Brain Injury Diagnostics
Development of a Natural Language Processing System that Extracts Posttraumatic Stress Disorder Clinical Data

Researchers at the North California Institute for Research and Education (San Francisco, California) are conducting a study to determine the effectiveness of evidence-based therapies for posttraumatic stress disorder (PTSD) applied naturalistically in a clinical setting, factors associated with PTSD symptom improvement, and optimal treatment trajectories for Veterans with PTSD and complex comorbidities. To accomplish the goals of this study, several datasets drawn from electronic medical records (EMR) from the Veterans Health Administration (VHA) will be updated and merged, and a natural language processing (NLP) system will be developed to extract relevant data.

During FY17, researchers succeeded in developing a Natural Language Processing (NLP) system with excellent performance characteristics for determining the type of psychotherapy described in VHA clinical notes. They found that positive predictive value was greater than .91 and sensitivity was greater than .92 for all types of PTSD evidence-based treatment (EBT), including Cognitive Processing Therapy individual and group, and Prolonged Exposure individual therapy (Figure 1). They completed seven major annotation projects resulting in over 11,935 documents, 1,297 of which were annotated by four people (quadruple-annotated) and 7,226 of which were double annotated. They also developed an NLP system to extract PTSD Checklist scores from clinical notes with excellent accuracy (98 percent positive predictive value). They were also able to obtain preliminary numbers related to psychotherapy utilization among Iraq and Afghanistan Veterans, as well as, information about their use of PTSD evidence based psychotherapies. Descriptive analyses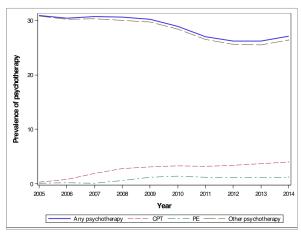 of psychotherapy utilization (2005-2014), based on NLP output, showed that although the absolute number patients with PTSD increased substantially (~18-fold) between 2005 and 2014, the proportion engaged in any psychotherapy remained below 50 percent, and the number engaged in EBT remained below 10 percent by 2014.

FIGURE 1: Prevalence of psychotherapy among cumulative PTS mental health patients. (Figure used with permission from the authors)

Health care utilization is a critical part of understanding the continuum of care and effectiveness of EBTs for Service members with PTSD. Understanding the current state will allow steps to be taken to improve utilization.

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