Published in final edited form as:

Prof Case Manag. 2016 ; 21(6): 266–276. doi:10.1097/NCM.0000000000000165.

Templated Interdisciplinary Rehabilitation Care Plan Documentation for Veterans with Traumatic Brain Injury

Joel Scholten, MD^{1,2,3}, Ellen Danford, BA⁴, Azadeh Leland, DScPT¹, Heather Malecki, DPT¹,
Douglas Bidelsbach, MPT^{2,5}, Brent Taylor, PhD, MPH^{6,7}, and Nina Sayer, PhD, LP^{6,8}

¹Department of Physical Medicine and Rehabilitation, Washington DC VA Medical Center, 50 Irving Street, NW, Washington, DC 20422

²Physical Medicine and Rehabilitation Program Office, Department of Veterans Affairs (VA), 810 Vermont Avenue, NW, Washington, DC 20420

³Department of Physical Medicine and Rehabilitation, Georgetown University Medical Center, 3900 Reservoir Road, NW Washington, DC 20007

⁴Research Service, Washington DC VA Medical Center, 50 Irving Street, NW, Washington DC 20422

⁵Rehabilitation and Prosthetics Services, Lebanon VA Medical Center, 1700 S Lincoln Avenue, Lebanon, PA 17042

⁶Center for Chronic Disease Outcomes Research, Minneapolis VA Health Care System, One Veterans Drive, Minneapolis, MN 55417

⁷Department of Medicine and Epidemiology and Community Health, University of Minnesota, 100 Church Street, SE, Minneapolis, MN 55455

⁸Departments of Medicine and Psychiatry, University of Minnesota, 100 Church Street, SE, Minneapolis, MN 55455

Abstract

Purpose of Study—Individualized interdisciplinary care is the hallmark for rehabilitation following traumatic brain injury (TBI). Veterans Health Administration (VHA) utilizes an electronic note template to document Interdisciplinary Rehabilitation and Community Reintegration (IRCR) care plans for Veterans with TBI requiring rehabilitation. All Veterans with a TBI diagnosis, receiving skilled therapy for TBI-related issues, and followed by a case manager must receive a care plan. The purpose of this study is to determine the level of compliance with the Individualized Rehabilitation and Community Reintegration (IRCR) care plan requirements used to identify Veterans with traumatic brain injury (TBI) in need of the care plan and to evaluate the reasons for inconsistent compliance. In addition, the study sought to provide a more objective assessment of Veterans with TBI requiring an IRCR to assist in establishing a target metric.

Corresponding author and Reprint Requests: Dr. Joel Scholten, MD, Washington DC VA Medical Center, Department of Physical Medicine and Rehabilitation (117), 50 Irving Street, NW, Washington, DC 20422, Telephone: 202-745-8000 x55099, Fax: 202-540-4996, Joel.Scholten@va.gov.

Conflict of Interest: Dr. Scholten, Mr. Bidelsbach, and Dr. Sayer were affiliated with the Polytrauma and Blast-Related Injuries (PT/BRI) QUERI, which provided funding for this study. For the remaining authors, no conflicts of interest were declared.

Primary Practice Setting—TBI outpatient clinics

Methodology and Sample—Investigators conducted a retrospective chart review of 546 Veterans with a TBI diagnosis seen at the DC VAMC's outpatient polytrauma clinics in 2013. Cases were initially reviewed for referral or engagement with skilled therapy. Charts where Veterans were referred or engaged with skilled therapy were forwarded to two polytrauma clinicians to determine if therapy was requested to treat a TBI-related condition. Finally, charts were reviewed for case management and analyzed for algorithm compliance. Analysis focused first on compliance with IRCR algorithm requirements and secondarily with identifying potential reasons for noncompliance.

Results—In 2013, 42% of the TBI cohort met the criteria for an IRCR. The vast majority of cases with a TBI diagnosis complied with IRCR algorithm criteria; however, 14% of all reviewed cases required an IRCR but did not receive one. Provision of case management outside of the TBI/polytrauma clinic characterized a majority of non-compliant cases.

Implications for Case Management—Interdisciplinary care can be challenging, particularly in the outpatient setting due to patient availability and access to care. Improved documentation in the electronic health record may assist case managers and other clinicians in coordinating rehabilitation care for Veterans with TBI. Case managers in the VA and other settings may find templates and trackable health factors helpful to identify patients in need of care plans.

