

## Executive Summary

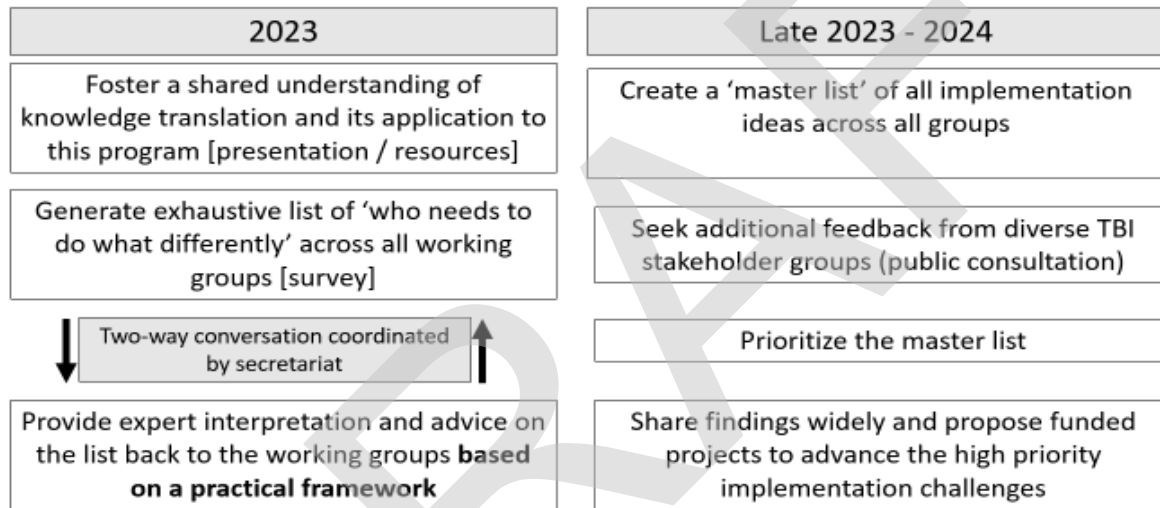
### Knowledge to Practice Working Group on Translating TBI Classification into Policy and Practice

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#### Introduction

The Knowledge to Practice (K2P) working group is a 'cross cutting' methodological group with a focus on two key activities: (1) fostering a shared understanding of knowledge translation science, and (2) identifying and prioritizing key actions to implement a new system of TBI classification into policy and practice. Guided by the Knowledge to Action Framework<sup>1</sup>, the K2P group worked to develop and finalize a set of activities reflecting these focus areas, which are displayed in Figure 1. These goals intersect across working groups and will support broad implementation of final recommendations.

