Recommendations for Changes to the Definition of Catastrophic Impairment

Final Report of the Catastrophic Impairment Expert Panel to the Superintendent

April 8, 2011
(Version 2 with Erratum)

Erratum (April 22, 2011): The reference originally cited in definition 2d (page 17): "*Jennett, B. and Bond, M., Assessment of Outcome After Severe Brain Damage, Lancet i:480, 1975"* has been replaced by "*Wilson JT, Pettigrew LE, Teasdale GM. Structured interviews for the Glasgow Outcome Scale and the extended Glasgow Outcome Scale: Guidelines for their use. J Neurotrauma. 1998; 15: 573–585."*

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1. EXECUTIVE SUMMARY

In the first phase of its mandate, the Expert Panel reviewed the definition of catastrophic impairment in the Statutory Accident Benefits Schedule and made recommendations to the Superintendent of the Financial Services Commission of Ontario on changes to the definition. The Expert Panel's recommendations aim to ensure that individuals who are most seriously injured in traffic accidents receive appropriate treatment. The Expert Panel developed its recommendations by giving precedence to scientific evidence and judgment. The Expert Panel made recommendations for significant changes at two levels: accuracy and fairness of the determination.

First, the Expert Panel revised the definition to improve its accuracy, relevance and clarity. Consequently, we recommend that assessment systems with acceptable validity, reliability and predictive ability be included (when available) as a criterion to determine the presence of catastrophic impairment. Specifically, the Expert Panel recommends that the American Spinal Injury Association (ASIA) classification be used to assist with the determination of catastrophic impairment subsequent to spinal cord injury. We recommend that the Extended Glasgow Outcome Scale (GOS-E) be used to assist with the determination of catastrophic impairment subsequent to traumatic brain injury in adults and that the Spinal Cord Independence Measure be used to assist with the measurement of catastrophic impairment associated with ambulation dysfunction. Finally, the Expert Panel recommends that the Global Assessment of Functioning (GAF) be used to assist with the determination of catastrophic impairment subsequent to psychiatric disorders. We believe that these assessment systems, particularly when combined with clinical anchors, will considerably compensate for long-recognized ambiguities and limitations found within the AMA Guides, 4th Edition.

The Expert Panel considered various methods for the rating of multi-system physical impairments. However, we found that the guidelines and rating systems used in other jurisdictions or the revised methodologies presented in more recent editions of the AMA Guides do not offer any benefits over continued reliance on the 4th edition.

The Expert Panel did not find that combining physical and mental/behavioural conditions can be achieved in a valid and reliable way with the currently available methods of impairment cross-rating. Moreover, the Expert Panel did not find sufficient evidence that combined impairment ratings are more clinically meaningful than using separate criteria. While 55% physical impairment establishes paraplegia as a prime example of catastrophic impairment, we did not find evidence for an equivalent threshold when physical and mental/behavioral impairments are combined. The Panel had difficulty understanding how combinations of physical impairments and psychological conditions that independently do not meet the criteria outlined in the revised version of 2(e) and 2(f) could be equated to a severe injury to the brain or, spinal cord or to blindness. Further investigation of this area is needed. Specifically defining a clinically comparable combined psycho-physical whole person impairment threshold that corresponds to the currently accepted physical threshold is needed. Therefore, until further scientific evidence is gained, we recommend that separate criteria and methods of evaluation be used for the determination of catastrophic impairment and that physical and psychiatric impairments not be combined for the purpose of catastrophic determination.

Second, the Expert Panel aimed to improve the fairness of the process of determination for catastrophic impairment. The Expert Panel believes that fairness will be improved if Insured Persons with catastrophic impairments receive benefits without undue delay and if the final determination of catastrophic impairment agrees with the natural history of the condition. Therefore, the Expert Panel recommends that a designation of interim catastrophic impairment status (hereafter referred to as the interim status) be allowed for Insured adults with traumatic brain injuries and for those with major physical impairments who unequivocally require intensive and prolonged rehabilitation. The purpose of the interim status is to ensure that these individuals have access to the rehabilitation services that are necessary to maximize their chance of achieving a lower final impairment level, and potentially that is less than catastrophic.

In summary, the Expert Panel proposes solutions to improve the determination of catastrophic impairment for Ontarians injured in traffic collisions by relying on the current scientific evidence and scientific judgment. We believe that that the integration of scientific knowledge to clinical expertise will benefit Ontarians and our automobile insurance system.

2. INTRODUCTION

2.1 Mandate of the Panel

The Catastrophic Impairment Expert Panel (hereafter referred to as the Panel) was mandated to review the definition of "catastrophic impairment" located in the Statutory Accident Benefits Schedule (SABS) and make recommendations to the Superintendent of the Financial Services Commission of Ontario (FSCO) on changes to the definition to ensure that the most seriously injured accident victims are treated appropriately (Phase I). The Panel members (hereafter referred to as the Members) will also make recommendations regarding the training, qualifications and experience of assessors who conduct catastrophic impairment assessments under the SABS (Phase II). The current report focuses on recommended changes to the definition of catastrophic impairment (Phase I).

2.2 The Expert Panel

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2.3 Objectives

The objectives of the Panel are to:

2.3.1 Identify ambiguities and gaps in the current SABS definition of "catastrophic impairment" in order to reflect emerging scientific knowledge and judgment.

2.3.2 Identify the required training, qualifications and experience of assessors who conduct catastrophic impairment assessments under the SABS.

2.3.3 Make recommendations for changes to the definition of catastrophic impairment and assessor qualifications.

2.3.4 Review and comment on such matters as requested by the Superintendent.

The Panel did not review or comment on issues unrelated to the SABS definition of catastrophic impairment. Issues deemed to fall outside of the mandate included the $2000 cap on assessments; expenses covered within the assessment cap; and benefits under the SABS available to claimants deemed to have a catastrophic impairment.

