Department of Veterans Affairs

Quality Enhancement Research Initiative (QUERI)

Polytrauma/Blast-Related Injuries QUERI Center

Strategic Plan

FY 2013 through FY 2015

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Nina Sayer, PhD, LP

Director, PT/BRI QUERI

Minneapolis VA Medical Center

One Veterans Drive (152/2E)

Minneapolis, MN 55417

Phone: 612.467.4623

Fax: 612.727.5699

Email: nina.sayer@va.gov

Web: www.queri.research.va.gov/ptbri

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1. Executive Summary

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

To achieve our mission, we have three interrelated **priority goals**. Each priority goal has a different target. Goal 1 primarily targets the clinicians and interdisciplinary teams that provide services to patients with symptoms and impairments associated with TBI/polytrauma. Goal 2 primarily targets patients themselves. Goal 3 primarily targets patients' support systems, including their family members and peers. The three PT/BRI QUERI priority goals are to:

1. Support and enhance implementation of evidence-based, integrated, patient-centered care for patients with TBI/polytrauma.
2. Improve patients' ability to manage their persistent TBI/polytrauma-related symptoms, impairments and functional difficulties.
3. Optimize Veterans' support systems, including family, peers, VA and community resources.

These goals were developed during a strategic planning process that involved our Executive Committee, the Physical Medicine and Rehabilitation Program Office (PM&R), other VHA offices and stakeholders, the PT/BRI QUERI Family Care Advisory Group, TBI/polytrauma clinical teams and our research affiliates. These goals build on and extend prior PT/BRI QUERI goals and map onto the Chronic Care Model (CCM)[1] which is the analytic framework guiding our QUERI's selection of goal areas. We use the Consolidated Framework for Implementation Research (CFIR)[2] as an overarching guide to selecting implementation interventions. However, because the CFIR is a framework based on the synthesis of 19 implementation models, PT/BRI QUERI investigators may draw more explicitly from one or more implementation models for their specific projects. Our evaluation work is guided by the Reach, Effectiveness, Adoption, Implementation and Maintenance (RE-AIM) framework of program evaluation.[3]

Our QUERI has also identified three cross-cutting themes which will inform research across our priority goal areas. The first cross-cutting theme is to identify and address the unique needs of women Veterans with TBI or polytrauma. The second cross-cutting theme is use of technology to provide patient-centered care, enhance self-management and optimize patients' support networks. The third cross-cutting theme is to advance the study of sustainability by improving the definition of this construct and identifying factors that contribute to the sustainability of programs rolled out to improve patient and family outcomes.

1.2 Highlights of Recent Accomplishments: PT/BRI QUERI has made considerable progress over the past three years. Our founding primary partner has been PM&R within Rehabilitation and Prosthetics Services, although we also work with other VHA Offices, including Care Management and Social Work Service. In our prior funding period, PT/BRI QUERI researchers conducted research to support VHA's TBI screening and evaluation program. This includes conducting research on the screening and evaluation tools VHA rolled out nationally as well as research to evaluate how those tools are integrated into practice. Prior to this research, there was no information about the psychometric properties of the TBI screening and evaluation tools disseminated nationally and only limited information on factors accounting for variation in program implementation. We have created Fact Sheets that summarize this research which are distributed to various VACO Offices, external stakeholders, including the Government Accountability Office (GAO) and DoD, and to clinicians working within the Polytrauma System of Care. These studies address the deficiencies the GAO noted in 2008 regarding the evidence for VHA's TBI screening program and satisfy our partners' need for evidence-based information to support the TBI screening and evaluation program.

During our last funding period, we generated FY 2009, 2010 and 2011 TBI Utilization Reports which summarize the prevalence of diagnosed TBI and comorbidities, as well as patterns of VA healthcare utilization and associated healthcare costs. This information is crucial for service delivery planning and was not available before PT/BRI QUERI created these reports. Because these reports fill such an important evidence gap, the data included in these reports have been widely distributed within VACO and to external stakeholders, including the Secretary of Veterans Affairs. Plans are underway to expand future TBI Utilization Reports to better characterize costs and healthcare utilization of Veterans with TBI/polytrauma over time.

We also made considerable progress in advancing research on family caregivers and peer support during this last funding period. Of particular note, "Understanding and meeting the needs of informal caregivers to improve outcomes for TBI patients with polytrauma" (SDR 07-044, FACES) was the first study to document the unmet needs of caregivers and the financial, emotional and physical health toll that caring for Veterans traumatically injured during OEF/OIF has on caregivers. This study was one of the largest studies of caregivers both within and outside the VA. This research, in conjunction with ongoing work examining the way polytrauma teams currently work with family members, sets the stage for QUERI research to evaluate VHA programs for family caregivers and identify interventions to improve family member and caregiver outcomes and ability to support injured Veterans.

1.3 Key Features of Future Plans

Our FY 2013 through FY 2015 goals build upon and expand our prior work and reflect changes in VHA service delivery for Veterans with TBI/polytrauma and changes in our partners' priorities. To advance each goal we have identified implementation targets (i.e., objectives) within each goal area.

To advance Goal 1 (Patient-Centered Care), we plan to conduct research to:

1) Identify both performance gaps and strong practices for patients with TBI/polytrauma.
2) Enhance access to high quality assessments and coordinated follow-up care.
3) Improve interdisciplinary treatment planning processes.
4) Implement best practices to improve clinical and functional outcomes.

Impacts from Goal 1 research will include: Improved access to high quality TBI evaluations, and metrics and monitors for improving the Congressionally-mandated TBI Care Plans. We will also continue to generate TBI Utilization Reports and expand this work to more fully characterize healthcare use and costs associated with TBI/polytrauma.

To advance Goal 2 (Self-Management), we plan to conduct research to:

1) Implement technologies or programs to support ongoing self-management and evaluate their implementation.
2) Promote patient engagement in self-management.

Impacts from Goal 2 research will include: Information on mobile apps to enhance implementation and dissemination efforts; patient educational materials to enhance patient knowledge and self-efficacy following TBI screening and evaluation; practice-level toolkit to assist interdisciplinary teams with efforts to integrate self-management support into practice.

To advance Goal 3 (Support Systems), we plan to conduct research to:

1) Implement interventions to help family members and peers support Veterans' TBI care plan, treatment participation and goal attainment and evaluate the impact of these interventions.
2) Improve access to VA and community resources to optimize vocational, family and community functioning.

Impacts from Goal 3 research will include: Evaluation of key caregiver programs, and resources for family members and peers to help them better support their injured Veteran.

2. Clinical Focus and Scope

2.1 Process of selecting clinical focus and scope

PT/BRI QUERI developed its goal areas and implementation targets within each goal area using an iterative qualitative process involving our Executive Committee, VHA Offices most closely involved in TBI/polytrauma care, the PT/BRI QUERI Family Care Advisory Group, research affiliates and polytrauma clinical teams. Specifically, development of our goals and objectives involved the following four steps: (1) Dr. Nina Sayer, the PT/BRI QUERI Research Director, conducted individual interviews with the PT/BRI QUERI Executive Committee members in which these experts reflected on prior PT/BRI QUERI goals and discussed current VHA priorities, patient and family needs, and possible implementation targets for future PT/BRI QUERI work. These discussions took into account the fact that the wars in Iraq and Afghanistan are winding down. Dr. Sayer synthesized the findings into an unordered list of potential implementation targets. (2) Dr. Sayer asked the PT/BRI QUERI Executive Committee to prioritize these potential implementation targets through small group discussions during our annual face to face meeting. Dr. Sayer then summarized this work and presented it back to the Executive Committee for clarification during a subsequent conference call. (3) PT/BRI QUERI leadership presented draft goals and objectives to various stakeholder groups during conference calls or in person and requested feedback. The goals and objectives were modified based on this input. These groups included Post-Deployment Integrated Care, Care Management and Social Work Service, Patient-Centered Care and Cultural Transformation, PT/BRI QUERI Family Care Advisory Group, National Pain Management Program, our research affiliates at various centers across the country, and TBI/polytrauma clinical teams. Because PM&R leads national calls with all polytrauma teams, we were able to solicit feedback on a draft version of our goals/objectives and future plans from clinical teams across the country. Dr. Sayer also met in person with the Minneapolis TBI/polytrauma team for additional feedback. (4)The final version of our goals and objectives was approved by our Executive Committee.

2.2 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. Our mission has remained unchanged since the inception of this QUERI in 2005.

2.3 The scope of the PT/BRI QUERI includes the full range of health problems, healthcare systems 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 comorbidities and related functional problems and health care needs among the combat-injured.

Despite the breadth of this scope, our **priority clinical focus** is traumatic brain injury (TBI) within the context of polytrauma (TBI/polytrauma). That is, our clinical priority is TBI that co-occurs with injuries to other body structures and systems (including mental health).TBI is a priority area for VHA and of increased prevalence due to the post-September 11, 2001 wars.[4-5] The cohort that is the primary target of our activities is VA patients who served in Operation Enduring Freedom (OEF), Operation Iraqi Freedom (OIF) and Operation New Dawn (OND).

In prior strategic plans our efforts focused primarily on enhancing the Polytrauma System of Care which was being rolled out when this QUERI was initially funded. PT/BRI QUERI research, however, has shown that patients diagnosed with TBI are seen in multiple care settings and that many receive services outside of TBI/Polytrauma clinics. In fact, we found that 40% of VHA patients diagnosed with TBI in FY 2011 were not seen by providers working on a TBI/ polytrauma team at all and that 30% were seen in a facility that did not have a TBI/polytrauma team. Therefore, while we still work closely with PM&R to improve the Polytrauma System of Care which sets the standard for TBI care within VA, our efforts now focus on all care settings where patients receive services for TBI/polytrauma.

2.4 PT/BRI QUERI's Clinical Goals
Analytic Framework

PT/BRI QUERI uses the Chronic Care Model (CCM)[1,6-7] as a clinical analytic framework because the effects of blasts and other battlefield injuries that persist are like other chronic conditions and require ongoing activities and responses from patients, family members/caregivers and the healthcare system. Furthermore, the CCM is conceptually similar to rehabilitation models of care with 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.[7-10] The relevance of the CCM to individuals with polytrauma is further demonstrated by the fact that more than half of patients with a chronic condition suffer from multiple chronic conditions.[11] That is, the CCM addresses management of needs of patients with multiple morbidities.

The result of our strategic planning process was the selection of three priority goals and implementation targets within each goal area that will guide our work over the next three years. Consistent with the CCM, each goal addresses a different determinant of health outcomes. Goal 1 primarily targets interdisciplinary teams that provide care to patients with TBI/polytrauma; Goal 2 focuses on patients themselves; Goal 3 focuses on patients' support networks. Figure 1 represents our QUERI's conceptual model, based on the CCM. Our premise is that improved reintegration and functioning result from productive, patient-centered interactions between patients and their providers working within interdisciplinary teams. We define productive, patient-centered interactions as those in which the patient's needs and goals are met through the delivery of systematic evidence-based care processes. These productive interactions are dependent on how clinical teams help patients live with persistent TBI/polytrauma sequelae (that is, how they provide self-management support) and the healthcare system. The healthcare system, furthermore, is embedded in the larger community which includes family members, peers, schools, jobs and community resources. Both patients' communities and the healthcare system provide self-management support.
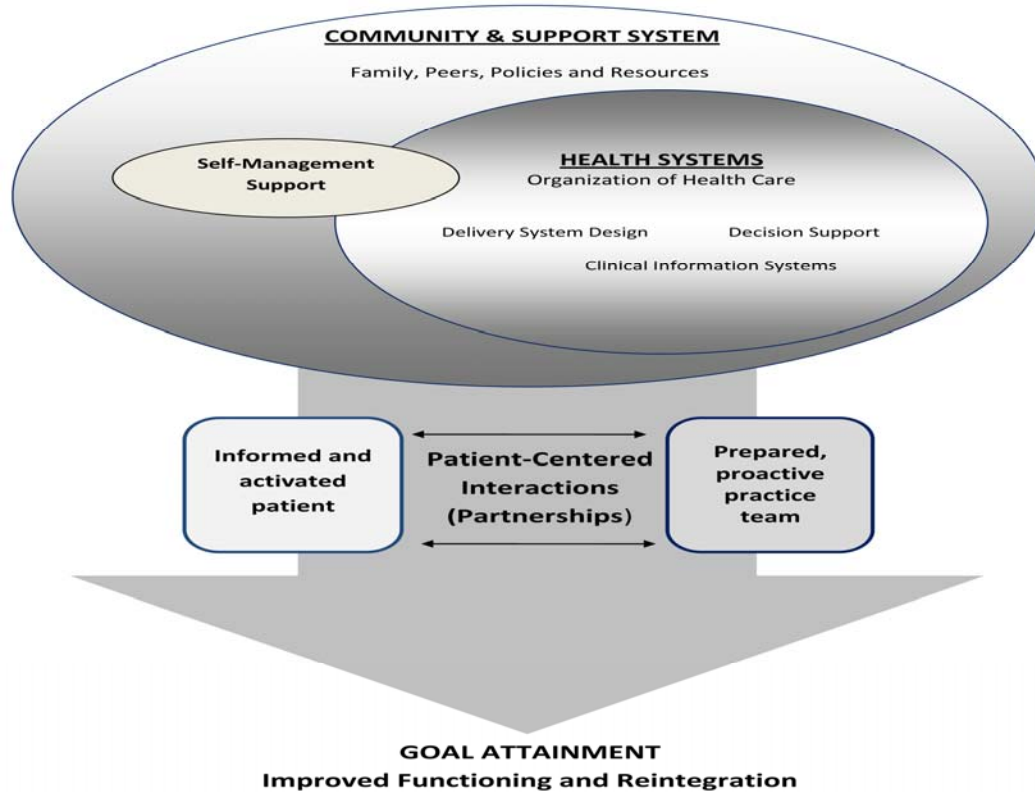

Figure 1. PT/BRI QUERI Conceptual Framework

Specific PT/BRI QUERI goals are:

1. Support and enhance implementation into clinical practice of evidence-based, integrated, patient-centered care for patients with TBI/polytrauma.
2. Improve patients' ability to manage their TBI/polytrauma-related symptoms, impairments and functional problems.
3. Optimize Veterans' support systems, including family, peers and community resources.