**Figure 1: K2P approach to TBI Classification program**

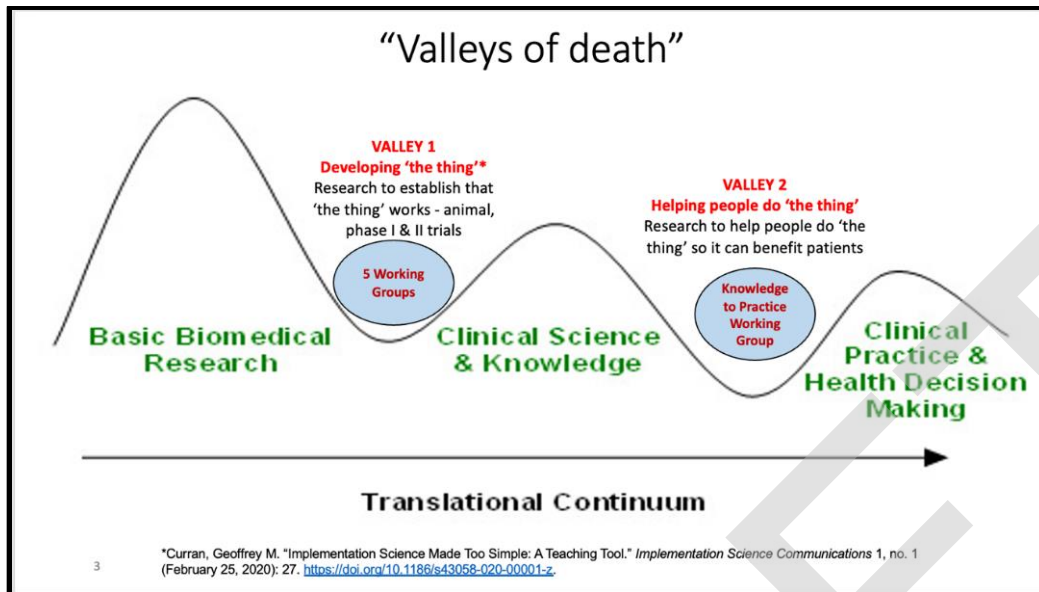


#### Working Group Objective 1: Fostering a shared understanding of knowledge translation science

The team developed and delivered a presentation to all working group chairs on July 21, 2023. The first key conceptual underpinning of the K2P working group is displayed in Figure 2. Essentially, the work of the K2P group centers on working collaboratively with the other working groups to bridge 'valleys of death' in the knowledge translation continuum<sup>2</sup>. Each 'valley of death' refers to a gap between research evidence and current practice that prohibits or delays translation of research knowledge into clinical practice settings and healthcare decision-making.

Ultimately, in knowledge translation, work is first needed to identify and synthesize the evidence to support a practice change or recommendation<sup>3</sup>. This work is done to address 'Valley 1' and reflects the efforts among the other working groups to critically synthesize existing research literature to generate proposed practice recommendations. The work of the K2P group then centers on addressing 'Valley 2' and includes collaborating with other working group members and key stakeholders in the broader TBI community to identify optimal methods to facilitate use of this information in routine practice settings.

Figure 2: “Valleys of death” in knowledge translation



In order to effectively address these ‘valleys of death’, the second key conceptual underpinning of the initial work of our group was to foster a shared understanding of knowledge translation science across working groups. As part of the presentation to the working groups, the K2P group shared a common definition of integrated knowledge transfer (KT): “a model of collaborative research, where **researchers** work with **knowledge users** who identify a problem and have the authority to implement the research recommendations”<sup>4</sup>. In this definition, the researchers for the current effort were members of the K2P working group, and the knowledge users included change champions for the new classification system (members of the 5 working groups), as well as diverse TBI stakeholder groups affected by the proposed changes (i.e. clinicians, individuals with lived experience, policy-makers, insurers, professional societies, etc). Knowledge translation encompasses the overall process of information synthesis, dissemination, exchange, and application among these collective groups to improve health care and services<sup>3</sup>.

### **Working Group Objective 2: Identifying and prioritizing determinants to implement a new system of TBI classification into policy and practice**

The second key activity of the K2P working group was to identify and prioritize specific target behaviors and practices that would need to change to implement a TBI classification system, as well as identify critical stakeholders most impacted by these proposed changes. The first step in this work was to collaborate with each working group to generate an exhaustive list of ‘who needs to do what differently’ based on their proposed recommendations. To generate this list, the K2P group created an electronic survey that was administered to each working group between October-December, 2023. The survey was comprised of 6 questions that working groups were asked to complete as they finalized their proposed recommendations. The survey was designed to gather information on target audiences, settings most impacted by the proposed recommendations, potential change champions, and specific behaviors that would need to occur to successfully integrate proposed changes into practice settings.

