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Predictors of poor health and functional recovery following road trauma: Protocol of a British Columbian inception cohort study

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TITLE: Predictors of poor health and functional recovery following road trauma: Protocol of a British Columbian inception cohort study.

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ABSTRACT

Introduction: Road trauma (RT) is a major public health problem affecting physical and mental health, and may result in prolonged absenteeism from work or study. It is important for health care providers to know which RT survivors are at risk of a poor outcome, and policy makers should know the associated costs. Unfortunately, outcome after RT is poorly understood, especially for RT survivors who are treated and released from an emergency department (ED) without the need for hospital admission. Currently, there is almost no research on risk factors for a poor outcome among RT survivors. This study will use current Canadian data to address these knowledge gaps.

Methods and analysis: We will follow an inception cohort of 1500 RT survivors (16 years and older) who visited a participating ED within 24 hours of the accident. Baseline interviews determine pre-existing health and functional status, and other potential risk factors for a poor outcome. Follow-up interviews at 2, 4, 6, and 12 months (key stages of recovery) use standardized health-related quality of life tools to determine physical and mental health outcome, functional recovery, and health care resource use and lost productivity costs.

Ethics and Dissemination: The *Road Trauma Outcome Study* is approved by our institutional Research Ethics Board. This study aims to provide health care providers with knowledge on how quickly RT survivors recover from their injuries and who may be more likely to have a poor outcome. We anticipate that this information will be used to improve management of all road users following RT. Health care resource use and lost productivity costs will be collected to provide a better cost estimate of the effects of RT. This information can be used by policy makers to make informed decisions on RT prevention programs.

KEYWORDS: Motor vehicle collisions, injury outcome, functional recovery, quality of life, risk factors, trauma

STRENGTHS AND LIMITATIONS

- Inception cohort design with large sample size (n=1500)
- Measures self-reported health outcomes during key phases of injury recovery
- Measures direct (healthcare) and indirect (lost productivity) costs
- Risk of recall and reporting bias, especially for pre-injury health status
- Risk of sampling or non-respondent bias and/or bias from attrition

INTRODUCTION.

In Canada, road trauma (RT) causes over 1,900 fatalities and 150,000 injuries annually, including 9,000 serious injuries,[1] with an annual cost estimated at $37 billion.[2] Injury-related disability is a public health concern,[3, 4] but outcome following RT and risk factors for a poor outcome are poorly studied, especially among cyclists, pedestrians, and motorists involved in motor vehicle crashes with a "minor injury" (emergency department (ED) visits without hospital admission). Outcomes are worse for RT survivors suffering severe injuries, but even "minor injury" crashes can result in reduced health-related quality of life (HRQoL), including psychological harm (*e.g.*, PTSD) and prolonged work absenteeism (or inability to continue the same work prior to the crash due to new physical or psychological limitations).[5] Psychological factors are important predictors of poor outcomes among RT survivors.[6] Chronic pain is more common among RT survivors suffering from depression, anxiety, severe pain, multiple somatic complaints, or PTSD in initial recovery stages.[6-8] Other psychological contributors to chronic pain include health-seeking behaviour, poor recovery expectations, higher perceived collision severity, catastrophizing, and passive coping strategies.[8-11] It is important to study injury outcomes among RT survivors (including all road users of all injury severity levels) and their associated risk factors, including baseline health status, socioeconomic and demographic factors, psychological factors, and coping strategies.

The recovery trajectory for most injuries can be viewed as occurring during four phases (Figure 1).[12] The *acute care* phase (0-8 weeks) is characterized by intensive hospital management of injuries (*e.g.*, surgery). During *rehabilitation* (1-3 months), injured individuals develop increased capacity and move towards pre-injury functioning. During *adaptation* (3-6 or more months), individuals modify their environment and personal routines to adapt to their limitations.

Finally, in most cases, injured individuals reach a *stable end situation* within 6-12 months (rarely 24 months) of injury.

Potential risk factors influence the outcome during these recovery phases. Injury severity, a major determinant of outcome, is determined by circumstances of the injury event and the individual's fragility. Injury severity varies by road user type, age, and sex. Medical factors affect all recovery phases. Socioeconomic factors impact both baseline health[13-15] and subsequent recovery through access to rehabilitation programs or resources facilitating adaptation.[16] Psychological factors may impact an individual's ability to comply with treatment, follow rehabilitation plans, or adapt to injury-related disability. Clearly, it is important to follow participants throughout the four key recovery phases.

Previous RT research has methodological flaws limiting validity, generalizability, and utility. One instance is use of retrospective cohorts of RT survivors who are enrolled after filing insurance claims, weeks following the crash,[17, 18] or after already developing symptoms as a result of the crash.[19, 20] Retrospective cohorts can result in selection bias if they exclude RT survivors who recover quickly from their injuries. Delayed enrolment can increase the likelihood of recall bias, especially related to pre-injury HRQoL and accident details. Other RT research has limited generalizability as many studies excluded RT survivors involved in minor injury crashes,[21] most excluded cyclists and pedestrians,[9, 22] and the majority excluded people with language barriers (non-native speakers).[10, 23]. These are important gaps considering the increasing number of minor injury crashes in Canada, comprising the majority of RT cases, and their associated health care costs.[24] Motor vehicle crashes involving cyclists and pedestrians will likely increase as active transportation (*e.g.*, cycling, walking) becomes more prevalent.[25] Inclusion of non-native speakers may identify certain groups (*e.g.,* new immigrants) who may be at higher risk of RT and may

experience worse outcomes. Additionally, many studies failed to conduct follow-up during key recovery phases, while others used idiosyncratic definitions or insurance company data to define outcomes.[26] Many RT outcome studies have limited ability to identify risk factors for a poor outcome due to small sample sizes,[27-29] not considering key risk factors (*e.g.*, psychological), or failure to identify or adjust for confounders like pre-existing health problems.[21] Finally, current North American RT outcome research is limited as most studies have been conducted in Europe or Australia. These study design choices limit the impact of the research and ability to inform policy to improve outcomes of RT survivors.

Currently, research into risk factors for a poor outcome following RT is lacking, and methodological improvements are needed to address limitations of prior RT outcome research. The objective herein is to present the methodology of a multi-centre study on the health and functional recovery of RT survivors who visited a participating ED in British Columbia (BC), Canada. This methodology addresses many limitations of current RT outcome research.

METHODS AND ANALYSIS

Study Design and Setting. This prospective observational study involves an inception cohort of RT survivors, with all injury severity levels. The study started recruitment in July 2018 and will run for five years. Participants are recruited from three BC EDs: Vancouver General Hospital (Vancouver), Royal Columbian Hospital (New Westminster), and Kelowna General Hospital (Kelowna). These hospitals serve rural, suburban, and urban populations similar to those served by other trauma centres across Canada.

Patient and Public Involvement. The study was designed in consultation with public health stakeholders. Patients and/or general public were not involved in study design.

Inclusion and Exclusion Criteria. Road trauma survivors (motorists, cyclists, and pedestrians) aged 16 years and older who arrive in the ED within 24 hours of injuries sustained in a collision involving at least one motorized vehicle are included. Collisions not involving a motorized vehicle are excluded. Children younger than 16 years old are excluded as they have a different recovery trajectory and require different tools to measure HRQoL. Non-BC residents are also excluded as health care use during the recovery phase is not available for out-of-province participants. Cognitively impaired survivors are included if consent and study information could be obtained from a reliable proxy (*e.g.*, partner, parent). Non-English speakers are interviewed through a translator (*e.g.*, family) or multi-lingual research assistant. RT survivors who are inappropriate to approach (suicidal, violent/aggressive, high alcohol or drug impairment, or in police custody) for the entire duration of their hospital visit or admission are excluded as reliable information cannot be obtained and it may be unsafe for research staff to approach the patient. For alcohol or drug impairment, individuals intoxicated on arrival at the ED, but subsequently sober during the same visit are included. Fatalities within 30 days following the hospital visit or admission are excluded.

Recruitment. Over 1.5 years of recruitment, it was estimated that 6,600 RT survivors would be treated at participating EDs with at least 1,200 severely injured patients admitted to hospital (Figure 2). Given the large disproportion between minor (discharged home directly from the ED) and severely injured RT cases, all severely injured survivors and a 1/3 representative sample of survivors with minor injuries are approached. A systematic sampling strategy is used to recruit a representative sample of RT survivors with minor injuries. Research assistants (RAs) recruit participants from the ED for an average of 8 hours per day on a rotating schedule covering all times of day and days of the week (holidays included) throughout the year. Reasons for refusal to participate and failure to approach potential participants are recorded. The recruitment goal for the

study is 1,500 RT survivors (approximately 225 pedestrians, 300 cyclists, and 975 motorists), including at least 750 who require hospital admission.

