military and VA are providing medical care to individuals with blast injuries who may have died in previous wars.

The four basic mechanisms of blast injury are termed as primary, secondary, tertiary, and quaternary.<sup>5</sup> Primary injuries are due to high-order explosive over-pressurization shock wave moving through the body from solid and liquid sections to gas-filled organs, such as the lungs, gastro-intestinal tract and middle ear. These injuries are not necessarily obvious. Secondary injuries are due to bomb fragments and other objects propelled by the explosion. Tertiary injuries result from the blast wind (not the over-pressurization shock wave) throwing the victim and can include bone fractures and traumatic amputation. Quaternary injuries are those not included in the first three classes, such as burns, crushing injuries and respiratory injuries.

Given the possible effects of explosions on the human body, it is not surprising that blast injuries are often “polytraumatic”. Injured body systems and structures include, (1) auditory/vestibular; (2) eye, orbit, face, (3) respiratory, (4) digestive, (5) circulatory, (6) central nervous system, (7) renal/urinary tract, (8) extremity, (9) soft tissue, (10) mental health, and (11) pain.<sup>12</sup> Particularly common is traumatic brain injury (TBI). It has been estimate that over 60% of blast-injuries result in Traumatic Brain Injury<sup>3,13</sup> and TBI has been labeled the “signature injury” in the GWOT.<sup>14</sup> Consequently, best practice for polytrauma requires a focus on TBI in the context of other injuries.

PT/BRI QUERI conducted an observational study of PRC patients to identify high priority problems among combat injured VA polytrauma patients (the Patient Characteristics and Outcomes Study). During the first four years of the GWOT, the PRCs treated 566 active duty service members, 188 of whom were injured in OIF/OEF. Most of the 188 patients sustained injuries to more than one body system or organ. Head injury was the primary injury for all but two patients. Blasts impacted more body systems and/or organs than other mechanisms of injury, with the median and modal number of injuries associated with blasts being five (range 1 to 9). Soft tissue (wounds, burns), eye, oral/maxillofacial, otologic and penetrating brain injuries were more common in blast injured patients than in those with war injuries secondary to other mechanisms.<sup>15</sup>

The severity of polytraumatic combat injuries and the circumstances in which they occur cause not only significant impairments, but also psychological stress to injured soldiers and their families. New systems of care are needed to meet the rehabilitation needs and optimize functional outcomes in this new patient group. Recognizing this, Congress passed Public Laws 108-422 (section 302) and 108-447 and the Secretary of Veterans Affairs designated four Polytrauma Rehabilitation Centers (PRCs; Minneapolis, MN, Palo Alto, CA, Richmond VA, Tampa, FL) to provide specialized rehabilitation treatment and expand clinical expertise in polytrauma throughout the VA.<sup>16,17</sup>

### **1.3 Treatment/Management Evidence Base.**

There is not a strong evidence base for best practice for rehabilitation of TBI with polytrauma. The PT/BRI QUERI priorities, therefore, stem from research on best practices for TBI rehabilitation, chronic disease management, and stakeholder needs. We selected the empirically-supported Chronic Care Model (CCM)<sup>18-20</sup> as a conceptual framework because the effects of blasts and other battlefield injuries are likely to be life-long. Furthermore, given the chronicity of the conditions for which individuals seek rehabilitation care, it is not surprising that there is considerable conceptual overlap between rehabilitation best practice and the CCM. Both, for example, seeking to optimize care coordination, treatment planning, environmental support, including support for family members/caregivers, and support for patient self-sufficiency/self-management in order to help patients achieve the highest possible level of functioning and quality of life.<sup>19-23</sup> The relevance of the CCM to individuals with polytraumatic injuries is further demonstrated by the fact that about half of patients with a chronic condition suffer from multiple chronic conditions.<sup>18</sup> That is, the CCM addresses the needs of patients with multiple morbidities.

Data System Development. There is strong evidence that reliable and valid data systems for tracking and monitoring patients are necessary for effective management of complex and chronic medical conditions. Evidence indicates that effective chronic illness care depends on information systems that assure ready access to data on individual patients as well as populations of patients.<sup>24-25</sup> Data systems are needed to provide timely reminders for providers and patients, identify relevant subpopulations for proactive care, facilitate treatment planning, share information with patients and providers to coordinate care, and monitor performance of teams and care systems. Because of the fundamental role data systems play in disease management, development of data systems for tracking and monitoring outcomes among patients with polytrauma and blast-related combat injuries is the PT/BRI QUERI's highest priority.