Keywords

Alphabetized key words: Brain Injuries; Community Integration; Health Plan Implementation; Rehabilitation; Veterans

Introduction**Polytrauma and Traumatic Brain Injury**

Since 2001, more than 2 million service members have been deployed to Operation Enduring Freedom (OEF), Operation Iraqi Freedom (OIF), and Operation New Dawn (OND) (Committee on the Assessment and the Readjustment Needs of Military Personnel, Veterans, and their Families, Board on the Health of Select Populations, Institute of Medicine, 2013). New body armor developed as protection from the ravages of improvised explosive devices and advances in medical care have increased the number of service members with severe injuries returning home with polytrauma (Department of Veterans Affairs, 2010a; Cifu, Cohen, Lew, Jaffee, & Sigford, 2010; Gawande, 2004; Sayer et al., 2008). The Veterans Health Administration (VHA) defines polytrauma as “two or more injuries...sustained in the same incident that affect multiple body parts or organ systems and result in physical, cognitive, psychological, or psychosocial impairments and functional disabilities” (Department of Veterans Affairs, 2013a). Traumatic brain injury (TBI) typically directs rehabilitation care for polytrauma providers (Department of Veterans Affairs, 2010a; Department of Veterans Affairs, 2013a).

VHA screens all post 9/11 Veterans for possible TBI and those with a positive screen are referred for a Comprehensive TBI Evaluation (CTBIE) (Department of Veterans Affairs, 2007; Department of Veterans Affairs, 2010b). Of the 918,737 OEF/OIF/OND Veterans

screened from April 2007 to January 31, 2015, 8.3% of the total population received a TBI diagnosis (Department of Veterans Affairs VHA Support Service Center, 2015). Mental health and pain diagnoses are highly prevalent within the cohort of Veterans with TBI. In Fiscal Year 2012, 72% of OEF/OIF/OND Veterans with a TBI diagnosis receiving VHA inpatient and outpatient care also had a co-morbid Posttraumatic Stress Disorder (PTSD) diagnosis and 54% of Veterans with a TBI diagnosis had both PTSD and pain diagnoses (Taylor et al., 2014).

Given the multiple comorbidities associated with TBI, the hallmark of TBI rehabilitation is individualized, interdisciplinary care (Department of Veterans Affairs, 2013a) to ensure that goals are communicated and coordinated, interventions are prioritized to focus on maximum functional improvement, and treatment efforts are not duplicated or in conflict (Hoge et al., 2008; Lew et al., 2007). Interdisciplinary care for TBI has been established in both military and civilian literature (Cifu et al., 2010; Cope, Mayer, & Cervelli, 2005; Sander & Constantinidou, 2008; Strasser, Uomoto, & Smits, 2008), with case studies and implementation research supporting the utilization of interdisciplinary care planning in OEF/OIF/OND populations (Lew et al., 2007; Ryan, Lee-Wilk, Kok, & Wilk, 2011).

Individualized Rehabilitation and Community Reintegration

VHA's Physical Medicine and Rehabilitation Program Office developed a templated electronic Individualized Rehabilitation and Community Reintegration (IRCR) plan of care note to improve identification and coordination of interdisciplinary care for Veterans receiving TBI rehabilitation (Department of Veterans Affairs, 2010a). The IRCR template, described in detail in VHA Handbook 1172.04, documents treatment goals focusing on improvement of function in "physical, cognitive, and vocational" realms, care coordination, and planned dates for the follow-up review of the plan by the interdisciplinary team (See Figure 1) (Department of Veterans Affairs, 2010a).

This template was developed to address legislative requirements mandated by the 2008 National Defense Authorization Act legislation (Department of Veterans Affairs, 2010a; U.S. House of Representatives, 2007) and improve data collection and reporting on TBI rehabilitation provided in VHA. The template was released in 2010 and TBI teams gradually migrated to using it for documentation. In Fiscal Year 2013, the first full year of reporting, 6,471 IRCRs were recorded, which increased to 10,230 IRCRs in Fiscal Year 2014 (Department of Veterans Affairs VHA Support Service Center, 2015). However, to our knowledge, no definitive metrics or targets have been identified for use of the template and no psychometric studies have been completed to analyze the template.

VHA Algorithm

For operational purposes, VHA Physical Medicine and Rehabilitation developed an algorithm to assist clinicians in identification of patients in need of an IRCR. Patients with a TBI diagnosis, receiving at least one skilled therapy intervention for TBI-related issues, and requiring case management must have an IRCR (Figure 2).

To our knowledge, no research exists to date on VHA's adoption of the IRCR care plan or objective determination of performance metrics for the use of IRCR. An in-depth analysis of

IRCR utilization and documentation at our clinical location was completed as a quality improvement project to enhance identification and documentation of interdisciplinary TBI care. This study proposes to determine the level of compliance with the IRCR requirements used to identify Veterans in need of a care plan and to evaluate the reasons for inconsistent compliance. In addition, we hoped to provide a more objective assessment of Veterans with TBI requiring an IRCR to assist in establishing a target metric.