2.4 Current Definition and Interpretation of Catastrophic Impairment

The following definition and interpretation of catastrophic impairment is a direct citation from the "Insurance Act, ONTARIO REGULATION 34/10, STATUTORY ACCIDENT BENEFITS SCHEDULE - EFFECTIVE SEPTEMBER 1, 2010". A full version of the regulations can be found at http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_100034_e.htm.

Definitions and interpretation

3.(1) In this Regulation,

"***accident***" means an incident in which the use or operation of an automobile directly causes an impairment or directly causes damage to any prescription eyewear, denture, hearing aid, prosthesis or other medical or dental device; ("accident")
"impairment" means a loss or abnormality of a psychological, physiological or anatomical structure or function;

(2) For the purposes of this Regulation, a catastrophic impairment caused by an accident is,

(a) paraplegia or quadriplegia;

(b) the amputation of an arm or leg or another impairment causing the total and permanent loss of use of an arm or a leg;

(c) the total loss of vision in both eyes;

(d) subject to subsection (4), brain impairment that results 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[51], according to a test administered within a 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[49], according to a test administered more than six months after the accident by a person trained for that purpose;

(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[5], results in 55 per cent or more impairment of the whole person; or

(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.[5] O. Reg. 34/10, s. 3 (2).

(3) Subsection (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 (2) (d), (e) or (f) can be applied by reason of the age of the insured person.[5] O. Reg. 34/10, s. 3 (3).

(4) For the purposes of clauses (2) (d), (e) and (f), an impairment sustained in an accident by an insured person described in subsection (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 (2) (d), (e) or (f), after taking into consideration the developmental implications of the impairment. O. Reg. 34/10, s. 3 (4).

(5) Clauses (2) (e) and (f) do not apply in respect of an insured person who sustains an impairment as a result of an accident unless,

(a) a physician or, in the case of an impairment that is only a brain impairment, either a physician or a neuropsychologist 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. 289/10, s. 1 (2).

(6) For the purpose of clauses (2) (e) and (f), an impairment that is sustained by an insured person but is not listed in the American Medical Association's Guides to the Evaluation of Permanent Impairment, 4th edition, 1993 is deemed to be the impairment that is listed in that document and that is most analogous to the impairment sustained by the insured person.[5] O. Reg. 34/10, s. 3 (6).

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.
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.

(3) Within 10 business days after receiving an application under subsection (1) prepared and signed by the person who conducted the assessment or examination under subsection (2), the insurer shall give the insured person,

(a) a notice stating that the insurer has determined that the impairment is a catastrophic impairment; or
(b) a notice stating that the insurer has determined that the impairment is not a catastrophic impairment and specifying the medical and any other reasons for the insurer's decision and, if the insurer requires an examination under section 44 relating to whether the impairment is a catastrophic impairment, so advising the insured person. O. Reg. 34/10, s. 45 (3).

(4) If an application is made under this section not more than 104 weeks after the accident and, immediately before the application was made, the insured person was receiving attendant care benefits,

(a) the insurer shall continue to pay attendant care benefits to the insured person during the period before the insurer makes a determination under this section; and

(b) the amount of the attendant care benefits for the period referred to in clause (a) shall be determined on the assumption that the insured person's impairment is a catastrophic impairment. O. Reg. 34/10, s. 45 (4).

(5) Within 10 business days after receiving the report of an examination under section 44, the insurer shall,

(a) give a copy of the report to the insured person and to the person who prepared the application under this section; and

(b) provide the insured person with a notice stating that the insurer has determined that the impairment is a catastrophic impairment or is not a catastrophic impairment and setting out the medical and any other reasons for the insurer's determination. O. Reg. 34/10, s. 45 (5).

(6) If an insured person is determined to have sustained a catastrophic impairment as a result of an accident, the insured person is entitled to payment of all expenses incurred before the date of the determination and to which the insured person would otherwise be entitled to payment under this Regulation by virtue of having sustained a catastrophic impairment. O. Reg. 34/10, s. 45 (6).

3. METHODOLOGY

The project is being conducted in two phases. In Phase I (current phase of the project), the Panel reviewed the current SABS definition of catastrophic impairment and made recommendations for changes to the definition of catastrophic impairment. In Phase II, the Panel will identify the required training, qualifications and experience of assessors who conduct catastrophic impairment assessments under the SABS and make recommendations for changes to the definition of catastrophic impairment and assessor qualifications.

3.1 Guiding Principle

As outlined in Objective 2.3.1, the Panel has been asked to base its deliberation and develop its recommendations on emerging scientific knowledge and judgment. The work of the Panel gave precedence to valid and reliable scientific evidence. In the absence of valid and reliable scientific evidence, the Panel informed its deliberation and developed its recommendations based on the best practices used in other Canadian and international jurisdictions. Finally, if both scientific evidence and best practices were not available, the Panel relied on expert opinions to inform its work. The Chair reserved the right to seek opinions from individuals outside of the Panel to inform the work of the Panel.

3.2 Disclosures of Conflicts of Interest

The work conducted by the Panel was carried out in a rigorous, transparent and unbiased manner. Therefore, at the first Panel meeting, the Members (including the Chair) were asked to openly disclose any conflicts of interest they may have with their involvement in this project. The disclosed conflicts of interest are included in Appendix 14.

The definition of Conflict of Interest endorsed by the International Committee of Medical Journal Editors was used:

> Conflict of interest exists when an author (or the author's institution), reviewer, or editor has financial or personal relationships that inappropriately influence (bias) his or her actions (such relationships are also known as dual commitments, competing interests, or competing loyalties). These relationships vary from being negligible to having great potential for influencing judgment. Not all relationships represent true conflict of interest. On the other hand, the potential for conflict of interest can exist regardless of whether an individual believes that the relationship affects his or her scientific judgment. Financial relationships (such as employment, consultancies, stock ownership, honoraria, and paid expert testimony) are the most easily identifiable conflicts of interest and the most likely to undermine the credibility of the journal, the authors, and of science itself. However, conflicts can occur for other reasons, such as personal relationships, academic competition, and intellectual passion.