Care Coordination. There is consistent evidence that breakdowns in communication and care coordination as patients navigate care systems, settings and providers interfere with service delivery.<sup>18,26-27</sup> It is, therefore, not surprising that care coordination plays an important role in the CCM model and rehabilitation best practice.<sup>27-28</sup> There is also consensus that care coordination over the life span is essential for management of TBI with polytrauma<sup>29</sup> and VHA has established specific care structures to facilitate care coordination to injured veterans, regardless of where they live, including a polytrauma case management system and a telehealth network.<sup>30</sup> Identification of optimal approaches to care coordination is limited by the fact that there is no consensus as to what constitutes coordinated care and what outcomes should be measured.<sup>31</sup> Furthermore, there is a dearth of studies examining the impact of care coordination on health outcomes in complex populations.<sup>31</sup> However, data systems and information support technologies are essential for effective care coordination.<sup>18</sup>

Screening. Failure to identify and treat TBI exacerbates the disability and burden on society associated with TBI related symptoms.<sup>21</sup> Furthermore, the social, emotional, and behavioral problems that frequently result from TBI can easily be mistaken for lack of motivation or effort, particularly in mild TBI. Thus, proper identification of TBI is a critical step in determining and providing appropriate treatment for those in need. Furthermore class II evidence suggests that earlier treatment may be associated with better outcomes.<sup>32</sup> Despite the probable benefit of early identification of TBI, there is no well validated TBI screening tool. This stands in contrast to other invisible conditions that are often co-morbid with TBI for which there are empirically supported screening tools, such as pain, depression, substance use and PTSD.<sup>33-36</sup> In fact, our recent Medline search using TBI and screening as key words yielded 98 articles, only three of

which focused on TBI screening tools.<sup>37-39</sup> The remaining articles focused on screening for other morbidities in patients with TBI. Two of these three relevant articles were based on children.<sup>37,38</sup> None of them included well tested screening tools. However, preliminary evidence suggests that a brief screening tool developed by the Defense and Veterans Brain Injury Center (DVBIC) and tested in active duty samples has particular promise for detecting combat-related TBI.<sup>40</sup> Therefore, at this time, the evidence is insufficient for implementation of a TBI screening program. What is needed first is identification of a TBI screening tool with adequate sensitivity and specificity in OIF/OEF veterans and then determination of its acceptability to patients and providers in various VA settings (e.g., primary care, mental health).

Caregiver Burden. A significant number of caregivers, spouses and family members of persons with TBI report stress, depression, anxiety and decreased time and energy for recreational activities.<sup>32</sup> The depression is often enduring.<sup>41</sup> Emotional and behavioral changes in the individuals with TBI are associated with caregiver distress and poor family functioning.<sup>32</sup> In one relatively large study, injury severity was also associated with caregiver burden.<sup>42</sup> Inferring from available data, one would expect for caregivers of patients with polytraumatic combat injuries to be at risk for adverse effects. There is some data to suggest that caregiver distress has a negative impact on the caregiving.<sup>43-45</sup> In a recent report, the Office of the Inspector General emphasized the need for VA to address the needs of the family members of patients who have TBI with polytrauma: "To adequately meet the needs of its TBI patients, VHA needs to provide additional help for the family members and other caregivers so vital to the well-being of these patients in the long-term."<sup>29(p.i)</sup> While the need is great, research on interventions to meet the support and information needs of family members of TBI patients is limited.<sup>32</sup>

#### **1.4 Current Practices and Quality/Outcome Gaps.**

The Polytrauma System of Care is new and rapidly evolving. There are no clinical practice guidelines for polytrauma rehabilitation. The only performance measure specific to injured OIF/OEF service members and veterans was issued October 19, 2006, to ensure prompt access to VA health services.<sup>46</sup> It requires that 90% of new veterans with combat injuries wait no longer than 30 days for specialty care services and that 95% of severely injured OIF/OEF service members/veterans are contacted by their VA case managers within 7 days of notification of transfer to VA. Baseline measures are in development.

To identify current practices and quality/outcomes gaps, the PT/BRI QUERI conducted a PRC Needs Assessment based on 54 semi-structured face to face interviews with PRC providers and consultants from services (pain, PTSD, blind rehabilitation, infectious disease) that work closely with the PRCs. Findings are summarized below.

##### *Changes in Current Practice in Response to a New Cohort of Patients*

Findings from the PRC Needs Assessment indicate that patients who have combat-related TBI with polytrauma are demographically and clinically distinct from other patient groups treated for TBI within the VA system and that rehabilitation providers and the system of care are adapting to meet the needs of this new group of patients and of their families. Table 1 lists provider identified distinctions between the war injured PRC patient and the modal VA TBI rehabilitation patient treated before the GWOT, as well as changes in practice that have been made in response to these differences.

##### *Knowledge and Quality Gaps*

Needs expressed by PRC providers can be grouped into the following content areas: (1) database development, (2) care coordination, (3) screening promotion, (4) provider education and (5) best or better practices for polytrauma rehabilitation, particularly for rehabilitation for

minimally responsive TBI patients and for optimizing caregiver outcomes, and (6) provider stress. Provider-identified needs are presented in Table 2. Needs 1 and 2 are consistent with those reported by the Office of the Inspector General.<sup>29</sup> Needs 3 and 4 are consistent with a recent VHA initiative to promote TBI education<sup>47</sup> and an Under Secretary for Health Information Letter to promote TBI screening<sup>48</sup>. These needs form the basis for the PT/BRI QUERI Center short-term goals to improve practice (see section 1.6).