Methods

The study proposal was reviewed and approved through the Washington DC VA Medical Center (DC VAMC) Research and Development Committee and Institutional Review Board and was granted waivers of informed consent and HIPAA authorization prior to initiating research. Investigators conducted a retrospective chart review of all Veterans with a TBI diagnosis seen in outpatient polytrauma clinics at the DC VAMC from January 1, 2013 to December 31, 2013. Cases were identified for review through data extraction from the Veterans Integrated Service Network 5 Data Warehouse. To meet inclusion for this study, cases must have had an outpatient visit to a polytrauma or Physical Medicine and Rehabilitation clinic in calendar year 2013 and a TBI diagnosis, determined by ICD-9 codes (Figure 2). Five-hundred and forty-six cases met the inclusion criteria for review.

Initial Chart Review

Initial chart review was completed by a research assistant. In addition to demographic information, data collection included type of skilled therapy referral and provision if requested, the presence or absence of case management, and date of IRCR, if present. Skilled therapy was defined as: Physical Therapy, Occupational Therapy, Recreational Therapy, Speech Language Pathology, Kinesiotherapy, Psychology or Neuropsychology interventions.

Defining case management from chart review was challenging as interactions with social workers and nurse case managers may be seen as case management or as intermittent resource utilization, i.e. a patient is referred to a case manager to answer a specific question about available resources but no care or case coordination is provided. According to VHA Handbook 1110.04, "There are many diverse case management roles and practices within the VA." (Department of Veterans Affairs, 2013b). As case managers fulfill varied roles within the VA, for purposes of this review, case management was broadly defined to identify any potential cases that may meet the algorithm criteria. This included: (1) Cases with any notes from a clinician specifically identified in the medical record as a case manager; (2) Cases where the patient affirmed a desire for case management and a social work consult was placed. If a Veteran had a documented interaction with a case manager for a single resource question they were excluded from the analysis, i.e., Veteran contacted a case manager to obtain a VA form for benefits or request a list of community resources with no further clinical interaction. Case management may be provided through a variety of services, including, but not limited to, primary care, mental health, polytrauma, and special teams for Iraq and Afghanistan War Veterans. Future studies will be needed to definitively identify those Veterans receiving case management.

Secondary Chart Review

All patient cases with a TBI diagnosis and referral or engagement with skilled therapy noted in the initial review underwent secondary review by two polytrauma clinicians to determine if therapy was requested to treat a TBI-related condition. Rater concurrence was monitored throughout review cycles. The Principal Investigator provided feedback and additional training for the clinical reviewers to clarify the definition of TBI-related skilled therapy periodically throughout the review process. If the clinician reviews conflicted on determination of therapy provision to address a TBI-related issue, the case was reviewed by the Principal Investigator for final determination.

Data Analysis

Analysis focused first on compliance with ICR algorithm requirements and secondarily with identifying potential reasons for noncompliance. Compliant cases were defined as those in which algorithm criteria were met and an ICR was completed as well as those without an ICR that also did not meet algorithm criteria. Conversely, noncompliant cases were those in which ICR algorithm requirements were met but with no ICR documentation in addition to cases of documented ICRs that did not fulfil the ICR algorithm criteria.

Results

Of 546 reviewed charts, 392 received a skilled therapy referral and were forwarded to doctoral level clinicians to determine if skilled therapy referral was initiated for TBI-related issues. Following the first half of case reviews (n=196), rater concurrence measured 68%. After the Principal Investigator provided feedback, concurrence for the second half of cases rose to 81%. TBI-related skilled therapy was recorded in 304 of those cases, which were further reviewed for case management. In total, 230 cases met the algorithm criteria for TBI-related skilled therapy and case management (Figure 3).

Chart review demonstrated that 42% of the 546 Veteran TBI patients seen in our clinic in 2013 received case management and skilled rehabilitative care for TBI-related issue, thereby meeting the algorithm requirement for ICR. As shown in Figure 3, only 66% (n=152) of this cohort had an ICR documented utilizing the electronic template. Of the 316 cases which did not meet ICR algorithm criteria, 97% did not have a documented ICR. The overall ICR algorithm compliance rate and template usage was 84%, as cases not requiring an ICR were vastly more compliant with the algorithm than cases requiring an ICR.

To better understand reasons for lack of algorithm compliance, we reviewed the treatment course of the 78 Veterans without an ICR who met algorithm requirements (Table 1). The vast majority of these cases (79%) received case management by providers outside of the TBI/polytrauma team, including special teams for Iraq and Afghanistan War Veterans (n = 23), mental health (n=23), primary care (n=14), and specialty services (n=2), such as spinal cord injury. Approximately one-third (35%) had only limited participation in skilled therapy defined as not completing the full course of the recommended therapy. Nearly another third (31%) did not engage in recommended skilled therapy. A quarter (24%) of the cases received minimal skilled therapy intervention. An additional 19 cases were non-compliant

due to the time frame of documentation. These cases were either in a chronic maintenance phase or an IRCR was completed outside the time frame of the study.

Ten cases had documented IRCR completion without meeting IRCR criteria. Timing was a significant factor for these cases. A majority of these Veterans (80%) were assigned a polytrauma case manager who scheduled an IRCR review prior to the Veteran's initial appointment with the rehabilitation physician. In these cases, the rehabilitation physician either determined that TBI-related skilled therapy was unnecessary or the Veteran declined a consult for skilled therapy.