For the purpose of the Catastrophic Impairment Expert Panel, the terms "journal, author, reviewer or editor" in the above definition are replaced by "Chair or Expert Panel member".

3.3 Baseline survey of Expert Panel Members

Prior to the first meeting of the Panel, the Members were asked to respond to an anonymous electronic questionnaire to determine:

- 3.3.1 Level of agreement with the guiding principle (described in section 3.1 of the methodology);
- 3.3.2 Individual understanding of the meaning of catastrophic impairment;
- 3.3.3 Level of agreement with the current definition of catastrophic impairment; and
- 3.3.4 Recommendations for improvement of the SABS definition of "catastrophic impairment."

Where applicable, the Members were invited to support their answers and recommendations with the best available scientific evidence.

3.4 Identify ambiguities and gaps in the current SABS definition of "catastrophic impairment" in order to reflect emerging scientific knowledge and judgment

3.4.1 The Panel conducted non-systematic reviews of the recent scientific literature to identify "ambiguities and gaps" in the current SABS definition of "catastrophic impairment." A systematic review of the literature was not possible given the resources and timeline available to the Panel. A search of Pubmed from 2000-2010

was conducted to identify research articles that specifically address the reliability, validity and predictive ability of the:

3.4.1.1 Glasgow Coma Scale;
3.4.1.2 Glasgow Outcome Scale;
3.4.1.3 American Medical Association's Guides to the Evaluation of Permanent Impairment.

Based on the Panel's recommendations, additional literature searches were conducted to examine the reliability and validity of the American Spinal Injury Association classification of spinal cord injury (ASIA), the Global Assessment of Functioning (GAF) and the King's Outcome Scale for Childhood Head Injury (KOSCHI). The relevant literature was presented to the Panel in order to guide their decisions concerning incorporation of these measures (Appendix 12).

The articles were reviewed by the Chair and his staff. To be included in the review, articles must have included original data and must have been judged to be scientifically valid by the Chair. Opinion papers, editorials, letter to the editor, case reports, case-series, textbook chapters without original data, basic science papers and narrative reviews of the literature were not considered. Summaries of the evidence were presented to the Panel to inform their deliberation.

Finally, PubMed was searched for alternative methods which could be used to define and determine catastrophic impairment. The result of this search was presented to the Panel to inform their deliberation.

3.4.2 The Panel conducted a non-systematic search of laws and regulations used in other jurisdictions to define "catastrophic impairment", "permanent impairment", and "permanent disability".

3.4.3 Potential gaps and ambiguities in the current SABS definition were also investigated by eliciting the opinions of the Members.

3.5 Development of recommendations for changing the definition and determination of catastrophic impairment

The Panel used a modified Delphi methodology to develop recommendations on changes to the definition and determination of catastrophic impairment. The Panel baseline survey, the literature review and the best practices from other jurisdictions serve as the foundation for the development of recommendations. The Panel also determined the feasibility of implementing the recommendations to the Ontario automobile insurance system.

The agreement of the Panel on the proposed recommendations and their suggestions for improvement were sought through electronic surveys. The results of the surveys were analyzed by the Chair and used to determine whether or not consensus was reached. Consensus was deemed to have been reached when 75% of the Panel (6/8 members) agreed with a recommendation. The Panel meetings were used to discuss the results of the

surveys and to refine the recommendations. When consensus was not reached, modified recommendations were submitted to the Panel in a second or third survey. The "round 2 or round 3" recommendations were based on the feedback received in the previous surveys and from the discussions of the Panel.

4. PROPOSED REVISIONS to the SABS – CATASTROPHIC IMPAIRMENT DEFINITIONS

In the initial stage of its deliberations, the Panel discussed the meaning of "catastrophic impairment." In summary, the Panel agreed that a catastrophic impairment is an extremely serious impairment or combination of impairments that is expected to be permanent and which severely impacts an individual's ability to function independently. It was the opinion of the Panel that catastrophic impairment is not a medical entity; rather, it is a legal entity which defines a point along the medical spectrum of impairment severity (Appendix 1, Survey 1).

The Panel agreed that, except for 2 (d) i, all current SABS definitions required significant revisions. The Panel voted to eliminate 2 (d) i: brain impairment that results in "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 a test administered within a reasonable period of time after the accident by a person trained for that purpose" (Appendix 2, Survey 2).[51] It is the opinion of the Panel that this definition ought to be eliminated because of the questionable ability of the GCS to predict the long term outcomes associated with respect to catastrophic impairment (Appendix 12, section 3). An alternative is proposed below in section 4.1.6.

4.1 Definitions

4.1.1 Adult versus paediatric definitions

The definitions proposed below apply to all age groups unless specified. For the purpose of these definitions, an adult is anyone 18 years of age or older. The following definitions 2 (a) (section 4.1.3), 2 (b) (section (4.1.4) and 2 (c) (section 4.1.5) apply to all age groups. The Panel recognized the long-term developmental implications of traumatic brain injuries in the paediatric population (<18 years old) and proposed a definition (definition 3. section 4.1.10) that is specific to this age group. Given the complexity of the issues, and the time constraints, the Panel determined that it was unable to adequately address adaptations to definitions 2 (e) (section 4.1.7) and 2 (f) (section 4.1.8) for the paediatric population. The Panel recognizes that adapting these definitions to the paediatric population is a priority and recommends that an Expert Paediatric Working Group be convened to address this issue as soon as possible. In the interim, the Panel recommends that the determination of catastrophic impairment for individuals younger than 18 years of age who sustain an impairment that is not covered by definitions 2 (a), 2 (b), 2 (c) or 3 be done by seeking the closest analogy using definitions 2 (e) and 2 (f) as well as the other adult definitions.