Data Sources and Data Management. Data are collected from baseline interviews, medical records, follow-up interviews and administrative health records. Follow-up interviews at 2, 4, 6, and 12 months correspond to key phases of recovery: acute treatment, rehabilitation, adaptation, and stable end situation.[12] (Figure-1) We use the Research Electronic Data Capture (REDCap) online database for data management.[30]

Baseline Interviews. Baseline interviews determine pre-existing health and functional status and other potential risk factors for a poor outcome. Baseline interviews are conducted in-person by RAs during ED visits or hospital admissions, or by telephone within one-week post-event in some cases, to collect demographic and socioeconomic information, baseline health, crash/injury details, and recovery expectations. Participants are approached as early as possible during their ED visit or hospital admission while respecting and prioritizing their recovery. RT survivors who sustained severe injuries and are admitted to hospital are approached during their hospital admission. RT survivors with minor injuries are approached in the ED during their ED visit. All RT survivors are approached multiple times until a decision on participation in the study was obtained. RT survivors with minor injuries, who are discharged from the ED before they were able to decide whether to participate, are offered the opportunity to be consented and interviewed by telephone within 7 days of their ED visit.

The baseline interview (Supplementary files, Appendix A) includes the following domains: i) crash details; ii) medical history (cardiorespiratory, neurological, gastrointestinal, musculoskeletal, psychiatric, other); iii) pre-event anxiety and depression with the PHQ-4;[31, 32] iv) somatic symptoms with the PHQ-15;[33] and v) pain catastrophizing and coping with the Pain

Catastrophizing Scale (PCS).[34] Baseline HRQoL is measured with the five-level EuroQol instrument (EQ-5D-5L – day before injury) and the Short Form 12 survey (SF12 – four weeks prior to event). The EQ-5D-5L and SF12 are validated tools assessing mental health (depression, anxiety), discomfort/pain, restrictions to bending or lifting, ambulation, self-care, and daily and social activities. These tools have Canadian population norms and can be used retrospectively to determine HRQoL. Pre-injury productivity four weeks prior to the motor vehicle accident is assessed using the iMTA Productivity Cost Questionnaire (iPCQ).[35] Participants are also asked about their expectations for recovery ("How long do you think it will take for you to fully recover from your injuries?").

Follow-up Interviews. RT survivors' recovery trajectory and outcomes are assessed by follow-up interviews at 2, 4, 6, and 12-months post-baseline interview. Follow-up interviews (Supplementary files, Appendix B) include the EQ-5D-5L, SF12, PHQ-15, Glasgow Outcome Scale (GOS-E), PTSD checklist (PCL-S), and iPCQ. The EQ-5D-5L and SF12 are suitable for assessing individuals living independently whereas the GOS-E differentiates based on level of severe disability. The PCL-S is designed to detect PTSD following a traumatic event.[36] The iPCQ is used to determine productivity losses related to absenteeism and reduced productivity at paid and unpaid work (*e.g.*, housework). Questions on recovery progress and return to daily activities are included. For example, participants are asked "Have you fully recovered from the accident?" (options: "yes", "no", and "don't know") Self-reported health care utilization (*e.g.*, physician visits, paramedical services) and quality of life difficulties (financial, legal, general) are also included in follow-up interviews.

Follow-up interviews are conducted by telephone, online survey, self-filled paper questionnaire, or in-person depending on participant preference. For each follow-up interview,

participants are contacted via telephone and email up to five times each. To maximize retention, more thorough and evidence-based retention strategies are applied including financial compensation and using alternate contact information (home, work and cell number, email, family or friend). Participants receive honorariums for completing the baseline ($15) and follow-up ($10 each) interviews. For those unable to complete interviews independently (*e.g.*, cognitive disability, language barrier), a proxy may either assist the participant or complete the questionnaire on the participant's behalf.

Medical Chart Review. Medical chart review of the index visit for all participants is the sole source of information for i) injury type (*e.g.*, fracture) and location (*e.g.*, lower extremity); ii) injury severity (ICISS);[37, 38] iii) ED visit details (*e.g.*, arrival mode, acuity, duration, discharge diagnosis); and iv) ED investigations: diagnostic tests (*e.g.*, x-rays) and procedures (*e.g.*, sutures). Chart reviews are also used to supplement baseline interviews for information on: i) accident details: road user type, location, single *vs* multiple-vehicle collision, seatbelt/helmet use; ii) medical history; and iii) medication history. Medical charts of participating hospitals include ambulance run sheets which typically include accident details.

Standardized forms and protocols guide data extraction to ensure accuracy and consistency between RAs. A committee of experienced clinicians will review interview responses and medical charts to identify major discrepancies (*e.g.*, patient denies prior health problems, but medical record indicates hospital admissions) and arbitrate discrepancies (decide which data is most accurate). The number and type of major discrepancies will be reported and sensitivity analyses excluding those cases will be conducted.

Administrative Health Records. To measure health care resource use and calculate comorbidity scores, administrative health records including hospital admissions (Discharge Abstracts

Database, DAD), medical service plan billings (BC MSP), ED visits (National Ambulatory Care Reporting System, NACRS), and prescriptions (BC Pharmanet) are used. For participants who consent to Personal Health Number (PHN) usage, records will be requested through PopDataBC, a health data depository supporting research with access to individual-level, de-identified longitudinal data on BC residents.[39] Data will be collected for one year prior to and one year following the crash to compare health care resource use pre- and post-accident. Health care services not covered by public health insurance will be identified during follow-up interviews.

Analysis. The following dichotomous outcomes will be assessed: i) self-reported incomplete recovery; ii) reduction from baseline "pre-event" values on EQ-5D-5L, SF12 and PHQ-15 exceeding Minimal Clinically Important Difference (MCID) values reported for these scales; iii) evidence of PTSD; and iv) have not returned to work, school, or usual activities. At each follow-up period, the percentage of participants who experience each of the above poor outcomes will be reported. Descriptive statistics will be generated for all study participants, disaggregated by sex, age group, socioeconomic factors, road user type, and disposition (discharged from ED or admitted to hospital).

The following candidate risk factor categories will be examined: 1) demographic and socioeconomic variables (sex, age, ethnicity, residence location, marital status, employment status, and education level); 2) baseline health status (pre-injury SF-12 and EQ-5D-5L scores, chronic disease score, self-reported medical history, previous year hospital admissions, and physician visits); 3) psycho-social factors (anxiety, depression, and catastrophizing/coping); 4) injury type, location, and severity; and 5) road user type (pedestrian, cyclist, and motorist) and accident details.

For outcomes i) to iv) defined above, separate mixed effects log-binomial regression models (generalized linear mixed models (GLMMs) using log link function), will be fitted to

estimate relative risks (RRs) and confidence intervals for associations between risk factors and poor outcomes measured at 2, 4, 6, and 12 months. The nested structure of the data will be accounted for by including a random intercept for hospital site and participants nested within each site. Since GLMMs can be unstable in the presence of many predictors, separate models for each risk factor to obtain unadjusted RRs for poor outcome will be fitted first. These models will also include follow-up period (2, 4, 6, or 12 months) as a categorical predictor and an interaction term between period and risk factor. This will allow estimation of recovery trajectories and risk factor impact at different recovery stages. Next, a single model to identify independent predictors of outcome and estimate adjusted RRs will be built. This model will include multiple candidate risk factors identified using Harrell's approach.[40] A L1-penalized estimation will also be used as this method combines shrinkage with variable selection for GLMMs and works well when there are many influential predictors.[41] A Bonferroni-adjusted significance level will be used.

Missing Data. The percentage of participants with missing baseline data is expected to be <4% based on pilot research. Assuming missing data are not related to the outcome, no bias will result from excluding these subjects.[42] For partially complete follow-up interview responses, guidelines of each validated tool will be followed to obtain on outcome score. As a mixed-effects log-binomial regression model is proposed, missing response data for participants who are lost to follow-up will be ignored. GLMMs use all available data and provide unbiased estimates if data are missing at random (unobserved data depend only on observed data). Further statistical testing using t-tests for continuous risk factors and chi-squared tests for categorical risk factors will be performed to explore differences between RT survivors who complete the study and those who are lost to follow-up.