Survey results were analyzed in aggregate, and then specifically for each group to create a ‘master list’ of implementation factors that could influence routine use of proposed recommendations among each working

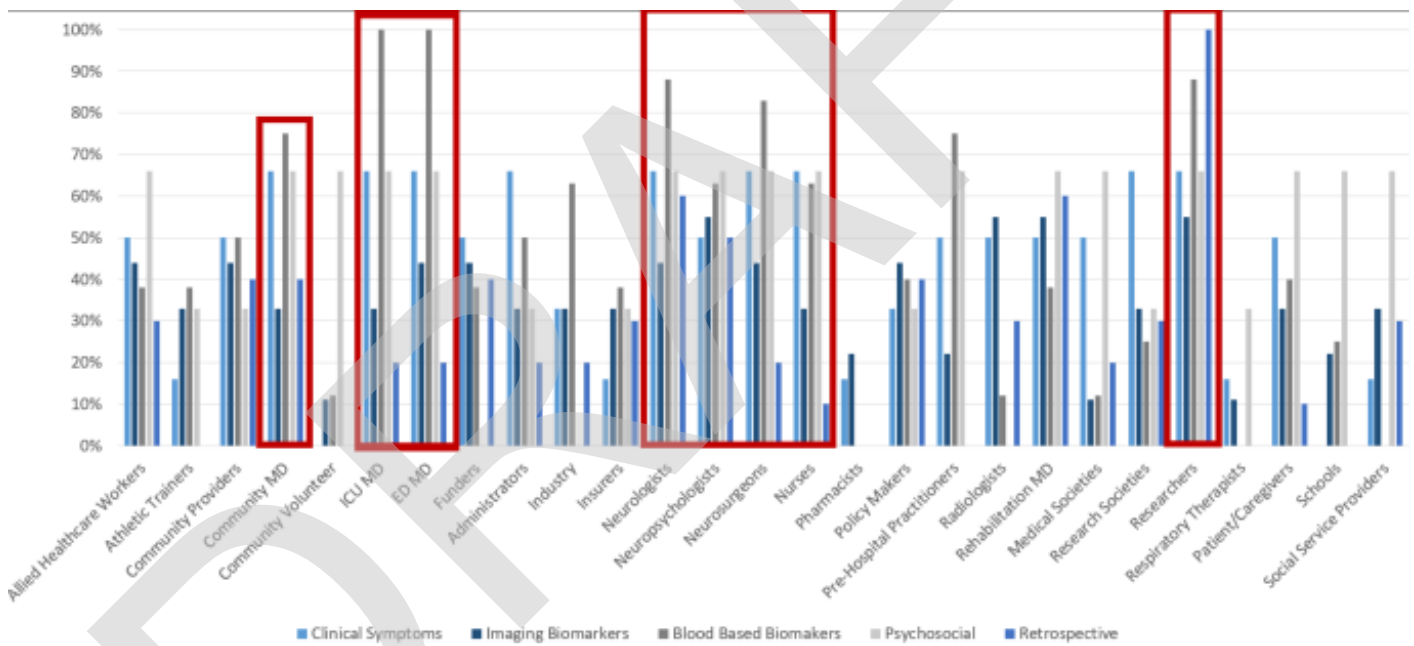
group. These findings were shared with the members of the working groups, and each group was then instructed to prioritize the top 3 activities of what would need to be done differently to support uptake of their recommendations into practice.

### Summary of Findings

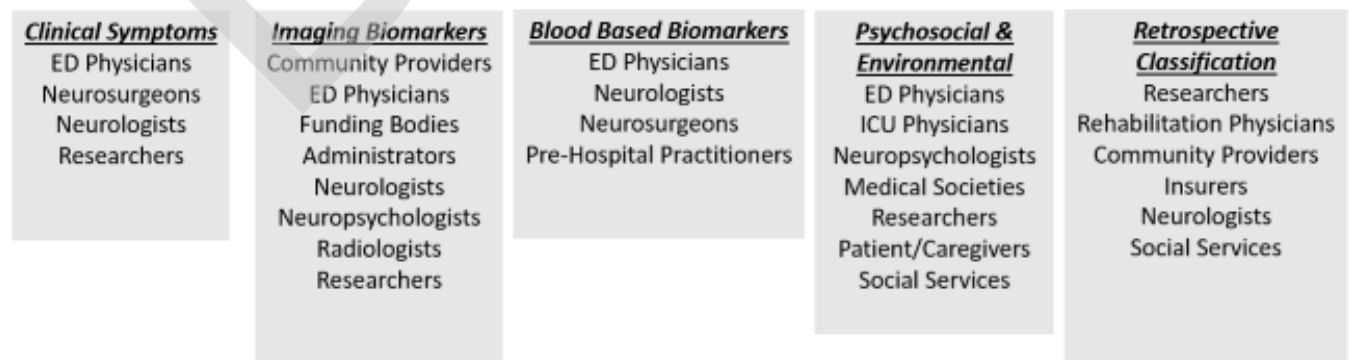
There were a total of 40 responses to the survey from the 5 working groups. Within these responses, there were 108 statements on ‘who needs to do what differently’ in response to the working group’s proposed recommendations, which resulted in 52 unique actions across stakeholder groups.