4.1.2 Interim catastrophic impairment status

The Panel recommends that an interim catastrophic impairment status be created for patients whose impairments specifically meet or exceed the criteria outlined under definition 2(d)

(section 4.1.6), 2 (e) (section 4.1.7). The purpose of the interim catastrophic impairment status is to ensure that these insured individuals have access to the rehabilitation services that are necessary to improve their health and maximize their chances of achieving a final impairment level that is less than catastrophic. The Panel also believes that a designation of interim catastrophic impairment status is necessary to balance access to higher level of funding necessary for early rehabilitation with the need to minimize the risk of patients being permanently designated as catastrophically impaired when there is a reasonable chance that they will cease to be catastrophically impaired.

4.1.3 2 (a) – Paraplegia/ Tetraplegia

Proposed revision:
2. For the purposes of this Regulation, a catastrophic impairment caused by an accident is,

2(a) paraplegia or tetraplegia that meets the following criteria i and ii, and either iii or iv:

i. The Insured Person is currently participating in, or has completed a period of, in-patient spinal cord injury rehabilitation in a public rehabilitation hospital; and
ii. The neurological recovery is such that the permanent ASIA Grade can be determined with reasonable medical certainty according to the American Spinal Injury Association Standards (*Marino RJ et al. ASIA Neurological Standards Committee 2002. International standards for neurological classification of spinal cord injury. J Spinal Cord Med 2003; 26(Suppl 1): S50–S56*)[62] and
iii. The permanent ASIA Grade is A, B, or C or,
iv. The permanent ASIA Grade is or will be D provided that the insured has a permanent inability to walk independently as defined by scores 0–3 on the Spinal Cord Independence Measure item 12 (indoor mobility, ability to walk <10 m) (*Catz A, Itzkovich M, Tesio L, et al. A multicenter international study on the spinal cord independence measure, version III: Rasch psychometric validation. Spinal Cord 2007; 45: 275–91*) and/or requires urological surgical diversion, an implanted device, or intermittent or constant catheterization in order to manage the residual neuro-urological impairment.[12]

Rationale for revision of 2 (a):

The scientific knowledge about the diagnostic classification of spinal cord injuries has grown in the past 15 years (Appendix 12, section 4). The American Spinal Injury Association (ASIA) classification of spinal cord injury has become the standard in medical practice. The ASIA system classifies patients in five mutually exclusive severity categories that range from complete (Grade A) to normal (Grade E).

The Panel recommends that the ASIA system be used for the determination of catastrophic impairment secondary to spinal cord injuries. Our review of the recent literature suggests that its reliability and validity is adequate.[33;63;70] The ability of the ASIA system to predict the ambulatory capacity of patients with spinal cord injuries provides a useful system for tracking the evolution of these injuries in the first year after the trauma.[94]

The recent scientific literature suggests that the majority of Grade D patients will be able to ambulate independently one year after the injury.[94] It was the consensus opinion of the Panel that those patients with Grade E, and those patients with Grade D injuries who successfully recover their ability to ambulate independently, are not catastrophically impaired. This led the Panel to initially question whether a suitable threshold for catastrophic impairment should be set at ASIA Grade C, thus excluding all ASIA Grade D and E patients.

While the overall reliability of the ASIA classification is adequate, the Panel recognized that differentiating between the two motor incomplete categories (Grades C and D) may be associated with unacceptable levels of error and inconsistency. Moreover, the Panel was also concerned that some patients with Grade D spinal cord injuries will not be able to ambulate for appreciable distances without substantial reliance on assistive devices and/or will not be able to manage their neurogenic viscera solely by means of medication or routine. Therefore, the Panel recommends that the determination with respect to patients with spinal cord injury should focus on the spectrum of mobility and neuro-urological impairments found within Grade D. The Panel recommends that the threshold mobility impairment should be a permanent inability to walk independently as defined by scores 0–3 on the Spinal Cord Independence Measure item 12 (indoor mobility, ability to walk <10 m) and the threshold urological impairment should be a requirement for urological surgical diversion, an implanted device, or intermittent or constant catheterization in order to manage the residual neuro-urological impairment.[12]

Individuals injured in traffic collisions may suffer from transient paralysis (also known as spinal shock). By definition, transient paralysis is an acute condition associated with favorable outcomes. The Panel agreed that transient paralysis is not a catastrophic impairment and that the determination of ASIA grade must not be made until the neurological recovery is such that the permanent ASIA Grade can be determined with reasonable medical certainty.

Finally, the Panel strongly supports the use of the ASIA classification for the purpose of catastrophic impairment determination because it is commonly used in routine spinal cord injury care, it requires the use of a standardized examination protocol and removes some of the subjectivity and other limitations associated with the use of the related sections of the AMA Guides. This system provides a more structured formula to rate impairment, and can be expected to both increase inter-rater reliability and more effectively identify the catastrophically impaired spinal cord injured patient.[62]

4.1.4 2 (b) - Severe impairment of ambulatory mobility

Proposed revision:
2. For the purposes of this Regulation, a catastrophic impairment caused by an accident is,

2 (b) Severe impairment of ambulatory mobility, as determined in accordance with the following criteria:

i. Trans-tibial or higher amputation of one limb, or
ii. Severe and permanent alteration of prior structure and function involving one or both lower limbs as a result of which:

a. The Insured Person is currently participating in, or has completed a period of in-patient rehabilitation in a public rehabilitation facility, and
b. It can be reasonably determined that the Insured Person has or will have a permanent inability to walk independently and instead requires at least bilateral ambulatory assistive devices [mobility impairment equivalent to that defined by scores 0–3 on the Spinal Cord Independence Measure item 12 (indoor mobility, ability to walk <10 m) (*Catz A, Itzkovich M, Tesio L, et al. A multicenter international study on the spinal cord independence measure, version III: Rasch psychometric validation. Spinal Cord 2007; 45: 275–91*).[12]

Rationale for revision of 2(b):

The Panel recommends significant changes to definition 2 (b). These changes were motivated by three realities. First, the Panel found no scientific evidence to assist its deliberation on the determination of catastrophic impairment secondary to severe physical injuries. Second, the current definition does not accurately describe the range of injuries that can lead to catastrophic impairment. The current definition focuses on amputations and does not include other injuries such as burns or crush injuries. Third, the definition offers no specific criterion for the determination of catastrophic impairment.