These goals are aligned with the VHA Strategic Goals and Objectives for 2013 to 2018 and those of our partners. Clinical teams also provided input on the practicality of these goals. In addition, quality gaps and/or variations have been noted in all three areas. Specifically, QUERI research, clinical teams and VHA decision makers have identified the need to ensure access to high quality evaluations and coordinated follow-up care for TBI sequelae, to improve treatment planning processes, to enhance patient engagement, and to more fully leverage patients' support networks and community resources so as to maximize patients' reintegration and functional outcomes.

2.5 Definitions
Polytrauma. Consistent with the VHA definition of polytrauma,[12] 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.

TBI. TBI is a traumatically induced structural injury and/or physiological disruption of brain function as a result of an external force that is indicated by new onset or worsening of at least one of the following signs or symptoms immediately following the event: (a) any loss of consciousness; (b) any loss of memory for events immediately before or after the event; (c) any alterations in mental state; (d) neurological deficits that may or may not be transient; and (e) intracranial lesion.

TBI Severity. TBI is categorized by severity as mild, moderate or severe based on the length of loss of consciousness, alteration of consciousness or posttraumatic amnesia at the time of injury and not by the severity of symptoms at various time points after injury.[13] There is substantial evidence that the epidemiology, pathophysiology, natural history, and prognosis of

mild TBI (mTBI) are different than for moderate to severe TBI, which are often grouped together for research purposes.

Table 1 details the criteria for classification of TBI by severity. While there is general consensus about the definition of moderate to severe TBI, mTBI has been variously defined, contributing to confusion regarding classification of patients and difficulty synthesizing results across studies.[14,15] The VA and DoD have adopted the American Congress of Rehabilitation Medicine (ACRM) definition of mTBI which specifies that a mTBI does not exceed the following: posttraumatic amnesia for greater than 24 hours; Glasgow Coma Score of 13 to 15 after the first 30 minutes; loss of consciousness for more than 30 minutes.[16] Generally, the terms mTBI and concussion are used interchangeably.

Table 1. Criteria for Rating TBI Severity

Criteria	Mild	Moderate	Severe
Structural imaging	Normal	Normal or abnormal	Normal or abnormal
Loss of consciousness	0-30 minutes	> 30 minutes and < 24 hours	> 24 hours
Alteration of consciousness	A moment for up to 24 hours	> 24 hours	> 24 hours
Posttraumatic amnesia	0-1 day	> 1 day and < 7 days	> 7 days
Glascow Coma Scale	13-15	9-12	< 9

Table from VA/DoD Clinical Practice Guideline for Management of Concussion/mild Traumatic Brain Injury.[13]

2.6 Other QUERI Center Overlap

PT/BRI QUERI's clinical goals overlap with those of Diabetes and eHealth QUERIs. In particular, Diabetes QUERI's sub-goal "to develop and implement innovative programs to improve diabetes self-management" is highly similar to our Goal 2 implementation target "to implement technologies or programs to support ongoing self-management and evaluate their implementation." Additionally, like the eHealth QUERI, in our revised strategic plan we are focusing on use of technology to support patient self-management. Because we are addressing such different clinical conditions, we do not share any projects with Diabetes QUERI. The eHealth QUERI is not focused on any one specific clinical problem. We currently have three projects that also involve eHealth QUERI.

Our Implementation Research Coordinator (IRC), Carmen Hall, PhD, has discussed this overlap with the IRCs of these other QUERIs and will continue to coordinate information related to our work with other QUERIs. In addition, Timothy Hogan, PhD, the eHealth QUERI IRC, has joined the Executive Committee of our QUERI to facilitate collaboration between our two QUERIs.

Because the vast majority of Veterans with diagnosed TBI also have mental health disorders, our QUERI is also interested in the work of MH QUERI and SUD QUERI. Several projects included in our portfolio are also supported by MH QUERI. Because PTSD is one of Dr. Sayer's research areas (she is PI of the recently funded HSR&D CREATE focused on expanding the reach of Evidence-Based PTSD treatments), she will serve as the primary link between PT/BRI QUERI and MH QUERI, which recently expanded its focus to include PTSD. Dr. Sayer has joined the PTSD Implementation Coalition, a collaboration between the National Center for PTSD and MH QUERI, to help identify opportunities to improve PTSD care for Veterans who also have TBI histories. At the time of this writing, PT/BRI QUERI and SUD QUERI were developing plans for future collaborations to improve care for Veterans with co-occurring TBI and SUD.

PT/BRI QUERI also shares implementation science goals and interests with other QUERIs. Our IRC participates in cross-QUERI workgroups to advance these initiatives. This work is more fully described in Section 7 under Implementation Science Contributions.

3. Significance and Consequences

3.1 Epidemiology of TBI in Veterans

Even during peacetime, the rate of TBI is higher in military personnel than in civilians.[17] This is probably because the demographics of military personnel (the majority of whom are men between the ages of 18 to 24 who are at increased risk for TBI) and certain military occupations put soldiers at a higher risk of sustaining TBI. Not surprisingly, during times of war, the rate of both penetrating and closed head injuries among military personnel increases.

There are challenges to determining the exact incidence and prevalence of deployment related TBI, particularly among service members with mild injuries that do not require immediate in-theater medical attention and therefore are not documented soon after the time of injury when the injury-causing event and acute injury characteristics (e.g., alteration of consciousness) are most accurately assessed. The DoD reports the number of service members who have received a TBI diagnosis in the military health system since 2000, using International Classification of Diseases–Ninth Revision (ICD-9) diagnosis codes to identify TBI cases and classify them by

severity level.[18] These reports show that TBI incidence has been increasing since 2001, the year OEF began, and that the vast majority of TBI in military personnel was mild in severity, whereas severe and penetrating brain injury, which have been the focus of TBI research based on Veterans of prior wars, were relatively infrequent (see Table 2). However, the DoD does not report the number of military personnel who received medical care through the military health system or the number at risk for TBI in each year, making it impossible to calculate a rate of TBI and limiting interpretation of these data. Furthermore, these numbers include all TBI among military personnel, not just war-related TBI.

Table 2. Annual Number of Service Members with Diagnosed TBI and Percent of TBI Cases by Severity Level from 2001 through 2011

Year	Mild	Moderate	Severe	Penetrating	Unknown	Total N per Year
2001	7,760 (66)	3,553 (30)	187 (2)	291 (2)	39 (<1)	11,830
2002	8,974 (72)	3,077 (25)	149 (1)	231 (2)	39 (<1)	12,470
2003	9,770 (76)	2,643 (20)	173 (1)	276 (2)	36 (<1)	12,898
2004	10,536 (79)	2,281 (17)	149 (1)	314 (2)	32 (<1)	13,312
2005	9,857 (81)	1,906 (16)	159 (1)	248 (2)	41 (<1)	12,211
2006	13,919 (82)	2,466 (15)	199 (1)	322 (2)	52 (<1)	16,958
2007	18,665 (81)	3,708 (16)	216 (1)	375 (2)	210 (1)	23,174
2008	21,859 (77)	3,343 (12)	249 (1)	437 (2)	2,679 (9)	28,567
2009	22,673 (78)	3,751 (13)	323 (1)	486 (2)	2022 (7)	29,255
2010	25,151 (81)	3,932 (13)	220 (1)	279 (1)	1661 (5)	31,243
2011	24,883 (78)	4,343 (14)	204 (<1)	273 (<1)	2,298 (7)	32,001

TBI severity (mild, moderate, severe) defined according to VA/DoD Clinical Practice Guideline for Management of Concussion/mTBI[13]. TBI Severity reported by DoD based on ICD-9 codes[18]

PT/BRI QUERI has been conducting research to describe the prevalence of TBI among Iraq and Afghanistan war Veterans who use VHA healthcare. We found that in any given year, less than 7% of OEF/OIF/OND Veterans received a TBI diagnosis in a VA clinic. Looking across the three years from FY 2009 through FY 2011, 58,998 (9.6%) of the 613,391OEF/OIF/OND Veterans utilizing VHA services received a TBI diagnosis. Figure 2 presents the number of Veterans diagnosed with TBI, with numbers grouped within VISN by quintiles. It is likely that most of these individuals were diagnosed through the VA's deployment-related TBI screening and evaluation program which was developed to identify OEF/OIF/OND Veterans with symptoms that may be associated with deployment-related mTBI. The focus of VHA's TBI screening and evaluation program is on mild injury because more severe TBI is readily identified, generally while the Veteran is active duty.
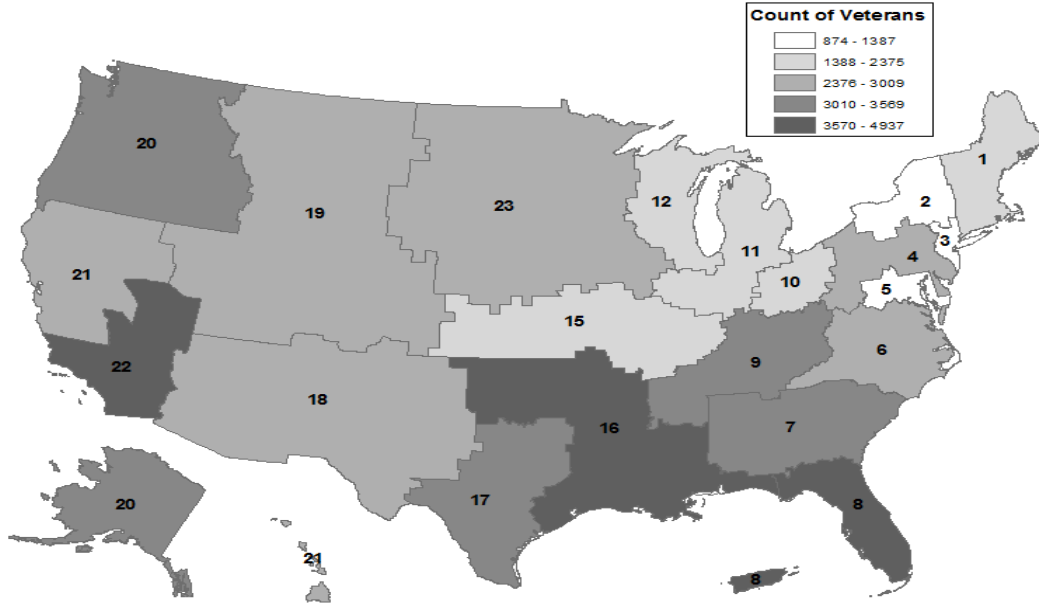
Figure 2. Number of patients diagnosed with TBI in FY 2009 through FY 2011 with patient numbers grouped within VISN by quintiles

3.2 Blast Injuries and Polytrauma

The vast majority of combat-related TBI cases are blast-related. 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 composition and amount of explosive material involved, surrounding environment, delivery method, distance between the victim and the blast, and presence of intervening protective barriers or environmental hazards.[19] Furthermore, blast-injuries are often associated with polytrauma, meaning that they involve more than one body organ or system. Prior PT/BRI QUERI research indicates that in the combat zone, blasts impact more body systems and organs than other mechanisms of injury, with the median and modal number of injuries associated with blasts being five (range 1 to 9).[20]

PT/BRI QUERI investigators have found that psychiatric morbidity, particularly PTSD and pain, are prevalent in Veterans with a history of TBI.[21-23] Some investigators have referred to the co-occurrence of TBI, pain, and PTSD as the "polytrauma triad"[24,25] and VHA has recognized the need to provide clinicians with guidance as to how to treat Veterans with this constellation of conditions.[26] Table 3 presents the prevalence of diagnosed TBI, psychiatric disorders and pain in OEF/OIF/OND Veterans who used VA in FY 2009 through FY 2011.

Table 3. Percent of Iraq and Afghanistan War Veterans with Comorbidities by TBI Status in FY 2009 through 2011

	TBI Status	
	Yes (N = 58,998)	No (N = 554,393)
	%	%
Any Mental Health Diagnosis	90.3	41.6
PTSD	75.3	24.4
Depression	54.6	23.2
Anxiety	31.5	14.1
Bipolar	3.7	1.4
Psychosis	2.9	1.0
Substance Disorder	27.3	10.5
Nicotine Dependence	31.0	17.3
Any Head/Back/Neck Pain Diagnosis	78.7	36.1
Headache	55.8	11.7
Back Pain	54.3	28.1
Neck Pain	19.3	7.1
Any Mental Health and Any Head/Back/Neck Pain Diagnosis	71.7	20.5
PTSD and Any Head/Back/Neck Pain	60.6	13.1

TBI status determined by VA-recommended ICD-9 codes for TBI given during inpatient stays and outpatient encounters in FY 2009 through FY 2011.

These data were compiled from PT/BRI QUERI's annual TBI Utilization Reports generated to provide VHA with data on the prevalence of diagnosed TBI and associated comorbidities in OEF/OIF/OND, as well as patterns of utilization and costs that can inform policy and programs.[22,23,27,28] Prior to generation of these reports, which are based on national data, information on prevalence was based on small samples of Veterans seen within select TBI/polytrauma clinics.[24,25]

While these reports are helping to fill an important evidence-gap, there remains little information about long-term healthcare needs of OEF/OIF/OND Veterans with TBI. The Congressionally mandated Committee on Care of Veterans with Traumatic Brain Injury (TBI) requested that ORD conduct an Evidence Synthesis Review to assess the long-term effects of mTBI. This systematic review will also describe pre-injury risk factors, co-morbid risk factors, and other patient characteristics that affect long-term outcomes from mTBI. The evidence synthesis was initiated in May 2012 and will be completed in March 2013. Early findings indicate a need for more research on long-term needs of Veterans with TBI. PT/BRI QUERI, therefore, sees an opportunity to contribute toward the understanding of these Veterans' long-term needs.

