Brain Injury/Impairment in the Catastrophic Impairment Definition, 2016

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Introduction and Focus of this Paper

This paper focuses on the assessment of impairment resulting from brain injuries in the catastrophic impairment definition in the regulations of the Insurance Act which applies to all motor vehicle accidents after June 1, 2016. The paper does not provide a comprehensive review of the 2016 catastrophic impairment definition. There is no analysis of (1)1, (1)2, and (1)3 which address spinal cord injury, ambulatory mobility, and blindness, respectively. Other reviewers have noted that the application of the ASIA scale to spinal cord injury requires precise examination and that measurement of walking in (1)1 and (1)2 raises significant methodological concerns regarding validity and reliability and variability of function in the same patient.

The criteria for combining impairments (1)6 {“physical”} and (1)7 {“physical” and mental}, and the criteria for impairments resulting from mental and behavioral disorder (1)8 are not addressed comprehensively in this paper, but only where relevant to understanding how brain injury and brain impairment are dealt with in the 2016 SABS. Combining of impairments using the chapters of AMA Guides Fourth is unchanged (1)6 from the 1996 regulations except that the regulation specifies combining impairments in the “physical” chapters and excludes combining impairment from mental and behavioral disorders (chapter 14). There is a new criterion (1)7 for combining all types of impairment which uses two separate and distinct versions of the AMA Guides (Fourth and Sixth) which have different approaches to rating impairments. Criterion (1)8 continues the use of the AMA Guides Fourth in the 1996 regulation for rating impairments resulting from mental and behavioral disorders.

Current Catastrophic Impairment Definition: Criteria Relevant to Accident Victims with Brain Impairments

The current catastrophic impairment definition provides several distinct criteria for evaluation of accident victims with brain impairments. These are:

The **Glasgow Coma Scale,** a measure of level of consciousness**,** which can be applied based on file review alone, the day of the accident and later,

The **Glasgow Outcome Scale,** a measure of disability from brain injury/brain impairment which can be assessed at six months post accident and later,

The **Whole Person Impairment Rating** based on all injuries including distinct impairments from Nervous System damage, utilizing the chapters of AMA Guides Fourth,

and **Mental and Behavioral Impairment** where one of the disorders is a brain injury or brain impairment, utilizing AMA Guides Fourth, chapter 14.

The latter two criteria, often referred to as 7 and 8, can be rated at two years post mva or earlier if the condition meets the severity requirement and is not likely to improve. For children, under 16 in the current definition, there are no specific criteria; however assessors are directed to use the adult measures if appropriate and otherwise consider the developmental implications of the impairment.

The current definition (prior to June 1, 2016) is especially protective of accident victims with brain impairments by including the GCS criterion. The GCS is available in the file, not requiring direct assessment, and arguably it has been the basis for a significant proportion of catastrophic impairment determinations. We might think of the GCS as a type of "automatic criteria", part of the patient's clinical data base, utilized in the SABS to confer access to a higher level benefits. However, as the GCS is not a measure of persisting or continuing impairment/disability, its use in the SABS has been criticized. There was a consensus in 1995/1996 to place the GCS in the SABS in order for those with serious brain injuries to have immediate access to high level of funding for treatment and attendant care. It was assumed that since only necessary and reasonable services are funded, catastrophic impairment determination with the GCS would not lead to excessive costs. The GCS scores in the file have generally been accepted by arbitrators. The GCS criterion has been particularly helpful for those with serious brain impairments, funding the process of hospital discharge, allowing a team to be created quickly, and sustaining intensive treatment and rehabilitation.

A Fundamental Policy Shift for MVA Victims with Brain Injuries

As I will argue, the removal of the GCS as a catastrophic impairment criterion in the 2016 SABS represents a fundamental policy shift away from targeted support for those with brain injuries and will have wide implications. Notably, the legislature did not create a new definition to provide immediate funding support for adults with serious brain injuries. In particular, although the legislature created two "automatic" criteria for brain injured children (general hospitalization with markers of intracranial pathology and hospitalization in a pediatric rehabilitation facility); no "automatic" criteria replaced the GCS for adults. The absence of such criteria will create tremendous challenges for those adults with serious brain injuries due to uncertainty and long delays in resolving disputes utilizing the criteria requiring direct assessment.

Implication of the License Appeal Tribunal (LAT) and other SABS Changes

We should also consider the implications for catastrophic impairment assessments of the shift to the License Appeal Tribunal with its limited time for hearings, potential lack of expertise of the Tribunal, restrictions on length of reports and number of expert witnesses for the types of assessment teams and reports we may expect to see. The LAT also makes no provision for funding assessors for the injured person.

Additionally, catastrophic impairment assessment will be taking place in the context of systematic cuts in benefits seen recently and forthcoming (for example, reduced prejudgement interest, limitations on ability of family members to be paid for attendant care, cutting the duration of the non earner benefit, cuts in the basic med/rehab benefit from $86,000 to $65,000, halving of the catastrophic impairment benefit, and halving the time for access to the med/rehab benefits from ten to five years). The more restrictive nature of many of the new criteria, in conjunction with the simplified process associated with the LAT, will reinforce a model where only one or a few assessors with the authority to diagnose impairments and who are expert in the natural course of disorders will be required for catastrophic impairment assessments. This will be a change from the current situation of large teams where some team members contribute nothing to the diagnosis and impairment rating process, where assessors or the team may not integrate their findings, and where the team or team leader (primary assessor) may fail to offer a true multidisciplinary analysis of impairment.

A Little History of the Catastrophic Impairment Definition

The initial Catastrophic Impairment (CAT) definition was drafted in 1995, and became part of the SABS in 1996 as a component of a two tier accident benefits product. It is 21 years old. There have been many reviews of the definition, along with changes to the definition in 2003 (developmental implications of an impairment when the insured is a child), 2010 (single amputation). Reviews of the definition were carried out in 2000 by a committee appointed by the parliamentary assistant to the Minister of Finance (this included Dr. Faith Kaplan), in 2010 by the Expert Panel, (which included myself), and by the Superintendent of Insurance in 2011. The government has studied various alternative definitions for several years, and on May 14, 2015, issued their proposal for a new definition. For the interested reader who wants to see the evolution in thinking regarding the 2016 definition, I refer you back to the Expert Panel and Superintendent's reports. For reference I also include a table comparing the current catastrophic impairment definition, (which will continue to apply to all accidents that occur until the end of May, 2016) with the new definition.

The Expert Panel report of 2011 was the basis for the proposals by the Superintendent in a report prepared December 15, 2011. The Superintendent concurred in proposing criteria which reduce access to the higher level benefits particularly for those with brain injuries and mental

disorders and argued against combining impairments due to mental disorder with bodily and brain based impairments.

The new catastrophic impairment definition will apply to all accidents that occur on or after June 1, 2016 (other changes will depend on the renewal date of the insurance policy). The new Catastrophic Impairment definition incorporates some, but not all of the recommendations of the Expert Panel and Superintendent's report. Notably it deviates from the former recommendations particularly regarding the method for evaluating mental disorders, retaining Guides Fourth, chapter 14. The methodology for mental disorder impairment determination recommended by the expert panel was rejected. Combining impairments across all organs and systems was accepted by the legislature, but the advice of the expert panel and superintendent not to use the Sixth Edition was rejected.

The Expert Panel (2010-2011) was given the task to create a catastrophic impairment definition that was consistent with the current science. However the science can only help us so far, for example, providing comparisons of the burden in terms of disability or future care for different types of injuries/impairments. The science can provide clinical measurement tools which vary along the dimensions of predictive or construct validity and reliability/repeatability/measurement error and ease of use. However, only the legislature can determine the policy perspective as to where to set the inclusion/exclusion criteria for the class of persons with a "catastrophic impairment." In this situation, it is my view that the changes were driven by the legislature's disappointment with the broad or inclusive interpretation of the current criteria provided by arbitrators and judges. (such as the interpretations regarding the use of Glasgow Coma Scale, combining impairments across all bodily systems and the method for doing so, and the mental impairment severity threshold) The new definition removes one criterion, alters other criteria and operationalizes them, and adds new measurement tools. Higher thresholds of severity are set for some types of injuries/impairments (combining across all bodily systems and mental disorder). The changes are driven by a policy direction to reduce the number of persons who will be found to have a catastrophic impairment. Those with brain injuries and mental disorders will experience the most profound change in access to the higher policy limits. This is particularly unfortunate in a Province which historically underfunds mental health services. The FSCO website states:

> *All owners of vehicles in Ontario must purchase a standard auto insurance policy. Effective June 1, 2016, to help make insurance premiums more affordable, the benefits and coverages you receive in a standard auto insurance policy are changing – some have been reduced, and some options for increased coverage have been eliminated or changed.*

The more stringent thresholds for catastrophic impairment are seen in: the mental disorder criterion in comparison with current practice, the combining criterion in comparison with current practice, and the brain injury/impairment criterion by removing the GCS. Additionally, some of the criteria are more complex than the current. Finally, the problem of inconsistent application of a common assessment methodology across assessors, a major reason for disagreement among assessors, has not been addressed in the new SABS.

Table Comparing Current and New Definition

(Thanks to Darcy Merkur of Thompson Rogers for permission to use this table)

INJURY TYPE	CURRENT SABS	NEW SABS (Ont. 251/15—EFFECTIVE FOR ACCIDENTS AS OF JUNE 1, 2016)
Paraplegia/ Tetraplegia	(a) Paraplegia or quadriplegia;	(1)1. Paraplegia or tetraplegia that meets the following criteria: 1. The insured person/s neurological recovery is such that the person's permanent grade on the ASIS Impairment Scale, as published in Marino, R.J. et al, *International Standards for Neurological Classification of Spinal Cord Injury*, Journal of Spinal Cord Medicine, Volume 26, Supplement 1, Spring 2003, can be determined. ii. The insured person's permanent grade on the ASIA Impairment Scale is or will be, A. A, B or C or B. D, and 1. The insured person's score on the Spinal Cord Independence Measure, Version III, item 12 (Mobility Indoors), as published in Catz, A. Itzkovich, M. Tesio L. et al *A multicentre international study on the Spinal Cord Independence Measure, version III: Rasch psychometric validation*, Spinal Cord (2007) 45, 275-291 and applied over a distance of up to 10 meters on an even indoor surface is 0 to 5. 2. The insured person requires urological surgical diversion, an implanted device, or intermittent or constant catheterization in order to manage a residual neuro-urological impairment, or 3. The insured person has impaired voluntary control over anorectal function that requires a bowel routine, a surgical diversion or an implanted device.
Severe impairment of ambulatory mobility	(a) the amputation or other impairment causing the total and permanent loss of use of both arms or both legs: (b) the amputation or other impairment causing the total and permanent loss of use of one or both arms and one or both legs.	(1)2. Severe impairment of ambulatory mobility or use of an arm, or amputation that meets the Following criteria: i. Trans-tibial or higher amputation of leg ii. Amputation of an arm or another impairment causing the total and permanent loss of use of an arm. iii. Severe and permanent alteration of prior structure and function involving one or Both legs as a result of which the insured person's score on the Spinal Cord Independence Measure Version III, item 12 (Mobility Indoors), as Published by Catz, A., Itzkovich, M., Tesio L. et al, *A multicentre international study on the Spinal Cord Independence Measure, version III. Rasch psychometric validation*, Spinal Cord (2007) 45, 275-291 and applied over a distance of up to 10 meters on an even indoor surface of 0 to 5.