Table 1  
Current Practice In Relation to Differences in OIF/OEF PRC Patients

Domain	Differences between Patient with PT/BRI and pre-GWOT TBI patient	Practice Change
Cohort Differences	Younger; different life-span and family issues; different skills and interests; military identities very important.	PRC units modified in structure, appearance and availability of cohort appropriate resources (e.g., internet); providers incorporating patients' skills and interests into treatment.
Medical Differences	New and complex patterns of injuries. Brain injury may be more severe. Different types of injuries than previously treated within VA (e.g., burns, multiple amputations).	Providers acquiring skills in and adapting standard rehabilitation for TBI to take into account impairments such as low vision or amputations. Using co-treatment more frequently; consulting with services outside of rehabilitation more frequently; Length of stay longer. New staff hired.
Evidence-Base for Practice	Evidence base less well developed than for rehabilitation for single injuries.	Work groups to identify potentially best practices; create protocols, templates and other tools.
Discharge Challenges	Patients may live far away from the PRC; variation in resources across the US and in expertise in TBI and polytrauma within VA. OIF/OEF service members who require long-term care do not fit the demographic of long-term care facilities or nursing homes.	Proactive case management system; PRC staff involved in education of providers across the system of care; implementation of Polytrauma Network Sites; Use of tele-rehab.
Active Duty Status	Most patients are active duty or recently separated, necessitating coordination across the two care systems and involvement of VBA	DoD Military Liaison on unit; VHA social worker at MTF; access to military records for some providers; Video-conferences with DoD; New responsibilities of case managers
Family Involvement and Needs	More intense and different in quality. Family members may travel great distances to support the recovery of injured service member and have their own sets of instrumental, information and psychological needs.	Providers integrating family members into the therapies; developing programming and interventions for family members to help them adjust to the changes in their loved one; using model of "ambiguous loss". New staff hired
Public Involvement	Patients receive more and different types of attention from officials, community members and the media because of the fact that they sustained their injuries in the GWOT.	Hospital administrators and public affairs more involved in units; patients considered "hospital patients"; providers and managers have more reporting responsibilities.

GWOT= Global War on Terror; MTF = Military Treatment Facility; PRC = Polytrauma Rehabilitation Center; VBA = Veterans Benefits Administration.

Table 2: PRC Provider Identified Needs

<b>Need 1</b>	<p><b>Database Development</b></p> <p>Providers expressed a need for descriptive information about polytrauma patients within and across sites, as well as information on outcomes over time. They also noted the need for a reliable and valid tracking system to facilitate reporting of data to managers and stakeholders.</p>
<b>Need 2</b>	<p><b>Tools and strategies to facilitate Care Coordination.</b></p> <p>Rehabilitation for the war injured presents unprecedented challenges to care coordination. This is because within a brief amount of time, combat injured polytrauma patients traverse countries and care systems. PRC providers expressed the need for continued improvement in communication and transfer of clinical information across care systems. They also emphasized the challenges to transfer of care from the PRC to the patient's home facility. Because the extension of the polytrauma system of care into the outpatient arena is new, the structures and processes needed to coordinate care from the PRC to community based care are in development.</p>
<b>Need 3</b>	<p><b>Screening for TBI and other injuries in new veterans at risk for blast exposure. .</b></p> <p>PRC providers discussed challenges to full evaluation of comorbidities in PRC patients with moderate to severe brain injuries, including of pain and PTSD, the diagnosis of which depends on self-report. Even more pronounced was their concern that OIF/OEF veterans who are not treated within a PRC may have undetected TBI and other blast injuries that interfere with adjustment to civilian life. Some of these patients are being referred to outpatient rehabilitation providers after failed employment experiences and/or relationships. Providers expressed the belief that earlier intervention would have prevented these adverse outcomes and that many others with mild blast-related injuries are not getting any treatment at all.</p>
<b>Need 4</b>	<p><b>Education of VHA Providers</b></p> <p>Because this is a new patient population with unique characteristics and needs (see Table 1 above) there is a strong need for provider education. Provider education is also essential for appropriate screening and effective transfer of care.</p>
<b>Need 5</b>	<p><b>Identification or development of best practices for rehabilitation of TBI with polytrauma.</b></p> <p>There is no well-established evidence base for rehabilitation for polytrauma and most VA rehabilitation specialists have not had training or experience treating combat-related blast injuries. PRC providers most consistently and emphatically described a <b>need for best practices for: (a) patients at low levels of cognitive functioning</b> who are not able to engage in standard acute rehabilitation therapies, and (b) <b>caregivers/family members</b> who have their own psychological and the information needs. Because the families of lower level patients often have greater needs themselves, Need 1 a and Need 1 b are related.</p>
<b>Need 6</b>	<p><b>Structures and processes to reduce PRC provider stress</b></p> <p>Rehabilitating the war injured is particularly stressful because of the severity of the patients' injuries, the needs of family members, the level of public involvement (e.g., media), and the new responsibilities providers have for identification of best practices, program development and training of other providers.</p>

**1.5 Significant Influences on Current Practice.** The following VA and DoD Offices, Programs and Initiatives influence the VA polytrauma care and hence are PT/BRI QUERI partners.

