Algorithm to predict traumatic brain injury patient quality of life

An algorithm and system for predicting the long-term quality of life for patients who have sustained a traumatic brain injury (TBI).

IP Status: Copyrighted

Applications

- Decision support system for trauma departments
- Traumatic brain injury (TBI) prognosis and patient care
- In-hospital and post-discharge treatment planning

Key Benefits & Differentiators

- **Accurate long-term prediction:** Uses a validated algorithm to estimate a patient's long-term quality of life with high accuracy
- **Wide applicability:** The model is applicable to all levels of TBI severity, addressing a gap left by existing models that focus only on moderate to severe cases
- **Patient-centric data:** Utilizes patient-reported outcomes to assess quality of life from the patient's perspective, a crucial factor in shared decision-making

Technology Overview

Every year, over 2.5 million patients in the United States suffer a traumatic brain injury (TBI), with many experiencing long-term disability and reduced quality of life. Predicting patient outcomes is critical for guiding treatment and improving patient care, but existing predictive models have significant limitations. These tools have traditionally focused on mortality rather than quality of life and are often inadequate for patients with mild TBI. The lack of large, multicenter databases with long-term follow-up has further hindered the development of accurate, widely-applicable predictive models. As a result, healthcare providers and patients lack the objective information needed for shared decision-making.

Researchers at the University of Minnesota have developed a TBI predictive algorithm (TBI-PRO) that estimates the long-term quality of life for adult TBI patients. The algorithm utilizes early hospital data, including patient-reported outcomes, to provide a reliable prognosis and clear, actionable forecasts of post-injury recovery trajectories. Unlike existing models that are often limited to moderate to severe TBI, this new model is widely applicable across all levels of TBI severity. At its core, the TBI-PRO model is a predictive engine that leverages advanced statistical and machine-learning models validated on three separate datasets and has shown a high degree of accuracy in predicting patient outcomes, providing a much-needed tool to help guide shared decision-making and improve patient care.

Beyond prediction, the platform doubles as a clinical decision support system. TBI-PRO forecasts can be used to tailor treatment plans, identify patients at higher risk of poor long-term outcomes, and prioritize resources for those most likely to benefit from intervention. Its flexible design supports deployment across mobile devices, hospital systems, and cloud environments,

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Category

All Technologies
Life Sciences/Health IT
Life Sciences/Human Health
Software & IT/Algorithms
Software & IT/Data Mining
Software & IT/Health IT

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making it a practical addition to modern healthcare workflows. By integrating predictive analytics into everyday practice, the TBI-PRO empowers providers to make more informed, personalized, and compassionate care decisions for individuals living with TBI.

Phase of Development

TRL: 4-5
Algorithm validated on several datasets

Desired Partnerships

This technology is now available for:

- License
- Sponsored research
- Co-development

Please contact our office to share your business' needs and learn more.

Researchers

- **Christopher Tignanelli, MD, MS, MBA** Associate Professor, Department of Surgery

References

1. Rachel S Morris, Juan F Figueroa, Courtney J Pokrzywa, Jason K Barber, Nancy R Temkin, Carisa Bergner, Basil S Karam, Patrick Murphy, Lindsay D Nelson, Purushottam Laud, Zara Cooper, Marc de Moya, Colleen Trevino, Christopher J Tignanelli, Terri A deRoon-Cassini(2022) , https://www.americanjournalofsurgery.com/article/S0002-9610(22)00317-8/abstract, https://www.americanjournalofsurgery.com/, 224, 1150-1155