Discussion

This study indicates that that 84% of the 546 Veteran cases with a TBI diagnosis receiving care during 2013 at an outpatient polytrauma clinic complied with established IRCR algorithm criteria. Of the total TBI population seen at the outpatient polytrauma clinic in 2013, 42% met IRCR algorithm requirements. VHA's Physical Medicine and Rehabilitation National Program Office is interested in objectively determining the percentage of patients who meet the algorithm criteria and require an IRCR to better evaluate compliance across the system. Previously, VHA had estimated that 20% of patients with a TBI diagnosis who receive care in a polytrauma clinic would likely require an IRCR (M. Cornis-Pop, personal communication, April 7, 2015). Our results, based on the experience of one outpatient polytrauma clinic, indicate this may be an underestimate and that additional research is needed to more accurately predict the percentage of patients across VHA who would require an IRCR. This is important as delivery of care is an intensive undertaking for TBI treatment teams. While every Veteran deserves an individualized approach to their current symptoms, IRCR documentation efforts should be targeted to Veterans with a TBI diagnosis who will likely benefit from patient-centered TBI-related therapies.

Veterans with a TBI diagnosis commonly have co-morbid conditions that complicate their treatment plan. In prior reports, Veterans undergoing a TBI evaluation were highly symptomatic with more than half of all Veterans endorsing at least mild impairment on 21 of 22 Neurobehavioral Symptom Inventory Checklist items (only "change in taste or smell" was rated as absent in more than half of all subjects) (Scholten et al., 2012). Developing a treatment plan for each and every symptom is not feasible and therefore clinicians must engage Veterans to prioritize treatment targeting symptoms they believe to be most problematic to daily functioning.

We have identified potential barriers to IRCR adoption for each component of the algorithm and propose clinical adaptations to facilitate identification of Veterans in need of an IRCR with the ultimate goal of increased IRCR compliance. We are not aware of any other studies evaluating IRCR algorithm compliance and are not aware of any work studying template utilization to document interdisciplinary rehabilitative care.

Algorithm Component 1: Clinical Diagnosis and Referral for Skilled Therapy

The CTBIE appointment with a physician generally initiates the identification process for Veterans requiring an IRCR with a TBI diagnosis and referral(s) for TBI-related skilled

therapy. Retrospective chart review of patients with a TBI diagnosis revealed challenges in determining whether skilled therapy was recommended for TBI-related difficulties or for issues stemming from co-occurring conditions. Initial low inter-rater concurrence further reveals the challenges of identifying TBI-related therapy in the medical record. Since clinical judgment of the underlying cause of the symptom requiring skilled therapy is not currently documented as part of available medical note templates, there is no way to automate the process of determining whether an IRCR is required for a given patient. Improved documentation of TBI diagnosis in the medical record based on standardized questions and templates has been recommended to improve diagnostic accuracy and subsequent treatment in civilian cases seen in the Emergency Department (Bazarian, Veazie, Mookerjee, & Lerner, 2006; Powell, Ferraro, Dikmen, Temkin, & Bell, 2008). Similarly, one possible method for improving identification of interdisciplinary care needs is to assist clinicians with documentation of their rationale for skilled therapy at the time of initial TBI diagnosis. This would provide clarification for case managers and other clinicians responsible for IRCR implementation. To address this gap, a note template defining clinical rationale by the provider has already been implemented at our site. Previous research has suggested that templated documentation improves communication and collaboration amongst clinicians of different specialties for mental health (Cifuentes et al., 2015) and diabetes care (Haley et al., 2015); however further research into the effectiveness of templated documentation within the veteran TBI population is warranted.

Algorithm Component 2: Case Management

We observed that only two-thirds of patients who should have had an IRCR received an IRCR, our findings suggest that case management outside of the polytrauma team may play a role. At our site, the polytrauma case managers coordinate each IRCR. The licensure of case managers embedded on the polytrauma team at our site included licensed clinical social workers and a certified rehabilitation registered nurse case manager. Other team members (OT, PT, Speech Therapy, etc.) may at times serve as a care coordinator and point of contact for an individual Veteran after the case manager completes an assessment and contributes to the treatment plan. The availability of a case manager or care coordinator on the TBI team improves identification of IRCR need and subsequent documentation, per our review. Unfortunately, the availability of TBI/polytrauma case managers may be limited and, though a Veteran with a TBI diagnosis may be receiving skilled rehabilitation services for TBI, they may best be served by maintaining case management/care coordination with their originally assigned care coordinator (mental health, primary care, etc.). Thus, strategies are needed to trigger completion of IRCR for Veterans with an assigned case manager outside of TBI/polytrauma. Possible methods for accomplishing this include developing a trackable health factor in the electronic health record enabling TBI rehabilitation teams to more easily search for Veterans in need of an IRCR. This suggestion aligns with existing studies recommending use of flags in the electronic health record to identify chronic care patients to facilitate interdisciplinary collaboration and improve patient care (Haley et al., 2015; Murphy et al., 2014).