***VHA Programs, Offices and Initiatives***

Polytrauma System of Care: The polytrauma system of care operates under the leadership of the VACO Rehabilitation Office. It consists of the four Commission on Accreditation of Rehabilitation Facilities (CARF) accredited PRCs which are linked to 21 Polytrauma Network Sites (PNS), one in each VISN. The PNSs became operative in December of 2005 and are charged with providing inpatient rehabilitation and outpatient care to former PRC patients and OIF and OEF veterans who present with milder war-related injuries and rehabilitation needs, as well as for coordinating care with patient's local facilities. In the near future, this system of care will also include Polytrauma Support Clinic Teams (PSCT) that will follow stable sequelae at facilities closer to the veteran's home, and a Polytrauma Point of Contact (PPOC) at every facility. In addition, workgroups from the Physical Medicine and Rehabilitation (PM&R) Program Office and the Prosthetics and Sensory Aids Service are developing strategic plans to more closely link amputation care with the Polytrauma System of Care.

Telehealth Initiative: The Care Coordination Office designed and provides technical assistance in the operation of a polytrauma telehealth network to improve patient access to PRC specialists and facilitate the transfer of PRC expertise in TBI and other impairments associated with polytrauma between the PRCs and PNSs. Expansion of this system to the PSCTs and facilities with specialized expertise in amputation care is under consideration.

Employee Education System (EES): EES is responsible for designing, developing, and implementing state-of-the-art health care training programs for VHA medical care personnel. EES sponsored the Veteran Health Initiative (VHI) independent study course on TBI, a specialized education program for the PRCs and PNSs in August of 2006, and several satellite broadcasts for polytrauma providers.

OIF/OEF Pain Research Subgroup: This subgroup of the VHA National Pain Research Working Group focuses on identifying best practices for pain assessment and management in polytrauma and research priorities within this area.

OIF/OEF Data Mart. The VISN Support Service Center (VSSC) is building an OIF/OEF data mart which will allow users to identify cause and effect patterns, outcome trends, and outlier patterns among OIF/OEF veterans who use VA services.

Corporate Data Warehouse. The Office of Information (OI) is building a Corporate Data Warehouse that will integrate key enterprise-wide clinical, administrative and financial data.

Amputation Practice Guidelines: VHA Clinical Practice Guidelines for amputation care should be released by winter, 2007.

Seamless Transition Office: The Seamless Transition Office (STO) coordinates all VA activities related to the provision of benefits and health care for service members transitioning directly from Military Treatment Facilities (MTFs) to VA facilities. The STO also provides coordination within VA for all other initiatives of the DoD and States to provide outreach services to OIF and OEF veterans. The STO recently rolled out a database of service members transferred from MTFs to VAMCs that may be of use to the PT/BRI QUERI.

## 1.5 Significant Influences on Current Practice (continued)

### ***DoD Research, Education and Clinical Programs***

Defense and Veterans Brain Injury Center (DVBIC). Coordinated at Walter Reed Army Medical Center, DVBIC is a multi-site medical care, clinical research and education center funded through the DoD. The 8 DVBIC sites include the four VA PRCs, 3 MTFs and a civilian partner.

Amputation Patient Care Program. The Amputee Patient Care Program, located at Walter Reed Army Medical Center, was developed to meet the comprehensive medical, rehabilitative, and social needs of amputees injured in the current global war on terrorism, with the goal of maximizing subsequent patient outcomes utilizing a sports medicine approach.

**1.6 QUERI Center Goals.** Goal areas and objectives within each goal area were identified through literature reviews, the PRC Needs Assessment, the Patient Characteristic and Outcomes Study, and subsequently supported in a survey of and meeting with the PT/BRI QUERI Executive Committee, which consists of experts in areas relevant to the QUERI mission.

In the tables that follow we list the PT/BRI QUERI clinical and implementation goals. For the Goals to Improve Practice, we also list the time frame for achieving each objective: short-term = 1-2 years; medium-term = 3-5 years; long-term = greater than 5 years. The Implementation Science Goals are time independent, meaning that we work toward accomplishing these goals on an ongoing basis.

Goals to Improve Practice are listed in order of priority. Improving the Polytrauma System of Care is the overarching goal of these specific QUERI goals and objectives. TBI with polytrauma is the primary clinical problem that system is designed to address. As amputation care becomes more closely linked to the polytrauma system of care, PT/BRI QUERI will expand its focus to include the promotion of evidence-based practice for traumatic amputation.

Clinical Goals 1 through 5 are those that address the most immediate needs in the field as identified through the PRC Needs Assessment, by VHA leadership and external stakeholder groups, including congress. Short-term objectives within these goal areas will be our primary focus during FY 2007, although we will also engage in foundation building activities to advance later goals. Because the evidence-base for best practice is in an early stage of development, a PT/BRI QUERI goal is to promote the identification and evaluation of best practices in local contexts.