The Panel relied on its clinical expertise and scientific judgment to revise definition 2 (b). The Panel has concluded that separate definitions are needed to determine the presence of catastrophic impairment related to the upper limb versus the lower limb. We recommend that the AMA Guides be used for the determination of catastrophic impairment related to upper extremity injury.[5] The Panel found that any extensive impairment to an upper extremity would result in 55% or more whole person impairment (WPI) and can therefore be determined using the revised 2e definition (see section 4.1.7).

However, the Panel proposes a different approach for patients with a catastrophic impairment related to ambulatory mobility. While Section 2 of Chapter 3 of the AMA Guides 4th edition offers a detailed assessment methodology, if injury is confined to the lower extremities the final rating does not permit a determination of catastrophic impairment.[5] This is true for all amputations. In fact, the highest score for a severe impairment such as a hip disarticulation is only 40% WPI. Moreover, even two below knee amputations (or similar injuries) do not result in an impairment of 55% WPI. This is very problematic given the lifetime costs associated with the purchase, maintenance and replacement of one or more prosthetic limbs, as well as the obviously serious challenges to independence that can arise. Rather than recommending a scoring adjustment (which would have no scientific justification given the structure of the AMA guides), we recommend that catastrophic impairment related to ambulatory mobility be determined according to the revised definition 2 (b) presented above.[5]

4.1.5 2 (c) - Blindness

Proposed revision:

2. For the purposes of this Regulation, a catastrophic impairment caused by an accident is,

2 (c). Legal blindness in both eyes due to structural damage to the visual system. Non-organic visual loss (hysterical blindness) is excluded from this definition.

Rationale for revisions of 2 (c):

The Panel agreed that only minor clarifications to the definition were needed. Non-organic visual loss was excluded from this definition because it is not associated with actual physical damage to the visual system.

4.1.6 2 (d) – Traumatic Brain Injury in Adults

Proposed revision:

Two proposed definitions have been developed. The first would apply in the event that the Government accepts the Panel's recommendation to implement interim catastrophic impairment status. The second definition is to be used in the event that the interim status is not implemented.

4.1.6.1 If Interim Catastrophic Impairment Status is Approved

2. For the purposes of this Regulation, a catastrophic impairment caused by an accident is,

2d: Traumatic Brain Injury in Adults (18 years of age or older):

i. An Insured is granted an interim catastrophic impairment status when accepted for admission to a program of inpatient neurological rehabilitation at a recognized neurological rehabilitation center (List of facilities to be published in a Superintendent Guideline).
ii. Catastrophic impairment, based upon an evaluation that has been in accordance with published guidelines for a structured GOS-E assessment (*Wilson JT, Pettigrew LE, Teasdale GM. Structured interviews for the Glasgow Outcome Scale and the extended Glasgow Outcome Scale: Guidelines for their use. J Neurotrauma. 1998; 15: 573–585)*[100], to be:
    a) Vegetative (VS) after 3 months or
    b) Severe Disability Upper (SD+) or Severe Disability Lower (SD -) after 6 months, or Moderate Disability Lower (MD-) after one year due to documented brain impairment, provided that the determination has been preceded by a period of inpatient neurological rehabilitation in a recognized rehabilitation center (List of facilities to be published in a Superintendent Guideline).

4.1.6.2 If Interim Catastrophic Impairment Status is not Approved

2d: Traumatic Brain Injury in Adults (18 years of age or older):
The impairment is deemed to be catastrophic, when determined in accordance with published guidelines for a structured GOS-E assessment (*Wilson JT, Pettigrew LE, Teasdale GM. Structured interviews for the Glasgow Outcome Scale and the extended Glasgow Outcome Scale: Guidelines for their use. J Neurotrauma. 1998; 15: 573–585)* [100], is:

i. Vegetative (VS) after 3 months, or
ii. Severe Disability Upper (SD+) or Severe Disability Lower (SD-) after 6 months, or

iii. Moderate Disability Lower (MD-) after 1 year, provided that the determination has been preceded by a period of inpatient neurological rehabilitation in a recognized rehabilitation center (List of facilities to be published in a Superintendent Guideline)

Rationale for revisions of 2 (d):

The Panel recommends the use of the Extended Glasgow Outcome Scale (GOS-E) for the determination of catastrophic impairment secondary to brain injury in adults. The GOS-E has strong psychometric properties and it is particularly reliable when a structured interview, standard scoring algorithm and a quality control system are used to monitor its administration and scoring (Appendix 12, section 2).

The GOS-E allows the grading of traumatic brain injuries into one of eight categories that range from death to good recovery. The Panel set the threshold for catastrophic impairment status at Moderate Disability Lower (MD-), as we find that the Moderate Disability Lower (MD-) category best approximates the Severe Disability level that is in use with the GOS under the current SABS. However, the Panel recognized that this finding, made in isolation, might be problematic and consequently stipulated that any finding other than Vegetative must be associated with a preceding period of inpatient neurological rehabilitation. In combination, these features will increase the sensitivity and specificity of the determination, and reduce any variability which might arise from reliance upon the GOSE definitions, when discriminating Moderate (Lower) from lesser levels of impairment. The requirement of a preceding period of inpatient rehabilitation also ensures that the patient has been exposed to and has engaged in an appropriate level of expert rehabilitation before a determination is made. Finally, precluding final assessment of the patient with Moderate Disability Lower (MD-), until one year after onset ensures that the condition has stabilized or is close to a final plateau and that the probability of further recovery to less than the Moderate Disability (Lower) level is unlikely.[50]

The natural history of traumatic head injury suggests that a significant proportion of patients with initially moderate or severe levels of disability will improve during the year following their injury. However, these patients will require substantial rehabilitation during this period to optimize their recovery. Therefore, we recommend that an interim catastrophic impairment status be created to allow these patients to access the necessary level of medical and rehabilitation care.

