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A New Approach to Evidence Synthesis in Traumatic Brain Injury: A Living Systematic Review

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Abstract

Living systematic reviews (LSRs) are online summaries of health care research that are updated as new research becomes available. This new development in evidence synthesis is being trialled as part of the Collaborative European NeuroTrauma Effectiveness Research in Traumatic Brain Injury (CENTER-TBI) project. We will develop and sustain an international TBI knowledge community that maintains up-to-date, high quality LSRs of the current state of knowledge in the most important questions in TBI. Automatic search updates will be run three-monthly, and newly identified studies incorporated into the review. Review teams will seek to publish journal updates at regular intervals, with abridged updates available more frequently online. Future project stages include the integration of LSR and other study findings into ''living'' clinical practice guidance. It is hoped these efforts will go some way to bridging current temporal disconnects between evidence, guidelines, and practice in TBI.

Key words: knowledge translation; living systematic reviews; traumatic brain injury

Editor's Note: All Living Systematic Reviews will be updated at approximately three month intervals, with these updates published as supplementary material in the online version of the Journal of Neurotrauma (see Update).

Traumatic brain injury (TBI) is a significant global health challenge. In Europe, 2.5 million people will experience some form of TBI each year, with the effects often catastrophic and costly for individuals, families, and society.[1] While TBI typically affects young males, the median age of TBI populations is increasing due to the rising incidence of falls in the elderly.[1–3] Despite medical advances across many areas of diagnosis and treatment, TBI management is characterized by treatments of limited or uncertain effectiveness with outcomes that have not significantly improved for people with TBI in more than 30 years.[4,5]

The Collaborative European NeuroTrauma Effectiveness Research in Traumatic Brain Injury (CENTER-TBI) project is a large, multi-national project with goals of improving the characterization, classification, and management of TBI.[6] It forms part of the international initiative on brain injury research—a collaboration between funding agencies.[7] The core project of CENTER-TBI consists of a precision medicine and comparative effectiveness study ($n = 5400$ participants) and a registry

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($n = 15{,}000$ to 25,000 participants). Within this, one work program has been set up to undertake evidence synthesis and knowledge translation. This work program is tasked with developing and sustaining an international TBI knowledge community that maintains up-to-date, high quality living systematic reviews (LSRs) of the current state of knowledge in the most important questions in TBI.

High quality systematic reviews (SRs) are the cornerstone of evidence based health care. While the methods for the production of reviews are well-described, this method is very time- and resource-intensive and maintaining currency brings significant burden for SR producers. An analysis of 100 SRs of interventions in neurology and other clinical areas found nearly a quarter of SRs were out of date within 2 years of publication, and 7% were out of date at the time of publication.[8] Within the field of neurotrauma, the median time taken for a trial to be incorporated into a systematic review is between 2.5 to 6.5 years.[9,10] Rapid reviews have emerged in recent years as a possible solution, but the necessary methodological shortcuts may leave these reviews open to bias.[11]

LSRs, as up-to-date online summaries of health care research that are updated as new research becomes available, are an attractive but largely untested answer to bridging the trade-off between systematic review currency and quality.[10] LSRs differ from traditional SRs in a number of ways. Ideally, LSRs are published online, to allow for rapid and frequent updates. Searches are automatically re-run at a pre-determined frequency, and fed into a continuous loop of screening, data extraction, critical appraisal and synthesis. Author teams must be set up to work differently and may require more people, with authorship evolving over time.[10] Operationalizing the LSR concept requires sufficient technological infrastructure, the likes of which has only recently emerged. Newer SR software tools facilitate real-time collaboration, streamline SR processes, and manage workflow.[12,13] In addition, growing momentum in SR task automation,[14] divesting discrete review tasks to the ''crowd''[15,16] and open SR data platforms[17,18] offer exciting possibilities to enable the widespread adoption of LSRs.

The CENTER-TBI LSR work program is overseen by a ''knowledge commons''—a team of people drawn from the broader project investigators who have expertise in TBI research, SRs, and knowledge translation. Individually, knowledge commons members have overarching responsibility for one or more LSRs and were involved in selecting and refining topics and sourcing a core author team. Author teams are comprised of novice reviewers (clinicians, researchers, and post-graduate students) who received an intensive SR training course and have been provided with ongoing methodological support from a designated project officer with SR expertise. Each review team also includes an expert advisory panel of senior clinicians and researchers with content expertise who have commented on protocols and review manuscripts. Since project commencement (October 2013), review teams have been working on a number of LSRs. Teams have followed standard SR methods, with protocols published on PROSPERO (International Prospective Register of Systematic Reviews)[19] and reviews conducted in line with relevant guidance, such as the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement.[20]

After publication these conventional SRs will transition into LSRs. Automatic search updates will run three-monthly, with the output screened and any new studies data extracted and critically appraised. Based on the search yield and number of included studies (including the number of studies published in the last three years) to date, we estimate that author teams will be required to screen approximately 75 citations every 3 months, and can expect to find approximately one new study. We will seek to implement the transition to LSRs in collaboration with the Editor and Publisher with regular (online) publication of updates and continuous updating on the CENTER-TBI website.[21] A mixed-methods evaluation of the methodology will be conducted and the lessons disseminated.

LSRs could offer exciting possibilities for real-time knowledge translation products that build on this evidence. Future stages of this work program include the integration of LSR with broader CENTER-TBI and other International Initiative in TBI Research (InTBIR) study findings into ''living'' clinical practice guidance. Ultimately, these efforts will go some way to bridging current temporal disconnects between evidence, guidelines and practice, with the end-goal of improving outcomes for people with TBI.

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