The Implementation Science Goals are influenced by the fact that the system of care is new and the evidence-base for best practice is not well established. To achieve our mission, PT/BRI QUERI needs to develop and adapt implementation strategies to this more ambiguous context. In this way, PT/BRI QUERI's clinical and implementation science goals are closely linked.

<b>Table 3 Goals to Improve Practice, Objectives, Time Frame, and Expected Products</b>	
<b>Goal 1:</b> Develop efficient, sustainable and valid data systems for identifying patients, their medical problems, service needs and outcomes.	
<b>1a:</b> Collaborate with PM&R on modifications to the Functional Status Outcomes Database (FSOD) so that it allows for reporting of injuries and impairments in the war injured and tracking of their outcomes over time.	Short-Term
<b>1b:</b> Collaborate with OIF/OEF Special Interest Work Group to ensure that the OIF/OEF data mart allows for identification of subgroups of combat injured service members.	Short-Term
<b>1c:</b> Collaborate with Office of Information to identify the preferred strategy for building a polytrauma virtual registry within the Corporate Data Warehouse (CDW).	Short-Term
<b>1d.</b> Use the OIF/OEF data mart and other VA databases to characterize the patient population, their medical problems and patters of service use.	Short to, Long-Term
<b>Product 1:</b> Enhanced FSOD for tracking injuries and impairments in war-injured rehabilitation patients across the continuum of care. <b>Product 2:</b> Virtual registry of polytrauma patients build into the CDW. <b>Product 3:</b> Reports describing subgroups of polytrauma patients and their patterns of service use.	
<b>Goal 2:</b> Optimize care coordination and transitions across care systems and settings for patients with polytrauma and blast-related injuries.	
<b>2a:</b> Collaborate with PM&R and EES to develop fact sheets for providers that includes findings from PT/BRI QUERI Patient Characteristics and Outcomes (PC&O) study.	Short-Term
<b>2b:</b> Dissemination of product 2a so that providers across VHA can access this information when needed (at time of encounter).	Short-Term
<b>2c:</b> Identify and implement methods of dissemination to providers outside the VA.	Medium-Term
<b>2d:</b> Develop and pilot test a case management database system to facilitate care coordination after PRC discharge.	Short-Term
<b>2e:</b> Roll-out and evaluation of case management database to the PRCs.	Short to Medium-Term
<b>Product 4:</b> Fact sheets to educate providers about impairments in patients with polytrauma. <b>Product 5:</b> Efficient and effective PRC patient case management database.	
<b>Goal 3:</b> Ensure that blast-exposed veterans receive screenings for high frequency “invisible” problems, including TBI, hearing loss, vision loss, pain, and mental health problems.	
<b>3a.</b> Form screening work group to develop plan for identifying and evaluating the sensitivity and specificity of methods to promote screening for TBI in OIF/OEF veterans.	Short-Term
<b>3b.</b> Identify and implement informatics to promote use of the TBI screener.	Medium-Term
<b>3c.</b> Develop tools for screening of blast-related injuries including TBI.	Medium-Term
<b>Product 6:</b> Tools and informatics to support screening for TBI and other blast-related impairments in OIF/OEF veterans.	

<b>Table 3 (continued)</b>	
<b>Goals to Improve Practice, Objectives, Time Frame, and Expected Products</b>	
<b>Goal 4:</b> Optimize caregivers'/family members' ability to provide supportive assistance to veterans with impairments resultant from polytrauma and blast-related injuries.	
<b>4a:</b> Informal caregiver needs assessment to characterize information needs of caregivers.	Short-Term
<b>4b:</b> Implement a caregiver workgroup to develop a research agenda for caregivers of patients with combat related polytrauma with input from leadership.	Short-Term
<b>4c:</b> Develop/modify and test educational materials adopted to findings in 4a.	Short to Medium-Term
<b>4d:</b> Test interventions to reduce caregiver burden.	Long-Term
<b>Product 7:</b> Educational materials for caregivers.	
<b>Product 8:</b> Research agenda to improve outcomes among polytrauma patient caregivers.	
<b>Goal 5:</b> Promote identification and evaluation of potentially best practices for polytrauma rehabilitation.	
<b>5a.</b> Collaborate with PM&R and the PRCs to develop, implement and evaluate a PRC learning collaborative.	Short-Term
<b>5b.</b> Promote the research of investigators conducting clinical research on TBI, polytrauma and blast-related injuries.	Short to Long-Term
<b>Goal 6:</b> Improve treatment for traumatic amputation within the polytrauma system of care	
<b>6a.</b> Evaluate the new Clinical Practice Guidelines for Amputation Care to determine role of PT/BRI QUERI in promoting guideline adherence.	Short-Term
<b>6b.</b> Obtain leadership input and direction on the QUERI role in the traumatic amputation system of care.	Short-Term
<b>6c.</b> Identify high priority gaps and needs in the VA system of care for patients with traumatic amputations.	Medium to Long-Term
<b>6d.</b> Identify and implement interventions to improve outcomes for OIF/OEF with combat-related amputations.	Long-Term
<b>6e.</b> Identify and test strategies for matching prosthetic devices to the needs and impairments of amputees.	Long-Term
<b>Product 6:</b> Tools for evaluating appropriateness of <u>prosthetic devices for amputees</u> who also have TBIs.	
<b>Goal 7:</b> Identify and test potentially fruitful strategies to improve self-management, including tele-rehabilitation, cognitive aids, augmentative communication and environmental controls.	Medium to Long-Term
<b>Goal 8:</b> Expand the evidence-base for treatment of mental health problems, including PTSD and substance use disorders, among individuals who have polytraumatic injuries.	Medium to Long-Term