3.3 Morbidity and Quality of Life

It is widely held that cognitive deficits resulting from moderate to severe TBI improve most during the first six to 12 months post-injury and that significant deficits often persist.[29,30] However, the majority of TBI cases among OEF/OIF/OND returnees are mild in severity.[31-33] The course and impact of mTBI is more variable than that of moderate to severe TBI, with research based on civilians indicating that most mTBI cases resolve within weeks or months.[34,35] Although PT/BRI QUERI reports on the number and proportion of OEF/OIF/OND who have TBI histories, the number and proportion who suffer mTBI-related *morbidity* remains unknown.

Persistent mTBI-related symptoms are often labeled "postconcussive syndrome".[36] These symptoms can be categorized as physical, cognitive, and behavioral/emotional. Physical symptoms include headaches, dizziness, fatigue, and disordered sleep; cognitive symptoms include deficits in concentration and memory; and behavioral/emotional symptoms include irritability, depression, and emotional lability.[13] Many postconcussive symptoms are nonspecific and may be reported by individuals with no history of head trauma who have other conditions, such as chronic pain and psychiatric disorders.[37-39] Controversy remains as to whether persistent symptoms in individuals who sustain mTBI are caused primarily by the TBI, psychological factors, or an interaction between the two.[31-37] Some recent findings based on newer neuroimaging techniques and post-mortem examination suggest that there may be a neural basis for persistent symptoms following a mTBI.[39,40,41] In general, research on the course of recovery from mTBI is based on concussed athletes or survivors of vehicular crashes and falls. Whether these findings generalize to mTBI secondary to multiple blasts is an important topic for clinical research.

3.4 Costs

The costs associated with TBI, particularly of TBI in Veterans, are understudied. One study estimated lifetime costs of treating combat-related TBI and the associated loss in quality of life in OIF Veterans.[42] This study has been criticized for grossly overestimating the rate of severe TBI in the population.[43] The other available study created cost estimates based on civilian populations and did not examine costs of treating individuals with deployment-related TBI who have comorbidities.[44] To fill this evidence gap, PT/BRI QUERI has been examining VA healthcare costs associated with providing care to OEF/OIF/OND Veterans with TBI and associated comorbidities compared with the costs associated with providing care to OEF/OIF/OND Veterans without TBI as part of our annual TBI Utilization Reports which we post

on the internet. We found that the median annual cost per TBI-diagnosed Veteran was nearly four-times higher than for those without TBI. Within the TBI group, cost increased as diagnostic complexity increased, such that those with TBI, pain, and PTSD demonstrated the highest median cost per patient.[22] Table 4 presents median costs for outpatient, inpatient and pharmacy services over the past three fiscal years for OEF/OIF/OND with TBI compared to those without. Median costs more closely approximate the typical patient costs than mean costs since there is a large skew in the distribution of costs driven by a relatively small number of very high cost patients.

4. Treatment/Management Evidence Base

4.1 TBI

Treatment of TBI sequelae varies by TBI severity. Evidence suggests that multidisciplinary neuropsychological rehabilitation therapies improve community reintegration and return to work outcomes among persons with moderate to severe TBI.[44] However, a recent systematic review concluded that the body of evidence is not conclusive and that interpretation of community integration outcomes is limited by lack of attention to minimal clinically important differences.[45] Intensive treatment is not of particular benefit for patients with mTBI.[46]

Treatment of mTBI generally involves patient and family education and, if symptoms persist, management of specific symptoms. In 2009, the VA and DoD released the *Clinical Practice Guideline for Management of Concussion/Mild Traumatic Brain Injury.*[13] This Clinical Practice Guideline (CPG*)* presents separate algorithms for initial presentation for treatment, the management of symptoms related to mTBI, and follow-up of persistent symptoms. Early education about symptoms and expected recovery as well as reassurance of positive recovery are the interventions with the strongest evidence base for mTBI in civilian populations (level A evidence).[46-49] Evidence suggests that these interventions are most effective when provided during the initial post injury phase. We could not identify studies that examined the effect of education and normalizing symptoms when delivered months to years after injury, which is when the majority of OEF/OIF/OND Veterans with a history of mTBI present for VA services. Given the lack of evidence for best practice, PT/BRI QUERI works to promote research to advance the evidence-base for practice and to implement processes of care that have been found to improve outcomes for individuals with complex chronic illnesses.

Table 4. Median costs for outpatient, inpatient and pharmacy for OEF/OIF/OND with TBI compared to those without

	Veterans with TBI diagnosis			Veterans without a TBI diagnosis		
	FY 2009	FY 2010	FY 2011	FY 2009	FY 2010	FY 2011
Category of Cost	Median (25th-75th Percentiles)			Median (25th-75th Percentiles)		
Outpatient						
Medical/Surgical	$1,431 ($653-$2,787)	$1,431 ($655-$2,785)	$1,418 ($670-$2,810)	$641 ($255-$1,347)	$661 ($257-$1,382)	$667 ($279-$1,435)
Behavioral	$1,262 ($332-$2,959)	$1,252 ($335-$3,120)	$1,186 ($304-$3,102)	$0 ($0-$568)	$0 ($0-$601)	$0 ($0-$667)
Diagnostic	$669 ($257-$1,394)	$670 ($254-$1,416)	$690 ($269-$1,429)	$210 ($58-$542)	$213 ($60-$558)	$226 ($61-$594)
Other	$835 ($287-$1,875)	$743 ($223-$1,785)	$631 ($146-$1,643)	$0 ($0-$210)	$0 ($0-$156)	$0 ($0-$127)
Total Outpatient	$5,181 ($2,727-$9,253)	$5,179 ($2,601-$9,405)	$5,014 ($2,532-$9,400)	$1,400 ($597-$3,080)	$1,436 ($606-$3,185)	$1,501 ($644-$3,319)
Total Inpatient	$0 ($0-$0)	$0 ($0-$0)	$0 ($0-$0)	$0 ($0-$0)	$0 ($0-$0)	$0 ($0-$0)
Total Outpatient and Inpatient	$5,387 ($2,784-$10,193)	$5,420 ($2,658-$10,492)	$5,227 ($2,587-$10,526)	$1,411 ($599-$3,155)	$1,446 ($607-$3,266)	$1,513 ($646-$3,404)
Total Pharmacy	$240 ($66-$703)	$258 ($71-$774)	$270 ($72-$805)	$50 ($0-$222)	$57 ($0-$250)	$64 ($0-$274)
Total Outpatient, Inpatient, and Pharmacy	$5,831 ($3,013-$11,116)	$5,922 ($2,915-$11,488)	$5,749 ($2,851-$11,614)	$1,548 ($643-$3,475)	$1,603 ($661-$3,630)	$1,688 ($695-$3,798)

There is not a strong evidence base for practice for TBI that co-occurs with other conditions, particularly blast-related TBI with polytrauma. The VA and DoD have developed separate guidelines for concussion/mTBI, lower back pain and PTSD. The concussion/mTBI CPG is described above. The PTSD CPG strongly recommends cognitive-behavioral therapy including cognitive processing therapy (CPT), prolonged exposure (PE), and eye movement desensitization and reprocessing[50] and the VA's Office of Mental Health Services (OMHS) has rolled out CPT and PE for PTSD. The pain management guideline emphasizes development of a comprehensive pain assessment and of an integrative, multimodal and multidisciplinary treatment plan. Pain treatment most often involves optimized pharmacological management and evidence-based non-pharmacological interventions.[51] The consensus of VA experts is that clinicians should not alter PTSD and pain treatments just because a Veteran has a history of mTBI.[26] Furthermore, early evidence supports the use of PE and CPT for Veterans with TBI.[52,53] Regardless, the presence of comorbidities brings to light the importance of a comprehensive treatment plan that addresses not only symptoms associated with each specific condition, but also Veterans' functional goals.

4.2 Self-Management Support

Self-management support is a crucial component of the chronic illness management.[1,6,7,54] Some programs that support self-management are community based whereas others are situated within the healthcare system. Effective self-management support strategies that teams deliver include assessment of patients' health conditions, beliefs, values and goals; patient-centered treatment planning; problem solving; and pro-active follow up.

Research also suggests that technologies and eHealth tools can improve patient self-management, including self-efficacy, medication adherence and disease specific self-efficacy/mastery.[55,56] Research also indicates that patients who are informed and actively engaged are better able to participate in decision making and understand their role in managing their health problems.[57] Therefore, PT/BRI QUERI is promoting research that implements technology, eHealth and patient activation strategies, including patient education, to help empower patients to engage in self-management.

4.3 Family Support and Patient Outcomes

The needs of family members of the war injured to actively participate in the rehabilitation of their loved one led to a significant paradigm shift within the Polytrauma System of Care from a professionally-led model to a patient- and family-centered model. The Institute for Patient-and

Family-Centered Care has defined patient- and family-centered care as "an approach to the planning, delivery, and evaluation of healthcare that is grounded in mutually beneficial partnerships among healthcare providers, patients, and families".[58,59] PT/BRI QUERI has partnered with PM&R to spread the philosophy of patient- and family-centered care and to implement family-centered practices within VHA's inpatient rehabilitation centers. Specifically, we used a web-based tool called the Family Care Map, which included educational information structured around the phases of inpatient rehabilitation, to help clinicians better partner with family members to care for injured Veterans.[60] PT/BRI QUERI recognizes the importance of expanding the Family Care Map work to outpatient teams to engage the families of less severely injured patients as allies in treatment planning and self-management support.

The PT/BRI QUERI has also supported research on the "informal" care that families provide to Veterans. PT/BRI QUERI researcher, Joan Griffin, PhD, and colleagues conducted the first study of family members of Veterans who received inpatient rehabilitation in a polytrauma unit. This work extended previous PT/BRI QUERI research indicating that family members of moderate to severely injured Veterans were highly involved in the rehabilitation of their loved one.[61] Dr. Griffin found that family support needs and involvement in patient care varied by TBI severity.[62,63] Furthermore, Veterans often required care at home years after discharge from an inpatient rehabilitation program and family members who provided basic care at home had significantly higher financial and psychological strain.[64] Griffin and colleagues also found that caregiver health was associated with patient re-injury after discharge. Nearly one-third of patients incurred medically treated injuries after discharge overall and Veterans whose informal caregivers had poor physical or mental health had significantly higher odds of subsequent injury.[65]

While family members play an obvious role in the care of those with severe injury, they also play a role in outcomes for patients with less severe TBI. The management of mTBI, like that of other chronic illnesses, often involves changes in daily routine that occur in family settings and, therefore, requires both patients and families to adapt to these changes. Moreover, family members often take an active role in helping adults with chronic illness execute complex self-management tasks. How families behave and communicate can affect adult chronic illness self-management and clinical outcomes. Families that emphasize patient self-reliance and personal achievement, family cohesion, and attentive response to symptoms and open illness discussions have better health outcomes.[66] Therefore, PT/BRI QUERI is supporting research to help families support patients' self-management activities.

5. Current Practices and Quality/Outcome Gaps

5.1 The Polytrauma System of Care

The Polytrauma System of Care operates under the leadership of PM&R within Rehabilitation and Prosthetics Services and consists of the following four components: (a) Five Polytrauma Rehabilitation Centers (PRC) provide acute inpatient rehabilitation for Veterans and Active Duty Service Members with TBI and Polytrauma. Each PRC has four beds utilized for the Emerging Consciousness Program to systematically evaluate and initiate interventions developed for minimally-responsive patients. Each PRC also has a Polytrauma Transitional Rehabilitation Program (PTRP) to provide comprehensive, post-acute cognitive retraining and community re-entry rehabilitation to TBI patients through outpatient and residential programming. (b) 23 Polytrauma Network Sites (PNS) (one in each VISN plus one in Puerto Rico and one co-located at the San Antonio PRC) charged with providing and coordinating TBI-related care for Veterans within each VISN. These sites act as referral centers and provide oversight and education to other medical centers within the VISN. (c) Polytrauma Support Clinic Teams (PSCT) provide evaluation for Veterans with positive TBI screens and follow stable TBI-related symptoms. At the beginning of FY 2012, there were 86 PSCTs. (d) Polytrauma Points of Contact (PPOC) at every facility that does not have a PNS or PSCT. At the beginning of FY 2012, there were 40 PPOC.

PT/BRI QUERI research demonstrates that TBI/polytrauma teams vary in size and staff composition. Because they are treating complex patients with multiple comorbidities, they are charged with coordinating patients' care across specialty teams and with primary care. PT/BRI QUERI researchers are studying care coordination processes for patients seen within the Polytrauma System of Care to determine how best to optimize care team composition and coordination.

5.2 TBI Screening and Evaluation

To ensure that Veterans returning from Iraq and Afghanistan with combat-related TBI receive appropriate healthcare, in April 2007 the VA instituted nationwide screening for all Iraq and Afghanistan Veterans who use VA healthcare.[67] The VA screening measure is based on the brief screening tool developed by the Defense and Veterans Brain Injury Center (DVBIC) and tested in a sample of active duty military members.[68] The VA TBI screening instrument contains questions to identify: (a) combat exposures that may have resulted in a TBI; (b) immediate alteration or loss of consciousness; (c) development of postconcussive symptoms near the time of the exposure; and (d) current postconcussive symptoms, including headaches, dizziness, or

sleep problems.[69] Although it does not involve assessment of TBI severity, QUERI research demonstrates that the majority of cases that are later confirmed to have a history of TBI have had mTBI. Because the VA is interested in identifying Iraq and Afghanistan war Veterans who have treatment needs, it classifies as a positive screen Veterans who report both a history of possible TBI (exposure and immediate alteration or loss of consciousness) and current postconcussive symptoms. Associated VA policy specifies that those who screen positive undergo a Comprehensive TBI Evaluation (CTBIE) by a specialist physician, specifically a physiatrist, neurologist, or other approved provider.[67] To date over 644,000 Veterans have been screened for TBI. This represents approximately 95% of those eligible for screening. Through July 2012, 127,901 OEF/OIF/OND Veterans have screened positive for TBI and 50,869 have been diagnosed with TBI during a CTBIE.