*Target Groups:* There were 27 different target audiences identified as most impacted by proposed changes across all working groups. Target audiences most frequently identified were: physicians in community health, critical care, emergency medicine, neurology, and neurosurgery, as well as nurses across settings, and also individuals and teams who conduct TBI research (Figure 3). Individual target audiences for each working group are displayed in Figure 4.

**Figure 3: Target Audiences for Proposed Changes Across Working Groups**

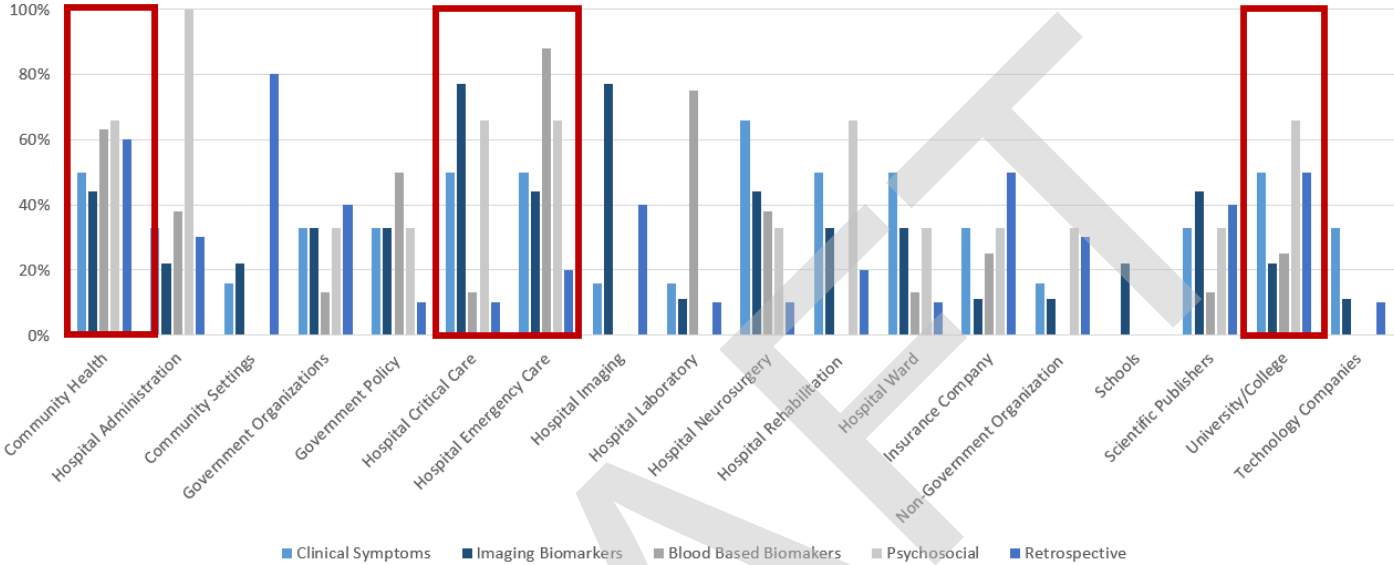


**Figure 4: Target Groups Most Impacted by Proposed Changes of the Working Groups**

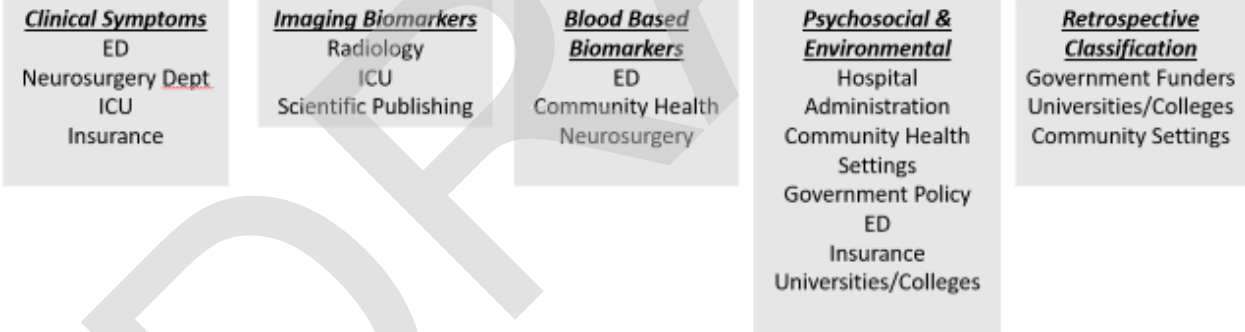


**Target Settings:** The working groups identified various settings most likely to be impacted by their proposed recommendations. A total of 18 different settings were identified, with common ones including community health, emergency and acute care, and university settings (Figure 5). Across working groups, there were also settings identified as being impacted by more than one of the proposed recommendations (Figure 6).

**Figure 5: Settings Affected by Proposed Changes**



**Figure 6: Settings Most Impacted by Proposed Changes of the Working Groups**



**Change Champions:** Each working group also identified potential change champions, who are individuals or groups that would be instrumental in facilitating uptake of the proposed recommendations into practice<sup>5</sup>. A total of 14 potential champions were identified, which included: advocacy, community, or consumer organizations, pre-hospital, hospital, and rehabilitation groups, industry partners, insurance organizations, media outlets, journal publishers, patients/caregivers, policy makers, medical/professional societies, and research societies.

**Specific Behavior Changes:** Working group members identified 52 different unique actions that would need to occur to facilitate uptake of proposed recommendations into practice. Each group was then asked to identify the top 3 priority actions that would need to occur to optimize successful integration of their recommendations. Figure 7 displays the top three priority areas for each group. The working group action items are color coded to indicate those that are focused on clinicians (blue), patient/caregivers (pink), and researchers (yellow).