Note. Short-term = 1-2 years; Medium Term = 3-5 years; Long-term = 5+ years.

<b>Table 3 (continued)</b>
<b>Implementation Science Goals</b>
<b>Implementation Goal A:</b> Develop and/or adapt and evaluate implementation and quality improvement strategies to clinical problems for which the evidence-base is not well developed.
<b>Implementation Goal B:</b> Promote the development of a community of evidence-based practice for polytrauma and blast-related injuries.
<b>Implementation Goal C:</b> Identify or develop strategies for evaluating the implementation readiness of research evidence.

*Note.* Implementation Science Goals are not time dependent.

### 1.7 Plans for Achieving QUERI Center Goals.

Ongoing and planned projects are detailed in our Annual Report. Here we describe the overarching approaches we are using to fulfill our mission and achieve our goals.

**QUERI Implementation Process:** PT/BRI QUERI is using the QUERI six-step process to guide its research activities. However, we have adapted this process to take into account the nature of the evidence-base for polytrauma rehabilitation. That is, we have modified the QUERI process to reflect the fact that: (a) the system of care is new, (b) literature reviews will not be the primary source of information on best practices for polytrauma, (c) potentially better practices may need to be adapted and tested in local contexts rather than through RCTs. Below we list the PT/BRI QUERI version of the QUERI six-step process:

- 1) Identify high priority clinical problems and outcomes for patients with polytrauma and blast injuries.
  - a. Develop data systems to facilitate Step 1.
- 2) Identify or develop potentially best or better practices for polytrauma rehabilitation
  - a. Develop tools and structures that facilitate best practice.
  - b. Promote and conduct research that builds the evidence base for best practice.
- 3) Promote and conduct research to identify gaps and needs in the polytrauma system of care.
- 4) Implement interventions to promote the adoption, evaluation and modification of potentially best practices.
- 5) Demonstrate a link between practice changes and improved patient and caregiver outcomes.
- 6) Demonstrate that these interventions improve quality of life, physical and mental health, and community reintegration for injured service members.

The most obvious change to the QUERI 6-step process is our explicit emphasis on the contextual nature of the evidence needed to improve practice in Steps 2 and 4, our inclusion of foundation building activities as integral to adapted QUERI step 1 and 2. Another adaptation which is not related to the nature of the evidence but rather to the scope of our QUERI's work is the inclusion of caregivers as an intervention target in step 5. Our plan is to refine these modifications to the QUERI implementation model through evaluation of our practice improvement efforts and ongoing assessment of the needs in the field.

**Implementation Model:** PT/BRI QUERI is reviewing literature from a range of fields within and external to health care, including public policy and business, as well as consulting with experts (see below) in order to identify an implementation framework for our work. Because the literature on implementation indicates that one size does not fit all<sup>49</sup>, we will tailor our implementation strategies to fit the nature of the innovation and target facility/setting. However,

our overall goal is to identify a set of principles that can guide our implementation planning for different innovations within different settings and organizations.

**Consultation with Implementation Experts:** PT/BRI QUERI welcomes innovative approaches to implementation and quality improvement. This has led us to seek consultation with experts in implementation and quality improvement who can help us to apply “lessons learned” through their work implementing practice improvement initiatives in other health care systems.

To build our knowledge and skills in implementation strategies that may be appropriate to polytrauma rehabilitation, PT/BRI QUERI regularly consults with an outside expert in health care organization and implementation of best practice for chronic illness whom we have designated our Implementation and Management Advisor (Jon Christianson, PhD, Director of the Center for the Study of Healthcare Management and Chair of the Department of Health Care Management in the Carlson School of Management at the University of Minnesota). This helps ensure that we employ state of the art implementation strategies as we move forward.

We are also consulting with another outside expert in quality improvement methods (Susanne Salem-Schatz, ScD) in our efforts to identify the strategies with the highest likelihood of success for identification of best practices, given the nature of the evidence, the needs in the field, and ongoing quality improvement efforts within the Polytrauma System of Care.

**Ongoing Needs Assessment:** Because the care structures and processes for polytrauma care are rapidly evolving, PT/BRI QUERI needs to take an active and ongoing approach toward needs assessment. That is, QUERI steps 1-3 are ongoing. We accomplish this through: (a) research, (b) collaborative relationships with the opinion leaders, VHA Offices, programs, work groups and leaders that influence the system of care, (c) integration into our Core Team of a PRC key informant and opinion leader whom we have designated as our Field Liaison (Rose Collins, PhD), and (d) literature reviews.