INJURY TYPE	CURRENT SABS (UNTIL JUNE 1, 2016)	NEW SABS (Ont. Reg. 251/1500EFFECTIVE AS OF JUNE 1, 2016)
Blindness	(c) The total loss of vision in both eyes:	(1)3. Loss of vision of both eyes that meets the following criteria: i. Even with the use of corrective lenses or medication, A. visual acuity in both eyes is 20/200 (6/60) or less as measured by the Snellen Chart or an equivalent chart, or B. The greatest diameter of the field of vision in both eyes is 20 degrees or less. ii. The loss of vision is not attributable to non-organic causes.

Traumatic Brain Injury In Adults	(c) Subject to subsection (1.4), brain impairment that, in respect of an accident, result in, (i) A score of 9 or less on the Glasgow Coma Scale, as published in Jennett, B, and Teasdale, G., *Management of Head Injuries.* Contemporary Neurology Series, Volume 20 F.A. Davis Company, Philadelphia, 1981, according to test administered within the reasonable period of time after the accident by a person trained for that purpose, or (ii) A score of 2 (vegetative) or 3 (severe disability) on the Glasgow Outcome Scale, as published in Jennett, B and Bond, M., *Assessment of Outcome After Severe Brain Damage*, Lancet i:480, 1975, according to a test administered more than six months after the accident by a person trained for that purpose;	(1)4. If the insured person was 18 years of age or older at the time of the accident, a traumatic brain injury that meets the following criteria: i. The injury shows positive findings on a computerized axial tomography scan, a Magnetic resonance imaging or any other medically recognized brain diagnostic Technology indicating intracranial pathology that is a result of the accident, including, but not limited to, intracranial contusions or haemorrhages, diffuse axonal injury, cerebral edema, midline shift or pneumocephaly. ii. When assessed in accordance with Wilson, J., Pettigrew, L. and Teasdale, G., Structured Interviews for the Glasgow Outcome Scale and the Extended Glasgow Outcome Scale: Guidelines for Their Use, Journal of Neurotrauma, Volume 15, Number 8, 1998, the injury results in a rating of, A. Vegetative State (VS or VS*), one month or more after the accident, B. Upper Severe Disability (Upper SD or Upper SD*) or Lower Severe Disability (Lower SD or Lower SD*), six months or more after the accident, or C. Lower Moderate Disability (Lower MD or Lower MD*), one year or more after the accident.

INJURY TYPE	CURRENT SABS (UNTIL JUNE 1, 2016)	NEW SABS (Ont. Reg. 251/15—EFFECTIVE AS OF JUNE 1, 2016)
Other Physical Impairments (not covered By 2(a), 2(b), 2(c) or 2(d	(f) Subject to subsections (1.4), (2.1) and (3), an impairment or combination of impairments that, in accordance with the America Medical Association's *Guide to the Evaluation of Permanent Impairment*, 4th edition, 1993, results in a 55 per cent or more impairment of the whole person; or (2.1) Clauses (1.2) (f) and (g) do not apply in respect of an insured person who sustains an impairment as a result of an accident that occurs after September 30, 2003 unless, (a) The insured person's health practitioner states in writing that the insured person's condition is unlikely to cease to be a catastrophic impairment; or 2. Two years have elapsed since the accident. O. Reg. 281/03.s.1 (7).	(1)6. Subject to subsections (2) and (5), a physical impairment or combination of physical impairments that, in accordance with the American Medical Association's *Guides to The Evaluation of Permanent Impairment*, 4th edition, 1993, results in a 55 per cent or more physical impairment of the whole person. 7. Subject to subsections (2) and (5) a mental or behavioural impairment, excluding traumatic brain injury, determined in accordance with the rating methodology in Chapter 14, Section 14.6 of the American Medical Association's *Guides to the Evaluation of Permanent Impairment*, 6th edition, 2008, that, when the impairment score is combined with a physical impairment described in paragraph 6 in accordance with the combining requirements set out in the Combined Values Table of the American Medical Association's *Guides to the Evaluation of Permanent Impairment*, 4th edition, 1993, results in 55 percent or more impairment of the whole person. (2) Paragraphs 6 and 7 of subsection (1) do not apply in respect of an insured person who sustains an impairment as a result of an accident unless: (a) Two years have elapsed since the accident or (b) An assessment conducted by a physician three months or more after the accident determines that, (i) The insured person has a physical impairment or combination of physical impairments determined in accordance with paragraph 6 of subsection (1), or a combination of a mental or behavioural impairment and a physical impairment determined in accordance with paragraph 7 of subsection (1) that results in a 55 per cent or more impairment of the whole person, and (ii) The insured person's condition is unlikely to improve to less than 55 per cent impairment of the whole person.

INJURY TYPE	CURRENT SABS (UNTIL JUNE 1, 2016)	NEW SABS (Ont. Reg. 251/15—EFFECTIVE AS OF JUNE 1, 2016)
Mental and Behavioral Impairment	(g) Subject to subsections (1.4), (2.1) and (3), an impairment that, in accordance with the American Medical Association's *Guides to the Evaluation of Permanent Impairment*, 4th edition, 1993, results in a class 4 impairment (marked impairment) or class 5 impairment (extreme impairment) due to mental or behavioural disorder. O. Reg. 281/03, s. 1 (5). (2.1) Clauses (1.2) (f) and (g) do not apply in respect to an insured person who sustains an impairment as a result of an accident that occurs after September 30, 2003 unless. (a) the insured person's health practitioner states in writing that the insured person's condition is unlikely to cease to be a catastrophic impairment: or (b) two years have elapsed since the accident. O. Reg. 281/03, s. 1 (7).	(1)8. Subject to subsections (3) and (5), an impairment that, in accordance with the American Medical Association's *Guides to the Evaluation of Permanent Impairment*, 4th edition, 1993 results in a class 4 impairment (marked impairment) in three or more areas of function that precludes useful functioning or a class 5 impairment extreme impairment) in one or more areas of function that precludes useful functioning, due to mental or behavioural disorder. (3) Paragraph 8 of the subsection (1) does not apply in respect of an insured person who sustains an impairment as a result of the accident unless, (a) Two years have elapsed since the accident; or (b) A physician state in writing that the insured person's impairment is unlikely to improve to less than a class 4 impairment (marked impairment) in three or more areas of function that precludes useful functioning, due to mental or behavioural disorder.

INJURY TYPE	CURRENT SABS (UNTIL JUNE 1, 2016)	NEW SABS (Ont. Reg. 251/15—EFFECTIVE AS OF JUNE 1, 2016)
Traumatic Brain Injury In Children	(1.3) Subsection (1.4) applies if an insured person is under the age of 16 years at the time of the accident and none of the Glasgow Coma Scale, the Glasgow Outcome Scale or the American Medical Association's *Guides to the Evaluation of Permanent Impairment*, 4th edition, 1993, referred to in clause (1.2) €, (f) or (g) can be applied by reason of the age of the insured person. O. Reg. 281/03, s. 1 (5). (1.4) For the purpose of clauses (1.2) €, (f) and (g), an impairment sustained in an accident by an insured person described in subsection (1.3) that can reasonably be believed to be a catastrophic impairment shall be deemed to be the impairment that is most analogous to the impairment referred to in clause (1.2) €, (f) or (g), after taking into consideration the developmental implications of the impairment. O. Reg. 281/03, s. 1 (5).	(1)5. If the insured person was under 18 years of age at the time of the accident, a traumatic brain injury that meets one of the following criteria: i. The insured person is accepted for admission, on an in-patient basis, to a public hospital named in a Guideline with positive findings on a computerized axial tomography scan, a magnetic resonance imaging or any other medically recognized brain diagnostic technology indicating intracranial pathology that is a result of the accident, including, but no limited to, intracranial contusions or haemorrhages, diffuse axonal injury, cerebral edema, midline shift or pneumocephaly. ii. The insured person is accepted for admission, on an in-patient basis, to a program of neurological rehabilitation in a paediatric rehabilitation facility that is a member of the Ontario association of Children's Rehabilitation Services. iii. One month or more after the accident, the insured person's level of neurological function does not exceed category 2 (Vegetative) on the King's Outcome Scale for Childhood Head Injury as published in Crouch man, M. et al *A practical outcome scale for paediatric head injury*, archives of Disease in Childhood, 2001:84: 120-124. iv. Six months or more after the accident, the insured person's level of neurological function does not exceed category 3 (Severe disability) on the King's Outcome Scale for Childhood Head Injury as published in Crouchman, M. et al, *A practical outcome scale for paediatric head injury*, Archives of Disease in Childhood, 2001: 84: 120-124. v. Nine months or more after the accident, the insured person's level of function remains seriously impaired such that the insured person is not age appropriately independent and requires in-person supervision or assistance for physical, cognitive or behavioural impairments for the majority of the insured person's waking day. 45.1 If an insured person who is under 18 years of age at the time of the accident sustains a traumatic brain injury that meets the criteria in subparagraph 5 I or 5II of subsection 3.1 (1) and that was caused by an accident that occurs on or after June 1, 2016, the person may submit an application under subsection 45 (1) and subsections 45 (2) or (5) do not apply, and the impairment is deemed to be a catastrophic impairment for the purposes of subsection 45 (6).

INJURY TYPE	CURRENT SABS (UNTIL JUNE 1, 2016)	NEW SABS (Ont. Reg. 251/15—EFFECTIVE AS OF JUNE 1, 2016)
Most Analogous Impairment Re AMA Guides	(3) For the purpose of clauses (1.1) (f) and (g) and (1.2) (f) and (g), an impairment that is sustained by an insured person but is not listed in the America Medical Association's *Guides to the Evaluation of Permanent Impairment*, 4th edition, 1993 shall be deemed to be the impairment that is listed in that document and this is most analogous to the impairment sustained by the insured person. O. Reg. 403/96, s.2(3): O. Reg. 281/03, s. 1(8).	(4) Subsection (5) applies to an insured person who was under the age of 18 at the time of the accident and whose impairment is not a catastrophic impairment within the meaning of subsection (1). (5) If the insured person's impairment can reasonably be believed to be a catastrophic impairment for the purposes of paragraph 6, 7 or 8 of subsection (1), the impairment shall be deemed to be the impairment referred to in paragraph 6, 7 or 8 of subsection (1) that is most analogous to the impairment, after taking into consideration the developmental implication of the impairment.