Algorithm Component 3: Engagement with Polytrauma Team

Of the cases in our review that needed but did not receive an IRCR, approximately one-third of cases did not actively engage in treatment and another one-third had limited engagement with treatment. Lack of engagement is an important clinical problem but determination of the cause of “non-engagement” was beyond the scope of this study. However, potential reasons for lack of engagement include geographic distance to care, time availability (both for the Veteran and the treatment team), and perceived benefit from recommended treatment. One additional factor may be that Veterans sometimes receive care from multiple other VHA providers, including primary care and mental health, as well as non-VHA providers. Again, potential solutions to increase compliance with IRCR requirements for patients who do not engage, even after skilled therapy is recommended, include the development of a trackable health factor in the electronic health record enabling TBI rehabilitation teams to more easily search for Veterans in need of an IRCR. These findings could be further studied through qualitative analysis of clinical experiences with interdisciplinary rehabilitation teams.

Strengths and Limitations

The study was strengthened by the in-depth chart review design completed by clinical experts. Each member of the research team completing chart review was embedded in the TBI/polytrauma team. Their clinical experience enabled a higher understanding of the clinical notes and thought processes behind referrals for skilled therapy. Further, the study was strengthened by including Veterans seen over the course of an entire year.

This study was limited by its retrospective design. An objective analysis of clinician notes was complicated by subjective interpretations of clinician’s reasoning. Frequently, clinicians do not record the reason for skilled therapy services and the experienced clinician reviewers opined on the whether they believed if therapy was to treat a TBI-related issue. This was challenging when potential skilled therapy services can be ordered for reasons that are not TBI-related. In this setting, the recommendation for skilled mental health services was the most common characteristic of non-compliant cases that met algorithm criteria. Since there is no true objective means to determine if a current symptom is related to TBI or other co-morbid conditions, a clinical determination is required. Difficulty in precise determination of case management is also a limitation. In order to capture the largest possible cohort, we used a broad definition of case management as inclusion criteria for the clinical algorithm. More extensive chart review to determine if true case management services were provided would be enlightening in future studies.

The decision to focus on IRCR compliance at one outpatient polytrauma clinic located in a large metropolitan area with significant TBI/polytrauma assets is another important limitation. Findings from medical centers with fewer TBI resources likely differ from our results and limit the generalizability of our findings. Documentation of interdisciplinary rehabilitation is important and fosters coordinated efforts for rehabilitation. While our processes and algorithm are unique in VHA, a similar process could be employed in other healthcare settings as structured interdisciplinary care is the foundation of TBI rehabilitation (Cifu et al., 2010; Lew et al., 2007; Cope et al., 2005; Sander & Constantinidou, 2008; Strasser et al., 2008; Ryan et al., 2011; Ontario Neurotrauma Foundation, 2013; The

Management of Concussions/mTBI Working Group, 2009). A final limitation is that we did not fully review the treatment course for compliant cases. Thus, we do not know the proportion of compliant cases that did not fully engage in therapy or that received case management outside of polytrauma. Our findings, therefore, are not comprehensive or definitive but rather set the stage for further research in this area.

Conclusions

Individualized interdisciplinary care is the hallmark for TBI rehabilitation (Department of Veterans Affairs, 2013a). Eighty-four percent of cases reviewed complied with IRCR requirements. However, compliance was significantly higher in cases where an IRCR was unnecessary as compared to cases requiring a care plan. More than 40% of Veterans with a TBI seen in an outpatient polytrauma clinic over the course of a calendar year required an IRCR but only two-thirds of those requiring an IRCR actually received one. The provision of case management services outside of the TBI team appears to be a significant factor for those cases meeting requirements but not receiving a care plan. Retrospective determination of the etiology of persistent symptoms following a TBI diagnosis is difficult and improved documentation at the time of initial TBI evaluation will likely improve the identification of Veterans in need of an IRCR. Interdisciplinary care delivery can be challenging, particularly in the outpatient setting, secondary to patient availability and coordinating schedules of specialists with clinical requirements across multiple settings. Efforts to improve utilization of the IRCR template should focus on clinician documentation at the time of TBI evaluation to further coordinate existing local VHA processes.

Acknowledgments

Source of Funding: This work was supported by the Department of Veterans Affairs, Veterans Health Administration, Office of Research and Development, Health Services Research and Development Service (HSR&D): Polytrauma and Blast-Related Injuries Quality Enhancement Research Initiative [VACO no. QLP 56-012].

Institutional Review: The study was reviewed and approved by the Institutional Review Board and Research and Development Committees at the Washington DC VAMC and was granted waivers of informed consent and HIPAA authorization.