Sample Size Considerations. Sample size calculation is for outcome data at 12 months and conducted for three road user types (pedestrians, cyclists, and motorists). A conservative 40% attrition is assumed such that 12-month outcome data will be available for at least 135 pedestrians, 180 cyclists, and 585 motorists. With an estimated prevalence of 35% for outcomes and 50% for risk factors, and using a significance level of 0.0125 corrected for multiple outcomes, this study will have 80% power to detect RRs of 2.3, 2.0, and 1.5 for pedestrians, cyclists, and motorists, respectively. These estimates are based on two-sided comparison of independent proportions using the Normal approximation described by Woodward.[43]

Health Care Resource Use. A total health care cost will be obtained for every study participant, supplemented by lost productivity costs. Generalized linear models (GLMs) will be fit to explore variation in health care and lost productivity costs according to road user type, injury severity, age range, sex, and disposition. Study participants will be differentiated by those who complete follow-ups and those who are lost to follow-up with respect to baseline characteristics.

ETHICS AND DISSEMINATION

Ethics Approval. This study is approved by the research ethics board of the University of British (Approval Certificate Number: H18-00284) and by research ethics boards for the other participating study sites: Fraser Health Authority (New Westminster, BC) and Interior Health Authority (Kelowna, BC). Note that there is a harmonized ethics review process for BC sites. Ethics approval is renewed annually and updated throughout the duration of the study.

Columbia. Participants provide informed written or verbal consent. For minors (16-18 years old), parental/guardian permission is obtained in addition to participant assent. For participants unable to provide consent (*e.g.,* comatose), proxy consent is obtained from a designated caregiver.

Importance of this research. The *Road Trauma Outcome Study (RTOS)* is designed to overcome many limitations of previous RT outcome research. It uses a robust methodology that will add to the RT outcome knowledge base. Firstly, it recruits an inception cohort of RT survivors during their ED visit (or hospital admission) following a crash. Inception cohorts are ideal for studying outcome and prognostic factors and are less prone to sampling bias compared to retrospective cohorts.[44, 45] To maximize generalizability, recruited RT survivors include: all road user types with all injury severity levels; non-native speakers (utilizing translators); and those with cognitive limitations (with history obtained from caregivers). Another strength is the use of patient-reported outcomes to study the effects of injury on daily lives of RT survivors; this study uses validated standardized tools to study HRQoL from physical and psychological domains during key recovery phases.[4, 12] This study includes a large sample size, determines health care costs associated with RT, and includes productivity loss estimates at work and home. The sample of 1,500 RT survivors provides sufficient power to study key risk factors for a poor outcome. It is also important to study RT outcome in North America as many risk factors for poor recovery, including recovery expectations and crash severity perception,[10] are likely related to cultural factors that vary between countries.

Total economic cost attributed to an injury is a combination of direct costs (health care costs from injuries) and indirect costs (due to reduced productivity from hospitalization, disability, and premature death).[46, 47] This study will determine health care and lost productivity costs for RT survivors, providing a more accurate and complete economic assessment and subsequently informing policy towards improving health delivery programs. Several instruments measure productivity loss; we utilized the iPCQ as it has been tested in the general population.[35] Moreover, the iPCQ allows for separate quantification of productivity losses due to absenteeism,

presenteeism, and unpaid work.[35, 48] The value of time lost from work and homemaking due to injury is measured by earnings data and market value of unperformed homemaking services, respectively.[46] This study addresses knowledge gaps including health and financial consequences, productivity impacts, and risk factors for a poor outcome following RT.

Limitations of Study Design. Although our study design improves on previous research, it still has limitations which have been addressed as best as possible to minimize their effects. These limitations include recall and reporting bias from using self-reported standardized tools, especially related to pre-crash health. The "good-old-days" bias, where patients knowingly or unknowingly exaggerate their preinjury HRQoL, is common following injury.[49-51] To minimize "good-old-days" and recall bias, baseline interviews were conducted as soon as possible following the crash, ideally within 7 days.[12] Administrative health records, including calculated chronic disease score, will be used as an objective measure of pre-injury health.[49] Participants are assured their responses are confidential, and identifying as health researchers strengthens rapport and improves response rate and quality.[52] Another limitation is sampling bias or non-respondent bias which may occur if those who are missed or decline to participate differ in important ways from participants. Refusals are tracked and differences between participants and those who refused to participate with respect to age, sex, road user type, and hospital admission required will be reported. Additionally, using modest honorariums and assurance of confidentiality is intended to minimize refusals, and the analysis plan also considers non-response bias. Inherently, our study cannot be generalized to RT survivors who never seek medical care in a hospital setting or seek care days later. Finally, attrition may affect the study findings in terms of overall response rate and baseline characteristics of those who complete follow-ups compared to those lost to follow-up. Different contact methods are used

to minimize attrition rate. These strategies to minimize bias and missing data are applied during recruitment and analysis to help reduce the effects of these limitations.

Expected Outcomes and Benefits. This research will advance understanding of the impact of RT on individuals treated in hospital for RT injuries. It will identify risk factors for poor outcomes and provide better estimates of direct and indirect RT costs. These findings are relevant to RT survivors and their families, health care providers, public health officials, health care and traffic policy makers, and researchers. Understanding recovery trajectory and risk factors for a poor outcome following RT may inform the development of rehabilitation programs and help clinicians identify RT survivors who would benefit from more intensive care, possibly earlier in their recovery trajectory. These findings may also help RT survivors and their families set expectations for recovery, possibly reducing the adverse psychological consequences commonly experienced by RT survivors. This research will also provide a better understanding of the impact of RT on health care costs and productivity and provide data and tools that other researchers can use for future economic analyses of RT prevention programs. Traffic policy makers and public health officials may use these cost estimates to make better decisions about allocating limited resources for expensive RT prevention programs. Thus, these findings will have practical implications for RT survivors and their families, health care providers, policy makers, public health officials, and other researchers.

Summary. The *RTOS* is a large inception cohort study that will provide a comprehensive description of outcome after RT including motor vehicle crashes of all severity levels for all road users, identify risk factors for poor outcomes, and determine direct health care and lost productivity costs associated with RT. This information can be used by numerous stakeholders who have an interest in preventing RT or improving outcome for RT survivors.

Abbreviations

RT: Road trauma; ED: Emergency department; HRQoL: Health-related quality of life; PTSD: Post-traumatic stress disorder; BC: British Columbia; RA: Research assistant; REDCap: Research Electronic Data Capture; PHQ-4: Patient Health Questionnaire for Depression and Anxiety; PHQ-15: Patient Health Questionnaire somatic symptom severity scale; PCS: Pain Catastrophizing Scale; EQ-5D-5L: Five-level EQ-5D; SF12: Short Form 12; iMTA: Institute for Medical Terminology Assessment; iPCQ: iMTA Productivity Cost Questionnaire; GOS-E: Extended Glasgow Outcome Scale; PCL-S: PTSD Checklist (specific); ICISS: International Classification of Diseases based Injury Severity Score; DAD: Discharge Abstract Database; MSP: Medical Services Plan; NACRS: National Ambulatory Care Reporting System; PHN: Personal health number; PopDataBC: Population Data BC; MCID: Minimal Clinically Important Difference; GLMM: Generalized linear mixed model; RR: Relative risk; GLM: Generalized linear model; RTOS: Road Trauma Outcome Study; REB: Research ethics board.

DECLARATIONS

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Competing Interests. The authors declare that they have no competing interests.

Author's Contributions. This research study methodology was conceptualized and developed by JRB (principal investigator) and HC. SE and LXP assisted with the data analysis plans. LKS

drafted the manuscript and is coordinating the study. All authors reviewed and approved the final manuscript.