As noted by the Government Accountability Office (GAO), VHA's TBI screening program was rolled out before research was conducted on the psychometric properties of the VHA's TBI screening tool.[70] Therefore, in response to VHA operational needs regarding TBI research, a priority for the PT/BRI QUERI during our last funding period was to conduct research to support the implementation of this screening tool and the associated TBI evaluation. Three PT/BRI QUERI studies respond to the GAO's call for research on the sensitivity and specificity of VHA's post-deployment TBI screening measure, two of which have published results. Both studies reported high sensitivity (.87 to .94).[71,72] However, across studies specificity was poor (.13-.18)[71] to moderate (.59).[72] Findings from Donnelly et al.[71] suggested that specificity was lower because some of the symptoms included in the screen are also common in disorders other than TBI, such as PTSD. Findings also indicated that the negative predictive value of VHA's postdeployment TBI screening measure is high.[71,72] That is, individuals who are screening negative are not likely to have sustained a deployment-related TBI. Furthermore, those who screen positive, particularly women who receive a TBI diagnosis, are highly symptomatic.[73] PT/BRI QUERI summarizes the results of these studies every six months in PT/BRI QUERI TBI Screening and Evaluation Research Fact Sheets that we share with our partners and the field.[74] This work is filling the evidence gap noted by the GAO. In addition, national data suggest that performance goals for TBI screening are being met (see 5.6 TBI Performance Measures below). As a result, our QUERI is no longer prioritizing research on TBI screening.

There remain, however, gaps with regard to post-screening TBI evaluations, as indicated by facility-level variation in rates of CTBIE completion and TBI diagnosis based on the CTBIE. Specifically, whereas nationally 75% of those who screen positive for TBI receive a CTBIE, the rate of completion of CTBIEs varies from 48% to 99% across facilities. Additionally, whereas

nationally the rate of TBI diagnosis based on a CTBIE is 56%, this rate varies from 21% to 91% across facilities, excluding one extreme outlier. Available research suggests that facility and patient demographic characteristics contribute to variation in the rate of CTBIE completion after a positive TBI screen.[69] To minimize the impact of these sources of variation and improve access to TBI evaluations, the Office of Healthcare Transformation is funding a TBI Telehealth Evaluation Project to promote the use of telehealth for TBI evaluations. Improving access to and quality of TBI evaluations is, therefore, an implementation target for PT/BRI QUERI.

5.3 TBI Care Plans

In 2008, the Polytrauma System of Care was mandated through the National Defense Authorization Act of Fiscal Year 2008, Subchapter II of Chapter 17 of Title 38, United States Code (U.S.C.) to develop an Individualized Rehabilitation and Community Reintegration Care Plan for Veterans and members of the Armed Services with TBI who had rehabilitation needs.[75] The legislation explicitly required fifteen elements to be included in the TBI Care Plans, including standard rehabilitation practices, such as documentation of patient goals. The identification of family needs and goals was also included. Currently, inpatient and outpatient sites across the Polytrauma System of Care use TBI Care Plan templates, and the number of completed initial, interim and discharge TBI Care Plans are reported quarterly by PM&R during Polytrauma System of Care conference calls and established email groups. As of June 30, 2012, over 17,000 Initial Care Plans, 10,000 Interim Care Plans, and nearly 7,000 Discharge Care Plans have been documented utilizing the template. Because these TBI Care Plans were Congressionally mandated, the VA's Office of the Inspector General (OIG) reviews whether programs are meeting the requirements set forth in the mandate by reviewing how often and for what purpose they are used, and by identifying if there are significant gaps in implementation. As of September 11, 2012 the OIG noted deficiencies in documentation of TBI Care Plans in over one third of sites reviewed.[76]

The national PM&R is strongly committed to improving polytrauma rehabilitation practice and patient outcomes through the use of the TBI Care Plan and sees it as a potential tool to improve continuity in care and communication between providers and patients beyond polytrauma to all the other programs in which these Veterans receive services. However, PM&R has not used any tools or evidence-based strategies to improve care planning or measure patient and family engagement. Furthermore, it has not developed metrics for identifying patients who should have TBI Care Plans. PTBRI QUERI, therefore, sees an opportunity to partner with PM&R to improve TBI treatment planning processes.

5.4 Self-Management Support

MyHealtheVet and Secure Messaging through MyHealtheVet have the potential of increasing patient engagement and self-management. All VA specialty providers have been mandated to start using Secure Messaging by the end of FY 2012. To date there are no metrics on the anticipated use of Secure Messaging among TBI/polytrauma providers and outpatient TBI/polytrauma teams have reported minimal use on national Polytrauma System of Care teleconference calls. In addition, a team from PM&R developed a TBI mobile application which has the potential to improve both self-management and patient engagement. However, no metrics are available yet on the expected utilization of this tool and plans for implementation are still in development. With these and other advancements, PT/BRI QUERI sees an opportunity to enhance implementation of patient-facing technologies to improve self-management.

5.5 Family-Centered Care

PT/BRI QUERI conducted surveys to identify gaps in patient- and family-centered care within the polytrauma outpatient programs. Fifty-seven percent (n= 602) of surveyed clinicians responded, 195 from 22 PNS and 407 from 81 PSCT programs. While PNS clinicians reported more frequent contact with families compared with PSCT clinicians, over 60% of clinicians across PNS and PSCT programs interacted infrequently with families. Clinicians who infrequently worked with families reported that families did not attend clinic visits with patients, patients did not want to involve a family member in their care or that they were not successful in including family members in visits. Clinicians who frequently worked with families reported that they typically interact with family members during in-person meetings that also involved the patient or communicated over the telephone. PNS clinicians were more likely to report also meeting with family members without the patient and to use secure messages to communicate with family members. We used the service provider version of the 27-item Measures of Processes of Care (MPOC) to assess providers' perceptions of their delivery of patient- and family-centered care.[77] Scores indicated that most teams perceived that they have created a culture of patient and family centeredness, but that there are opportunities for improvement, particularly in the area of provision of general information to patients and families. In terms of MPOC scores, we found relatively high performing polytrauma teams spread across 13 VISNs and relatively low performing teams spread across 13 VISNs; nine of these VISNs had both high and low performing polytrauma teams. We identified six PSCTs with particularly strong family-

centered care practices and another five PSCTs whose MPOC scores suggested more room for improvement across the domains the MPOC assesses.

5.6 TBI Performance Measures

Three measures related to the TBI screening and evaluation process have been reported in the "Functional Status" domain for FY 2012. The first measure requires screening for TBI of all OEF/OIF/OND Veterans who present for medical care with a program office goal for achievement set at 95%. The second measure requires that the designated service contacts a Veteran who has a positive screen within 14 working days to schedule a comprehensive evaluation for TBI, with a threshold of achievement set at 84%. The third measure requires that 75% of all cases have the comprehensive evaluation for TBI completed within 30 days of a positive screening. National data suggests that the screening rate and timeliness of follow-up evaluation are meeting program office goals. PT/BRI QUERI is collaborating with PM&R and the Office of Quality and Performance (OQP) to revise the third performance measure in FY 2013.

5.7 Data Systems and Databases for TBI/Polytrauma

Database development had been a high priority goal for PT/BRI QUERI when it was first funded because there were no systems for identifying and tracking new Veterans with war injuries. This gap, however, has been filled by the databases described below. The DoD also has registries and databases for identifying OEF/OIF/OND service members with war injuries but those databases are not readily available to VA investigators.

OEF/OIF/OND Reports: The VSSC OEF/OIF/OND data reports allow for the identification and tracking of VA service utilization of OEF/OIF/OND services members who have: (a) been PRC patients; (b) received a purple heart; or (c) been treated for amputation, burns, TBI, low vision or blindness, hearing loss, or SCI. It does not allow for identification of OEF/OIF/OND patients with multiple morbidities. PT/BRI QUERI participated in the VSSC Data Mart Special Interest Work Group during the planning stage of this project.

TBI Screening and Evaluation Database: The TBI Screening and Evaluation Database contains patient responses to the TBI Clinical Reminder implemented nationally in April 2007 and the CTBIE of positive screens which was released nationally in October 2007. Technical aspects of this project are being managed by the VSSC but are currently being transitioned to management by OI&T. PM&R maintains stewardship of the TBI database. Our QUERI played an instrumental role in promoting the development of the database and the included measures.

Functional Status Outcomes Database (FSOD): The FSOD tracks patients treated in VA inpatient rehabilitation settings. It includes the Functional Independence Measure (FIM), which is to be completed within 72 hours of admissions and discharge.[78] All VA rehabilitation clinicians submitting data to the VA Uniform Data System are credentialed in the use of the FIM. The FIM is a 2-dimensional instrument consisting of 13 motor items and 5 cognitive items.[79] In 2006, PT/BRI QUERI participated in a project to enhance the FSOD so that it would collect information on patients' injuries and impairments. PT/BRI QUERI research informed the selection of the data fields that were added to the FSOD to better characterize polytrauma patients. In FY 2007, modifications were implemented and fielded for inpatients.

Polytrauma Visual Impairment Database: PT/BRI QUERI investigators at the Palo Alto VA Western Blind Rehabilitation Center have created a database, supported by PT/BRI QUERI LIPs, to characterize the types of visual impairments present in blind rehabilitation patients who have combat related injuries, including TBI. This database provides information about vision dysfunction in patients with polytrauma referred for vision evaluation.

TBI Registry: The National Defense Authorization Act of Fiscal Year 2008, Public Law 110-181, Section 1704 (d) established a TBI Registry that must include information about each individual who served in OEF/OIF/OND who has symptoms of TBI and applies for VA care or disability benefits. The VA and the National Institute on Disability and Rehabilitation Research (NIDRR) collaborate through an interagency agreement which contains the scope of work related to the Registry. Intellica Corporation has been awarded a contract from the VA to develop a series of registries on topics of specific interest to the VA, and they extract data needed for the TBI Veterans Health Registry. The TBIMS National Data and Statistical Center (NDSC) located at Craig Hospital in Englewood, Colorado accesses the data through Intellica for analysis and report development. Data elements include DoD data, TBI screen, CTBIE, TBI diagnosis code(s), VA service utilization, disability determination and cause of death. PT/BRI QUERI had no involvement in the design of this database but we are monitoring its progress through our relationship with PM&R.

TBI Model System National Database (TBIMS): The TBIMS database began in 1989 and is maintained by the TBIMS NDSC. The National Database currently has detailed diagnostic and functional information for over 8000 persons who have sustained a TBI, for 6000 of those persons at one year post injury, and for 2500 of those persons at five years' post-injury. In FY 2009, the VA signed an interagency agreement with the Department of Education which covered the collaborative efforts for the VA PRCs to establish a parallel TBIMS project. This partnership will allow the PRC TBI data to be analyzed in a similar manner to the NIDRR TBIMS

data, and allow for research collaboration and programmatic evaluation. PT/BRI QUERI Executive Committee members were involved in promoting and implementing this project.

Mayo-Portland Participation Index (M2PI): In the last quarter of 2012, the VA rolled out the Participation Index (M2PI) from the Mayo-Portland Adaptability Inventory (MPAI)[80] through the TBI Instruments package which was released in August 2012. The M2PI has been designated as the outcome measure for the outpatient TBI/polytrauma teams, focusing on patients who are: (a) discharged from inpatient rehabilitation or who receive outpatient rehabilitation services for TBI/polytrauma; (b) referred to a TBI/polytrauma team for interdisciplinary rehabilitation assessments; or (c) receive rehabilitation treatments by interdisciplinary specialists including medical/case management and at least one of the following: Physical Therapy, Occupational Therapy, Speech Language Pathology, Psychology, Recreational Therapy, Kineseotherapy, Vocational Rehabilitation, Blind Rehabilitation. Processes for monitoring use of the M2PI and making these data available for research were still being developed at the time of this writing. PT/BRI QUERI will monitor clinician use of the M2PI to evaluate the possibility of using the M2PI as a metric for benchmarking progress among TBI patients who meet the above criteria.

6. Significant Influences on Current Practice

Below we list influences on TBI/polytrauma care, including VHA programs and directives, legislation and governmental reports, and DoD programs. PT/BRI QUERI has consulted with representatives of all the VHA programs listed below in developing this Strategic Plan.

6.1 VHA Programs, Offices and Directives

Polytrauma System of Care: The Polytrauma System of Care is described above in Section 5. Current Practices and Quality/Outcome Gaps.

Amputation System of Care: The Amputation System of Care is a separate tiered-system under PM&R with ties to the Polytrauma System of Care. It was implemented in FY 2009 and provides access to specialty amputee-related services for Veterans with limb loss. It includes: (a) Seven Regional Amputation Centers (RAC) provide inpatient and outpatient rehabilitation services for amputee care. These centers also serve as referral centers for the region. (b) Fifteen Polytrauma Amputation Network Sites (PANS) for each VISN that does not have a RAC serve as VISN hubs for amputee care and provide education and support to other teams within the VISN. (c) One hundred eleven Amputation Clinic Teams (ACT) at medical facilities that provide evaluation and treatment for Veterans with an amputation. (d) Twenty-two Amputation Points of

Contact (APOCs) at the remaining sites that do not have a dedicated clinical amputation team connect Veterans with amputations to the Amputation System of Care team.

Office of Patient Centered Care and Cultural Transformation: To underscore its commitment to provide Veterans with world-class healthcare that is patient-centered and evidence-based, VA established the Office of Patient-Centered Care and Cultural Transformation (PCCCT). The goal of this new Office is to transform medical facilities nationwide from problem-based disease care systems to patient-centered cultures.

Post-Deployment Integrated Care Initiative (PDICI): Over three fourths of VAMCs have a post-deployment clinic or team. These teams provide integrated care for Veterans recently leaving Active Duty or returning from deployment. Post-deployment teams have enhanced case management and mental health services and expertise in military culture, deployment-related health concerns and compensation and pension issues. As of FY 2013, these teams will have been integrated into PACTs, but will still provide unique expertise in deployment and military-to-civilian transition health issues.