4.1.7 2 (e) – Other Physical Impairments (not covered by 2(a), 2 (b), 2 (c) or 2 (d))

Proposed definition:

2. For the purposes of this Regulation, a catastrophic impairment caused by an accident is,

2 (e): 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*, (GEPI-4), results in a physical impairment rating of 55 per cent whole person impairment (WPI).

i. Unless covered by specific rating guidelines within relevant Sections of Chapters 3-13 of GEPI-4, all impairments relatable to non-psychiatric symptoms and syndromes (e.g. functional somatic syndromes, chronic pain syndromes, chronic fatigue syndromes, fibromyalgia syndrome, etc.) that arise from the accident are to be understood to have been incorporated into the weighting of the GEPI-4 physical impairment ratings set out in Chapters 3 – 13.[5]

ii. With the exception of traumatic brain injury impairments, mental and/or behavioural impairments are excluded from the rating of physical impairments.

iii. Definition 2(e), including subsections i and ii, cannot be used for a determination of catastrophic impairment until two years after the accident, unless at least three months after the accident, there is a traumatic physical impairment rating of at least 55% WPI and there is no reasonable expectation of improvement to less than 55% WPI.

If Interim Catastrophic Impairment Status is Approved

iv. Interim catastrophic impairment status is deemed to apply to any patient whose traumatic physical impairment rating is at least 55% WPI, when that determination is made at least three months after the accident date.

v. Interim catastrophic impairment status ceases to exist as soon as a final determination has been made, in accordance with subsection iii, and in any event no later than two years after onset.

Rationale for revisions of 2 (e):

The Panel reviewed the literature on the validity and reliability of the AMA Guides and found very little scientific literature to support of their use for the determination of catastrophic impairment (Appendix 12, section 1). Moreover, we found no literature supporting the use of a 55% WPI threshold as a cut-point for catastrophic impairment status. However, we note that 55% WPI is the score given to paraplegia, which the Panel agreed was a reasonable exemplar of the catastrophically impaired accident victim. The Panel's literature review suggests that the reliability of the AMA Guides is moderate at best in patients with either low back pain or major trauma (Appendix 12, section 1).[5] There is evidence that AMA Guides has adequate construct validity in patients with upper extremity injuries and fractures of the lower limb (Appendix 12, section 1).[66;67;69;95]

The Panel was unable to identify an alternative impairment rating system for physical impairments not covered under definitions 2 (a), 2 (b), 2 (c) or 2 (d). The Panel found no convincing scientific or clinical evidence that earlier or later editions of the AMA Guides offered substantial advantages over the 4th edition. Therefore, based on our collective clinical experience and the scarce available literature on its reliability and validity, we recommend that Chapters 3-13 of the AMA Guides 4th edition be used for the determination of catastrophic impairment

status in patients with physical impairments not covered under definitions 2 (a), 2 (b), 2 (c) or 2 (d).[5]

The Panel recommends that interim status be instituted for individuals who meet the 55% WPI threshold three months or more after the accident. The Panel was aware that patients whose physical impairments are initially of catastrophic severity may not reach their final rehabilitative plateau for many months or even years. Of necessity, therefore, an accurate determination of final outcome should not be made before two years unless there is an unambiguous prognosis. While a two year delay increases the likelihood of accurately identifying patients with permanent catastrophic impairment, it also may preclude timely access to catastrophic impairment benefits. The Panel believes that the interim status will provide the necessary resources to those who need prolonged and substantial rehabilitations services and assistance with re-integration into the community. These services should improve the probability of a catastrophically impaired Insured to make a significant recovery, perhaps to a non-catastrophic impairment level. The goal of instituting interim status is to provide extended access to rehabilitative and attendant care services and thus promote maximal medical recovery, for patients at high risk of a permanent catastrophic impairment.

The Panel agreed that physical and mental or behavioural impairments cannot be combined in any consistent manner using the AMA Guides 4th Edition.[5] The impairment rating systems for physical and mental/behavioural impairment are not compatible and cannot be combined. Moreover, the Panel found no scientific evidence supporting the reliability and validity of mental/behavioural impairment ratings using the AMA Guides (Chapter 14).[5] The Panel had difficulty understanding how combinations of physical impairments and psychological conditions that independently do not meet the criteria outlined in the revised version of 2(e) and 2(f) could be equated to a severe injury to the brain or, spinal cord or to blindness. The Panel also had difficulty understanding that combining impairments is a simple additive process. Finally, the Panel did not have the resources to conduct a comprehensive literature review to determine whether a valid and reliable method of combining physical and psychological impairments exists. Research is also needed into identifying the most appropriate threshold WPI score(s) for various psychophysical combinations.