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Figure Legends:

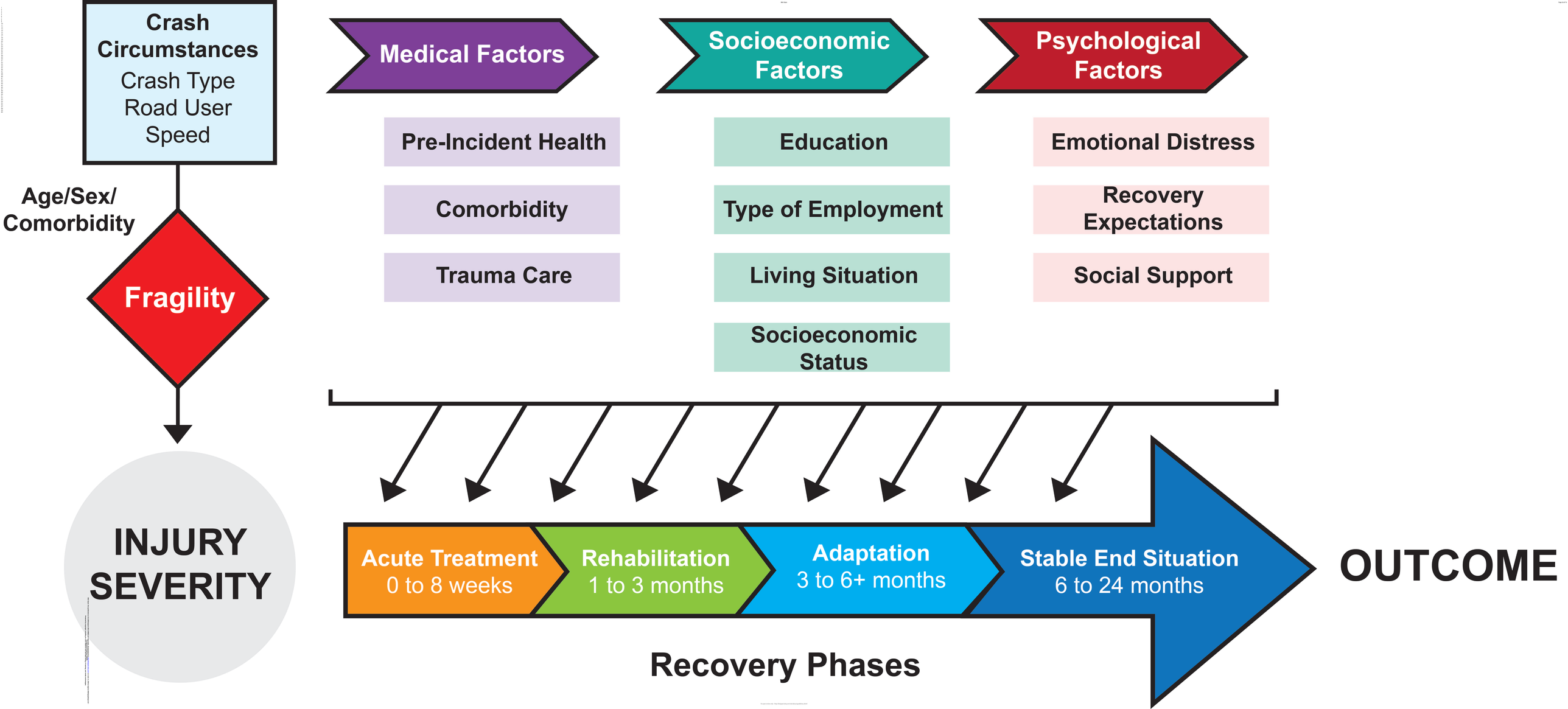
Caption for Figure 1

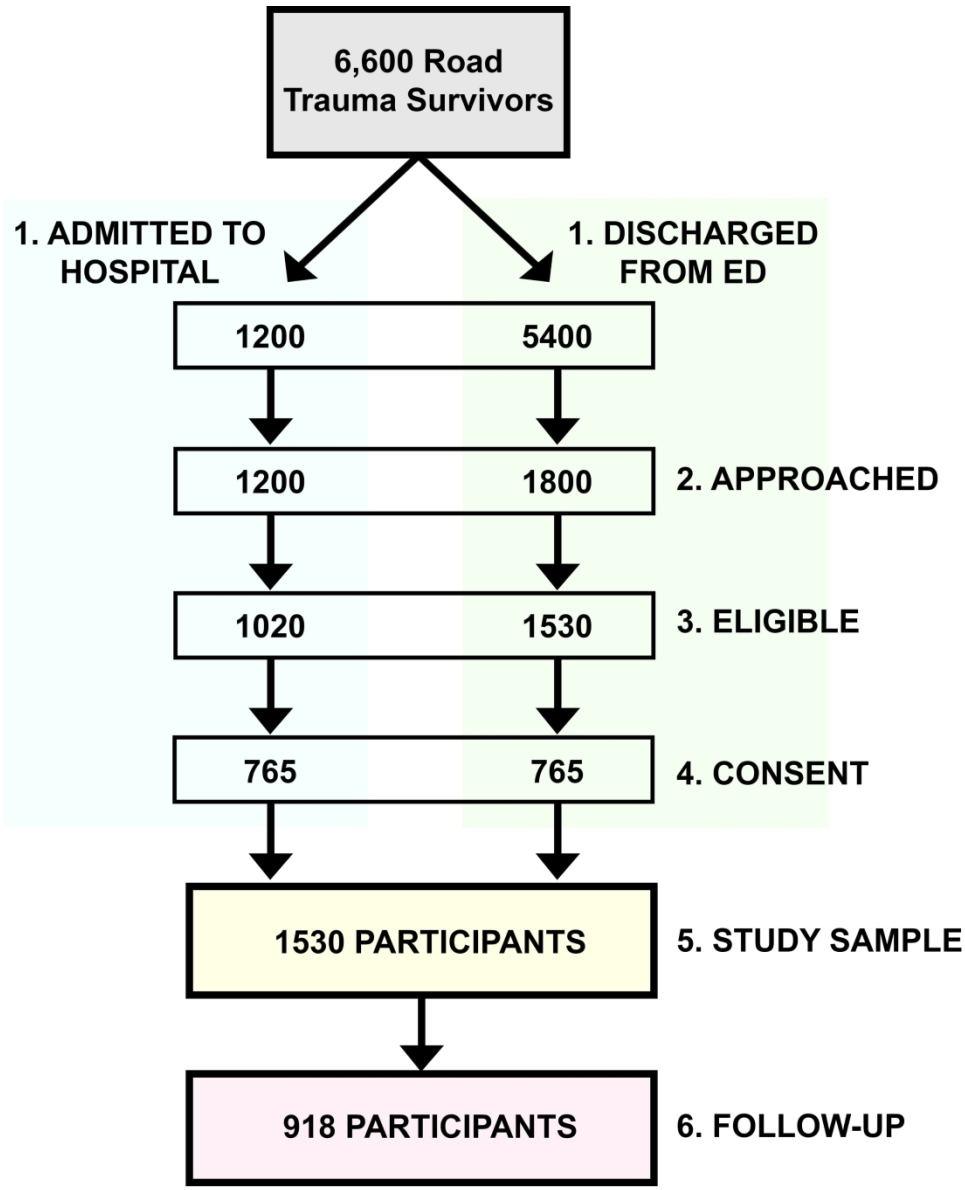
Figure 1. Factors affecting post RT outcome. This conceptual diagram shows how potential risk factors act during different stages of recovery. Injury severity, a major determinant of outcome, depends on crash factors (transfer of kinetic energy) and the victim's fragility. Medical factors affect all stages of the recovery process. Socio-economic factors impact both baseline health,[13-15] and access to rehabilitation programs or to resources that facilitate adaptation.[16] Psychological factors may impact ability to comply with treatment or rehabilitation plans, or ability to adapt to injury related disability.

Caption for Figure 2.

Figure 2. Recruitment Flow Chart. Anticipated recruitment and follow-up numbers over the duration of the study. This diagram illustrates estimated patient numbers for this study.

1. **Admitted to Hospital and Discharged from ED:** It was estimated that 4,400 RT survivors per year would be treated at participating study sites. Of these, approximately 18% would be admitted to hospital and the rest would be discharged home directly from the ED.
2. **Approached:** RAs approach *all* admitted RT survivors and use a systematic sampling strategy (based on the time of ED visit) to approach 1/3 of those who were discharged from the ED.
3. **Eligible:** Approximately 85% of RT survivors meet the inclusion and exclusion criteria.
4. **Consent:** Consent rates differ between those who were admitted to hospital and those who were discharged from the ED. It was estimated that 75% of admitted RT survivors and 50% of those discharged from the ED would consent to participate.
5. **Study Sample:** With these estimates, the recruitment goal of 1,500 participants would be achieved within two years.
6. **Follow-Up:** The power calculations were based on a conservative 40% attrition rate (918 followed for 12 months). Attrition will not affect access to administrative data.