Disclaimer: The content of this manuscript does not necessarily represent the views of the Department of Veterans Affairs or the United States Government.

Permissions: Dr. Micaela Cornis-Pop has provided written permission for the use of her email communication with the research team as source material for this manuscript.

References

- Bazarian JJ, Veazie P, Mookerjee S, Lerner EB. Accuracy of mild traumatic brain injury case ascertainment using ICD-9 codes. *Academic Emergency Medicine*. 2006; 13(1):31–38. [PubMed: 16365331]
- Cifu DX, Cohen SI, Lew HL, Jaffee M, Sigford B. The history and evolution of traumatic brain injury rehabilitation in military service members and veterans. *American Journal of Physical Medicine & Rehabilitation*. 2010; 89(8):688–694. [PubMed: 20647782]
- Cifuentes M, Davis M, Fernald D, Gunn R, Dickinson P, Cohen DJ. Electronic health record challenges, workarounds, and solutions observed in practices integrating behavioral health and

primary care. The Journal of the American Board of Family Medicine. 2015; 28(Suppl 1):S63–S72. [PubMed: 26359473]

Committee on the Assessment and the Readjustment Needs of Military Personnel, Veterans, and their Families, Board on the Health of Select Populations, Institute of Medicine. Returning home from Iraq and Afghanistan: assessment of readjustment needs of Veterans, Service Members, and their families. Washington, DC: National Academies Press; 2013.

Cope DN, Mayer NH, Cervelli L. Development of systems of care for persons with traumatic brain injury. The Journal of Head Trauma Rehabilitation. 2005; 20(2):128–142. [PubMed: 15803037]

Department of Veterans Affairs. VHA handbook 1172.01: Polytrauma system of care. Washington, DC: Veterans Health Administration; 2013a.

Department of Veterans Affairs. VHA Handbook 1110.04: Case management standards of practice. Washington, DC: Veterans Health Administration; 2013b.

Department of Veterans Affairs. VHA handbook 1172.04: Physical medicine and rehabilitation individualized rehabilitation and community reintegration care plan. Washington, DC: Veterans Health Administration; 2010a.

Department of Veterans Affairs. VHA Directive 2007–013: Screening and evaluation of possible traumatic brain injury in Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) Veterans. Washington, DC: Veterans Health Administration; 2007.

Department of Veterans Affairs. VHA directive 2010–012: Screening and evaluation of possible traumatic brain injury in Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) Veterans. Washington, DC: Veterans Health Administration; 2010b.

Department of Veterans Affairs VHA Support Service Center. Comprehensive TBI Evaluations Reports [Data file]. 2015. Retrieved on April 1, 2015 Available: <http://vssc.med.va.gov/tbireports/ComprehensiveTBI.aspx>

Gawande A. Casualties of war--military care for the wounded from Iraq and Afghanistan. The New England Journal of Medicine. 2004; 351(24):2471–2475. [PubMed: 15590948]

Haley WE, Beckrich AL, Sayre J, McNeil R, Fumo P, Rao VM, Lerma EV. Improving care coordination between nephrology and primary care: a quality improvement initiative using the renal physicians association toolkit. American Journal of Kidney Diseases. 2015; 65(1):67–79. [PubMed: 25183380]

Hoge CW, McGurk D, Thomas JL, Cox AL, Engel CC, Castro CA. Mild traumatic brain injury in U.S. Soldiers returning from Iraq. The New England Journal of Medicine. 2008; 358(5):453–463. [PubMed: 18234750]

Lew HL, Poole JH, Vanderploeg RD, Goodrich GL, Dekelboum S, Guillory SB, Sigford B, Cifu DX. Program development and defining characteristics of returning military in a VA Polytrauma Network Site. Journal of Rehabilitation Research & Development. 2007; 44(7):1027–1034. [PubMed: 18075959]

Murphy DR, Laxmisan A, Reis BA, Thomas EJ, Esquivel A, Forjuoh SN, Parikh R, Khan MM, Singh H. Electronic health record-based triggers to detect potential delays in cancer diagnosis. BMJ Quality and Safety. 2014; 23(1):8–16.

Ontario Neurotrauma Foundation. Guidelines for concussion/mild traumatic brain injury & persistent symptoms: For adults (18+ years of age). 2. Toronto, ON: Ontario Neurotrauma Foundation; 2013. [online]Retrieved on July 24, 2015 Available: http://onf.org/system/attachments/223/original/ONF_mTBI_Guidelines_2nd_Edition_COMPLETE.pdf

Powell JM, Ferraro JV, Dikmen SS, Temkin NR, Bell KR. Accuracy of mild traumatic brain injury diagnosis. Archives of Physical Medicine and Rehabilitation. 2008; 89(8):1550–1555. [PubMed: 18597735]

Ryan PB, Lee-Wilk T, Kok BC, Wilk JE. Interdisciplinary rehabilitation of mild TBI and PTSD: A case report. Brain Injury. 2011; 25(10):1019–1025. [PubMed: 21812588]