Other SABS Changes Relevant to the New Catastrophic Impairment Definition (2016)

Determination of catastrophic impairment

45. (1) An insured person who sustains an impairment as a result of an accident may apply to the insurer for a determination of whether the impairment is a catastrophic impairment. O. Reg. 34/10, s. 45 (1).

(2) The following rules apply with respect to an application under subsection (1):

1. An assessment or examination in connection with a determination of catastrophic impairment shall be conducted only by a physician but the physician may be assisted by such other regulated health professionals as he or she may reasonably require.
2. Despite paragraph 1, if the impairment is a brain impairment only, the assessment or examination may be conducted by a neuropsychologist who may be assisted by such other regulated health professionals as he or she may reasonably require.

Note: On June 1, 2016, paragraph 2 of subsection 45 (2) of the Regulation is amended by striking out "brain impairment" and substituting "traumatic brain impairment". (See: O. Reg. 251/15, s. 17 (1))

3. If a Guideline specifies conditions, restrictions or limits with respect to the determination of whether an impairment is a catastrophic impairment, the determination must be made in accordance with those conditions, restrictions and limits. O. Reg. 34/10, s. 45 (2); O. Reg. 289/10, s. 5.

Change in definition of neuropsychologist:

Note: On June 1, 2016, the definition of "neuropsychologist" in subsection 3 (1) of the Regulation is amended by adding "who has been registered to practice as a neuropsychologist in Canada for a minimum of five years" at the end. (See: O. Reg. 251/15, s. 2 (1))

In 2010 the government eliminated psychologists from those who could confirm a catastrophic mental disorder. In 2016, only neuropsychologists, not physicians, will be required to have been licensed for five years. Given that psychologists have the broadest training and skill set for assessment of mental disorder and that the AMA Guides Fourth supports the psychological method, (review of medical files, diagnostic interviews, collateral interviews, interpretation of psychological, cognitive and neuropsychological tests including tests of performance and symptom validity), the government's policy decision has no basis in the extent of training, expertise and legal status of psychologists.

Review of the New Definition: Traumatic Brain Injury (Currently "Brain Impairment") in Adults

Removal of the Glasgow Coma Scale (GCS)

The Glasgow Coma Scale (GCS), currently SABS (d) (i), has been removed and there are no Interim benefits available while waiting for determination under impairment/disability based criteria.

The Superintendent accepted the Expert Panel's recommendation to eliminate the Glasgow Coma Scale (GCS) as a measurement tool for determining catastrophic impairment in adults with traumatic brain injuries. In making this recommendation the Superintendent stated.

> *"The Panel recommended that the Glasgow Coma Scale (GCS), included in the current definition of catastrophic impairment in the SABS, be eliminated because it has proven a poor tool for predicting the long-term outcomes of traumatic brain injury. In addition, the GCS has weaknesses because it relies on a claimant's ability to communicate. Hence, inaccurate scores may result with patients who have alcohol in their blood, have breathing tubes inserted or are too young to understand verbal cues. The Panel recommends the Extended Glasgow Outcome Scale (GOS-E) as the most appropriate alternative to the GCS. According to the Panel, using an outcome-based measure like GOS-E would reduce the chance of inaccurate determinations.*
>
> *Some stakeholders have commented that the GCS should continue to be used as part of the definition as it is easy to apply and health professionals and lawyers are very familiar with it. I do not believe these arguments justify continuing to use a flawed tool. The purpose of this project is to move to more effective, accurate and predictable measurement tools and to make*

the definition of catastrophic impairment reflect evidence- based medicine. The level of comfort with the existing assessment system is immaterial."

To summarize, the Expert Panel proposed removal of the Glasgow Coma Scale (GCS*)*, the Superintendent concurred, and the government agreed. The GCS has been removed from the new definition.

The GCS in the current SABS is best thought of as a risk marker for poor outcome and higher initial care need after brain injury. Its utility stems from its ready availability in the medical file the day of the accident. It allows a quick determination for access to the higher level med/rehab and attendant care benefits. It is a type of "automatic" criteria. Since individuals with a GCS score of nine or less have variable outcomes, the predictive validity of this acute injury marker was challenged. We do not know what proportion of individuals determined to have a catastrophic impairment since 1996 were determined based on the GCS, but we believe it was substantial. Although some GCS cases were the subject of dispute, ultimately many have been accepted by insurers.

We do not know what proportion of individuals with a GCS of nine or less had extensive care and rehabilitation needs, but would not have met the other relevant SABs criteria, (GOS, Whole Person Impairment, and Impairment due to Mental Disorder). Individuals who met the catastrophic impairment criteria due to the GCS had funding available to receive a high level of initial intervention (when reasonable and necessary) which is shown to contribute to better outcome.

When the new regulations without the GCS comes into force in June, 2016, traumatically brain injured individuals with GCS scores of nine or less, (including those hospitalized with prolonged amnesia, up to 29 days of unconsciousness in a vegetative state, and imaging evidence of destruction of brain matter), will only receive catastrophic impairment level benefits if they meet one of the new GOSE impairment based criteria at one month, 6 months, or one year post injury. The criterion for a vegetative level of disability at one month post injury is likely relevant to only a few Ontario citizens each year, but importantly a person who does not remain in the vegetative state for a full month does not have a catastrophic impairment. That person cannot apply until six months post accident under the GOSE severe disability category. He cannot apply until one year post accident under the GOS moderate disability category. He cannot apply under the 55% threshold unless his physician states in writing at 3 months that he exceeds the 55% WPI threshold and will not improve to less than that by two years post accident. The traumatically brain injured person cannot apply under the mental disorder criterion unless his physician states in writing at any time post accident that he has three domains of marked impairment or one of extreme impairment (where a brain injury is one of the conditions producing a mental disorder and the brain injury contributes to mental disorder) and is not likely to improve by two years post accident.

In the absence of the GCS criterion there will be a delay in catastrophic impairment determination for individuals with moderate to severe traumatic brain injury (TBI). We do not

know how many will ever satisfy other relevant criteria and when the determination process will be completed. Access to an enhanced level of intervention will in some situations be delayed for years given the time it takes to make a determination with the functional impairment based criteria and the time for dispute resolution.

There will be intense pressure for admission to inpatient and outpatient publically funded brain injury rehabilitation facilities in the absence of accident benefits. There will be time pressure and financial pressure to apply for catastrophic impairment determination for these individuals who run out of funding for necessary services and are struggling with persistent, cognitive, emotional, behavioral and somatic impairments from traumatic brain injury. With delayed access to higher levels of funding, there may be an increased pressure on OHIP and other publically funded systems such as CCAC as well as increased occurrence of poorer recovery, development of additional psychological disorders, family chaos and breakdown.

The current SABS are uniquely helpful for those individuals with serious brain injuries needing early access to intensive services, and arguably were designed with the needs of the brain injured in mind. The new SABS, which contain neither the GCS, nor a mechanism for interim benefits as proposed by the Expert Panel, nor an alternative "automatic" criterion as has been created for children; will dramatically change the ability of seriously brain injured adults to access early, intensive treatment and attendant care and be associated with poorer rehabilitation outcomes.

Glasgow Outcome Scale-Extended (GOSE)

4. If the insured person was 18 years of age or older at the time of the accident, a traumatic brain injury that meets the following criteria:
    i. The injury shows positive findings on a computerized axial tomography scan, a magnetic resonance imaging or any other medically recognized brain diagnostic technology indicating intracranial pathology that is a result of the accident, including, but not limited to, intracranial contusions or haemorrhages, diffuse axonal injury, cerebral edema, midline shift or pneumocephaly.
    ii. When assessed in accordance with Wilson, J., Pettigrew, L. and Teasdale, G., Structured Interviews for the Glasgow Outcome Scale and the Extended Glasgow Outcome Scale: Guidelines for Their Use, Journal of Neurotrauma, Volume 15, Number 8, 1998, the injury results in a rating of,
        A. Vegetative State (VS or VS*), one month or more after the accident,
        B. Upper Severe Disability (Upper SD or Upper SD*) or Lower Severe Disability (Lower SD or Lower SD*), six months or more after the accident, or
        C. Lower Moderate Disability (Lower MD or Lower MD*), one year or more after the accident.

The Superintendent's report stated,

> *"The Panel recommends basing the catastrophic impairment determination on specific thresholds in the GOS-E, with timelines correlating to the various levels of impairment. Specifically, injuries resulting in a Vegetative State would qualify one month after the accident; injuries classed as Upper or Lower Severe disabilities would qualify at six months, and injuries classed as Lower Moderate disabilities would qualify at one year."*
>
> *"I accept the thresholds and timelines recommended by the Panel. Upon review of stakeholder comments supporting the predictability of the GOS-E, I find that the requirement for neurological rehabilitation is not necessary."*

This new criterion 4 replaces SABS (d) (i) and (ii). The definition is changed from "brain impairment" to "traumatic brain injury"; the definition of age of adulthood is changed to 18 from 16 for all of the new definition criteria; the GOS (severe disability or vegetative) is replaced by the GOSE with vegetative, severe, and moderate disability thresholds at different times post accident. In addition to the requirement to meet certain disability thresholds at various times, the definition now requires diagnostic findings to substantiate intracranial pathology from traumatic brain injury and includes the following statement:

> *The injury shows positive findings on a computerized axial tomography scan, a magnetic resonance imaging or any other medically recognized brain diagnostic technology indicating intracranial pathology that is a result of the accident, including, but not limited to, intracranial contusions or haemorrhages, diffuse axonal injury, cerebral edema, midline shift or pneumocephaly.*

What will be the impact of this requirement? Brain imaging after a traumatic brain injury may be clinically required to evaluate life threatening injuries requiring immediate medical/surgical intervention such as bleeds. Brain diagnostic technology is used clinically for specific limited purposes often based on Guidelines for their use. Repeat imaging usually occurs to monitor only individuals at risk of need for further medical/surgical interventions, and use may be dependent upon access to specialists and equipment provided only in certain facilities.