Telehealth Initiative: The Office of Telehealth and Care Coordination supports delivery of services through Clinical Video Telehealth (CVT) and through home telehealth. PM&R has championed the exploration of telehealth to promote access to specialty rehabilitation services including TBI evaluations following a positive screen. A new initiative will make it possible for clinicians to conduct sessions with patients in their homes.

VHA National Pain Management Strategy Coordinating Committee: This committee supports the Pain Management Program Office. It initiated the National Pain Research Working Group and the Pain and Polytrauma Subcommittee which focuses on identifying best practices for pain assessment and management as well as research priorities. It also issued a consensus statement on the assessment of pain in patients with impaired communication, which is relevant for patients with moderate to severe TBI.

Care Management and Social Work Service: This program office provides oversight for case management, the VA's Caregiver Program, the caregiver hotline, REACH-VA, and the Peer Support Mentoring Program.

VHA Committee on Care of Veterans with TBI: This committee is mandated by Congress to evaluate VA's capacity to support programs for Veterans with TBI (Section 515 of Public Law 111-163, the Caregivers and Veterans Omnibus Health Services Act of 2010). The VHA Under Secretary for Health (USH) appointed this Committee to assess VA's capacity to provide diagnostic and treatment services for TBI and to advise the USH regarding the development of

policies, the provision of guidance, and the coordination of services for the diagnosis and treatment of TBI.

VHA Directives

- VHA Directive 2005-024 established the Polytrauma Rehabilitation Centers.
- VHA Directive 2010-12 updates policies and procedures for screening and evaluation of possible TBI in OEF/OIF/OND Veterans that first appeared in VHA Directive 2007-013.
- VHA Directive 2008-065 requires TBI specific ocular health and visual functioning examination in all Polytrauma Rehabilitation Center patients.
- VHA Directive 2009-028 defines the Polytrauma-TBI System of Care.
- VHA Directive 2009-053 provides policy and implementation procedures for the improvement of pain management consistent with the VHA National Pain Management Strategy and compliance with generally accepted pain management standards of care.
- VHA Directive 2012-008 defines Polytrauma Case Management.
- VHA Handbook 1172.04 establishes the requirements for individualized rehabilitation treatment plans for Veterans with TBI. This handbook is being revised by PM&R to reflect recent legislative and policy changes.

6.2 Legislation and Governmental Reports

- GAO-Report No. 08-276 reported on deficiencies in the VA's TBI screening and evaluation program.
- Tilte 38 USC 1710C/D/E requires that VA must provide each Veteran treated for TBI with an individualized rehabilitation and community reintegration treatment plan.
- Caregivers and Veterans Omnibus Health Services Act of 2010 establishes a program of comprehensive assistance for family caregivers of eligible Veterans.

6.3 DoD Research, Education and Clinical Programs

The Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury (DCoE): DCoE was established in 2007 to integrate knowledge and identify, evaluate and disseminate evidence-based practices and standards for the treatment of psychological health and TBI within the Defense Department. The DCoE's three component centers are the Defense and Veterans Brain Injury Center (DBVIC), the Deployment Health Clinical Center, and the National Center for Telehealth and Technology. Among these centers, PT/BRI QUERI is most closely affiliated with the DVBIC. Established in 1992 by Congress, DVBIC is a multi-site

medical care, clinical research and education center that includes10 military treatment facilities, the 5 VA PRCs, and two civilian rehabilitation centers.

6.4 Challenges/Barriers to Improving Practice

Limited Evidence-Base for Interventions to Improve Outcomes for TBI/polytrauma

The most significant barrier to improved practice is the weak evidence-base for interventions for TBI (including multiple blast-related TBI) and even weaker evidence-base for TBI that occurs in the context of other medical conditions (i.e., polytrauma). In short, mainstream research is still needed to better understand which clinical interventions will make a difference for Veterans with combat-related TBI/polytrauma. For this reason, our QUERI closely monitors and promotes clinical research to identify potentially best practices and includes goals that focus on the processes of healthcare delivery.

Lack of Single Clinical Outcome for Benchmarking Progress.

The second most significant barrier to improved practice is the lack of a single, psychometrically sound clinical outcome against which to benchmark progress. Treatment following TBI/polytrauma is complex, based on the multiple organ systems involved and the overlap of nonspecific symptoms among commonly co-occurring conditions. Due to the multiplicity of diagnoses, impairments and symptoms, there is no single gold standard outcome measure. Arguably, patient goal attainment and improved community functioning ("reintegration") are the most important clinical outcomes, regardless of symptoms and comorbidities. However, patients' goals, including those focused on community reintegration, are highly individualized and processes for ascertaining and documenting patients' goals and progress toward achieving them remains variable. Furthermore, there are limitations associated with existing measures of functioning following TBI including ceiling effects and lack of sensitivity when measuring more mild impairment. Furthermore, most measures of functioning or reintegration are designed to be completed by rehabilitation clinicians or teams and require clinician expertise in TBI and time. As mentioned above, PM&R has selected the M2PI as an outcome measure for monitoring progress for a select subgroup of patients with TBI/polytrauma. PT/BRI QUERI will closely monitor its implementation to determine, in collaboration with PM&R, its usefulness as a clinical outcome metric. There is, however, no available indicator of clinical outcome readily available through VHA administrative databases.

Challenges Identifying Veterans with Mild TBI Morbidity

TBI is a diagnosis based on history and the presence of a TBI history does not necessarily indicate TBI-related morbidity. This is particularly true for mTBI. Therefore, it is difficult to definitively determine whether mTBI or a comorbidity such as PTSD is accounting for a patient's symptoms and impairments. The difficulty in determining etiology of current problems compounds as time since injury increases.

Challenges identifying and tracking family members/caregivers

Information on the person or persons Veterans designate to help support their care plan is not included in VA administrative records. Providers and researchers need to ask Veterans themselves to identify the family members who are involved in their care and, due to HIPAA rules, request permission to contact them. Patients, therefore, are gatekeepers for family member participation in research. This creates particular challenges if the patients are cognitively impaired. Further complicating the picture, Veterans may have more than one support person whose role in supporting the Veteran may change over time.

7. QUERI Center Goals

Implementation and Evaluation Frameworks

Overall, our approach toward identification of priorities and implementation activities are consistent with what has been described as Mode II research.[82-84] That is, we conduct needs assessment studies and develop and test our interventions in collaboration with decision makers and clinicians. This ensures the relevance and usefulness of our research activities to our stakeholders.

Our implementation work is guided by the Consolidated Framework for Implementation Research (CFIR) developed by Diabetes Mellitus (DM) QUERI investigators.[2] We selected CFIR as our overarching guide for implementation because it is comprehensive, representing most of the universe of implementation constructs. The CFIR brings together key constructs from 19 published implementation theories into five well-described major domains: a) intervention characteristics; b) inner setting; c) outer setting; d) individuals involved with the intervention and/or the implementation process; and e) the implementation process.[85] We encourage our researchers to focus on one or more of these domains as appropriate and to use implementation strategies and measurement approaches most suited for the domains included in their work.

Our evaluation work is guided by the Reach, Effectiveness, Adoption, Implementation and Maintenance (RE-AIM) framework of program evaluation[3]. Reach is the percent and representativeness of the individuals willing to participate; Effectiveness is the impact of the intervention; Adoption is the percent and representativeness of the settings and intervention staff that deliver a program; Implementation is the consistency and skill with which various program elements are delivered; and Maintenance at the individual level is the extent to which participants maintain behavioural change and, at the setting level, the degree to which the program is sustained over time.

PT/BRI QUERI Center Goal Overview

Within each goal area we have two to four implementation targets or objectives. Below we describe our plans for advancing the objectives within each goal area. **Tables 5, 6 and 7** list sample projects to meet these objectives. The planned projects included are those with clear plans for development and grant submission. We are not including projects in the problem exploration phase of development.

7.1 <u>Goal 1: Support and enhance implementation into clinical practice of evidence-based, integrated, patient-centered care for patients with TBI/polytrauma</u>

As mentioned above, rehabilitation for TBI/polytrauma is challenged by a relative paucity of evidence for practices. However, significant effort has been devoted to maximizing the availability of the existing evidence through the concussion/mTBI CPG. We will support implementation of the existing evidence-base to help standardize and strengthen the delivery of integrated, patient-centered care for Veterans with TBI/polytrauma. Specifically, through studies focused on the objectives listed below, our QUERI will help ensure that gaps in and best practices for TBI/polytrauma care are identified and that teams provide patients with high quality evaluations, comprehensive interdisciplinary treatment plans and coordinated services to reduce patients' symptoms and improve their functioning.

➤ **Plan for Achieving Goal 1: Patient-Centered Care (see Table 5)**

Goal 1, Objective 1: *Identify performance gaps, resource needs and strong practices*

This implementation target reflects our commitment to ongoing assessment of gaps, resources and problems, as well as strong practices that can be more broadly implemented to improve

Table 5. Sample Projects in Goal Area 1

GOAL 1: Support and enhance implementation of evidence-based, integrated, patient-centered care for patients with TBI/polytrauma			
Project ID	PI	Title/Description	Status
Objective 1: Identify performance gaps, resource needs and strong practices			
PLY 05-2010-2	Taylor	Monitoring VA Polytrauma Patients: Patient Characteristics and Practice Variations	Current
IIR 11-078	Pogoda	Organizational and Patient Factors Related to Polytrauma/TBI Patient Outcomes	Current
RRP	Carlson	The Unique Needs and Treatment Preferences of Women Veterans with TBI	Planned FY 2013
Objective 2: Enhance access to high quality assessments and coordinated follow-up care			
RRP	Taber	Creating a Virtual Mild TBI Patient to Train Clinical Evaluation Skills	Submitted
RRP 11-418	Smith	Examining Telehealth Applications for Evaluation of Mild Traumatic Brain Injury	Current
SDP	Smith	Evaluating Implementation of the CTBIE Telerehabiliation Pilot Program	Planned FY 2013
Objective 3: Improve interdisciplinary treatment planning processes			
RRP	Sayer	Development of Metrics and Monitors for TBI Plans of Care	Planned FY 2013 to 2014
RRP 12-450	McCart	Using Information from the EHR to Monitor Adherence to mTBI Practice Guidelines	Funded
IIR	Elnitsky	Care Planning to Maximize Community Reintegration of Veterans with TBI	Planned FY 2013
IIR 11-358	Meterko	Identifying mTBI Subtypes and their Implications for Recovery and Reintegration	Current
Objective 4: Implement best practices to improve clinical and functional outcomes			
IIR or SDP	Epstein	Stepped Insomnia Treatment for OEF/OIF/OND Veterans with Polytrauma	Planned FY 2013
SDP	Bernardy	PTSD – Treatment Improved Practices	Planned FY 2013
SDP	Henry	Implementing Progressive Tinnitus Management	Planned FY 2013

service delivery for Veterans with TBI/polytrauma. Our partners in PM&R and Rehabilitation and Prosthetics Services have used PT/BRI QUERI needs assessments to inform changes made within the Polytrauma System of Care and remain highly interested in having access to evidence-based information to plan future services to meet these patients' needs and respond to Congressional requests for information on TBI/polytrauma patients.

To address our partners' need for up to date information on TBI/polytrauma patients, PT/BRI QUERI has been creating annual TBI Utilization Reports which are posted on the internet. These reports describe the prevalence of diagnosed TBI and mental health and pain-related comorbidities in Veterans from the wars in Iraq and Afghanistan, as well as patterns of utilization and healthcare costs (Monitoring VA Polytrauma Patients: Patient Characteristics and Practice Variations; PLY 05-2010-2, VA PT Patients). In FY 2013, PT/BRI QUERI will also use these data to track patterns of utilization and costs over a three year period in a cohort of Veterans newly diagnosed with TBI/polytrauma. In addition, PT/BRI QUERI is collaborating with PM&R to make the data used to generate these utilization reports available to our affiliate investigators to accelerate their research. This work will help fill the evidence gap on the longitudinal course of TBI being identified through an ongoing VA systematic review.[85]

In 2005 VHA developed the TBI/Polytrauma System of Care which was rolled out over the following years. PT/BRI QUERI investigators from the Center for Organization, Leadership and Management Research (COLMR) at the Boston VA Medical Center are bringing their expertise in organizational assessment to study polytrauma team structure and care coordination (Organizational and Patient Factors Related to Polytrauma/TBI Patient Outcomes; IIR 11-078, TBI Patient Factors). If certain organizational characteristics are found to be associated with superior care processes and reintegration outcomes, PT/BRI QUERI will work with COLMR investigators and PM&R to facilitate their implementation more broadly.

We are also planning a needs assessment of women Veterans with TBI (The Unique Needs and Treatment Preferences of Women Veterans with TBI; Planned RRP, Tx pref TBI women). Women comprise only 6% of OEF/OIF/OND Veterans with TBI; however, ensuring that their healthcare needs are identified and met is a high priority for our QUERI and our partners. Findings from this study will help us determine whether we need to tailor implementation strategies or quality improvement efforts to women Veterans in specific.

Goal 1, Objective 2: *Enhance access to high quality assessments and coordinated follow-up care*

In 2007 VHA rolled out TBI screening and a protocol for evaluation of positive TBI screens. In 2008, the GAO reported on the lack of evidence-based information about VHA's TBI screening instrument.[70] Our QUERI worked over the following years to promote research to improve TBI screening and evaluation of positive screens. Rehabilitation and Prosthetics Services has reported results of this work back to the GAO. In addition, feedback from the field and PT/BRI QUERI research involving TBI evaluators led PM&R to develop additional training opportunities to help standardize and improve TBI evaluations. This pre-implementation research was necessary given lack of evidence for the current national TBI screening and evaluation initiative and our partners' need for information to support this high profile program.