Crash Circumstances
Crash Type
Road User
Speed
Age/Sex/ Comorbidity
Fragility
INJURY SEVERITY
Medical Factors
Socioeconomic Factors
Psychological Factors
Pre-Incident Health
Comorbidity
Trauma Care
Education
Type of Employment
Living Situation
Socioeconomic Status
Emotional Distress
Recovery Expectations
Social Support
Acute Treatment
0 to 8 weeks
Rehabilitation
1 to 3 months
Adaptation
3 to 6+ months
Stable End Situation
6 to 24 months
OUTCOME
Recovery Phases



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Supplementary Files

Appendix A. Baseline Questionnaire

Road Trauma Health Outcome Study
Baseline Interview

Participant ID ☐☐-☐☐☐☐☐☐

Interview Date ☐☐ / ☐☐ / ☐☐☐☐ (m m / d d / y y y y)

Interviewer ID ☐☐

Site (*circle*) **VGH** | **RCH** | **KGH**

Please indicate who is completing the questionnaire:

☐ Participant ☐ Participant with assistance from another person

☐ Another person on behalf of the participant

For Office Use Only

Baseline Gift Card Received: ☐ Yes ☐ No

REDCap Data Entered: ☐☐ / ☐☐ / ☐☐ (m m / d d / y y)

Appendix A. Baseline Questionnaire

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Appendix A. Baseline Questionnaire

TEMPORARY TRACKING SHEET

****DETACH AND DESTROY THIS SHEET AFTER DATA ENTRY****

Participant ID | | | - | | | | | |

Site Code ID Number

Medical Record Number (MRN): _____

Following data entry, separate this page from the survey and shred it immediately

Appendix A. Baseline Questionnaire

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Appendix A. Baseline Questionnaire

SECTION 1

1. Date of Interview			/			/			**Time of Interview**			:		
	m	m		d	d		y	y		24-hour clock				
2. ED Date			/			/			**ED Arrival Time**			:		

Interviewer: *Please rate the level of consciousness and speech of participant.*

3. Level of Participant's Consciousness (Check the <u>one</u> that best fits)

- ☐ Alert (eyes open spontaneously)
- ☐ Restless (pressured speech, constantly in motion, easily distracted)
- ☐ Agitated (yelling, threatening, combative)
- ☐ Drowsy (eyes closed but open to voice)
- ☐ Sleeping (does not open eyes to voice)
- ☐ Comatose (does not open eyes to pain)

4. Participant's Speech:

***Interviewer* PROMPT**: "Do you know what time of day it is?"

☐ Yes ☐ No ☐ Don't Know

<u>Participant's Status</u>:

- ☐ Normal conversation and speech, oriented (knows where they are, the date, and their name)
- ☐ Normal conversation, but slurred speech, oriented
- ☐ Confused or disoriented, but speaking in sentences using recognizable words
- ☐ Nonsense or incomprehensible words or phrases, moaning

<u>INTERVIEWER</u>

<u>To give consent, the participant must be alert/oriented.</u>

1. ***If participant is alert and oriented, proceed with consent process and interview.***
2. ***If participant is not alert and oriented, try again later.***
3. ***If participant remains confused or comatose, obtain consent from an appropriate proxy (someone who knows the patient well, e.g. a family member) and interview the proxy.***

Appendix A. Baseline Questionnaire

Interviewer: *Unless the participant requests otherwise, the interview should be conducted one-on-one.*

5. Is anyone else present during this interview?

☐ Yes
☐ No (SKIP TO **QUESTION 6**)

5a. Has the participant specifically requested someone else to be present?

☐ Yes
☐ No

5b. What is the person/people's relationship(s) to the patient? (Check ALL that apply)

☐ Partner / Spouse
☐ Family member other than spouse; **Specify:** _____
☐ Friend
☐ Police
☐ Ambulance / Paramedics
☐ Other; **Specify:** _____
☐ Not Applicable

6. Participant's Consent

☐ Yes (Ensure consent/assent form is signed – verbal or written)
☐ No

Interviewer: For the remaining questions in the interview, please use the following codes to indicate participant's responses when applicable.

- When a participant answers: "Don't know", write **"DK"** besides the question
- When a participant refuses to answer a question, write **"R"** besides the question
- If a question does not apply to the participant and there is no option for 'Not applicable', write **"NA"** besides the question

Note: All questions can only have ONE response, unless otherwise stated right beside the question

Appendix A. Baseline Questionnaire

SECTION 2

I am going to ask you some questions about the accident. **Please tell me what happened to you during the accident.**

1. Were you a…?

- ☐ Driver
- ☐ Passenger
- ☐ Motorcyclist
- ☐ Pedestrian
- ☐ Cyclist

2. When did this accident occur?

Date (MM/DD/YY): _____

Time (24-hour clock): _____

Interviewer: *If more than 24-hours have passed between the time of the accident and the time of this interview, stop the interview and thank the participant for their time. For admitted patients, the interview can be completed at any time during their admission to the hospital from the time of the accident – try to enrol them as soon as possible.*

Participant's Study Eligibility:

- ☐ Yes (*i.e.* accident occurred within 24 hours of the interview **OR** patients are interviewed about their accident at some point during their admission to the hospital for ADMITTED patients only → proceed with the interview)
- ☐ No (*i.e.* accident occurred over 24 hours ago → stop the interview and thank the participant for their time)

If the participant was a driver or motorcyclist, SKIP TO **SECTION 2A** (page 8).
If the participant was a passenger, SKIP TO **SECTION 2B** (page 10).
If the participant was a pedestrian, SKIP TO **SECTION 2C** (page 12).
If the participant was a cyclist, SKIP TO **SECTION 2D** (page 13).

Appendix A. Baseline Questionnaire

SECTION 2A: DRIVER/MOTORCYCLIST

A1. What type of vehicle were you driving?

- ☐ Car, sedan, or convertible (small-sized vehicle)
- ☐ SUV, jeep, light truck, or minivan (medium-sized vehicle)
- ☐ Commercial vehicle, bus, semi-truck, or big truck (large-sized vehicle)
- ☐ Motorcycle / Scooter

A2. How many vehicles were involved in this accident?

- ☐ One (*i.e.* single vehicle – including crashing into parked cars)
- ☐ Two (including your vehicle)
- ☐ Three or more

A3. Do you know the type of the other vehicle(s) involved? (Check ALL that apply)

- ☐ Car, sedan, or convertible (small-sized vehicle)
- ☐ SUV, jeep, light truck, or minivan (medium-sized vehicle)
- ☐ Commercial vehicle, bus, semi-truck, or big truck (large-sized vehicle)
- ☐ Motorcycle / Scooter
- ☐ Not Applicable (*e.g.* single vehicle accidents)
- ☐ Don't Know

A4. Where did the accident occur?

- ☐ Main street (*e.g.* multi-lanes, lots of traffic, *etc.*)
- ☐ Side street (*e.g.* less traffic, residential area, *etc.*)
- ☐ Ramp (*e.g.* exit or entrance ramp, *etc.*)
- ☐ Highway

If uncertain, write participant's response here: _____

A5. Did this accident occur at an intersection?

- ☐ Yes
- ☐ No

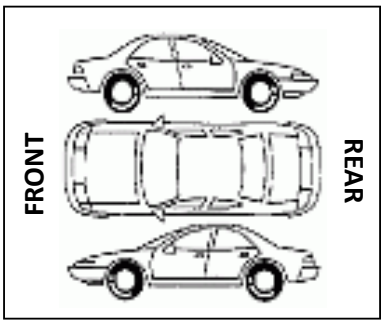
A6. How fast was your vehicle travelling?

- ☐ Slow speed (< 30 km/hr)
- ☐ Moderate speed (30-60 km/hr)
- ☐ High speed (> 60 km/hr)
- ☐ Don't Know

A7. What side of your vehicle was hit? (Check ALL that apply)

Interviewer: Circle the area(s) of impact on the diagram to the right.

- ☐ Side (right side angle)
- ☐ Side (left side angle)
- ☐ Side (right side swipe)
- ☐ Side (left side swipe)
- ☐ Back (rear-ended)



Appendix A. Baseline Questionnaire

☐ Front (head-on collision)

A8. Were you wearing a seatbelt? (If the vehicle was a motorcycle/scooter: Were you wearing a helmet?)

☐ Yes
☐ No

A9. Was the airbag deployed?

☐ Yes
☐ No
☐ Not Applicable

A10. Did you strike the windshield or any object in the car/motorcycle?