Central to this discussion is the extent to which routine clinical imaging (i.e. CT, MRI) is predictive of long-term functional outcome. Overall, current research indicates that CT and MRI obtained in the acute or semi-acute phase post-injury do predict functional outcome, with MRI emerging as a more sensitive tool for detecting intracranial pathology that impacts outcome. However, there are several caveats directly relevant to the new SABS definition: First, positive MRI and CT findings are predictive of functioning (as measured by the GOS-E) in the short-term (i.e. 3 – 6 months post-injury), but do not necessarily predict functioning in the longer-term (i.e. >12-months post-injury). Moreover, a significant portion of TBI patients with negative CT findings report continuing symptoms (i.e. physical complaints, poor sleep, cognitive

complaints, emotional distress) at 12 months post-injury. Consequently, there exist a subset of patients with negative neuroimaging findings in the acute phase, who develop persisting physical, cognitive, and emotional symptoms. These patients will not be eligible for assessment under this criterion of the SABS, and must wait until 2 years post-accident to be assessed under criteria 6, 7 or 8.

Further, diagnosis and treatment/rehabilitation of impairments due to brain injury is usually based on clinical and functional indicators, not "medical diagnostic technology," narrowly conceived; so such technologies are not often medically required beyond the acute injury situation. However, while not clinically indicated; under the SABS, in some situations of moderate and serious traumatic brain injury, other brain diagnostic technologies and biomarkers of intracranial pathology will now be required in order to apply the GOSE. That is, these are not medically required investigations, but are required for the completion of some OCF 19s to address the legal test. I note, however, that neuropsychological testing is one of the most sensitive brain diagnostic technologies and will take on greater importance in determining the presence of intracranial pathology in those cases where imaging is negative. Will neuropsychological testing be considered to be sufficiently sensitive and specific and recognized by the LAT adjudicators in the absence of brain imaging indicators of intracranial pathology? Again, in the absence of MRBDTs, catastrophic impairment applications will likely be delayed until two years post accident or when the condition is stable, when other catastrophic impairment criteria can be applied.

Germane to this discussion is whether other medical imaging technologies exist which are more sensitive to traumatic brain injury-related pathology, and are better predictors of functional outcome. Indeed, emerging MRI scans such as diffusion tensor imaging (which measures the integrity of the structural connections between brain regions) and resting state functional MRI (which measures the activation between brain regions while a person is not engaged in a task) show promise as sensitive indicators of cognitive and emotional symptoms, which would impact functioning in the long-term. However, these technologies are still in their infancy, and are not recommended for routine clinical use, as they lack the standardized protocols and predictive power to be applied on an individual patient basis (the interested reader is directed to Bigler, 2015; Hayes et al., 2016; Wintermark et al., 2015).

Interpretation and Use of the Glasgow Outcome Scale

Assessors generally have very little experience with the GOS. Only in 2015 did we have an Arbitration decision where the Glasgow Outcome Scale (GOS) was utilized, Watters and State Farm, a decision of Arbitrator Feldman.

Arbitrator Feldman summarizes:

FSCO A13-006328

"The primary distinction on the GOS between severe and moderate disability appears to be the level of independence achieved by the brain-injured person by the time of the assessment; independence in activities of daily living; independence in mobility within and outside of the home; independence in organizing, initiating and completing daily activities; independence in initiating and responding to opportunities for social interaction; and, independence in returning to work and participating in the person's usual, pre-accident leisure activities."

"As will be further described in the next section on attendant care, the evidence clearly shows that while the Applicant has made some gains since the accident, she still requires a substantial amount of attendant care and requires daily assistance. While she can be left alone in her home for several hours without undue risk of harm, she is not truly independent either inside or outside of her home."

"She requires constant monitoring and cueing to ensure that she is eating properly, changing into clean clothes, properly caring for her dog and taking the right medication at the right time. She only occasionally leaves her home; usually to attend medical appointments, engage in physical rehabilitation (such as swimming and aqua fitness) or going shopping. When she leaves the home, she is almost always accompanied by a family member or other attendant. Based upon the overwhelming weight of the evidence presented, I am satisfied that she cannot independently use public transportation or go shopping. There have been times when the Applicant has been unable to remember where she is going or why and when she has been unable to follow a shopping list, even if she helped to prepare it. Past incidents described by Derek Watters demonstrate that the Applicant can become confused and overwhelmed when out in the community and that she needs to have an attendant with her when she leaves her home. In short, the Applicant is dependent upon daily support. This ongoing need for daily support is, in large part, due to the brain impairment she sustained as a result of the September 29, 2011 accident."

Arbitrator Feldman gives us insight into the severity of disability required to meet the current GOS threshold (severe disability).

There are various reasons why the GOS has been little utilized, and why the GOSE will take on more focus under the new regulations:

1) The GOS, severe disability, typically has been seen to apply to only the most severe brain injuries. It is likely most individuals with moderate to severe TBI have a GCS of nine or less in their medical file and there is currently no need for impairment/disability assessment to determine catastrophic impairment.
2) Although the GOS can currently be assessed at six months, relatively few catastrophic impairment assessments and subsequent IE response are completed before two years have passed since an accident, and by two years some insureds satisfy other

catastrophic impairment criteria (e.g., WPI of 55% or more, marked impairment due to mental or behavioural disorder). Will disputes regarding the GOSE be resolved soon after the six month mark, unlikely?

Key Considerations from Wilson, et. al. 1998, the GOSE

A number of important points are to be gleaned from the article describing the GOSE (Wilson et. al., 1998). The article uses "brain injury" and "head injury" interchangeably, a common problem in our discourse, but inadequate for the purposes of the SABS. The new SABS require a diagnosis of a traumatic brain injury, a diagnosis which is only within the scope of practice of physicians and neuropsychologists. The SABS require additional evidence of intracranial pathology, not a requirement for clinical use of the GOS or GOSE.

The focus of both the GOS and GOSE is functional outcome, not the severity of initial injury to the brain. In contrast, the current medical scientific definitions of brain injury severity focus mainly on acute injury characteristics; and the diagnosis of severity does not reflect the extent of recovery/persistence of deficits. Wilson et al note "Only preinjury status and current status should be considered," not the severity of initial injury. The impairments resulting from the brain injury are described at times as "social disability" or "handicap". In other places in the article "impairment" is used interchangeably with "handicap".

The authors emphasize that "Disability from head injury (the confusion between head and brain injury is front and center) is identified by a change from preinjury status." Questions regarding preinjury disability are included so that change can be assessed. An asterisk* is used to designate persons with pre-existing disabilities. The article by Wilson et. al. states,

> *The approach suggested here is to rate such people on their current functional status and to indicate the existence of preinjury disability by putting a * besides the rating*.

This convention allows for identification of some pre-existing disability and also makes it clear that the intention is to rate based on current functional level. The new SABS incorporate this convention in the definition. (Find the asterisk above). There is no instruction in Wilson et. al. to "apportion" or subtract for pre-accident disability level.

Wilson et. al. also state: "Disability must be a result of physical or mental impairment." Presumably this means that the physical/bodily change is due to brain injury rather than for example orthopedic injuries effecting function. The authors acknowledge that the GOSE scale, "while directed to the effect of brain injury, does not itself distinguish changes due to injury to the brain from disability caused by injury to other parts of the body." The GOSE test itself also does not distinguish mental and behavioral changes produced by damage to the central nervous system from changes produced by mental disorders. The diagnosing physician or neuropsychologist makes this determination regarding the cause of the impairment.

The authors indicate, "depending on the purposes for which the scale is used, it may be important at the time of interview to distinguish any such effects from those caused by brain

injury." Thus, for purposes of the SABS, which requires we identify impairments due to traumatic brain injury, it is essential to distinguish the physical impairments resulting from brain injury from those resulting from other injuries and to distinguish cognitive, emotional and behavioral change resulting from brain injury from those changes due to other mental disorders. This requires the diagnostic expertise of physicians and neuropsychologists.

The GOSE disability rating is completed by response to questionnaires which have been designed to be used in a structured interview format with patient, family, or caregiver. The GOSE has simple hierarchical scales and the overall rating may be based on one question. The article states,

> *"The best source of information should be utilized……A necessary limitation of the approach is that it relies on verbal report, and much of the time information must be taken at face value."*

The authors note that patients may lack insight or family may over report problems.

We note that there is no mention in the article of direct assessment of function by clinicians which is what we typically see in catastrophic impairment assessments of disability currently. The authors summarize, "Improved reliability does not completely eliminate limitations such as the use of broad social roles to define outcome categories, the reliance on verbal report, and the need for the exercise of some judgement by the interviewer." As with the other catastrophic impairment criteria, a robust assessment methodology is necessary to ensure that valid data are captured in the answers to the questionnaire and the resulting ratings. This definition requires the expertise of physicians or neuropsychologists in diagnosing traumatic brain injuries and in understanding the nature and course of brain injury in order to accurately apply the GOSE with respect to the functional impact of the traumatic brain injury as distinct from other injuries. Structured standardized assessments of function such as neuropsychological testing will take on a grater role as well as observations of the patient in rehabilitation settings and work trials. Those who are not physicians or neuropsychologists may provide useful observations about function but cannot diagnose the disorders and determine their prognosis and specific impact.

How Will the GOSE Work?

As noted above, there is the new requirement that there be positive findings of intracranial pathology on medically recognized brain diagnostic technology ("MRBDT"). If these are not available, the GOSE cannot be utilized and the insured must wait to use the WPI, combining, or mental disorder definition.

The GOSE has more levels/differentiation than the GOS (8 vs 5 levels). Under the new SABS, patients can be assessed at one month, six months, and one year. At one month, the GOSE level required is Vegetative State; at six months, Severe Disability; at one year, Lower Moderate disability. A rating of Vegetative State at one month is found rarely among traumatically injured persons. I expect that applications will not be initiated until six months post MVA and that the

majority of brain injured individuals will be assessed at one year with a focus on questions such as 5b sub b below. “Able to work only in a sheltered workshop or Non-competitive job or currently unable to work.”

Below please find tables with two descriptions of each of the disability levels.

1 = Dead	
2 = Vegetative State	Condition of unawareness with only reflex responses but with periods of spontaneous eye opening.
3 = Low Severe Disability 4 = Upper Severe Disability	Patient who is dependent for daily support for mental or physical disability, usually a combination of both. If the patient can be left alone for more than 8h at home it is upper level of SD, if not then it is low level of SD.
5 = Low Moderate Disability 6 = Upper Moderate Disability	Patients have some disability such as aphasia, hemiparesis or epilepsy and/or deficits of memory or personality but are able to look after themselves. They are independent at home but dependent outside. If they are able to return to work even with special arrangement it is upper level of MD, if not then it is low level of MD.
7 = Low Good Recovery 8 = Upper Good Recovery	Resumption of normal life with the capacity to work even if pre-injury status has not been achieved. Some patients have minor neurological or psychological deficits. If these deficits are not disabling then it is upper level of GR, if disabling then it is lower level of GR.