Despite considerable progress with regard to TBI screening, gaps in implementation of TBI evaluations remain. The first gap concerns the quality of TBI evaluations and likely contributes to variation in the TBI diagnosis rate following a positive screen. We are pleased to have been collaborating with the Durham MIRECC on a planned RRP to develop a mTBI "virtual standardized patient (VSP)" to improve clinicians' diagnostic skills (Creating a Virtual Mild TBI Patient to Train Clinical Evaluation Sites; Submitted RRP, Virtual mTBI Patient). Standardized patients, which are people trained to emulate a particular patient presentation, are a relatively recent development in medical education. This approach is particularly useful for both testing and training of clinical interviewing and communication skills.[86] In principle, computer-based VSPs can perform the same functions as live standardized patients, with the advantages of absolute fidelity of presentation and capacity to portray a much wider range of conditions, as well as the potential to be available anywhere, anytime, at low cost, once developed and validated.[87] Importantly, the mTBI VSP will present with the range of comorbidities commonly seen in Veterans with TBI. The VSP will be added to the TBI mini-residency curriculum which is used to educate and train non-TBI specialists in the necessary competencies for TBI management including accurate diagnosis. It will also be added to the training for the ongoing TBI Telehealth Evaluation Project funded by the Office of Healthcare Transformation to promote the use of telehealth for TBI evaluations. Other applications of the VSP to help improve TBI evaluation will be considered in collaboration with PM&R.

Another remaining gap in the TBI evaluation process that PT/BRI QUERI research will address is the rate of Veterans who do not undergo a full evaluation after a positive screen. Specifically, nationally 25% of Veterans who screen positive do not receive a CTBIE. Use of telemedicine for the TBI evaluation would make it easier for Veterans with positive TBI screens to obtain their CTBIE, particularly those who live in more remote areas or who would have to go to a different facility than usual to obtain this specialty evaluation. PT/BRI QUERI affiliates with

the Center for Management of Complex Chronic Care (CMC3) at the Edward Hines Jr. VA Hospital are examining barriers and facilitators to the use of telehealth to conduct TBI evaluations (Examining Telehealth Applications for Evaluation of Mild Traumatic Brain Injury; RRP 11-418, mTBI Telehealth). This work is being used to inform the development of a SDP evaluating the implementation of the CTBIE Telerehabilitation Pilot Program currently being rolled out, including associated costs (Evaluating Implementation of the CTBIE Telerehabilitation Pilot Program; Planned SDP, CTBIE TR Eval). Our QUERI will also support projects that bring videostreaming of clinical services into the homes of patients with TBI/polytrauma.

Goal 1, Objective 3: *Improve interdisciplinary treatment planning processes*

As mentioned above, in 2008 Congress mandated the use of Individualized Rehabilitation and Community Reintegration Care Plans for Veterans and members of the Armed Services with TBI who had rehabilitation needs. In 2012, PM&R rolled out a template for meeting this requirement. Improving treatment planning for TBI/polytrauma is a high priority for our primary partner and therefore is a priority for our QUERI in this new funding period. Overall, our plan is to support PM&R's efforts to improve the quality and usefulness of TBI Care Plans.

Currently, PM&R monitors the number of Veterans who receive initial, interim and discharge treatment plans, but it has no method for determining whether Veterans who should have TBI Care Plans are in fact receiving them. We plan to work with PM&R to develop metrics for measuring appropriate use of TBI Care Plans. Specifically, Dr. Sayer will lead a study to link the data PM&R collects on TBI evaluations, which include a symptom measure, and treatment plans to the service use data that PT/BRI QUERI collects for the purpose of its annual TBI Utilization Reports (Development of Metrics and Monitors for TBI Plans of Care; Planned RRP, TBI Plans of Care Metrics). We will test algorithms for identifying Veterans who should have TBI Care Plans and determine the rate of appropriate use. We will look not only for missed opportunities for developing TBI Care Plans, but also the potential unnecessary use (that is, cases in which treatment plans were developed for Veterans who may not need them).

While compliance with the requirement for TBI Care Plans is a priority, an even higher priority is to ensure their quality and utility as tools to help foster patient-centered, evidence-based care. PT/BRI QUERI investigators with the James A. Haley VA Hospital's Center of Excellence in Tampa, FL, Maximizing Rehabilitation Outcomes, have two related projects focused on improving the quality of TBI Care Plans. In the first, investigators are using Natural Language Processing (NLP) to facilitate review of TBI Care Plans and determine whether they

are consistent with the practices detailed in the concussion/mild TBI CPG (Using Information from the EHR to Monitor Adherence to mTBI Practice Guidelines; RRP 12-450, NLP & TBI Care Plans). This project will inform future studies using NLP to improve treatment planning for Veterans with TBI/polytrauma. In the second, investigators plan to study the treatment planning process from the clinician, patient and family perspective. This planned project will identify gaps in care planning as well as examine the association between care planning and patient outcomes (Care Planning to Maximize Community Reintegration of Veterans with TBI; Planned IIR, Reintegrate TBI Vets). Another funded study will help clinicians determine which postconcussive symptoms are related to reintegration outcomes over time and therefore should be targeted as part of the TBI Care Plan (Identifying mTBI Subtypes and their Implications for Recovery and Reintegration; IIR 11-358, mTBI Subtypes).

Goal 1, Objective 4: *Implement best practices to improve clinical and functional outcomes*
As mentioned above, those with ongoing problems from blast-related TBI/polytrauma may have injuries and impairments that involve multiple body regions or systems. In our prior funding period, we conducted research to guide prioritization of the resulting symptoms and functional difficulties.[88] This work led us to prioritize the identification and implementation of interventions to address sleep-related problems, pain and mental health concerns. Sleep disturbance is of particular concern because of its prevalence and because it may compound post-concussive and PTSD symptom severity.

PT/BRI QUERI investigators have been conducting research to determine whether evidence-based protocols for insomnia need to be modified for Iraq and Afghanistan War Veterans with TBI histories. This research suggested that Iraq and Afghanistan war Veterans may prefer less intensive treatments and treatments that make use of technologies.[89] Additionally, preliminary evidence suggested that a TBI history did not interfere with CBT insomnia treatment outcomes. As a result, PT/BRI QUERI affiliates are working with the Post-Deployment Integrated Care Initiative and the OMHS to develop a project to test a stepped care model of insomnia treatment that would benefit all OEF/OIF/OND Veterans, including those with TBI histories (Stepped Insomnia Treatment for OEF/OIF/OND Veterans with Polytrauma; Planned IIR or SDP, Insomnia Tx II).

Implementing best practice for PTSD is of particular importance to PT/BRI QUERI because the vast majority of Veterans diagnosed with TBI also have diagnosed PTSD. Furthermore, PT/BRI QUERI research conducted during our prior funding period suggests that PTSD may account for symptoms and functional difficulties in Veterans with TBI histories[90] (see

Renewal Report). As mentioned above, we have joined the PTSD Coalition to help identify opportunities to improve care for Veterans who have both PTSD and TBI. We are also supporting a SDP, led by MH QUERI, to decrease benzodiazepine use among Veterans with PTSD and TBI (PTSD – Treatment Improved Practices, Planned SDP, BZ Reduce).

An important QUERI activity related to this objective is monitoring results from ongoing treatment studies. Specifically, we are monitoring findings from studies designed to determine whether evidence-based treatments for high prevalent comorbidities are efficacious in those with TBI histories. Results from ongoing and planned trials, including results from trials listed in our Renewal Report, will inform implementation studies proposed during this funding period. For example, we are providing consultation to investigators with the National Center for Rehabilitative Auditory Research about developing a SDP that builds on their successful RCTs of Progressive Tinnitus Management (Implementing Progressive Tinnitus Management; Planned SDP, Implement Tinnitus). Tinnitus is the most prevalent service connected disability among Veterans. We are also working with the Center of Excellence in Implementing Evidence-Based Practice (CIEBP) to develop an implementation trial that builds on HSR&D funded research testing interventions for chronic pain. Additionally, we are in contact with the National Center for PTSD about their plans for a trial that will help determine whether evidence-based psychotherapies for PTSD are effective in Veterans with mTBI histories.

Goal 1 Anticipated Key Impacts

- Information to improve care coordination for patients with TBI/polytrauma
- Improved access to high quality TBI evaluations
- Metrics and monitors for improving the Congressionally mandated TBI Rehab Care Plans

In keeping with our cross-cutting themes, additional impacts include:

- Identification of the unique treatment needs and preferences of women Veterans with TBI histories

Goal 1 Primary Partners. Partners for this goal area include David Cifu, MD, National Program Director of PM&R; Laura Krejci, MSW, Associate Director, Communications/Marketing, Education and Research/Measurement, PCCCT; Stephen Hunt, MD and Lucile Burgo, MD, National Co-Directors of PDICI; Nan Musson, MA, CCC-SLP, BC-NCD-A, in the Office of Telehealth and PM&R; Robert Kerns, PhD, National Program Director for Pain Management; and Bradley Karlin, PhD, with the OMHS.

Goal 1 Implementation Science Contribution. Goal 1 projects will advance understanding of the contextual issues ("inner setting" and "outer setting" within the CFIR) accounting for differences in treatments and outcomes for Veterans seen within the Polytrauma System of Care. In particular, Objective 1 projects provide information about sources of variation in TBI care, including factors at the organizational and team levels. Therefore, findings from this work will help inform future implementation studies in which the implementation process and the intervention itself may need to be adapted for the context of the change initiative. In addition, as part of Objective 4 projects, PT/BRI QUERI will promote examination of factors that promote or inhibit sustainability of best practices.

Goal 1 Cross-QUERI contribution. Carmen Hall, RN, PhD is a member of the CFIR development workgroup whose members includes three current and one former IRC. This group is collaborating to improve the CFIR and develop a repository of measures to assess the constructs included in the CFIR. This group's first project involved mapping a tool for assessing an organization's readiness to adopt a new practice called the Organizational Change Manager (OCM)[91] to the CFIR in collaboration with the University of Wisconsin researchers who developed the OCM. This work will foster refinements of the CFIR and provide guidance to researchers developing implementation projects, including PTBRI QUERI researchers working to help teams deliver patient-centered care. Dr. Hall is collaborating with other IRCs on projects that build on this work by linking CFIR constructs to those included in other implementation frameworks. By linking implementation taxonomies, these projects should improve and accelerate the synthesis of findings across settings and thereby help researchers better understand which implementation strategies work in which settings and why.

Goal 1 Disparities. Regional variation is an important focus for Goal 1 Objectives 2 and 3 research. Planned projects to improve access to high quality evaluations for TBI/polytrauma and coordinated follow-up care for TBI/polytrauma sequelae (Objective 2) are designed to address identified regional variations in access. In addition, PT/BRI QUERI will work with PM&R during this funding period to create and test metrics for TBI Care Plans that will help the Program Office determine whether there is unwanted regional variation in rate of completion and quality of TBI Care Plans (Objective 3).

As mentioned above, identifying and addressing the unique needs of women Veterans with TBI is a cross-cutting issue for our QUERI. In the absence of a specific focus on women

Veterans with TBI, their unique needs would probably be missed. This is because 94% of OEF/OIF/OND Veterans with TBI are male. The two projects led by PT/BRI QUERI researchers at COLMR include a focus on women Veterans. One will examine care coordination (TBI Patient Factors) and the other will focus on symptom constellations and reintegration outcomes for women as compared to male Veterans with TBI (mTBI Subtypes). In addition, a planned QUERI study will focus on identifying treatment preferences and experiences of women Veterans with TBI (Tx pref TBI women). Taken together, these Goal 1 studies will allow us to determine whether women Veterans with TBI have unique treatment needs and preferences and whether there are gender disparities in terms of service delivery. This information will inform initiatives PM&R takes to ensure that women Veterans with TBI and polytrauma receive the highest quality care.

Goal 1 Data Development. As part of development of its annual TBI Utilization Reports, PTBRI QUERI has created a data set that allows for identification of OEF/OIF/OND Veterans with TBI and high frequency comorbidities, patterns of utilization and costs. The methods documented in the appendices of these reports are helping to standardize case definition for TBI. That is, PT/BRI QUERI investigators are using the same set of ICD-9 codes to identify TBI cases. The validity of this series of codes has been tested using results of the CTBIE as a criterion standard. This is important given the well-known challenges identifying TBI using diagnostic codes. [92,93] In addition, PT/BRI QUERI is exploring the possibility of making these datasets available to other QUERI investigators through VINCI, pending appropriate approvals.

At the time of this writing, PM&R did not have methods for identifying patients for whom a TBI Care Plan should be developed. During this funding period, PT/BRI QUERI investigators will work with PM&R, including Doug Bidelspach, MPT, Rehabilitation Planning Specialist for PM&R, to develop and test metrics for identifying the patients who should receive TBI Care Plans and the rate of completion of TBI Care Plans.

Goal 1 Health Information Technology (HIT) Development. PT/BRI QUERI investigators have QUERI funding to use NLP to identify the symptoms and impairments of patients diagnosed with TBI/polytrauma as documented in their TBI Care Plans and link these problems to the types of treatments they receive to determine whether patients are receiving guideline concordant treatment. This project will serve as the springboard to future implementation studies using NLP to characterize the treatment needs of patients with TBI polytrauma and determine whether they are receiving appropriate care. The researchers plan to work with

PM&R and PT/BRI QUERI to determine the types of information within structured notes that should be reported back to the polytrauma teams to help them in monitoring their care planning processes.

As mentioned above PT/BRI QUERI investigators with the MIRECC plan to develop a mTBI VSP. PM&R plans to use the mTBI VSP developed through PT/BRI QUERI research in its multi-site TBI mini-residency program established through the Rehabilitation and Prosthetics Services and in the TBI Comprehensive Telehealth Evaluation Project funded through the Office of Healthcare Transformation and will consider additional options for using the VSP to standardize and improve TBI evaluation as well.

7.2. Goal 2: Improve patients' ability to manage their TBI/polytrauma-related symptoms, impairments and functional problems (Self-Management)

This goal reflects our recognition that TBI/polytrauma related symptoms and functional difficulties may be chronic and therefore require ongoing patient self-management. Success in this goal area would, along with success in Goal 1, contribute to patients' long-term functional outcomes. Projects in this goal area will promote Veterans to become more involved in their care and active participants in management of their symptoms and impairments.