☐ Yes
☐ No
☐ Not Applicable

A11. Was your vehicle severely damaged? For example: Did the vehicle have to be towed away? Was the vehicle drivable after the accident? Could you open the vehicle door? Was there major damage or intrusion into the vehicle**?**

☐ Yes
☐ No
☐ Don't Know

Next: Go to **Section 3** (Page 15)

Appendix A. Baseline Questionnaire

SECTION 2B: PASSENGER

B1. What type of motor vehicle were you a passenger in?

- ☐ Car, sedan, or convertible (small-sized vehicle)
- ☐ SUV, jeep, light truck, or minivan (medium-sized vehicle)
- ☐ Commercial vehicle, bus, semi-truck, or big truck (large-sized vehicle)
- ☐ Motorcycle / Scooter

B2. How many vehicles were involved in this accident?

- ☐ One (*i.e.* single vehicle – including crashing into parked cars)
- ☐ Two (including your vehicle)
- ☐ Three or more

B3. Do you know the type of the other vehicle(s) involved? (Check ALL that apply)

- ☐ Car, sedan, or convertible (small-sized vehicle)
- ☐ SUV, jeep, light truck, or minivan (medium-sized vehicle)
- ☐ Commercial vehicle, bus, semi-truck, or big truck (large-sized vehicle)
- ☐ Motorcycle / Scooter
- ☐ Not Applicable (For single-vehicle accidents)
- ☐ Don't Know

B4. Where did the accident occur?

- ☐ Main street (*e.g.* multi-lanes, lots of traffic, *etc.*)
- ☐ Side street (*e.g.* less traffic, residential area, *etc.*)
- ☐ Ramp (*e.g.* exit or entrance ramp, *etc.*)
- ☐ Highway

If uncertain, write participant's response here: _____

B5. Did this accident occur at an intersection?

- ☐ Yes
- ☐ No

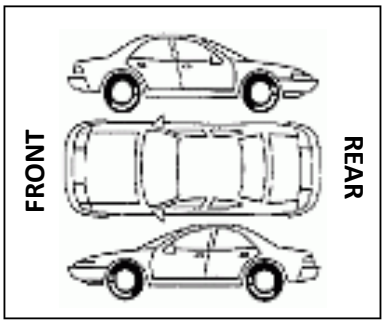
B6. How fast was the vehicle travelling?

- ☐ Slow speed (< 30 km/hr)
- ☐ Moderate speed (30-60 km/hr)
- ☐ High speed (> 60 km/hr)
- ☐ Don't Know

B7. What side of the vehicle was hit? (Check ALL that apply)

Interviewer: Circle the area(s) of impact on the diagram to the right.

- ☐ Side (right side angle)
- ☐ Side (left side angle)
- ☐ Side (right side swipe)
- ☐ Side (left side swipe)
- ☐ Back (rear-ended)



Appendix A. Baseline Questionnaire

☐ Front (head-on collision)

Appendix A. Baseline Questionnaire

B8. What was your seating location when the accident occurred (vehicle passenger)?

- ☐ Front row: passenger seat
- ☐ Back or middle row: right seat
- ☐ Back or middle row: middle seat
- ☐ Back or middle row: left seat
- ☐ Passenger seat (motorcycle)

B9. Were you wearing a seatbelt (If the vehicle was a motorcycle/scooter: Were you wearing a helmet?)

- ☐ Yes
- ☐ No

B10. Was the airbag deployed?

- ☐ Yes
- ☐ No
- ☐ Not Applicable

B11. Did you strike the windshield or any object in the car/motorcycle?

- ☐ Yes
- ☐ No
- ☐ Not Applicable

B12. Was your vehicle severely damaged? For example: Did the vehicle have to be towed away? Was the vehicle drivable after the accident? Could you open the vehicle door? Was there major damage or intrusion into the vehicle**?**

- ☐ Yes
- ☐ No
- ☐ Don't Know

Next: Go to **Section 3** (Page 15)

Appendix A. Baseline Questionnaire

SECTION 2C: PEDESTRIAN

C1. What type of motor vehicle hit you?

- ☐ Car, sedan, or convertible (small-sized vehicle)
- ☐ SUV, jeep, light truck, or minivan (medium-sized vehicle)
- ☐ Commercial vehicle, bus, semi-truck, or big truck (large-sized vehicle)
- ☐ Motorcycle / Scooter
- ☐ Don't Know

C2. What was the speed of the vehicle that hit you?

- ☐ Slow speed (< 30 km/hr)
- ☐ Moderate speed (30-60 km/hr)
- ☐ High speed (> 60 km/hr)
- ☐ Don't Know

C3. Where did the accident occur?

- ☐ Main street (*e.g.* multi-lanes, lots of traffic, *etc.*)
- ☐ Side street (*e.g.* less traffic, residential area, *etc.*)
- ☐ Ramp (*e.g.* exit or entrance ramp, *etc.*)
- ☐ Highway

If uncertain, write participant's response here: _____

C4. Did the accident occur at an intersection?

- ☐ Yes
- ☐ No

C5. What side of your body did the vehicle hit? (Check ALL that apply)

- ☐ Front
- ☐ Back
- ☐ Left
- ☐ Right

C6. What was the vehicle doing at the time of impact?

- ☐ Turning right
- ☐ Turning left
- ☐ Driving straight
- ☐ Reversing

C7. Which part of the vehicle hit you?

- ☐ Front (*i.e.* vehicle struck you head-on)
- ☐ Back (*i.e.* vehicle was reversing)
- ☐ Side (*e.g.* side swipe)

Next: Go to **Section 3** (Page 15)

Appendix A. Baseline Questionnaire

SECTION 2D: CYCLIST

D1. How fast were you travelling?

- ☐ Slow speed (*e.g.* not going faster than a walking pace / brisk walk)
- ☐ Moderate speed (*e.g.* faster than a brisk walk, but slower than traffic)
- ☐ High speed (*e.g.* with or faster than the speed of traffic)

D2. What type of motor vehicle hit you?

- ☐ Car, sedan, or convertible (small-sized vehicle)
- ☐ SUV, jeep, light truck, or minivan (medium-sized vehicle)
- ☐ Commercial vehicle, bus, semi-truck, or big truck (large-sized vehicle)
- ☐ Motorcycle / Scooter

D3. What was the speed of the vehicle that hit you?

***Interviewer* PROMPT:** Was the vehicle driving over the speed limit?

- ☐ Slow speed (< 30 km/hr)
- ☐ Moderate speed (30-60 km/hr)
- ☐ High speed (> 60 km/hr)
- ☐ Don't Know

D4. Where did the accident occur?

- ☐ Main street (*e.g.* multi-lanes, lots of traffic, *etc.*)
- ☐ Side street (*e.g.* less traffic, residential area, *etc.*)
- ☐ Ramp (*e.g.* exit or entrance ramp, *etc.*)
- ☐ Highway

If uncertain, write participant's response here: _____

D5. Did the accident occur at an intersection?

- ☐ Yes
- ☐ No

D6. Did the vehicle hit you, your bike, or both?

- ☐ Yes, hit cyclist only
- ☐ Yes, hit bike only
- ☐ Yes, hit cyclist and bike

D7. What side of your body did the vehicle hit? (Check ALL that apply)

- ☐ Front
- ☐ Back
- ☐ Left
- ☐ Right

Appendix A. Baseline Questionnaire

D8. What was the vehicle doing at the time of impact?

- ☐ Turning right
- ☐ Turning left
- ☐ Driving straight
- ☐ Reversing

D9. Which part of the vehicle hit you?

- ☐ Front (*i.e.* vehicle struck you head-on)
- ☐ Back (*i.e.* vehicle was reversing)
- ☐ Side (*e.g.* side swipe)

D10. Were you wearing a helmet?

- ☐ Yes
- ☐ No

D11. Besides a helmet, were you wearing any outfit/gear that can provide you some protection from injury?