It is anticipated that the boundary between upper and lower moderate disability will be the most challenging of these levels to determine.

The following are expanded descriptions of moderate disability, upper and lower.

Moderate Disability - Lower	1. Not able to work, or, only in a sheltered or non-competitive position 2. Unable to participate (or, rarely if ever) in regular social and leisure activities outside home 3. Constant and intolerable (daily) disruption of family relationships or friendships due to psychological problems
Moderate Disability - Upper	1. Able to work or study but at a reduced capacity 2. Participates much less (less than half as often) in regular social and leisure activities outside home. 3. Frequent but tolerable (once per week) disruption of family relationships or friendships due to psychological problems

As noted above, the level is determined based on the answers to specific questions regarding independence that address whether the insured has a severe disability, lower or upper; moderate disability, lower or upper. Here are the key questions.

INDEPENDENCE IN THE HOME

The following are examples of some of the questions to be addressed:

2b. Do they need frequent help of someone to be around at home most of the time?

❑ Yes (lower SD) ❑ No (upper SD)

Note: for a NO answer they should be able to look after themselves at home up to eight hours during the day if necessary, though they need not actually look after themselves

INDEPENDENCE OUTSIDE THE HOME

3a. Are they able to shop without assistance?

❑ Yes ❑ No (Upper SD)

Note: this includes being able to plan what to buy, take care of money themselves and behave appropriately in public. They need not normally shop, but must be able to do so.

4a. Are they able to travel locally without assistance?

❑ Yes ❑ No (upper SD)

Note: they may drive or use public transport to get around. Ability to use a taxi is sufficient, provided the person can phone for it themselves and instruct the driver.

WORK

5a. Are they currently able to work (or look after others at home) to their previous capacity?

❑ Yes If yes, go to 6 ❑ No

5b. How restricted are they?

a. Reduced work capacity ❑ a. (Upper MD)
b. Able to work only in a sheltered workshop or Non-competitive job or currently unable to work? ❑ b. (Lower MD)

SOCIAL AND LEISURE ACTIVITIES

6b. What is the extent of restriction on their social and leisure activities?
a) Participate a bit less, at least half as often as before injury, Lower GR
b) Participate much less, than half as often, Upper MD
c) Unable to participate; rarely if ever take part, Lower MD

FAMILY AND FRIENDSHIPS

7a. Has there been family or friendship disruption due to psychological problems?

❑ Yes ❑ No If No, go to 8

Note: typical post-traumatic personality changes are: quick temper, irritability, anxiety, insensitivity to others, mood swings, depression and unreasonable or childish behaviour.

7b. What has been the extent of disruption or strain?

a. Occasional – less than weekly	❑ a. (Lower GR)
b. Frequent – once a week or more, but not tolerable	❑ b. (Upper MD)
c. Constant – daily and intolerable	❑ c. (Lower MD)

In summary, the GOSE provides questions to be asked to determine the associated disability level to be assigned. Although the GOSE is presented as a structured interview and the authors note high reliability in a small study with trained interviewers; such interviews, in practice may have poor reliability and validity. Further, the GOSE questions and process of determining severity levels are sufficiently vague and imprecise to be open to interpretation and dispute.

These questions provide a schema for rating functional level. However, the rating will only be as sound as the answers are an accurate reflection of actual function. Given the concerns about the accuracy of self report due to lack of self-awareness and/or exaggeration, alternative methods are required to validate the responses to the questions. Psychologists and Neuropsychologists have robust assessment methodology which allows them to ensure that the answers to the questions are a valid representation of actual functional level. In addition to direct administration of the questionnaire, the psychological/neuropsychological assessment methodology includes multiple sources of information including: comprehensive diagnostic interview, observation, collateral interviews, observation of the patient in rehabilitation settings where specific performance is required, psychological and neuropsychological test interpretation, and review of medical files. As noted above, neuropsychologists and physicians are required to diagnose the disorder causing the impairments to determine which reflect traumatic brain injury.

Review of Assessment of Traumatic Brain Injury/Brain Impairment in Adults in the 1996 and 2016 SABS

Earlier in this paper, I commented on the criteria currently used to assess brain injured adults for catastrophic impairment. When considering this material, be mindful that the current SABS uses the broader term "brain impairment," while the new SABS has an explicit criterion for "brain injury" and several criteria where "brain impairments" are rated.

I will now summarize and compare current methods with those we will use for those injured after May, 2016.

The current definition provides for determination of catastrophic impairment for those individuals with *brain impairment:*

1) The day of the accident or later with the GCS,
2) Six months post-accident or later with the GOS,
3) At any time post-accident with the WPI if the condition is stable and not likely to improve to better than the 55% WPI, ("*the insured person's condition is unlikely to cease to be a catastrophic impairment'),*
4) At any time post-accident with the mental and behavioral criterion if the condition is stable and not likely to improve to better than a marked impairment, ("*the insured person's condition is unlikely to cease to be a catastrophic impairment'),*
5) WPI of 55% at two years or later (this includes patients where impairments arising from traumatic brain injury are combined with impairments from mental and behavioral disorder and bodily impairments under current practice),
6) A two years or later after an accident, a Marked or Extreme Impairment due to a mental and behavioral disorder when the latter diagnosed disorders include a brain injury/disorder (for eg. Minor or major neurocognitive disorder).

Under the new definition, we will be assessing individuals who have sustained a *traumatic brain injury* with the following assessment tools:

1) GOSE (one month, six months, one year), in those individuals when there is medically recognized brain diagnostic technology showing intracranial pathology.
2) Whole Person Impairment utilizing the AMA Guides Fourth Edition, if
    (a) two years have elapsed since the accident; or
    (b) an assessment conducted by a physician *three months or more after the accident* determines that,
        (i) the insured person has a physical impairment or combination of physical impairments determined in accordance with paragraph 6 of subsection (1), or a combination of a mental or behavioural impairment and a physical impairment determined in accordance with paragraph 7 of subsection (1) that results in 55 per cent or more impairment of the whole person, and

(ii) the insured person's condition is unlikely to improve to less than 55 per cent impairment of the whole person. O. Reg. 251/15, s. 3.

3) Marked or Extreme Impairment due to mental and behavioral disorders when the latter includes brain injury as one source of impairment, however,

Paragraph 8 of the subsection (1) does not apply in respect of an insured person who sustains an impairment as a result of the accident unless,

(a) Two years have elapsed since the accident; or

(b) A physician state in writing that the insured person's impairment is unlikely to improve to less than a class 4 impairment (marked impairment) in three or more areas of function that precludes useful functioning, due to mental or behavioural disorder.

I believe that both the current and new definition envision that a patient with a significant traumatic brain injury or brain impairment is changing, improving, or even deteriorating over time from the date of the accident and can be evaluated at different times post-accident with different requirements for disability or impairment level. As described above, both the current and new SABS provide multiple criteria for evaluating the impact of brain impairment or traumatic brain injury. The distinction in the new SABS is that the GOSE applies only when there is a diagnosis of traumatic brain injury (vs brain impairment the current SABS) which produces disability, while the other current criteria: WPI and Mental and Behavioral Disorder all allow rating impairments resulting from any type of brain impairment resulting from an accident, not simply brain injuries. The scenario for the rare non traumatic brain impairments is seen in frail elderly who suffer injury, intervention, hospitalization, and whose brains are impacted.

As noted, it is also reasonable to expect some individuals with brain injuries and brain impairments will apply for catastrophic impairment determination at several different time points. For example, an application under 4. ii B at six months (GOSE severe disability) may be followed by a further application or an insurer examination at one year when 4. ii C (GOSE moderate disability, lower) can be applied; and then again, the insured person can apply under the criteria 6, 7, 8 at two years post accident or earlier if the stability requirements are met.

What About Mild Brain Injuries (mTBI), Can They Produce Catastrophic Impairment?

The definition of mTBI in the Ontario Neurotrauma Foundation Guidelines, states,

Table B. Diagnostic Criteria for Concussion/Mild Traumatic Brain Injury*

Concussion/mTBI is defined as a complex pathophysiological process affecting the brain, induced by biomechanical forces. Several common features that incorporate clinical,

pathologic and biomechanical injury constructs that may be utilised in defining the nature of a concussion/mTBI include:
1. Concussion/mTBI may be caused either by a direct blow to the head, face, neck or elsewhere on the body with an impulsive force transmitted to the head.
2. Concussion/mTBI typically results in the rapid onset of short-lived impairment of neurological function that resolves spontaneously. However, in some cases, symptoms and signs may evolve over a number of minutes to hours.
3. Concussion/mTBI may result in neuropathological changes, but the acute clinical symptoms largely reflect a functional disturbance rather than a structural injury and, as such, no abnormality is seen on standard structural neuroimaging studies.
4. Concussion/mTBI results in a graded set of clinical symptoms that may or may not involve loss of consciousness Resolution of the clinical and cognitive symptoms typically follows a sequential course. However, it is important to note that in some cases symptoms may be prolonged.

As noted earlier, the diagnosis of brain injury severity is based on acute clinical indicators, not later impairment and disability; thus some individuals with mTBI will have poor outcomes with serious persistent impairments. Wilson et. al. emphasize that the severity of initial injury is not relevant in determining outcome with the GOSE. However, in the SABS, to satisfy GOSE criteria, those with traumatic brain injuries must have positive findings of intracranial pathology on medically recognized brain diagnostic technology (MRBDTs) and sufficient functional disability to meet the six month and/or one year thresholds.

As quoted above from the ONF, the expectation for mTBI is that no abnormality is seen on diagnostic studies. Only those few individuals initially classified as mTBI who have BOTH positive test findings on medically recognized diagnostic technology and significant persistent disability will be identified as having catastrophic impairment according to the GOSE.

However, when mTBI is accompanied by other injuries/diagnoses/ conditions that are diagnosed and rated under new SABS criteria 6, 7, 8; the catastrophic impairment threshold may be achieved based on the combination WPI produced by rating of all impairments.

What About Brain Impairment that Results from an Accident where there is not a Traumatic Brain Injury?

As noted above, some individuals, notably frail seniors, suffer debilitating brain impairment after hospitalization for bodily injuries and some satisfy current catastrophic impairment criteria. The GOSE would not be able to be utilized in these instances even if their functional level can be described using the standard questions as meeting the moderate or severe disability criteria. Under the new definition, they will apply for determination under the mental and behavioral or combining criteria. Due risk of ongoing deterioration, these individuals often can be assessed prior to the two year mark.