> **Plan for Achieving Goal 2: Self-Management (see Table 6)**

Goal 2, Objective 1: *Implement technologies or programs to support ongoing self-management and evaluate their implementation*

Objective 1 projects focus on use of technologies to help Veterans to better manage their TBI sequelae. One planned project involves testing the TBI smartphone application (Smart Phone Application for Postconcussion Symptom Reduction; Planned IIR, TBI Coach) which is one of a suite of mobile apps that are being developed through the Clinic in Hand Initiative. The PI of this project was on the TBI Coach development team. We are also consulting with the Pain Research, Informatics, Medical Comorbidities, and Education Center (PRIME) Center which has participated in the development of the "Pain Coach" about the possibility of developing an implementation project to compare different strategies for implementation of this self-management tool once the application is finalized. We do not list this latter project in Table 6 because it is earlier in conceptualization. Another planned project tests the feasibility of using iPads for delivery of telerehabilitation and support self-management (Feasibility of iPAD2 Telerehabilitation (iTR) for TBI; Planned RRP, iTR for TBI). Last, Dr. Sayer is testing the efficacy

Table 6. Sample Projects in Goal Area 2

GOAL 2: Improve patients' ability to manage their persistent TBI/polytrauma-related symptoms, impairments and functional problems.			
Project ID	PI	Title/Description	Status
Objective 1: Improve Veteran access to technologies and programs that support self-Management			
IIR	Belanger	Smart Phone Application for Postconcussion Symptom Reduction	Planned FY 2013
RRP	Elnitsky	Feasibility of iPAD2 Telerehabilitation (iTR) for TBI	Planned FY 2013
DHI 07-150	Sayer	Military to Civilian: RCT of an Intervention to Promote Post-Deployment Reintegration	Current
Objective 2: Promote patient engagement in self-management			
RRP 10-221	Hamblen	A Brief Educational Intervention to Improve TBI Screening Outcomes	Current
RRP11-434	Seal	A Video Educational Intervention to Improve Outcomes of VA TBI Screening	Funded
RRP	Hall	Clinical tools to promote patient engagement	Planned FY 2013
SDP	Griffin	Implementation of a provider intervention to promote patient and family engagement in polytrauma care (COACH)	Planned FY 2014
RRP 12-193	Sadler	Online Interventions to Facilitate Post-War Access of Reserve and National Guard Servicewomen	Current

of an internet-based expressive writing intervention to improve reintegration outcomes in OEF/OIF/OND Veterans, including those with TBI histories (Military to Civilian: RCT of an Intervention to Promote Post-Deployment Reintegration; DHI 07-150, M2C). She is in communication with Dr. Belanger to determine whether findings from this study could inform the functionalities included in TBI Coach. In addition, findings from this study, expected in FY 2013, will help determine whether broader implementation of internet-based expressive writing is warranted.

Goal 2, Objective 2: *Promote patient engagement in self-management*

Patient education is part of self-management support if the material helps patients understand their role in managing their health and healthcare.[6,7] We have two complementary RRPs focused on educating Veterans about their TBI screening results and next steps. One project represents a collaboration with the National Center for PTSD (A Brief Educational Intervention to Improve TBI Screening Outcomes; RRP 10-221, TBI Education). In this project, the investigators are testing the usefulness of an educational brochure in improving understanding of the meaning of a positive screen and likelihood of undergoing a TBI evaluation. The other study in this area tests an educational video (A Video Educational Intervention to Improve Outcomes of VA TBI Screening; RRP 11-434, TBI Video Education). Both interventions are implemented in primary care settings, where the majority of TBI screening takes place. Findings from both will be synthesized and used to make recommendations to improve Veterans' understanding of TBI screening and evaluation processes. They will also inform an implementation trial that builds on these two RRPs.

We also have a planned RRP and SDP in this area. Led by Dr. Hall, PT/BRI QUERI investigators are developing a RRP to adapt a toolkit to promote patient engagement (Clinical Tools to promote patient engagement; Planned RRP, Patient Engage Toolkit). The toolkit, originally developed by the Institute for Healthcare Improvement as part of the New Health Partnerships project, includes specific skills, practices, tools and links to references and other materials to support patient self-management. This work will inform a revision of a SDP to determine whether the toolkit by itself or in conjunction with coaching improves patient and family engagement in care and increases the rate of enrollment in myHealtheVet (Implementation of a Provider Intervention to Promote Patient and Family Engagement in Polytrauma Care; Planned SDP, COACH). Last, Anne Sadler, PhD, has been testing an internet-based screening tool to engage National Guard women Veterans in treatments. This tool screens for TBI and other post-deployment problems, including PTSD (Online Interventions

to Facilitate Post-War Access of Reserve and National Guard Servicewomen; RRP 12-193, Online Interventions for Women). This work, supported by both MH and PT/BRI QUERIs, helped form the basis for an approved CREATE project included in the EBT4PTSD CREATE portfolio. PT/BRI QUERI plans to monitor findings from Dr. Sadler's CREATE project to see if they warrant a cross-QUERI (MH and PT/BRI QUERI) implementation study.

Goal 2 Anticipated Key Impacts
- Information on TBI Coach that can be used to enhance implementation and dissemination efforts
- Methods to increase the proportion of Veterans with mTBI enrolled in myHealtheVet
- Patient educational materials to enhance self-efficacy following TBI screening and evaluation
- Practice-level toolkit to assist interdisciplinary teams with efforts to integrate self-management support into practice

Goal 2 Primary Partners. Our primary partner in this area is PM&R. Other partners in this goal area include Margaret Kabat, LCSW-C, CCM, Care Management and Social Work Services; Laura Krejci, MSW, Associate Director, Communications/Marketing, Education and Research/Measurement, PCCCT; and Drs. Stephen Hunt and Lucile Burgo, National Co-Directors of PDICI. Cross-QUERI Collaborators include the eHealth and Mental Health QUERIs. The eHealth QUERI's IRC is on our Executive Committee, helping to facilitate this partnership. The fact that Dr. Sayer is part of the PTSD Coalition co-led by the National Center for PTSD and MH QUERI will help facilitate partnership with the MH QUERI.

Goal 2 Implementation Science Contribution. In a planned implementation project in this goal area, we will collaborate with researchers at the University of Wisconsin to determine whether and how coaching helps teams implement practices to promote self-management. This research focuses on the "process" domain of CFIR. Through this work, we will also help clarify the difference between coaching and facilitation as described in the PARHIS framework. This research builds on the Network to Improve Addiction Treatment – 200 Trial (NIATx-200) which compared the effectiveness of four improvement strategies.[94,95]

Goal 2 Disparities. As mentioned above, PT/BRI QUERI will examine gender differences across goal areas. In addition, one specific RRP in this goal area focuses on women Veterans

(Online Interventions for Women). However, the primary disparity issue addressed through research in this goal area is regional differences in access to care. In particular, use of technologies to support patient self-management and treatment engagement is likely to help address known variation in access to services. Additionally, we will promote examination of sustainability of strategies implemented to promote self-management and patient engagement in self-management.

Goal 2 Data Development. PT/BRI QUERI does not have any planned data development projects in this goal area. However, it is in communication with the eHealth QUERI and will use the information eHealth QUERI collects about use of myHealtheVet among Veterans with TBI to develop future projects.

Goal 2 HIT Development. Many of the planned projects in this goal area involve use of technologies (smart phones, the internet, iPads, videos, MyHealtheVet) to augment patient access, self-management and engagement in care. Most of these technologies are patient-facing. Results of this research will provide VA with information about the usefulness of these technologies for improving patient outcomes and about how to integrate these tools into practice. One of these studies is testing a smart phone application (TBI Coach) that VA has already developed but not yet rolled out and will provide information that will inform VHA's dissemination efforts.

7.3 <u>Goal 3: Optimize Veterans' support systems, including family, peers, VA and community resources</u>. Our QUERI recognizes the challenge of focusing on factors outside the healthcare setting. However, because of the importance of external sources of support on reintegration outcomes, we are prioritizing research in this area.

> **Plan for Achieving Goal 3: Support System (see Table 7)**

Goal 3, Objective 1: *Implement interventions to help family members and peers support Veterans' TBI care plan, treatment participation and goal attainment and evaluate the impact of these interventions*

This objective reflects our awareness that Veterans' support systems plays a crucial role in their treatment engagement, ability to self-manage, and treatment outcomes.[61,66] Dr. Hall is planning a LIP to adapt the Family Care Map to outpatients (Expansion of the Family Care Map to Outpatients; Planned LIP, XFCM2OP). This adapted version of the Family Care Map will include

Table 7. Sample Projects in Goal Area 3

GOAL 3: Optimize Veterans' support systems, including family, peers, VA and community resources.			
Project ID	PI	Title/Description	Status
Objective 1: Implement interventions to help family members and peers support Veterans' TBI care plan, treatment participation and goal attainment and evaluate the impact of these interventions			
LIP	Hall	Expansion of the Family Care Map to Outpatients	Planned FY 2014
SDP	Williams	A Peer Mentor Intervention to Improve Post-TBI Evaluation Care	Planned FY 2013
Objective 2: Improve access to VA and community resources to optimize vocational, family and community functioning			
SDP	Griffin	Evaluating the Reach and Effectiveness of Caregiver Support Programs among Veterans	Submitted
SDP	Elnitsky	Multi-Site Evaluation of a Program to Support Caregivers of Veterans with TBI	Planned resubmission FY 2013
LIP	Griffin	Evaluation of VHA's Caregiver Support Telephone Line	Planned FY 2013
IIR	Carlson	Supportive Employment for Veterans with Traumatic Brain Injury: Needs and Barriers	Planned FY 2013

information families can use to help their Veteran loved one prepare for his or her clinic visit, support his or her self-management practices, identify when he or she is having problems and keep track of his or her care plan, including providers, medications and goals.

Peer Mentorship (PM) is another area of planned work moving forward. PM provides individuals dealing with an injury the opportunity to interact with peers who have survived or managed such an injury. During our last funding period, we supported research to help bring PM into the Polytrauma System of Care (see Renewal Report). During this funding period, the researchers plan to build on this work through an expanded PM intervention to help educate and motivate Veterans to seek rehabilitation and mental health services for post-deployment symptoms identified during their CTBIE (A Peer Mentor Intervention to Improve Post-TBI Evaluation Care; Planned SDP, Peer Mentor).

Dr. Griffin's planned project implementing a toolkit to improve patient and family engagement, COACH, fits within this goal area as well. However, because it primarily focuses on enhancing patient engagement, it is listed in Goal 2 goal above.

Goal 3, Objective 2: *Improve access to VA and community resources to optimize vocational, family and community functioning*
Consistent with our QUERI mission to conduct research to foster reintegration, we plan to conduct studies that improve access to programs developed to improve functional outcomes and quality of life for individuals with TBI and their family members, including programs that VA operates and those outside of VA's purview.

Three of our proposed projects in this area focus on evaluation of new VHA programs Care Management and Social Work Service is rolling out to meet the needs of informal caregivers, including evaluation of: (a) the caregiver stipend program included as part of the Caregivers and Veterans Omnibus Health Services Act of 2010 (Evaluating the Reach and Effectiveness of Caregiver Support Programs Among Veterans; Submitted SDP, FACES 2); (b) the Resources for Enhancing Alzheimer's Caregiver Health in VA (REACH-VA) program, which was extended from Alzheimer's disease to Spinal Cord Injury and which Care Management and Social Work Service, in collaboration with PM&R, plans to extend to TBI/polytrauma (Multi-Site Evaluation of a Program to Support Caregivers of Veterans with TBI; Planned SDP, TBI REACH); and (c) the Caregiver Support Telephone Line (Evaluation of VHA's Caregiver Support Telephone Line; Planned LIP, Caregiver Support Line).

Another planned study focuses on barriers and facilitators of the use of vocational rehabilitation services, particularly supported employment programs, among Veterans with TBI/

polytrauma (Supportive Employment for Veterans with Traumatic Brain Injury: Needs and Barriers; Planned IIR, TBI Employ Needs). Supported employment (SE) is considered *the* evidence-based practice for helping individuals acquire and maintain competitive work.[96] Systematic reviews of randomized, controlled trials have shown two- to three-fold improvements in employment outcomes for SE compared with traditional vocational services.[97] Some evidence suggests that SE is also effective for individuals with TBI, though there are fewer trials.[98] This study bridges RR&D and HSR&D interests and fills an important evidence-gap concerning a key VA service that can improve the long-term functioning of Veterans with TBI. It also helps advance the recent recommendation of the VHA Committee on Care of Veterans with TBI that VA "develop a plan for the establishment of Supported Employment vocational rehabilitation services across the Polytrauma System of Care". Our QUERI is including this pre-implementation work in our portfolio because of its importance to our partners and its potential to help inform policy and implementation efforts related to SE.

Goal 3 Anticipated Key Impacts

- Evaluation of key VHA caregiver programs that our partners can report to stakeholders and can guide quality improvement efforts.
- Resources to improve family and Veteran access to information to improve Veteran and family member outcomes
- Information to inform efforts to expand the reach of Supportive Employment to Veterans with TBI

Goal 3 Primary Partners. Primary Partners include PM&R and Care Management and Social Work Service which has purview over the caregiver programs within VA. Within PM&R we have been working closely with Sharon Benedict, PhD, National Program Manager, Assisted Living-TBI Pilot Program, on our family caregiver research agenda. Executive Committee member Margaret Kabat, LCSW-C, CCM, National Program Manager of the Caregiver Support Program, is our primary contact within the Care Management and Social Work Service. Two planned projects in this area will make use of data that Care Management and Social Work Service will provide (FACES 2 and Caregiver Support Line).

      Another key partner in this work is the PT/BRI QUERI Family Care Advisory Group which began meeting in 2010 to continue the work initiated by the PRC Family Care Collaborative in 2008. The members of the group include PM&R leadership, polytrauma clinicians, health services and clinical researchers, as well as non-VA experts in family-centered

care and implementation science. This group is further described in the Management Plan section below.