- ☐ Yes; **Please describe:** _____

  _____
- ☐ No

Next: Go to **Section 3** (Page 15)

Appendix A. Baseline Questionnaire

SECTION 3

1. **Can you tell me the location and type of injury you sustained?** Use the picture and describe the injuries. (Check ALL that apply)

i. Head (skull and brain)
- ☐ Superficial injury
- ☐ Fracture
- ☐ Burn
- ☐ Eye injury
- ☐ Internal injury

ii. Neck
- ☐ Superficial injury
- ☐ Fracture
- ☐ Sprain / Strain

iii. Chest
- ☐ Superficial injury
- ☐ Fracture
- ☐ Burn
- ☐ Internal injury

iv. Abdomen
- ☐ Superficial injury
- ☐ Burn
- ☐ Internal injury

v. Pelvis
- ☐ Superficial injury
- ☐ Fracture
- ☐ Internal injury

vi. Spine (vertebrae)
- ☐ Fracture
- ☐ Dislocation

vii. Back
- ☐ Superficial injury
- ☐ Fracture
- ☐ Internal injury

viii. Upper Extremity
- ☐ Superficial injury
- ☐ Fracture
- ☐ Burn

ix. Lower Extremity
- ☐ Superficial injury
- ☐ Fracture
- ☐ Burn

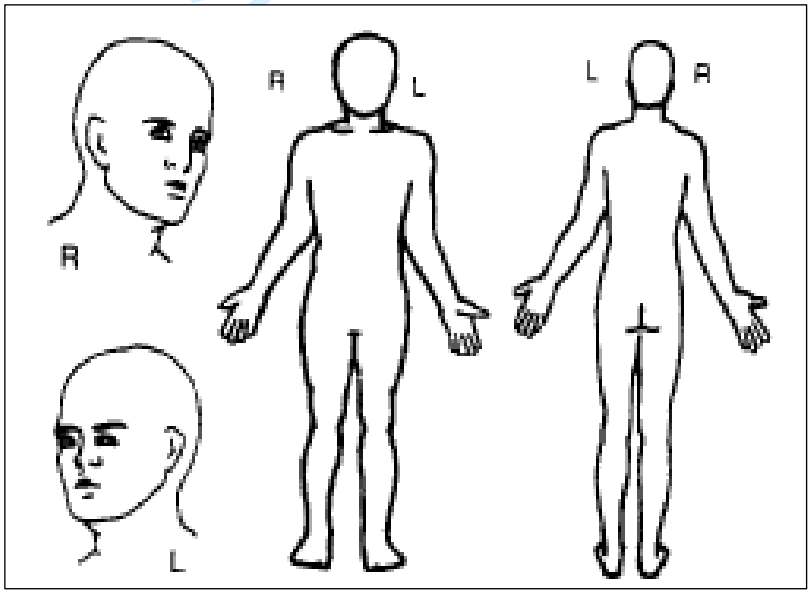
x. Other: _____

_____

_____

_____

_____



Appendix A. Baseline Questionnaire

2. Have you ever had any complaints in the involved body area(s) before this accident?

☐ Yes ☐ No ☐ Don't Know

If yes, were they present at the time of the accident? ☐ Yes ☐ No ☐ Don't Know

If yes, can you tell me about these complaints prior to the accident?

_____

_____

3. At the time of the accident, did you feel any pain immediately after the accident? (Check ALL that apply)

Interviewer: *Prompt the following symptoms.*

☐ Headache
☐ Chest pain
☐ Back pain
☐ Stiff back
☐ Neck pain
☐ Stiff neck
☐ Irritability
☐ Numbness in toes
☐ Face flushed
☐ Cold hands
☐ Cold feet
☐ Shortness of breath
☐ Pins and needles (arms)
☐ Pins and needles (legs)
☐ Ringing in ears
☐ Dizziness
☐ Tension
☐ Memory loss
☐ Other; **Please specify:**

_____

_____

☐ None

4. On a scale of 0 to 10, where '0' is no pain and '10' is the worst pain possible, how much pain are you currently experiencing?

No Pain		Mild		Moderate		Severe		Very Severe		Worst Pain Possible
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

Current pain level = ☐

5. How long do you think it will take for you to fully recover from your injuries?

☐ Less than a week
☐ 1 week to less than a month
☐ 1 month to less than 3 months
☐ 3 months to less than 6 months
☐ 6 months or more

Appendix A. Baseline Questionnaire

SECTION 4

The next questions are about your medical history. For the first question, I will ask if you have ever been diagnosed with specific diseases and you can answer "Yes" or "No". **If** you answer "Yes" to any disease, I would appreciate if you can also tell me if you are/have been treated for it or if it has remained untreated.

1. Has a healthcare professional ever diagnosed you with the following?

	Yes	No	Don't Know / Refused	Treating /Treated	Untreated	Don't Know / Refused	Not Applicable
a. Eye disease	☐	☐	☐	☐	☐	☐	☐
b. Arthritis	☐	☐	☐	☐	☐	☐	☐
c. Diabetes	☐	☐	☐	☐	☐	☐	☐
d. Respiratory disease (*e.g.* COPD)	☐	☐	☐	☐	☐	☐	☐
e. Heart disease	☐	☐	☐	☐	☐	☐	☐
f. Hypertension	☐	☐	☐	☐	☐	☐	☐
g. Cerebrovascular accident (CVA) / Stroke	☐	☐	☐	☐	☐	☐	☐
h. Epilepsy	☐	☐	☐	☐	☐	☐	☐
i. Kidney disease	☐	☐	☐	☐	☐	☐	☐
j. Psychiatric disease	☐	☐	☐	☐	☐	☐	☐
k. Other: _____	☐	☐	☐	☐	☐	☐	☐

2. Are you currently taking any prescribed medications? (Refer to Medical Record Forms)

Interviewer: *Ask the patient to list medications they are currently taking and, if their Medical Record Form is available, ask the patient if they are taking the listed medications (skip those already mentioned).*

_____

_____ ☐ None

3. Are you taking any over-the-counter medications?

☐ Yes; **Specify:** _____

☐ No

4. Do you take any medications for…?

	Yes	No	Don't Know	Refused	Not Applicable
a. Sleep	☐	☐	☐	☐	☐

Appendix A. Baseline Questionnaire

b. Anxiety	☐	☐	☐	☐	☐
c. Pain	☐	☐	☐	☐	☐
d. Depression	☐	☐	☐	☐	☐

5a. Do you ever drink alcohol (including beer, wine, hard liquor, *etc.*)?

- ☐ Yes
- ☐ No (SKIP TO **QUESTION 6A**)

5b. During the last 4 weeks, how often did you have any kind of drink containing alcohol?

- ☐ Daily or almost daily (6 or 7 times a week)
- ☐ Three to five times a week
- ☐ Once or twice a week
- ☐ Less than once a week
- ☐ None in the last 4 weeks

6a. Do you ever use marijuana (including medical marijuana)?

- ☐ Yes
- ☐ No (SKIP TO **QUESTION 7A**)

6b. During the last 4 weeks, how often did you use marijuana (including medical marijuana)?

- ☐ Daily or almost daily (6 or 7 times a week)
- ☐ Three to five times a week
- ☐ Once or twice a week
- ☐ Less than once a week
- ☐ None in the last 4 weeks

7a. Do you ever use any other recreational drugs such as cocaine, heroin, or methamphetamine?

- ☐ Yes
- ☐ No (SKIP TO **SECTION 5**)

7b. Which other recreational drugs have you ever used?

- ☐ Cocaine
- ☐ Heroin (or other opiates such as fentanyl or morphine)
- ☐ Methamphetamine
- ☐ Ecstasy (MDMA)
- ☐ Other; **Please specify:** _____

7c. During the last 4 weeks, how often did you use any of these drugs?

- ☐ More than once a week
- ☐ Less than once a week
- ☐ None in the last 4 weeks

Appendix A. Baseline Questionnaire

Appendix A. Baseline Questionnaire

SECTION 5

Please indicate which statements best describe your own health state **a day before the accident**.

1. MOBILITY

- ☐ I have no problems in walking about
- ☐ I have slight problems in walking about
- ☐ I have moderate problems in walking about
- ☐ I have severe problems in walking about
- ☐ I am unable to walk about

2. SELF-CARE

- ☐ I have no problems washing or dressing myself
- ☐ I have slight problems washing or dressing myself
- ☐ I have moderate problems washing or dressing myself
- ☐ I have severe problems washing or dressing myself
- ☐ I am unable to wash or dress myself

3. USUAL ACTIVITIES (*e.g. work, study, housework, family or leisure activities)*

- ☐ I have no problems doing my usual activities
- ☐ I have slight problems doing my usual activities
- ☐ I have moderate problems doing my usual activities
- ☐ I have severe problems doing my usual activities
- ☐ I am unable to do my usual activities

4. PAIN/DISCOMFORT

- ☐ I have no pain or discomfort
- ☐ I have slight pain or discomfort
- ☐ I have moderate pain or discomfort
- ☐ I have severe pain or discomfort
- ☐ I have extreme pain or discomfort

5. ANXIETY/DEPRESSION

- ☐ I am not anxious or depressed
- ☐ I am slightly anxious or depressed
- ☐ I am moderately anxious or depressed
- ☐ I am severely anxious or depressed
- ☐ I am extremely anxious or depressed

Appendix A. Baseline Questionnaire

6. **We would like to know how good or bad your health was a day before the accident.** This scale is numbered from 0 to 100. A '100' indicates the best health you can imagine, while a '0' indicates the worst health you can imagine. Mark an 'X' on the scale to indicate how your health is a day before the accident. Then please write the number you marked on the scale in the box below.