Whole Person Impairment Rating

6. *Subject to subsections (2) and (5), a physical impairment or combination of physical impairments that, in accordance with the American Medical Association's* Guides to the Evaluation of Permanent Impairment*, 4th edition, 1993, results in 55 per cent or more physical impairment of the whole person*. Replaces (e) *subject to subsections (4), (5) and (6), an impairment or combination of impairments that, in accordance with the American Medical Association's Guides to the Evaluation of Permanent Impairment, 4th edition, 1993, results in 55 per cent or more impairment of the whole person;*

Guides Fourth, with all the associated clinical and judicial interpretive experience, is maintained for rating bodily impairments. However, the term "physical" in the definition is new, creating a potentially confusing distinction regarding the cause/physiological underpinning of mental disorders which are brain based and which are not. Notably, "physical" impairment chapters in the AMA Guides Fourth include, among others, the evaluation of injury to the nervous system (brain damage), utilizing chapter four. Diagnostic precision by physicians and psychologists is required to address the correct diagnosis, cause, and prognosis of mental disorders produced by brain injuries. As traumatic brain injuries include symptoms/impairments of cognition, emotional regulation, personality change, and behavioural disturbance, as well as somatic changes; covered in chapter 4, these will be diagnosed and rated as injury/damage to the nervous system (brain).

Combining Mental and Physical Impairments (WPI)

7. Subject to subsections (2) and (5) a mental or behavioural impairment, excluding traumatic brain injury, determined in accordance with the rating methodology in Chapter 14, Section 14.6 of the American Medical Association's *Guides to the Evaluation of Permanent Impairment*, 6th edition, 2008, that, when the impairment score is combined with a physical impairment described in paragraph 6 in accordance with the combining requirements set out in the Combined Values Table of the American Medical Association's *Guides to the Evaluation of Permanent Impairment*, 4th edition, 1993, results in 55 percent or more impairment of the whole person.

I am not including a detailed analysis of combining in this paper as my focus is on brain injury and brain impairment.

However, some attention is required as criterion 7 is both a methodologically confusing approach to impairment rating and a conceptually challenging way of addressing mental disorders and brain injuries. This is a new criterion to address combining impairments across organ systems to combine both "physical" impairment ratings and those due to mental and behavioural disorders. Key features are as follows: 1) maintaining the Fourth Edition of the AMA Guides for all bodily and brain impairments; 2) utilizing the specific method (section 14.6)

in the mental and behavioural chapter of Guides Sixth for determination of mental and behavioural impairments; 3) when rating mental impairments utilizing Guides Sixth, distinguishing the symptoms and functional changes resulting from brain injury from the symptoms and functional changes resulting from all other mental disorders and excluding the former. As all mental disorders arise from the same brain, and brain injuries produce a variety of mental and behavioural changes; the artificiality of this distinction will challenge assessors, even those well trained with expertise in neuropsychology and neuropsychiatry. Assessors will be using two separate editions of the Guides with distinctive approaches to the evaluation and rating of impairments resulting from mental and behavioural disorders, the Fourth Edition for criterion 8, the Sixth Edition for criterion 7.

The legislature has created a complex method based in part on the untested Guides Sixth Chapter 14 which produces disproportionately low ratings and has never been validated. Guides Sixth is based on a different impairment rating system than Guides Fourth. Guides Sixth introduces methods and GAF/GAF Impairment Score conversion tables that result in drastically and unscientifically reduced impairment ratings for impairments due to mental and behavioural disorders.

Guides Sixth uses three scales to rate patients with mental and behavioural disorders, one of which is the GAF with the new GAF/GAF Impairment Score conversion table introduced in this edition without explanation for the basis of the impairment ratings assigned. The other two scales used in Guides Sixth, Chapter 14, the Brief Psychiatric Rating Scale (BPRS) and the Psychiatric Impairment Rating Scale (PIRS), also are scientifically unsound and result in ratings inequities. Thus Guides Sixth requires we rate dysfunction and symptom severity (GAF), symptom severity (BPRS) and role dysfunction (PIRS). The latter two rating scales are not in common use in psychiatry and psychology. Guides Sixth utilizes an arbitrary GAF conversion score dramatically lower than those that derive from Guides Fourth and the California method often used in catastrophic impairment determination. Guides Sixth, for example, provides a maximum WPI of 50% for the most profound brain damage/impairment or mental disorder, lower than the other chapters in Guides Sixth and much lower than Guides Fourth with which we must combine these ratings. Further, contrary to the approach in Guides Fourth which is that when impairments overlap, one takes the highest to stand for the impairment level; this section of chapter 14 Guides Sixth (14.6) directs taking the median of the three scores.

Practically, the method will mean that only those with profound bodily/brain impairments (for eg. WPI 47%) will achieve the 55% threshold when combining the mental impairment based on the Guides Sixth method when the mental disorder is severe with a GAF of 40-50 and likely results in at least one domain of marked impairment. It is possible there is no person who does not already meet the WPI threshold based on bodily and brain impairments or who does not already have three domains of marked impairment who will achieve the 55% threshold through combining.

Here is an example regarding combining based on a case described in Guides Sixth for a person with schizophrenia. (See the tables in the Appendix for the WPI conversions obtained using

different methods.) For the sake of discussion of brain impairments, consider a patient with combined bodily and brain impairment that produces a WPI=47%.

Lower GAF scores represent more severe dysfunction, while the higher WPI scores represent more severe dysfunction. This may create some confusion in going back and forth from GAF to WPI. A patient with serious mental and disorders may have a GAF of 41-50 (serious symptoms or serious impairment in social, occupational, or school functioning). Referencing Guides Fourth, Chapter 4, Table 3; this would result in a WPI of 48-30%. Using the California approach it would also result in a WPI of 48-30%. However, using Guides Sixth, the individual in this example is given a GAF Impairment Score of only 15%. Thus for example, a patient with a serious mental impairment (GAF 41-50) would need a bodily impairment rating of 47% for combining with 15% to achieve the 55% WPI threshold. This example highlights the severely underestimated impairment ratings for brain impairments and impairments from mental and behavioral disorders provided in Guides Sixth. (See Guides Sixth, Chapter 14, page 361, example 14-2 for patient example of 15% WPI).

My conclusion is that assessors will actually almost never have to apply the Guides Sixth mental impairment rating method, because it is relatively straightforward to screen patients to determine that combining physical impairments with impairments from mental disorders is not relevant.

Mental and Behavioral Impairment

8. Subject to subsections (3) and (5), an impairment that, in accordance with the American Medical Association's *Guides to the Evaluation of Permanent Impairment*, 4th edition, 1993 results in a class 4 impairment (marked impairment) in three or more areas of function that precludes useful functioning or a class 5 impairment (extreme impairment) in one or more areas of function that precludes useful functioning, due to mental or behavioural disorder. O. Reg. 251/15, s. 3.

This replaces (f) *subject to subsections (4), (5) and (6), an impairment that, in accordance with the American Medical Association's Guides to the Evaluation of Permanent Impairment, 4th Edition, 1993, results in a class 4 impairment (marked impairment) or class 5 impairment (extreme impairment) due to mental or behavioural disorder*.

In this paper I am not including a detailed analysis of the new criterion 8 for mental and behavioural disorder; but rather focusing on how impairments resulting from brain injuries will be rated under the mental disorder criterion. Currently impairments from brain disorders (for eg. DSM IV Cognitive disorder, DSM V minor and major neurocognitive disorder) are rated as mental disorders when considering the overall impairment due to mental disorders. Multiple mental disorders are often found in patients being evaluated for catastrophic impairment. This will not change. The new criterion 8 does not exclude any type of mental disorder such as pain disorders (DSM IV) or somatic symptom disorders (DSM V) as it continues to use AMA Guides

Fourth chapter 14. The new criterion 8 does not exclude consideration of brain injuries/disorders/impairments. Be reminded however, that the new combining criterion, 7, cited above, also allows for the rating of any and all impairments from central nervous system damage using Guides Fourth chapter four, while the rating of mental disorder in chapter 14 (14.6) Guides Sixth excludes the brain injuries.

To summarize, brain injuries produce mental disorders and impairments. These impairments are diagnosed by physicians and psychologists using the ICD or DSM systems and the impairment/dysfunction which arises from one or more mental disorders are rated using Guides Fourth chapter 14 methodology.

The new criterion explicitly requires three domains of marked impairment or one domain of extreme impairment and indicates that this level of impairment precludes useful function.

The Fourth Edition, Chapter Fourteen method remains the most robust of all six AMA Guides editions. It also remains an accurate and current statement of the "psychological method" more than 20 years after it was published. AMA Guides Fourth emphasizes a multi-method approach where several sources of information are utilized. Maintaining its use in the new regulation highlights the importance of a robust and comprehensive assessment incorporating a full range of methods to achieve a formulation and diagnosis. Faithful application of a consistent method will remain the best way to reduce disputes regarding diagnosis and severity of impairment from mental and behavioral disorder.

Section 14.2 p 293 describes the assessment method:

> *The methodology of the Guides requires that the presence of a mental disorder be documented primarily on the basis of reports from accepted professional sources, such as psychiatrists, psychologists, psychiatric nurses, psychiatric social workers, and health professionals in hospitals and clinics. Adequate descriptions of functional limitations should be obtained from these sources and, if possible, from programs in which the individual has been observed over a period of time. Data gathered during a period of years are particularly useful.*
>
> *The individual's own description of his or her functioning and limitations is an important source of information. The presence of a mental disorder does not automatically rule out the individual as a reliable source of information. Information from nonmedical sources, such as family members and others who have knowledge of the patient, may be useful in indicating the level of functioning and the severity of the impairment.*
>
> *Information from medical and nonmedical sources may be used to obtain detailed descriptions of the individual's activities of daily living, social functioning, concentration, persistence, pace, and ability to tolerate increased mental demands (stress). This information may be available from professionals in community mental health centers, day-care centers, and sheltered workshops, and it also can be provided by family members. If the descriptions from these sources are insufficiently detailed or in conflict with the observed clinical picture or the reports of others, it is necessary to resolve the inconsistencies. Also, any gaps in the history should be explained.*

An individual's level of functioning may vary considerably over time. The level of functioning at a specific time may seem relatively adequate or, conversely, rather poor. Proper evaluation of an impairment must take into account variations in the level of functioning with time in arriving at a determination of severity. Thus, it is important to obtain evidence over a sufficiently long period before the date of examination. This evidence should include treatment notes, hospital discharge summaries, work evaluations, and rehabilitation progress notes if they are available.

An individual may have worked or have attempted to work when there was a question about impairment. The individual's efforts may have been independent, or the work may have been in conjunction with a community mental health or other sheltered program and of short or long duration. Information concerning the individual's behavior during the attempt, and the circumstances surrounding termination of the work effort, are particularly useful in determining the individual's ability to function in a work setting and with others. Results of work evaluations and rehabilitation programs can be significant sources of data concerning impairments affecting work capabilities.

