

Paediatric Brain Monitoring with Information Technology (KidsBrainIT): Using Information Technology (IT) Innovations to Improve Childhood Traumatic Brain Injury Intensive Care Management, Outcome, and Patient Safety, (KidBrainIT)

Project Coordinator: Dr. Tsz-Yan Milly Lo, University of Edinburgh, Child Life and Health, MRC; Edinburgh, United Kingdom,

Project Partners: Dr. Ian Piper, University of Glasgow, Clinical Physics at Southern General Hospital, MRC, Glasgow, United Kingdom,

Prof. Bart Depreitere, University of Leuven, University Hospitals Leuven, FWO, Leuven, Belgium

Prof. Juan Sahuquillo, Vall d'Hebron University Hospital, Department of Neurosurgery, ISCIII, Barcelona, Spain

Dr. Stefan Iencean, "GrT Popa" University of Medicine and Pharmacy, Neurosurgery Department Iasi, UEFISCDI, Iasi, Romania

Brain trauma (TBI) is the main cause of death in children older than 1 year of age. We know 5.6 children per 100,000 population in Britain will sustain life-threatening brain trauma requiring intensive care. The majority of children surviving a life-threatening brain trauma have new disabilities that affect how they function throughout the rest of their lives. This also has great impact on their carers and supporting community. Currently the best option to improve survival and recovery of children with life-threatening brain trauma is to improve their early intensive-care as none of the new experimental therapies tested in the laboratory are useful in clinical practice.

In the early hospital treatment of children with life-threatening brain trauma, often much of the routine bedside monitoring data that is available for clinical interpretation is not fully used. Vital information from this data is discarded rather than being used to help clinicians improve treatments. Multicentre data collection and analysis of such 'big-data' in adult brain trauma have been shown to generate new research ideas and analysis methods. A good example of successful 'big-data' initiatives in adult brain trauma is the adult BrainIT group. No-one has attempted to setup a similar approach in children with brain trauma.

Using such 'big-data' from two children's intensive-care-units (PICU) and working with the adult BrainIT group, we know that new research ideas, and treatment improvement measures are possible which can lead to huge advances in children's brain trauma treatment. In this proposal, we are setting up a new childhood brain trauma 'big-data' initiative (KidsBrainIT) that uses high-quality data from TBI patients recruited in 10 PICU from 4 countries. Use of this data is expected to improve current treatment, patient safety and outcome.

Intensive-care treatment of brain trauma aims to treat a patient's abnormal physiology that often follows a brain injury (i.e. secondary insults like low blood pressure or increased brain pressure). In this application, we will focus on improving treatments to two of these physiological insults: increase in pressure from brain swelling (raised ICP) and brain perfusion pressure (CPP).