**Partnerships with VHA Data System Initiatives and Experts:** Data system development is our highest priority goal. We are leveraging ongoing data system and data collection initiatives, including the VISN Support Service Center (VSSC) OIF/OEF data mart, Office of Information (OI) Corporate Data Warehouse (CDW) and PM&R FSOD Enhancement project. These initiatives are of high priority to VHA and are sufficiently staffed and resourced to achieve their goals in a timely fashion. The OIF/OEF data mart and the CDW do not require any additional staff time, an important consideration given the level of stress among PRC clinicians.

PT/BRI QUERI works closely with the Statistics and Data Management Groups within the Center for Chronic Disease Outcomes Research at the Minneapolis VAMC. These teams are well-versed in VA and Medicare data systems, statistics, database design and development, administrative data extraction, data management, storage and security, design, development and implementation of custom applications and websites; project management, and monitoring and validation of data collection. Their involvement in the Colorectal Cancer QUERI's C4 project was crucial to its success. They have already played an important role in the PT/BRI QUERI Patient Characteristics and Outcomes Study and will be key to the success of projects involving data system development and extractions.

**PT/BRI Network:** PT/BRI QUERI is developing and coordinating a broad network of: (a) investigators from the VA (including HSR&D and RR&D Centers of Excellence), DoD, and academic institutions, (b) consumers (patients and caregivers), (c) clinician experts, and (d)

managers and VHA leaders. We have developed a database to track our affiliates, monitor their research activities, and facilitate networking among them. PT/BRI QUERI investigators are regularly linked with clinician experts to ensure that projects are appropriate to the field and do not overburden clinicians, patients and caregivers.

PT/BRI QUERI has created a website that is useful for researchers, consumers and clinicians and fosters a PT/BRI community of practice and research. It contains links to resources identified as important by PRC clinicians, educators, and managers. We also plan to use the QUERI website to update our affiliates on PT/BRI QUERI priorities and activities by posting an information letter on our website on a quarterly basis and emailing the link to our affiliates. We will evaluate satisfaction with this approach and alter our strategy accordingly.

**Work Groups:** We are developing two PT/BRI Work Groups, one focused on screening for TBI and blast-related injuries, the other focused on caregiver burden. These work groups will bring together clinicians and investigators with interest and expertise needed to develop a course of action in these two high priority areas. Work group leaders will solicit input from and provide information to PM&R and PRC leadership to ensure that the direction taken is appropriate to the field.

**PT/BRI QUERI Core Team:** The research and clinical arms of the PT/BRI QUERI are fully integrated and therefore PT/BRI QUERI sees itself as being one Center. The Core Team is comprised of the PT/BRI QUERI Coordinators and our Field Liaison. It is committed to identifying goals and using methods that meet the needs of patients, caregivers, providers, VHA and external stakeholders.

## II Management Plan

### II.1 Administrative Structure.

PT/BRI's administrative structure consists of a **Core Team**, an **Executive Committee** and **Specialty Work Groups**.

#### Core Team

Through the PT/BRI QUERI Core Team, research and clinical coordination efforts are integrated. Purposeful integration of research and practice is crucial for the success of this QUERI because the evidence for best practice is coming from the field and because the field is highly responsive to VHA leadership, external stakeholders (e.g., Congress) and consumers. We prefer the term Core Team to Coordinating Center because team members are located in different facilities and "Coordinating Center" connotes one physical location. Nina Sayer, PhD (Research Coordinator), Barbara Sigford, MD, PhD (Clinical Co-Coordinator), Carmen Hall, RN, PhD (Implementation Research Coordinator starting in December, 2006), Rose Collins, PhD (Field Liaison), and Suzanne Leger, MPA (Administrative Coordinator) are based at the Minneapolis VAMC; Steven Scott, DO (Clinical Co-Coordinator) is based at the Tampa VAMC. Dr. Scott solicits and brings to the Core Team the input and feedback of other Tampa VAMC experts in areas relevant to polytrauma rehabilitation, making the Tampa VAMC rehabilitation team integral to the PT/BRI QUERI Core Team. The Core Team is responsible for the PT/BRI QUERI research portfolio and day to day activities. Conference calls among the Research, Clinical and Implementation Coordinators occur weekly or every other week and QUERI affiliates are invited to join those calls as needed.

#### Executive Committee

PT/BRI Executive Committee (EC) is comprised of investigators, managers and leaders with expertise and job responsibilities relevant to the PT/BRI QUERI mission. DoD clinical managers and experts serve on our EC to ensure that PT/BRI QUERI activities meet the needs of patients with polytraumatic combat injuries, many of whom are active duty at the time of their VA inpatient stays. Drs. Sayer, Sigford and Scott are members of the EC. The EC serves advisory and evaluative functions for the QUERI. It helps shape our strategic plan by prioritizing the identified needs in system of care that form the focus of our goals and objectives, assisting in networking and coordination efforts, linking us with resources that may advance our goals, contributing to QUERI research in various capacities, and helping us to monitor and evaluate our own progress.