**Figure 7: Priority Actions To Support Translation of Recommendations into Practice**

WG1 Clinical	WG2 Imaging biomarkers	WG3 Blood biomarkers	WG4 Psychosocial & environmental	WG5 Retrospective
<p><b>Change GCS assessment:</b>                      From: Routinely recording GCS as a sum score, classified as mild/moderate/severe TBI                      To: Recording                      - The Eye, Motor, and Verbal components of GCS separately                      - Explicitly recording pupillary reactivity on both sides                      - In patients who are GCS 15 who have not emerged from post-traumatic amnesia - explicitly record this                      By: All stakeholders (Prehospital and Ambulance personnel, Primary Care Physicians, Emergency Department, ICU, Neurosurgery, Neurology, Administrators, Clinical Researchers, School-based care)</p>	<p>Clinical Recommendation: <b>Develop standardized terminology and structured reporting of radiological traumatic brain injury</b> features integrated into an easy-to-use software platform ideally embedded in routine electronic medical record systems commonly used today in hospitals around the world</p>	<p><b>Insurance companies establish monetary support for routine biomarker analysis</b></p>	<p>Clinical providers (e.g., ED providers, social workers) should <b>Identify and document psychosocial and environmental modifiers (PEFs) that affect acute assessment of severity and outcome</b></p>	<p>Scientific publications should expect that self-report is captured using standardized and validated instruments, when possible; and, when not possible, the alternative approach should be justified and mention should be made in the limitations section of the report.</p>
<p><b>Change recording of disease modifying information:</b>                      From: Inconsistent and nonuniform recording of collateral information                      To: Explicit and uniform recording of                      - Confounds in clinical assessment (alcohol and recreational drugs, prescription medication, sedation/ neuromuscular blockade)                      - Frailty (using a Clinical Frailty Score)                      - Comorbidities, pre-injury therapies.                      - Any extracranial injury with AIS &gt; 3                      - Early physiological insults (using thresholds recommended by expert opinion (in TQIP) till definitive evidence becomes available).                      - By: All stakeholders (Prehospital and Ambulance personnel, Primary Care Physicians, Emergency Department, ICU, Neurosurgery, Neurology, Administrators, Clinical Researchers, School-based care)</p>	<p>TBI Patients/Families Recommendation: <b>Provide simplified language to clinicians treating brain injury patients to assist in patient/family understanding of complex terminology</b> describing imaging features of traumatic brain injury and importantly also clear acknowledgement of limitations of CT/MRI to caution overinterpretation of negative findings as the lack of injury should not be based on imaging alone.</p>	<p>Include biomarkers in head injury practice guidelines</p>	<p>Researchers should <b>Advance understanding of mechanisms by which PEFs contribute to TBI healthcare seeking, presentation (provider assessment of severity), and outcome</b></p>	<p>Convene a <b>consensus conference on case definition for medical record extraction</b></p>
<p><b>Change assessment timing:</b>                      From: Assessment solely at presentation                      To: Dynamic and repeated assessment                      - Assessment of symptom severity at presentation and repeated (up to 14 days post-injury in non-hospitalised patients - timing and frequency will depend on clinical factors)                      - Serial assessment of clinical features to detect neuroworsening in hospitalised patients.                      By: Emergency Department, ICU, Neurosurgery, Neurology, Primary Care Providers, School-based care teams (trainers, school nurses),</p>	<p>Research Recommendation: <b>Identify core set of traumatic brain injury imaging features to be universally implemented/collected across all research studies</b> collecting brain imaging in TBI patients to provide more systematic and in depth reporting for enhancement of data sharing across major studies.</p>	<p>Include TBI biomarker tests in acute TBI evaluation and management / integrate acute blood based biomarker values in the decision to get head CT and disposition plan</p>	<p>Researchers should <b>Develop and validate tools for measuring PEFs in diverse contexts/patient subpopulations</b></p>	<p>Convene a <b>consensus conference on case definition for repeated head impacts</b></p>

## Summary and Recommendations

Translation of knowledge into practice is guided by models, such as the Knowledge to Action Framework<sup>1</sup> to identify key stakeholders, settings, champions, and actions that will influence uptake of research into practice. By collaborating across working groups charged with generating evidence-based recommendations for a new TBI classification system, our K2P group was able to identify targeted groups and behaviors that should be leveraged to facilitate routine use of this information into practice.

Knowledge generated from our group identifies important barriers and facilitators to implementation of a new TBI classification system. Within the Knowledge to Action framework, specific implementation strategies can then be selected and tailored that address barriers and leverage facilitators to increase uptake of recommendations across practice settings. Information on identified target audiences, settings, champions, and priority actions for specific recommendations should be used to advocate for required resources and facilitate early engagement with key stakeholders to support widespread use of the revised TBI classification system.

The efforts of this working group align with the National Academy of Medicine’s *Traumatic Brain Injury: A Roadmap for Accelerating Progress*<sup>6</sup> report that calls for a new classification system, advancement of learning systems for improved TBI care, and for agencies to accelerate collaboration and impact of advancing TBI knowledge and practice. Embedding objective identification of key stakeholders, target settings, and priority actions into these efforts is an essential step for successful practice change, and a critical component in the broader vision to reduce the burden of TBI.

## References

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