Sander AM, Constantinidou F. The interdisciplinary team. The Journal of Head Trauma Rehabilitation. 2008; 23(5):271–272. [PubMed: 18815503]

Sayer NA, Chiros CE, Sigford B, Scott S, Clothier B, Pickett T, Lew HL. Characteristics and rehabilitation outcomes among patients with blast and other injuries sustained during the Global

- War on Terror. Archives of Physical Medicine and Rehabilitation. 2008; 89(1):163–170. [PubMed: 18164349]
- Scholten JD, Sayer NA, Vanderploeg RD, Bidelsbach DE, Cifu DX. Analysis of US Veterans Health Administration comprehensive evaluations for traumatic brain injury in Operation Enduring Freedom and Operation Iraqi Freedom Veterans. Brain Injury. 2012; 26(10):1177–1184. [PubMed: 22646489]
- Strasser DC, Uomoto JM, Smits SJ. The interdisciplinary team and polytrauma rehabilitation: Prescription for partnership. Archives of Physical Medicine and Rehabilitation. 2008; 89(1):179–181. [PubMed: 18164351]
- Taylor, BC.; Campbell, E.; Nugent, S.; Cutting, A.; Bidelsbach, DE.; Carlson, KF.; Sayer, NA. Fiscal year 2012 VA utilization report for Iraq and Afghanistan War Veterans diagnosed with TBI [online]. Minneapolis, MN: Minnesota VA Health Care System; 2014. Retrieved on March 20, 2015 Available: <http://www.queri.research.va.gov/ptbri/doc/FY12-TBI-Diagnosis-HCU-Report.pdf>
- The Management of Concussions/mTBI Working Group. VA/DoD Clinical Practice Guidelines for Management of Concussion/Mild Traumatic Brain Injury (mTBI) [online]. Washington, DC: Department of Veterans Affairs & Department of Defense; 2009. Retrieved on July 3, 2014 Available: http://www.healthquality.va.gov/guidelines/Rehab/mtbi/concussion_mtbi_full_1_0.pdf
- U.S. House of Representatives. National Defense authorization act for fiscal year 2008. Conference report to accompany H.R. 1585 [online]. Washington, DC: Congress of the United States of America; 2007. Retrieved on March 20, 2015 Available: <http://gpo.gov/fdsys/pkg/CRPT-110hrpt477/pdf/CRPT-110hrpt477.pdf>

Biographies

Joel Scholten, MD, is the Associate Chief of Staff for Rehab Services at the Washington DC VA Medical Center and National Director of the VA's Physical Medicine & Rehabilitation Program Office. He is an Assistant Clinical Professor of Rehabilitation Medicine at Georgetown University School of Medicine and serves as the Director of the DC VA's Advanced Polytrauma Fellowship program.

Ellen Danford, BA, is a Health Science Specialist and Research Coordinator at the Washington DC VA Medical Center. During her time at the VA, Ms. Danford has been highly involved in quality improvement projects and randomized controlled trials.

Azadeh Leland, DScPT, is a graduate of University of Maryland post professional doctor of science in physical therapy and rehabilitation services. She has also completed a two year fellowship in Polytrauma and Rehabilitation services at the VA. Dr. Leland has 25 years of clinical experience as a physical therapist.

Heather Malecki, DPT, is the Polytrauma and Rehabilitation Coordinator for Physical Medicine & Rehabilitation at the Washington, DC VA Medical Center. She coordinates the VISN 5 Polytrauma Network Site and Polytrauma Support Clinic Teams. She serves as the PT/TBI Fellowship Clinical Director for the Washington, DC VA and on the VA National Physical Therapy Federal Advisory Board.

Douglas Bidelsbach, MPT, currently serves as Rehabilitation Planning Specialist for Rehabilitation and Prosthetic Services in VA Central Office where he is responsible for database development, utilization and management in support of planning and administration of VA rehabilitation and health care programs.

Brent Taylor, PhD, MPH, is the Associate Director at the Minneapolis VA Health Care System's Center for Chronic Disease Outcomes Research. He is an Associate Professor of Medicine and Adjunct Associate Professor of Epidemiology and Community Health at the University of Minnesota.

Nina A. Sayer, PhD, LP is Deputy Director of the Center of Innovation (COIN) at the Minneapolis VA Healthcare System, the Center for Chronic Disease Outcomes Research (CCDOR). She is also Associate Professor in the Departments of Medicine and Psychiatry and Adjunct Associate Professor in the Department of Psychology at the University of Minnesota. Her funded research has examined Posttraumatic Stress Disorders (PTSD), psychiatric disability, unmet needs for mental health treatment, and TBI/polytrauma.