The results of well-standardized psychological tests, such as the Wechsler Adult Intelligence Scale, the Minnesota Multiphasic Personality Inventory-2, the Rorschach Psychodiagnostic Inkblot Test, and the Thematic Apperception Test, may be useful in establishing the existence of a mental disorder. For example, the Wechsler Adult Intelligence Scale is useful in establishing mental retardation. Broad-based neuropsychological assessments using, for example, the Halstead-Reitan or the Luria-Nebraska batteries may be useful in determining deficiencies in brain functioning, particularly in individuals with subtle signs such as those that may be seen in traumatic brain injuries.

Taking a standardized test requires concentration, persistence, and pacing; thus, observing individuals during the testing process may provide useful information. The description of test results should include the objective findings, a description of what occurred during the testing, and the test results. A report of intellectual assessment should include a discussion of whether the obtained intelligence quotient (IQ) score is considered to be valid and consistent with the individual's impairment and degree of functional limitation.

Guides Fourth and Sixth indicate that the assessment of mental disorder is to be carried out by a psychiatrist or psychologist. Only these professions can diagnose mental disorders and determine the functional impact of mental disorders as these professions have expertise regarding course and prognosis. Psychologists in particular have expertise in the full multi-method approach required in Guides Fourth; diagnostic interview, collateral interview, file review, psychological and cognitive testing and effort testing. Other professions, including occupational therapy, may provide additional information on function.

Brain Trauma in Children (under age 18)

5.If the insured person was under 18 years of age at the time of the accident, a traumatic brain injury that meets one of the following criteria:

i. The insured person is accepted for admission, on an in-patient basis, to a public hospital named in a Guideline with positive findings on a computerized axial tomography scan, a magnetic resonance imaging or any other medically recognized brain diagnostic technology indicating intracranial pathology that is a result of the accident, including, but not limited to, intracranial contusions or haemorrhages, diffuse axonal injury, cerebral edema, midline shift or pneumocephaly.

ii. The insured person is accepted for admission, on an in-patient basis, to a program of neurological rehabilitation in a paediatric rehabilitation facility that is a member of the Ontario Association of Children's Rehabilitation Services.

iii. One month or more after the accident, the insured person's level of neurological function does not exceed category 2 (Vegetative) on the King's Outcome Scale for Childhood Head Injury as published in Crouchman, M. et al, *A practical outcome scale for paediatric head injury*, Archives of Disease in Childhood, 2001: 84: 120-124.

iv. Six months or more after the accident, the insured person's level of neurological function does not exceed category 3 (Severe disability) on the King's Outcome Scale for Childhood Head Injury as published in Crouchman, M. et al, *A practical outcome scale for paediatric head injury*, Archives of Disease in Childhood, 2001: 84: 120-124.

v. Nine months or more after the accident, the insured person's level of function remains seriously impaired such that the insured person is not age-appropriately independent and requires in-person supervision or assistance for physical, cognitive or behavioural impairments for the majority of the insured person's waking day.

Note the following:

(4) Subsection (5) applies to an insured person who was under the age of 18 at the time of the accident and whose impairment is not a catastrophic impairment within the meaning of subsection (1). O. Reg. 251/15, s. 3.

(5) If the insured person's impairment can reasonably be believed to be a catastrophic impairment for the purposes of paragraph 6, 7 or 8 of subsection (1), the impairment shall be deemed to be the impairment referred to in paragraph 6, 7 or 8 of subsection (1) that is most analogous to the impairment, after taking into consideration the developmental implications of the impairment. O. Reg. 251/15, s. 3.

The new definition for children changes the age for children from 16 to 18 reflecting, to some degree, current thinking about brain development and the prolongation of dependency due to extended education. Specific new criteria to allow early and automatic identification are included for some children with traumatic brain injuries. The brain injury criteria are disjunctive; only one needs to be met. Thus for children with brain injury, attention must be paid to whether:
1. they are accepted for admission to a hospital named in the Guideline and have evidence of intracranial pathology;
2. are admitted an in-patient program of neurological rehabilitation in a paediatric rehabilitation facility that is a member of the Ontario Association of Children's Rehabilitation Services;
3. 4. 5. meet specific disability thresholds at various times (two thresholds are based on the KOSCHI at one and six months while one criterion is based on a verbal threshold describing dependency at nine months). Given the extensive treatment, rehabilitation, and attendant care needs of some brain injured children; careful consideration of these criteria must come early.

Table 2 KOSCHI category definitions

	Category	***Definition***
1	Death	
2	Vegetative	The child is breathing spontaneously and may have sleep/wake cycles. He may have non-purposeful or reflex movements of limbs or eyes. There is no evidence of ability to communicate verbally or non-verbally or to respond to commands.
3	Severe disability	(a) The child is t least intermittently able to move part of the body/eyes to command or make purposeful spontaneous movements; for example, confused child pulling at nasogastric tube, lashing out at carer givers, rolling over in bed. May be fully conscious and able to communicate but not yet able to carry out any self care activities such as feeling. (b) Implies a continuing high level of dependency, but the child can assist in daily activities; for example, can feed self or walk with assistance or help to place items of clothing. Such a child is fully conscious but may still have a degree of post-traumatic amnesia.
4	Moderate disability	(a) The child is mostly independent but needs a degree of supervision/actual help for physical or behavioural problems. Such a child has overt problems; for example, 12 year old with moderate hemiplegia and dyspraxia insecure on stairs or needing help with dressing. (b) The child is age appropriately independent but has residual problems with learning/behaviour or neurological sequelae affecting function. He probably should have special needs assistance but his special needs may not have been recognised/met. Children with symptoms of post-traumatic stress are likely to fall into this category.
5	Good recovery	(a) This should only be assigned if the head injury has resulted in a new condition which does not interfere with the child's well being and/or functioning; for example: • Minor headaches not interfering with social or school functioning • Abnormalities on brain scan without any detectable new problem • Prophylactic anticonvulsants in the absence of clinical seizures • Unsightly scarring of face/head likely to need cosmetic surgery at some stage • Mild neurological asymmetry but no evidence of affect on function of limb. Includes isolated change in hand dominance in young child. (b) Implies that the information available is that the child has made a complete recovery with no detectable sequelae from the head injury.

M.V. and Aviva, Arbitration Decision Utilizing the GOS, February 1, 2016

M.V. and Aviva is the first reported arbitration decision regarding pediatric catastrophic impairment due to traumatic brain injury of which we are aware. It utilizes the current definition. The matter is discussed in this paper as the case is relevant to how the new catastrophic impairment definition for children may be interpreted.

M.V. was born November 11, 1998, injured January 4, 2007, age 8. A catastrophic impairment assessment was completed in August and October, 2010, prior to her 12th birthday. The arbitration occurred in June, 2015, prior to her 17th birthday. In this matter there were pre-existing learning disabilities; it was accepted by all parties that in the mva she suffered a head injury, bodily injuries and pain, fractures, a disfiguring facial scar, post traumatic stress disorder, evidence of behavioral, interpersonal, cognitive, and emotional deterioration. In dispute however was the diagnosis of traumatic brain injury, expected course given her pre-existing condition and the accident injuries, impairment severity, and applicability of two SABS Criteria (mental disorder and GOS). Arbitrator Sherman ultimately determined that the mental disorder criterion and Glasgow Outcome Scale could be applied to this child. He stated:

> *"I find on the balance of probabilities that the car accident materially contributed to Michaela's current presentation. I also find, adopting the holistic approach mandated by the Court of Appeal in the Pastore case, supra, that Michaela suffers from a marked impairment in at least one domain of functioning and she merits the definition of catastrophic impairment under ss. 2(1.2)(g) of the Schedule."*
>
> *"Upon consideration of the totality of the evidence relating to brain injury and on the balance of probabilities, I find that Michaela suffered a brain injury as a result of the accident and that she continues to suffer from the effects of the brain injury. The accident materially contributed to the brain injury."*
>
> *"I find on the totality of the evidence and on the balance of probabilities that the car accident materially contributed to Michaela's brain impairment that results in a severe disability. She meets the definition of catastrophic impairment under ss. 2(1.2) (e) of the Schedule."*

How would M.V. or a similar child be assessed if injured June 1, 2016?

M. was admitted to her local hospital and then airlifted to the regional trauma center. Her GCS was 15/15. According to the Arbitrator:

> *"Michaela was using a lap belt at the time of the accident during which time she hit her head on the console. She suffered from a fracture of her lower spine, a fracture of her left elbow, bruising to her lower pelvis and a large laceration on her forehead extending along her eyebrows that required 45 stitches to repair. A CT scan taken three days post-accident did not reveal any fractures or inter-cranial bleeding. The CT scan noted frontal subcutaneous emphysema that may have been caused by trauma. Michela also suffered from a facial contusion (bruising) and swelling. She has been left with a facial scar that is usually covered by makeup. She also has ongoing muscle paralysis in her forehead."*
>
> *"Michaela had two surgeries to repair her elbow. She was in a body cast for four months because of her lower back fracture. She experienced bruising around her eyes and that*

remained swollen and discoloured, and her upper lip was bruised and swollen one week after the accident."

"While in London Hospital, Michaela was transferred uneventfully to the Acquired Brain Injury ("ABI") team. There is no evidence that anything significant regarding Michaela's presentation arose from the transfer to the ABI team. Michaela spent one week in hospital before she returned home. She remained home for four months following the accident where she was home schooled. She attended school for the final month of the school year. Michela was then in grade three."

We can now apply what we know in this matter to the new pediatric catastrophic impairment criteria for brain injury:

5(i) M. does not meet this criterion. Although she was admitted to a regional trauma center/public hospital she did not have positive findings of intracranial pathology on medically recognized diagnostic technology.

5(ii) Does her inpatient stay with the ABI team satisfy this criterion? This depends on whether this service is described as a neurological rehabilitation program in a pediatric rehabilitation facility.

5(iii) KOSCHI vegetative is not relevant.

5(iv) KOSCHI severe disability is challenging to apply as the definition is vague and has not yet been interpreted by the LAT. On its face, it requires a "continuing high level of dependency." M. likely demonstrated a "continuing high level of dependency."

5(v) "Nine months or more after the accident, the insured person's level of function remains seriously impaired such that the insured person is not age-appropriately independent and requires in-person supervision or assistance for physical, cognitive or behavioural impairments for the majority of the insured person's waking day." This criterion would have applied to M. at nine months post mva in 2007 and also applied when assessed for catastrophic impairment in 2010. This definition depends on what is "seriously impaired" function, what is "age appropriate dependency", and "whether supervision is required for the majority of the day" The definition should be able to be operationalized and described in specific objective terms. The nine month threshold language in the new pediatric definition is similar to GOS severe which was found to apply in M.'s case.