PT/BRI QUERI's goals to improve practice are established annually but adjusted as necessary through needs assessments, review of the literature, PM&R and PRC leadership, and EC member input and feedback. EC members complete an annual survey prior to our face to face meeting to ensure full assessment of the needs, gaps and priorities in the field of polytrauma rehabilitation and to promote identification of resources, initiatives and programs that will help us advance our mission and achieve our goals. In other words, PT/BRI QUERI uses its EC as a source of information in conducting QUERI steps 1 to 3. PT/BRI QUERI summarizes responses to the EC survey and integrates survey responses with data derived from formal and informal needs assessments. The resultant summary of identified needs is then presented during the annual EC meeting for the purpose of prioritization. Prioritization is crucial to ensuring that our goals and the associated objectives address the most important gaps in the field. At the time of this writing, the Core Team is responsible for defining objectives within each goal area. We see this as reflecting the fact that we are early in our development as a QUERI. As the PT/BRI QUERI becomes more established, we expect EC members to be more closely involved in the process of defining and executing specific QUERI projects. PT/BRI QUERI Core Team updates the EC committee on QUERI activities formally every six months

during a conference call or face to face meeting, depending on funding and feasibility considerations. However, PT/BRI QUERI has more regular contact with EC members who have roles in specific PT/BRI QUERI projects or initiative. We expect to need more frequent contact with EC members when EC members are more directly involved in executing QUERI projects.

### Work Groups

In order to achieve our goals, we are forming two work groups. The Caregiver Work Group, led by Dr. Friedemann-Sanchez, the former PT/BRI QUERI Implementation Research Coordinator, is responsible for defining a coherent research agenda to improve outcomes for caregivers/family members of service members with polytrauma and blast-related injuries. The Screening Work Group, facilitated by Dr. Sayer, is responsible for developing a plan for identifying and testing tools for screening for TBI and other blast-related injuries in combat injured service members appropriate to VA settings.

Conference calls and email are the primary mode of communication among Work Group members. External consultants with expertise in methods or content relevant to the work group's agenda are invited to join these calls as needed. Work Groups update the Core Team and seek input from VHA and Physical Medicine and Rehabilitation (PM&R) leadership.

## **II.2 Roles of PT/BRI QUERI Coordinators.**

Along with our Field Liaison, the PT/BRI QUERI Coordinators form the QUERI Core Team. The Core Team works closely with the EC and VHA leadership.

**Nina A. Sayer, PhD** is the Research Coordinator and Chair of the PT/BRI QUERI EC. Her responsibilities include policy setting, developing and executing the QUERI Strategic Plan, promoting research consistent with the QUERI mission, and establishing the PT/BRI Network. She works very closely with the Clinical Coordinators.

**Barbara Sigford, MD, PhD** and **Steven Scott, DO**, are the Clinical Coordinators. They ensure that PT/BRI QUERI's agenda and activities are consistent with national and local needs, synergistic with other programs and initiatives being implemented through VA Central Office, and informed by DoD practice and policy. They also facilitate PT/BRI QUERI's close relationship with the PRCs and evolving relationship with the Polytrauma Network Sites.

**Carmen Hall, RN, PhD**, replaces Greta Friedemann-Sanchez as the QUERI Implementation Research Coordinator (IRC). Her responsibilities include leading and participating in the design, implementation and evaluation of PT/BRI QUERI projects, disseminating PT/BRI QUERI products and research findings, and serving as liaison and resource for affiliates within the PT/BRI network, as well as performing literature reviews and researching implementation strategies appropriate to PT/BRI QUERI goals and objectives. Dr. Hall is also responsible for communicating with other QUERI IRCs about projects that may overlap with their goals and impact their activities.

**Suzanne Leger, MPA**, is the PT/BRI QUERI Administrative Coordinator. She is responsible for all administrative activities, including tracking the progress of ongoing and planned projects, managing the QUERI budget, scheduling, organizing the QUERI EC meeting, disseminating publicity and reports to QUERI affiliates, disseminating surveys to EC members, writing and disseminating meeting minutes, and for monitoring and updating the PT/BRI QUERI website.

## **II.3 Key Administrative Collaborations.**

PT/BRI QUERI coordinates its work with PM&R and the Rehabilitation Office. The Core Team has regular contact with EC member and Chief Consultant to the Rehabilitation Office, Lucille Beck, PhD. The Clinical Coordinators are leaders within the Polytrauma System of Care and local PIs for the DBVIC. PT/BRI QUERI participates in the PM&R FSOD Enhancement Project,

the VSSC OIF/OEF Data Mart Special Interest Focus Group and the OIF/OEF Pain Research Subgroup. Other administrative collaborators include the Mental Health Strategic Healthcare Group, the Office of Information, and the Employee Education system.

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