4.1.8 2 (f) – Psychiatric Impairment

Proposed definition:

2. For the purposes of this Regulation, a catastrophic impairment caused by an accident is,

2(f) psychiatric impairment that meets the following criteria:

i. The post-traumatic psychiatric impairment(s) must arise as a direct result of one or more of the following disorders, when diagnosed in accordance with DSM IV TR criteria: (a) Major Depressive Disorder, (b) Post Traumatic Stress Disorder, (c) a Psychotic Disorder, or (d) such other disorder(s) as may be published within a Superintendent Guideline.

ii. Impairments due to pain are excluded other than with respect to the extent to which they prolong or contribute to the duration or severity of the psychiatric disorders which may be considered under Criterion (i).
iii. Any impairment or impairments arising from traumatic brain injury must be evaluated using Section 2(d) or 2(e) rather than this Section.
iv. Severe impairment(s) are consistent with a Global Assessment of Functioning (GAF) score of 40 or less, after exclusion of all physical and environmental limitations.[1]
v. For the purposes of determining whether the impairment is sufficiently severe as to be consistent to Criterion (iv) - a GAF score of 40 or less - at minimum there must be demonstrable and persuasive evidence that the impairment(s) very seriously compromise independence and psychosocial functioning, such that the Insured Person clearly requires substantial mental health care and support services. In determining the demonstrability and persuasiveness of the evidence, the following generally recognized indicia are relevant:

    a. Institutionalization;
    b. Repeated hospitalizations, where the goal and duration are directly related to the provision of treatment of severe psychiatric impairment;
    c. Appropriate interventions and/or psychopharmacological medications such as: ECT, mood stabilizer medication, neuroleptic medications and/or such other medications that are primarily indicated for the treatment of severe psychiatric disorders;
    d. Determination of loss of competence to manage finances and property, or Treatment Decisions, or for the care of dependents;
    e. Monitoring through scheduled in-person psychiatric follow-up reviews at a frequency equivalent to at least once per month.
    f. Regular and frequent supervision and direction by community-based mental health services, using community funded mental health professionals to ensure proper hygiene, nutrition, compliance with prescribed medication and/or other forms of psychiatric therapeutic interventions, and safety for self or others.

Rationale for revisions of 2 (f):

As stated above, the Panel found no scientific evidence supporting the reliability and validity of mental/behavioural impairment ratings using the AMA Guides 4th Edition (Chapter 14).[5] Moreover, the Panel noted that Chapter 14 does not specifically address psychological impairment. Rather, it relies heavily of the functional limitations experienced by a patient (in four complex spheres of life) to derive its ratings. Furthermore, the Panel did not find a valid and reliable assessment tool to measure overall psychiatric impairment. The Panel consulted two psychiatrists (Drs. William Gnam and Ram Veluri) to obtain their expert clinical opinion on how to define catastrophic psychiatric impairment.

The Panel recommends that the Superintendent assemble an independent panel of experts to develop a comprehensive list of disorders to be included under criteria 2(f) i. We recommend that the definition must incorporate the Global Assessment of Functioning Scale (GAF) as one of the necessary criteria (Appendix 12, section 4).[1] The GAF has good reliability and face

validity.[80;84;96] The Panel selected a GAF cut-point of 40 as a threshold for catastrophic impairment because it likely captures individuals with severe psychiatric impairment, whose capacity for living safely within the community is tenuous in the absence of substantial mental health support services.

4.1.9 Clause 6

The Panel unanimously agreed that this definition was to be eliminated because of the redundancy with 2(e).

4.1.10 3 – Traumatic Brain Injury in Children

Proposed definition:

3. Paediatric Traumatic Brain Injury (prior to age 18)[a]

i. A child who sustains a traumatic brain injury is automatically deemed to have sustained a catastrophic impairment automatically provided that either one of the following criteria (a or b) is met on the basis of traumatic brain injury sustained in the accident in question:

    a. In-patient admission to a Level I trauma centre with positive findings on CT/MRI scan indicating intracranial pathology that is the result of the accident, including but not limited to intracranial contusions or haemorrhages, diffuse axonal injury, cerebral edema, midline shift, or pneumocephaly; or
    b. Inpatient admission to a publically funded rehabilitation facility (i.e. an Ontario Association of Children Rehabilitation Facility or equivalent) for a program of brain injury rehabilitation or Ontario Association of Children Rehab Facilities);

Paediatric catastrophic impairment on the basis of traumatic brain injury is any one of the following criteria:

ii. At any time after the first 3 months, the child's level of neurological function does not exceed the KOSCHI Category of Vegetative *(Crouchman M et al., A practical outcome scale for paediatric head injury. Archives of Disease in Childhood. 2001; 84:1204)*[18]*:* 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.

iii. At any time after the first 6 months, the child's level of function does not exceed the KOSCHI Category of Severe *(Crouchman M et al., A practical outcome scale for paediatric head injury. Archives of Disease in Childhood. 2001; 84:1204)*[18]: (1) The child is at least intermittently able to move part of the body/eyes to command or make purposeful spontaneous movements; for example, a confused child pulling at nasogastric tube, lashing out at caregivers, or rolling over in bed. (2) May be fully conscious and able to communicate but not yet able to carry out any self care activities such as feeding. (3) Severe Impairment 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. (4) Such a child is fully conscious but may still have a degree of post-traumatic amnesia.

iv. At any time after the first 9 months[b], the child's level of function remains seriously altered such that the child is for the most part not age appropriately independent and requires supervision/actual help for physical, cognitive and/or behavioural impairments for the majority of his/her waking day.

Rationale for revisions of 3:

The final outcome for a brain injured child may not become apparent for years or even decades after injury (i.e. in the case of the very young child). The Panel was aware of the inadvisability of substantially delaying a final determination of catastrophic impairment in children, on the sole basis of achieving reasonable certainty of outcome. The Panel weighed the arguments in favour of and against creating a set of criteria of unknown reliability and validity that would permit an early determination

The Panel noted that a long period of waiting for a final determination could impose medically unnecessary stressors on parents and families already challenged with coping with a child suffering from a serious traumatic brain injury. Notwithstanding the above, the Panel was also aware that false positive determinations of catastrophic impairment were not in the best interest of the child, or a reasonable burden for the Insurer.

The Panel noted that certain objective markers of serious acute traumatic brain injury are correlated to poor outcome. Such markers are also indicative of a need for extended use of rehabilitation resources, in order to reduce the eventual impairment. The Panel concluded that the problems associated with a false-positive determination through early identification of catastrophic impairment were far outweighed by the benefits to all catastrophically impaired children and their families.