In M.'s case catastrophic impairment was disputed for many years. The diagnosis of brain injury was disputed as well as severity of her impairments. Presence of a marked impairment due to mental disorder was also disputed.

On a preliminary basis, when looking at the new pediatric brain injury catastrophic impairment criteria, I believe M. probably satisfied 5(iv) and 5 (v), and may have satisfied 5(ii).

The advantage of the new definition is in the automatic criteria 5(i) and 5(ii) compared to the current definition. For some brain injured children and their families there will be reduced uncertainty and more timely access to services for the children who satisfy 5(i) and 5(ii).

We note that no new criteria for children with bodily injury and mental disorders have been introduced. These continue to be rated by analogy, "after taking into consideration the developmental implications of the impairment" and no new guidance is offered.

Impact of the New Definition and Recommendations

Changes to the benefit levels and the catastrophic impairment definition are occurring in the context of a weak economy in a debt burdened province which has followed years of higher than inflationary spending with austerity. Downloading of health care, mental health care, and rehabilitation on citizens will continue. Citizens must do without or pay out of pocket. Auto Insurance Benefits are shrinking dramatically even as health care inflation continues, so accident benefits buy less than in 1990. Government expects policy holders to reduce their risks of not having resources to respond to a catastrophic injury by purchasing optional benefits. However, few policy holders take optional med/rehab benefits. Also this option is not applicable for those who are not drivers. Thus more risk is carried by insured drivers and both insured drivers and uninsured victims of accidents rely more on tort. Insurance brokers have a greater responsibility to advise their clients to protect themselves both in terms of their tort and accident benefit policies.

The new catastrophic impairment definition will result in greatly reducing the number of insured injured individuals with brain injuries and mental and behavioural disorders who are determined to have a catastrophic impairment. Individuals with serious brain injuries will not have immediate access to necessary higher level benefits to fund interventions to reduce the risk of chronicity and improve their ultimate outcome. Substantial delays in access to treatment, rehabilitation, and attendant care are built into the new catastrophic impairment SABS. Delayed treatment often means a permanently missed opportunity for recovery of function and increased risk of secondary conditions and losses.

The new definition will require all stakeholders including adjusters, assessors, lawyers, arbitrators as well as the public to be mindful of the significant changes. The new definition focuses to a greater extent on diagnostic and measurement accuracy especially for brain injuries and mental disorders, but also for some physical injuries. The GOSE criterion will require standardized direct assessment of those impairments/disabilities/handicaps determined by the diagnostic expert to result from the brain injury. The focus of the mental disorder criterion is unchanged, but requires the diagnostic expert to follow comprehensively the method in Guides Fourth. Combining of "physical impairments" which includes all the sequelae of brain injury (mental status, emotional, somatic) requires both diagnostic precision and careful measurement of impairment and dysfunction. Psychological and

neuropsychological assessment must be part of “physical” assessments to distinguish the impairment from brain injury and brain disorder from the impairments that arise from mental disorder. However, combining “physical” impairments using Guides Fourth with impairments from mental disorder using Guides Sixth will provide relatively little challenge to the system of catastrophic impairment determination as expert screening will show that combining rarely or never will contribute to a different outcome than separate psychological, neuropsychological, and physical assessments utilizing Guides Fourth have yielded.

There are numerous problems with the current system for catastrophic impairment determination, including the following: assessment teams are too large, containing professionals who contribute little to the determination process; professionals don’t work together to integrate their diagnostic and impairment findings and conclusions and often do not seem to understand that there are differences among team members which must be resolved transparently; reports continue to be written as if the organ being assessed is in isolation from the other organs. Many assessors are inexperienced and don’t understand the criteria and the SABS. The key assessors may not carry out sufficiently complete assessments, may carry out methodologically flawed assessments, or may fail to explain their findings and conclusions. There appears to be a lack of mentoring, supervision, and quality control for many Catastrophic Impairment assessments.

The problems of methodological inconsistency are not solved by changing the definition. Specific diagnostic expertise and knowledge of course and outcome is needed for each criterion, but the new definition does not address assessor competence.

Disputes regarding the new definition will no longer be heard by FSCO arbitrators. Rather they will be addressed by the License Appeal Tribunal (LAT). The rules of the LAT may improve the quality of catastrophic impairment examinations. The LAT practices and procedural rules include:

> 10.2 EXPERT WITNESSES (IDENTIFICATION AND DISCLOSURE) …
> *(b) A signed statement from the expert, in the Tribunal’s required form, acknowledging his or her duty to:*
> *(i) Provide opinion evidence that is fair, objective, and non-partisan;*
> *(ii) Provide opinion evidence that is related to matters within his/her area of expertise; and*
> *(iii) Provide such additional assistance as the Tribunal may reasonably require to determine a matter in issue;*
> *(c) The qualifications of that expert witness, referring specifically to the education, training and experience relied upon to qualify the expert;*
> *(d) A signed report that sets out the instructions provided to the expert in relation to the proceeding, the expert’s conclusions, and the basis for those conclusions on the issues to which the expert will provide evidence to the Tribunal; and*

(e) A concise summary stating the facts and issues that are admitted and those that are in dispute, and the expert's findings and conclusions.

If these requirements are met, it will encourage more transparent and valid/reliable evaluations.

Articles of Interest

Bigler, E. D. (2015). Neuropathology of Mild Traumatic Brain Injury: Correlation to Neurocognitive and Neurobehavioral Findings. In FH Kobeissy (Eds), *Brain Neurotrauma: Molecular, Neuropsychological, and Rehabilitation Aspects.* CRC Press/Taylor & Francis: Boca Raton (FL).

Hayes, J. P., Bigler, E. D., & Verfaellie, M. (2016). Traumatic brain injury as a disorder of brain connectivity. *Journal of the International Neuropsychological Society, 22,* 120-137.

Wintermark, M., Sanelli, P. C., Anzai, Y., Tsiouris, A. J., Withlow, C. T. (2015). Imaging evidence and recommendations for traumatic brain injury: Advanced neuro- and neurovascular imaging techniques. *American Journal of Neuroradiology, 36,* E1-E11.

Appendices

Table 1	
Guides Fourth, chapter 4, table 3 Emotional or Behavioral Impairments	
Impairment Description	**WPI***
Mild limitation of daily social and interpersonal functioning	0-14
Moderate limitation of *some* but not all social and interpersonal daily living functions	15-29
Severe limitation impeding useful action in *almost all* social and interpersonal daily functions	30-49
Severe *limitation of all daily functions* requiring total dependence on another person	50-70
Note: Page 4/142 *The criteria for evaluating these disturbances (table* 3) *relate to the criteria for mental and behavioural impairments (chapter 14, page 291).* * Specific WPI scores are determined within the range by interpolating as per Guides 4, chapter 4, page 2/9, which states, *"in general, an impairment value that falls between those appear in a table or figure of the Guides may be adjusted or interpolated to be proportional to the interval of the table or figure involved, unless the book gives other directions"*)	

Table 2						
California GAF to WPI table from the SCHEDULE FOR RATING PERMANENT DISABILITIES, January 2009: Psychiatric Impairment GAF to WPI Conversion						
GAF=WPI	GAF=WPI	GAF=WPI	GAF=WPI	GAF=WPI	GAF=WPI	GAF=WPI
1 = 90	2 = 89	3 = 89	4 = 88	5 = 87	6 = 87	7 = 86
8 = 85	9 = 84	10 = 84	11 = 83	12 = 82	13 = 82	14 = 81
15 = 80	16 = 80	17 = 79	18 = 78	19 = 78	20 = 77	21 = 76
22 = 76	23 = 75	24 = 74	25 = 73	26 = 73	27 = 72	28 = 71
29 = 71	30 = 70	31 = 69	32 = 67	33 = 65	34 = 63	35 = 61
36 = 59	37 = 57	38 = 55	39 = 53	40 = 51	41 = 48	42 = 46
43 = 44	44 = 42	45 = 40	46 = 38	47 = 36	48 = 34	49 = 32
50 = 30	51 = 29	52 = 27	53 = 26	54 = 24	55 = 23	56 = 21
57 = 20	58 = 18	59 = 17	60 = 15	61 = 14	62 = 12	63 = 11
64 = 9	65 = 8	66 = 6	67 = 5	68 = 3	69 = 2	>70 = 0

Table 3		
Guides Sixth: GAF / GAF Impairment Score		
GAF	Description	**GAF IMPAIRMENT SCORE**
91-100	No symptoms; superior functioning in a wide range of activities, life's problems never seem to get out of hand, is sought out by others because of his or her many positive qualities.	0%
81-90	Absent or minimal symptoms (e.g. mild anxiety before an exam); good functioning in all areas, interested and involved in wide range of activities, socially effective, generally satisfied with life, no more than everyday problems or concerns (e.g. an occasional argument with family member).	0%
71-80	If symptoms are present, they are transient and expectable reactions to psychosocial stressors (e.g. difficulty concentrating after family arguments); no more than slight impairment in social, occupational, or school functioning (e.g. temporarily falling behind in school work)	0%
61-70	Some mild symptoms (e.g. depressed mood and mild insomnia) or Some difficulty in social, occupational, or school functioning (e.g. occasional truancy or theft within the household), but generally functioning pretty well, has some meaningful interpersonal relationships.	5%
51-60	Moderate symptoms (e.g. flat affect and circumstantial speech, occasional panic attacks) or Moderate difficulty in social, occupational, or school functioning (e.g. few friends, conflicts with coworkers)	10%
41-50	Serious symptoms (e.g. suicidal ideation, severe obsessional rituals, frequent shoplifting) or Any serious impairment in social, occupational, or school functions (e.g. no friends, unable to keep job)	15%
31-40	Some impairment in reality testing or communication (e.g. speech is at times illogical, obscure, or irrelevant) or Major impairment in several areas, such as work or school, family relations, judgment thinking, or mood (e.g. depressed adult avoids friends, neglects family, and is unable to work; child frequently beats up younger children, is defiant at home, and is failing at school)	20%
21-30	Behavior is considerably influenced by delusions or hallucinations or Serious impairment in communication or judgment (e.g. sometimes incoherent, acts grossly inappropriately, suicidal preoccupation) or Inability to function in almost all areas (e.g. stays in bed all day; no job, home, or friends)	30%
11-20	Some danger of hurting self or others (e.g. suicide attempts without clear expectation of death, frequently violent, manic excitement) or Occasionally fails to maintain minimal personal hygiene (e.g. smears feces) or Gross impairment in communication (e.g. largely incoherent or mute).	40%
1-10	Persistent danger of severely hurting self or others (e.g. recurrent violence) or Persistent inability to maintain minimal personal hygiene or Serious suicidal act with clear expectation of death	50%