Goal 3 Implementation Science Contribution. In 2008, PT/BRI QUERI implemented the Family Care Map to address the information and support needs of family caregivers of Veterans with moderate to severe injuries receiving inpatient rehabilitation.[60] Our formal role in the Family Care Map ended in 2009. However, the polytrauma inpatient teams continue to use the practices that were part of the Family Care Map rollout to help ensure that families are involved in their loved ones' care in accordance with their needs and preferences. PT/BRI QUERI researchers, in collaboration with University of Wisconsin researchers, are studying the sustainability of the Family Care Map through interviews and provider surveys. This work will provide information to help define sustainability ("maintenance" in RE-AIM) and understand factors that affect maintenance in the absence of performance measures and dedicated resources for a change initiative. In addition, Goal 3 research will contribute to our understanding of the CFIR domain of "intervention characteristics" as we adapt the Family Care Map to a new setting.

While the evidence-base for TBI/polytrauma rehabilitation is evolving, programs are being rolled out to improve TBI/polytrauma care. PT/BRI QUERI, therefore, has the opportunity to evaluate "natural experiments" that take place within VHA. As mentioned above, we are promoting use of RE-AIM as a framework for evaluation of these programs. This work will help us not only better understand specific programs, but also identify factors that impede and enhance program adaptations, rollouts, and sustainability across systems of care and research methods that can be leveraged to evaluate such natural experiments.

Goal 3 Disparities. A unique source of variation among family caregivers is their relationship with injured Veterans. Specifically, Dr. Griffin and colleagues found that parents often serve as caregivers for Veterans with more severe TBI and polytrauma and that they may have different sets of needs than caregivers who are spouses.[61,62] In her planned evaluation of the Caregiver Stipend program, she will determine whether there are disparities in access ("reach" in RE-AIM) for parents compared with spouses. This information could be used to inform outreach efforts to ensure that all caregivers receive the benefits they deserve through this program.

It is well known that there is regional variation in resources available for individuals with TBI. Although correcting this at the community level is beyond the scope of this QUERI, we can help Veterans and family members to be informed of local and national resources and help

standardize the information that is offered to patients and families. Dr. Hall's work extending the Family Care Map to outpatient venues will help accomplish that goal. Specifically, the revised Family Care Map will make available to patients and families information about both resources and tools that they can use to prepare for medical appointments, adhere to a care plan, manage their medical condition, monitor their own progress and thus sustain their self-management.

Goal 3 Data Development. None planned.

Goal 3 HIT Development. The Family Care Map is a web-based tool available through the internet. During this next funding period, PT/BRI QUERI will adapt the Family Care Map for outpatients with TBI and their family members. It will include information about what to expect from treatment for TBI/polytrauma within VA, educational information, resources and self-management tools.

8. Performance Metrics

				Timeline
Goal 1: Support and enhance implementation into clinical practice of evidence-based, integrated, patient-centered care for patients with TBI/polytrauma				FY 2012-2017
Objectives	**Scope**	**Project**	**Metric Data Source**	
Center Activities/Project Outcomes				
1. Create and distribute annual TBI Utilization Reports which summarize rate of TBI, comorbidities, service use and healthcare costs to inform service delivery and future research.	National	PLY 05-2010-2; VA PT Patients	VA admin data	FY 2013-2015
2. Submit grant to develop a mild TBI "virtual standardized patient (VSP)" that can be used to improve quality of TBI evaluations	Polytrauma System of Care (PSC)	Submitted RRP; Virtual mTBI Patient	Project product	FY 2013-2014
3. Conduct research to spread use telehealth to conduct CTBIE	14 sites	Planned SDP; CTBIE TR Eval	VA admin data	FY 2013-2016
4. Assess usefulness of Natural Language Processing to TBI Care Plans and adherence to mTBI CPG	PSC	RRP 12-450; NLP & TBI Care Plans	VA admin data	FY2013-2014
5. Development of metric for monitoring appropriate use of TBI Care Plans	PSC	Planned RRP	VA admin data	FY 2014
Administrative Outcomes				
1. VACO partners distribute TBI Utilization Reports to external and internal stakeholders and uses reports to inform decision making	National, including PSC	PLY 05-2010-2; VA PT Patients	VA admin data	FY 2013-2015
Clinical Process Outcomes				
1. Partners use research findings to increase use of telehealth for TBI evaluations	14 VAMCs	Planned SDP; CTBIE TR Eval	VA admin data	FY 2013-2016
2. PM&R uses mTBI VSP in provider education training programs	PSC		PM&R	
3. Increase in percent of TBI patients with documented treatment plans who are required to have one	PSC	Planned LIP	VA admin data	FY 2015
4. Collaborate with PM&R to modify performance measures for TBI evaluations	National	Workgroup	Performance Measure Modified	FY2014

Clinical Outcomes				
1. Improved Neurobehavioral Symptom Inventory (NSI-22) scores	PSC	IIR 11-078; TBI Patient Factors	Study data	FY 2016
2. Reduced Insomnia Severity Index scores	TBD	Planned SDP; Insomnia Tx II	Study data	FY 2016
3. Reduced Tinnitus Functional Index scores	One VISN	Planned SDP; Implement Tinnitus	Study data	FY 2017
Goal 2: Improve patients' ability to manage their persistent TBI/polytrauma-related symptoms, impairments and functional problems				FY 2013-2017
Objectives	**Scope**	**Project**	**Metric Data Source**	
Center Activities/Project Outcomes				
1. Test TBI smart phone application VA developed as part of Clinic to Hand Initiative	1 facility	TBI Coach	Project data	FY 2013-2015
2. Develop patient educational material to improve patient post-TBI screening care	1 facility; 3 facilities	RRP 10-221; RRP 11-434	Products from projects	FY 2013-2014
3. Development of toolkit for providers to promote patient and family engagement and self-management	2 facilities	Planned RRP	Project product	FY 2013-2014
4. Conduct research to implement patient engagement toolkit	8 PNS and 12 PSCT sites	Planned SDP	Trial data	FY 2014-2017
Clinical Process Outcomes				
1. Significant improvement in Patient Assessment of Chronic Illness Care (PACIC) scores	8 PNS and 12 PSCT sites	Planned SDP	Trial data	FY 2015
2. Significant improvement in Patient Activation Measure (PAM) scores				
3. Increase TBI-related Knowledge and Beliefs scores	1 facility; 3 facilities	RRP 12-193; RRP 10-221	Trial data	FY 2013-2014

Goal 3: Optimize Veterans' support systems, including family, peers and community resources				FY 2013-2017
Objectives	**Scope**	**Project**	**Metric Data Source**	
Center Activities/Project Outcomes				
1. Conduct research to evaluate programs rolled out through Care Management and Social Work for family member and caregivers	National	SDP submitted	Survey data and Caregiver Stipend Database	FY 2013-2015
2. Conduct research to evaluate programs rolled out through Care Management and Social Work for family member and caregivers	National	LIP	Caregiver Support Line Database	FY 2013-2014
3. Modify the Family Care Map for use in outpatient settings	PSC	Planned LIP	Project Product	FY 2013-2014
Administrative Outcomes				
1. Care Management and Social Work uses findings from program evaluations to inform outreach efforts	National	SDP submitted & LIP	Evaluation findings	FY 2014-2016
2. Care Management and Social Work and PM&R use findings from program evaluations to inform rollout of REACH-VA to TBI	National	LIP	Evaluation findings	FY 2016
Clinical Process Outcomes				
1. Assess use of Peer Mentors to improve follow up care after TBI evaluations	3 sites	Planned SDP	Trial data	FY 2014-2017

9. Management Plan

PT/BRI's core administrative structure consists of a **Leadership Team** and an **Executive Committee.**

Leadership Team. Nina Sayer, PhD is the Research Director. She is based in the Minneapolis VA Health Care System. Her responsibilities include policy setting, leading the development and execution of the PT/BRI QUERI Strategic Plan, promoting research consistent with the QUERI mission, and establishing and maintaining the PT/BRI research network. She also has supervisory responsibility of the Administrative Coordinator and the IRC, both of whom are also based in the Minneapolis VA Health Care System. Joel Scholten, MD, and Steven Scott, DO, are the Clinical Co-Coordinators. Dr. Scholten is based in Washington, DC and Dr. Scott is based in the James A. Haley Veterans' Hospital in Tampa, FL. They ensure that PT/BRI QUERI's agenda and activities are consistent with national and field-level needs. Dr. Scott solicits and brings to the Leadership Team the input and feedback from rehabilitation experts with the Tampa polytrauma teams as well as investigators with the HSR&D/RR&D Center of Excellence for Maximizing Rehabilitation Outcomes. Dr. Scholten, who serves as the Director of Special Projects within PM&R as well as the Associate Chief of Staff, Rehabilitation Services at the Washington DC VA, links us to another clinical team and our primary operations level-partner in improving TBI/polytrauma care. Conference calls among the Leadership Team members occur at least every other week. QUERI affiliates and VHA partners are invited to join those calls to discuss quality gaps, priorities and implementation projects. Nancy Rettmann, MS, is the Administrative Coordinator. She provides administrative support for all QUERI activities, tracks projects, manages our budget, schedules and organizes our Executive Committee meetings, disseminates information through our research network, and delegates and oversees the work of our Research Assistant. Carmen Hall, RN, PhD is the 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; serving as a resource for affiliates within the PT/BRI network; and identifying 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 and participating in cross-QUERI research activities to advance implementation science.

Executive Committee. The PT/BRI Executive Committee is comprised of investigators, managers and leaders with expertise and job responsibilities relevant to the PT/BRI QUERI mission as well as a Veteran and family member representative to help ensure that our goals, objectives and plans are Veteran- and family-centered. Executive Committee members are appointed to serve from 3 to 5 years, with the possibility of renewal. Drs. Sayer, Scholten, Scott and Hall are also members of the Executive Committee, which Dr. Sayer chairs. Executive Committee members are listed in Table 8.

Table 8. PT/BRI QUERI Executive Committee Members

Name	Title
Leigh Anderson, MD	VISN 19 Chief Medical Officer
Adam Anicich, MBA	Acting Director of Operations, Congressional and Legislative Affairs; Veteran
Lucille Beck, PhD	Chief Consultant, Rehabilitation and Prosthetics Services
Doug Bidelspach, MPT	Rehabilitation Planning Specialist, PM&R
Lucile Burgo, MD	National Co-Director, PDICI
David Cifu, MD	National Director, PM&R
Timothy Hogan, PhD	IRC, eHealth QUERI
Stephen Hunt, MD	National Co-Director, PDICI
Margaret Kabat, LCSW-C, CCM	Deputy Director of the National Caregiver Support Program
Robert Kerns, PhD	VHA National Program Director for Pain Management, Director of the Pain Research, Informatics, Medical comorbidities and Education (PRIME) Center
Laurent Lehmann, MD	Associate Chief Consultant for Mental Health Disaster Response / Post-Deployment Activities & PTSD
RyAnne Noss, PhD	Family member of and caregiver for combat injured Veteran
Andrew Quanbeck, PhD	Systems Engineer, University of Wisconsin-Madison's Center for Health Enhancement Systems Studies

The Executive Committee serves advisory and evaluative functions for the QUERI. The Executive Committee plays a crucial role in establishing our Strategic Plan goals and objectives. To facilitate this process, each Executive Committee member has been assigned to one of three PT/BRI QUERI Executive Committee Review Groups. Each Review Group evaluates PT/BRI QUERI's research portfolio in one of our priority goal areas, assists in advancing the goal area's objectives and provides Dr. Sayer with recommendations. Dr. Scholten leads the Executive Committee Review Group focused on Goal 1 (Patient-Centered Care); Dr. Scott leads the Executive Committee Workgroup focused on Goal 2 (Self-Management); and Dr. Hall leads the workgroup focused on Goal 3 (Support System). They may solicit input from a wide range of stakeholders and QUERI investigators who do not serve on the Executive Committee, as

needed. The Review Group leaders also provide the entire Executive Committee with summaries of progress and coordinate across review groups.

Strategies to support and monitor field-based activities. PT/BRI QUERI has regular contact with our research affiliates, TBI/polytrauma clinicians, and the PT/BRI QUERI Family Care Advisory Group.

- We have identified key contacts within each research center with whom we collaborate. These points of contact update the leadership team on progress and barriers to progress and help disseminate PT/BRI QUERI-related information within their centers.
- We have developed a process for promoting and facilitating the development of RRPs and SDPs in our priority areas that has been posted on our website (http://www.queri.research.va.gov/ptbri/docs/RRP-SDP.pdf).
- We participate in monthly Polytrauma System of Care calls, facilitated by PM&R, to stay apprised on developments in the field, provide the field with updates and seek feedback on PT/BRI QUERI projects. We also participate in calls involving subgroups within the Polytrauma System of Care, as needed.
- PT/BRI QUERI participates in monthly national TBI Screening Coordination calls in which PM&R provides various VHA Offices updates on implementation of the TBI screening and evaluation program and reports on TBI performance measures.
- We developed the PT/BRI QUERI Family Care Advisory Group to advance what had been our caregiver research agenda and has now broadened its focus to Veterans' support network, including but not limited to caregivers (Goal 3). The members of the group include PM&R leadership, polytrauma clinicians, health services and clinical researchers, as well as non-VA experts in family-centered care and implementation science. One member is also a caregiver for an individual who sustained a TBI. Dr. Hall facilitates the Family Care Advisory Group which meets monthly to discuss specific projects and initiatives related to Goal 3. PT/BRI QUERI investigators are invited to obtain consultation from the Advisory Group on their project ideas, study measures and potential clinical tools. Dr. Hall ensures that this Advisory Group's input is integrated into the Goal 3 Executive Committee Review Group portfolio evaluation.
- PT/BRI QUERI is convening a Family Member Stakeholder group, which will include a purposefully selected group of 5 to 10 family members of Veterans with TBI. This group, to begin in the second quarter of FY2013, will provide consultation to researchers on study questions and measures as well as serve as a resource for the Family Care Advisory Group.

- PT/BRI QUERI funds LIPs to either meet an immediate need one of our partners identifies or to help researchers obtain preliminary data that can be used to inform a grant submission in one of our priority areas.

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