In particular, the Panel noted that radiological features of serious brain injury, in association with admission to a Level I hospital are good clinical predictors of a prolonged recovery and poor outcome. Similarly, given the careful screening of patients at paediatric rehabilitation centers, it is believed that admission for brain injury rehabilitation is a sensitive and specific indicator of high risk of poor outcome. Using these criteria for an automatic determination of catastrophic impairment will provide injured children access to early and necessary health care.

The Panel acknowledges that the underlying premise, that use of these criteria for automatic determination will be highly advantageous and have a limited and acceptable 'downside', is an assumption that must be tested, and the results monitored for a period of time.

For those children who do not fall within the automatic determination criteria, an early determination based upon clinical status would still be important. The natural course of the condition suggests that most improvement occurs early. A child who is still Vegetative at 3 months or still Severe at 6 months, is very unlikely to ever recover to an independent level of function. Similarly, it is the opinion of the Panel that children showing serious impairments and

disabilities including a significant delay in maturation despite at least 9 months of recovery have a poor prognosis. The cut-point of nine months was arbitrarily selected by the Panel and it is important to note that a later cut-point would further reduce the likelihood of a false positive determination.

Having set out criteria for automatic determination, the Panel then focused on determinations that would require direct or chart-based clinical evaluations. The Panel agreed that the standard tools used to evaluate traumatic brain injury in adults (e.g., Glasgow Coma Scale and Glasgow outcome Scale, and the AMA Guides) are not appropriate for head injuries in children.

The Panel considered recommending the King's Outcome Scale for Childhood Head Injury (KOSCHI), a modified GOS adapted to children. However, the scientific evidence on the psychometric properties of the KOSCHI is preliminary and does not support its use as the sole basis of determination at this time. The data supporting its construct validity is preliminary and its inter-examiner reliability is poor to moderate.[11;18] The Panel also observed that the reviewed studies on the reliability of the KOSCHI used examiners that were either inexperienced clinicians or examiners who would not be involved in making a determination of catastrophic impairment in Ontario.[11;18] Therefore, the Panel recommends that an inter-examiner reliability study be conducted with experienced paediatric neurologists and rehabilitation medicine specialists in Ontario.

The Panel recommends that (until the results of an inter-examiner reliability study are available) the Vegetative and Severe Categories of KOSCHI be used, with the time thresholds of 3 months and 6 months respectively. The Panel felt that the Moderate Category of KOSCHI could not be used without modification because it may be liable to misclassification of children. The Panel therefore drew on its clinical expertise and experience to modify the Moderate KOSCHI category.

As for those few children with subtle injuries that will become serious sources of impairment only with the fullness of time, meaning a delayed manifestation sometimes spanning decades in the case of infants whose impairments of cognition, emotion or behavioural regulation may not fully express themselves until late teen years, optimally the direct paediatric evaluative route should remain available, along with the adult criteria pertaining to traumatic brain injury, until age 21. However this is a question of policy and outside the Panel's direct mandate.

4.1.11 Challenges to be resolved

The Panel met several challenges throughout the course of its deliberations. In the section below, the Panel describes these challenges and makes recommendations on how to address them.

i. Combining physical and psychological impairment: The Panel did not have the resources to conduct a comprehensive review of the literature to determine whether valid and reliable methods of combining physical and psychological impairments exist. The Panel recommends that the Superintendent convenes an Expert Panel of clinicians and scientists to systematically

review the literature and determine whether a valid and reliable methodology is available to rate and combine physical and psychological impairment ratings.

ii. Method to rate physical and psychiatric impairments in the paediatric population: The Panel made recommendations for the determination of physical (2(e)) and psychiatric (2(f)) impairments in adults. However, we could not indentify a clinically and scientifically sound method to accomplish the same in the paediatric population. Therefore, the Panel recommends that the Superintendent convene a Paediatric Expert Panel of clinicians and scientists to examine and recommend a valid and reliable method of assessment for the paediatric population.

iii. Classification of traumatic Head Injury in the paediatric population: As mentioned in section 4.1.10, the Panel considered recommending the King's Outcome Scale for Childhood Head Injury (KOSCHI), a modified GOS adapted to children. However, the scientific evidence on the psychometric properties of the KOSCHI is preliminary and does not support its use as the sole basis of determination at this time. The Panel recommends that an inter-examiner reliability study be conducted with experienced clinicians in Ontario. The Panel also recommends that the Superintendent re-evaluates definition 3, once the results of the study are available.

iv. Premorbidity and Age: A significant minority of the population involved in car accidents have prior chronic illnesses and impairments; the same is true of senior citizens. The Panel notes that these persons may be particularly vulnerable to the effects of injury, leading to loss of capacity to remain independent within the home or otherwise enjoy a reasonable quality of life. The Panel acknowledges the need to address the question of premorbid vulnerability from illness or aging. The Panel recommends that the Superintendent considers the development of an additional criterion or means of adjustment to an existing criterion, to address special circumstances in which significant but sub-catastrophic threshold impairments arising from car accident injuries, when superimposed on prior and significant impairment from chronic illness and/or age-related health conditions, create disproportionately adverse outcomes.

5. Acknowledgements

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We also thank Drs. William Gnam and Ram Veluri for their assistance in the development definition 2(f).

Finally, the Panel thanks Sivan Raz and Willie Handler for their administrative support and technical knowledge of the current SABS.

[a] The Panel notes that brain maturation may continue through to a child's 21st birthday. Consequently, impairment of higher centres of the brain such as the Executive functions of social integration, insight, judgment, goal setting and behavioural integration may not be effectively discernible from typical features of the immature teenage brain

prior to that time. Hence, the Panel believes that there is a reasonable scientific basis for a 21st birthday cut-off for the paediatric traumatic brain injury criterion.

[b] By structuring the definition as we have, we make it possible for the Superintendent or a subsequent paediatric working panel to elect a different cut-off date for definition iii, such as 9 months or 12 months.