Plan of Care <i>Initial</i> <i>Interim</i> <i>Discharge</i>	3. Interdisciplinary Treatment (IDT) evaluations: Check all that apply)	6. Consults requested and/or follow-up on consults
History of present illness/interim history since last team note	<i>Assistive technologist or rehabilitation engineer</i> <i>Blind rehabilitation specialist</i> <i>Driver rehabilitation specialist</i> <i>Kinesiotherapist</i> <i>Neurologist</i> <i>Occupational therapist</i> <i>Orthotist or prosthetist</i> <i>Physical therapist</i> <i>Psychiatrist</i> <i>Psychologist/neuropsychologist</i> <i>Recreation therapist</i> <i>Rehabilitation nurse</i> <i>Rehabilitation physician</i> <i>Social worker/case manager</i> <i>Speech language pathologist</i> <i>Vocational rehabilitation</i> <i>Other</i>	<i>Audiology</i> <i>Behavioral Health</i> <i>Dietician</i> <i>Drivers Rehab</i> <i>Low vision rehabilitation specialist</i> <i>Optometry/ophthalmology</i> <i>Orthopedics</i> <i>Pain Management</i> <i>Radiology/imaging</i> <i>Vocational rehabilitation</i> <i>Other</i>
2. Current problems: (Patient has identified needing help in addressing the symptoms selected below as they are frequently present and disrupt activities.)	Summary of evaluations (including family education and family support needs)	7. Proposed timeframe for IDT
<i>Feeling dizzy</i> <i>Poor coordination, clumsy</i> <i>Headaches</i> <i>Nausea</i> <i>Vision problems, blurring, trouble seeing</i> <i>Sensitivity to light</i> <i>Poor concentration, cannot pay attention, easily distracted</i> <i>Forgetfulness, cannot remember things</i> <i>Difficulty falling or staying asleep</i> <i>Feeling anxious or tense</i> <i>Irritability, easily annoyed</i> <i>Other</i>	4. Interdisciplinary Treatment Team Goals	<i>1 Week</i> <i>2 Weeks</i> <i>1 Month</i> <i>2 Months</i> <i>Other</i>
	<i>Symptom reduction</i> <i>Initiation</i> <i>Social contact</i> <i>Leisure and recreational activities</i> <i>Self-care</i> <i>Independent living and homemaking</i> <i>Transportation</i> <i>Employment/education</i> <i>Managing money and finances</i> <i>Other</i>	Plan of care communicated? <i>Yes</i> <i>No</i>
	5. Rehabilitation and reintegration plan	8. Physician responsible for managing the treatment plan
	<i>Treatments</i> <i>Frequency</i> <i>Duration</i> <i>Location</i> <i>Discharge/Transition</i>	<i>Name</i> <i>Telephone Number</i>
		9. Polytrauma-TBI Case Manager responsible for monitoring implementation
		<i>Name</i> <i>Telephone Number</i>
		10. Other case management support (Optional):
		<i>Name</i> <i>Telephone Number</i>
		11. Date care plan will be reviewed
		12. Additional information

Figure 1.

Component sections of the national electronic template for recording the IRCR in the VHA's electronic health record, adapted from VHA Handbook 1172.04 (Department of Veterans Affairs, 2010a).

Figure 2.

Algorithm used for determining need for an IRCR. Requirements to necessitate an IRCR include a TBI diagnosis (white), engagement with the polytrauma team (light gray), referral or engagement with TBI-related skilled therapy (dark gray), and case management (black). Second level boxes document the ICD-9 codes and other criteria used in this study to identify cases meeting algorithm criteria.

Figure 3.

Compliance with the ICR algorithm at a single outpatient polytrauma clinic, January 1, 2013-December 31, 2013. Compliant cases (white) were defined as those with a TBI diagnosis requiring skilled therapy and case management who received an ICR in addition to all cases diagnosed with TBI without recommended TBI-related skilled therapy or case management that did not have a documented ICR. Non-compliant cases (gray with dots) included those who received an ICR without receiving TBI-related skilled therapy and cases that fulfilled the algorithm's criteria for an ICR yet did not receive a documented care plan.

Table 1

Treatment course among those who did not have an IRCR but met requirements (n=78)*

Subset	Definition	N (%)
Case Management Outside of Polytrauma	Case followed by a case manager who was affiliated outside of polytrauma in 2013.	62(79)
Limited Participation	Case followed up with consult for skilled therapy but did not complete the recommended course of therapy.	27(35)
Did Not Engage	Case was referred for skilled therapy but did not follow up on consult.	24(31)
Minimal Skilled Therapy	Case engaged with skilled therapy but the clinician discharged the patient in <30 days or <3 visits.	19(24)
Chronic Maintenance	Case received an IRCR prior to 2013 but was a long-term patient engaged with a Case Manager and some skilled therapy in 2013 but did not receive an IRCR.	13(17)
Late with IRCR	Case should have received IRCR within 2 months of beginning skilled therapy in 2013, but did not receive one until >3 months later during 2014.	6(8)

* Overlap occurs between non-mutually exclusive characteristics resulting in n>78 when totaled.