Worst health you can imagine — Best health you can imagine

0 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Your health a day before = ☐

Appendix A. Baseline Questionnaire

SECTION 6

Now I am going to ask you about your general feelings. Please think about how you were feeling in the **past 2 weeks before this accident.**

Over the past 2 weeks, how often have you been bothered by the following problems? (Circle only one answer per question)

	Not at all	Several days	More than half the days	Nearly everyday
1. Feeling nervous, anxious, or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Little interest or pleasure in doing things	0	1	2	3
4. Feeling down, depressed, or hopeless	0	1	2	3

Appendix A. Baseline Questionnaire

SECTION 7

Please think about your health and conditions **4 weeks prior to this accident**.

1. **In general, would you say your health before this crash was…?** (Check only one box)

☐ Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor

2. **Health and daily activities before this crash.** The following questions are about activities you might do during a typical day. Does your health limit you in these activities? If so, how much? (*Please check only one box per line*)

	Yes, limited a lot	Yes, limited a little	No, not limited at all
a. **Moderate activities, such as moving a table, pushing a vacuum, bowling, or playing golf**	☐	☐	☐
b. **Climbing several flights of stairs**	☐	☐	☐

3. **During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?** (Please answer "Yes" or "No" to each question)

	Yes	No
a. **Accomplished less than you would like**	☐	☐
b. **Limited in the kind of work or other activities**	☐	☐

4. **During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?** (Please answer "Yes" or "No" to each question)

	Yes	No
a. **Accomplished less than you would like**	☐	☐
b. **Did not do work or other activities as carefully as usual**	☐	☐

5. **During the past 4 weeks, how much did pain interfere with your normal work (including work outside the home and housework)?** (Please check only one box)

☐ Not at all ☐ A little bit ☐ Moderately ☐ Quite a bit ☐ Extremely

Appendix A. Baseline Questionnaire

Your Feelings: Now we would like to ask about your feelings in health.

These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please indicate the one answer that comes closest to the way you have been feeling. (Please check only one box per question)

6. How much time during the past 4 weeks:

	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
a. Have you felt calm and peaceful?	☐	☐	☐	☐	☐	☐
b. Did you have a lot of energy?	☐	☐	☐	☐	☐	☐
c. Have you felt downhearted and low?	☐	☐	☐	☐	☐	☐
d. Has your health limited your social activities (*e.g.* visiting friends or close relatives)?	☐	☐	☐	☐	☐	☐

Appendix A. Baseline Questionnaire

SECTION 8

In the 4 weeks prior to your injury, how much have you been bothered by any of the following problems?

	Not bothered at all (0)	Bothered a little (1)	Bothered a lot (2)
a. Stomach pain	☐	☐	☐
b. Back pain	☐	☐	☐
c. Pain in your arms, legs, or joints (knees, hips, *etc.*)	☐	☐	☐
d. Menstrual cramps or other problems with your periods (WOMEN ONLY)	☐	☐	☐
e. Headaches	☐	☐	☐
f. Chest pain	☐	☐	☐
g. Dizziness	☐	☐	☐
h. Fainting spells	☐	☐	☐
i. Feeling your heart pound or race	☐	☐	☐
j. Shortness of breath	☐	☐	☐
k. Pain or problems during sexual intercourse	☐	☐	☐
l. Constipation, loose bowels, or diarrhea	☐	☐	☐
m. Nausea, gas, or indigestion	☐	☐	☐

Appendix A. Baseline Questionnaire

n. Feeling tired or having low energy	☐	☐	☐
o. Trouble sleeping	☐	☐	☐

Appendix A. Baseline Questionnaire

SECTION 9

Interviewer: Read the following to the participant.

Everyone experiences painful situations at some point in their lives. Such experience may include headaches, tooth pain, joint or muscle pain. People are often exposed to situations that may cause pain such as illness, injury, dental procedures or surgery.

We are interested in the types of thoughts and feelings that you have when you are in pain. Listed below are 13 statements describing different thoughts and feelings that may be associated with pain. Using the following scale, please indicate the degree to which you have these thoughts and feelings when you are experiencing pain.

Interviewer: The PCS is a validated questionnaire. Make sure the participant understands that we are asking about their response to physical pain (**not** psychological/emotional or overall pain).

Please tell me how you would describe your different thoughts and feelings about pain ***before this accident.***

0 = Not at all; **1** = To a slight degree; **2** = To a moderate degree; **3** = To a great degree; **4** = All the time

When I'm in pain:

_____ **I become afraid that the pain will get worse.**

_____ **I feel I can't stand it anymore.**

_____ **I can't seem to keep it out of my mind.**

_____ **There's nothing I can do to reduce the intensity of the pain.**

_____ **I wonder whether something serious may happen.**

_____ **It's awful and I feel that it overwhelms me.**

_____ **I worry all the time about whether the pain will end.**

_____ **I keep thinking about how much it hurts.**

_____ **I keep thinking about how badly I want the pain to stop.**

_____ **I feel I can't go on.**

_____ **It's terrible and I think it's never going to get any better.**

_____ **I keep thinking of other painful events.**

_____ **I anxiously want the pain to go away.**

Appendix A. Baseline Questionnaire

SECTION 10

These are questions about your general health and work.

1. **What is the highest degree of education you have achieved?**

   Interviewer: Classify the participant's response under the most appropriate option.

   - ☐ I never finished school or any training program
   - ☐ Primary or elementary school (Kindergarten to Grade 7)
   - ☐ Lower general secondary school (Grades 8 to 10)
   - ☐ Higher general secondary education (Grades 11 and 12)
   - ☐ Junior vocational education (1 to 2 years of trades school/apprenticeship training)
   - ☐ Intermediate vocational education (3 years of trades school/apprenticeship training)
   - ☐ School for higher vocational education (4 or more years of trades school/apprenticeship training)
   - ☐ University (Bachelor's degree or Associate's degree/2-year diploma)
   - ☐ I achieved another degree (Master's or Doctoral degree; or other education); **Specify:** _____

   If uncertain, write participant's response here: _____

2. **What do you do?** Select one option for what you usually do.
   - ☐ I go to school, I am studying (Full-time school, part-time work; *i.e.* more school than work)
   - ☐ I am employed (Full-time work, part-time school; *i.e.* more work than school)
   - ☐ I am self-employed
   - ☐ I am a housewife or husband
   - ☐ I am unemployed
   - ☐ I am unable to work, for _____%
   - ☐ I am retired or on a pre-pension plan
   - ☐ I do something else; **Specify:** _____

3. **Do you have a paying job?**
   - ☐ Yes
   - ☐ No (SKIP TO **QUESTION 13**)

The following questions refer to your work/job. That is work that you get paid for. If you do not have a paying job? SKIP TO **QUESTION 13**. *Please first read the explanation above the question.*

4. **What is your occupation?** _____

5. **How many days a week do you work?** _____ **days** (on average)

6. **How many hours a week do you work?** (Count only the hours that you get paid) _____ **hours**

Appendix A. Baseline Questionnaire

The following questions refer to productivity losses.

Interviewer: *The next 3 questions refer to absenteeism (absence from paid work; sick leave).*

7. **Have you worked at all in the last 4 weeks?**
   - ☐ Yes (If yes, SKIP TO **QUESTION 9)**
   - ☐ No

8. **When did you call in sick?** *(Long-term absence)* ☐☐ / ☐☐ / ☐☐
   m m d d y y

   (This is the date that you first got sick earlier than the period of 4 weeks. This is referring to one whole uninterrupted period of missed work as a result of being sick**)**

   Next: *If the participant has not worked in the last 4 weeks and earlier than the last 4 weeks,* SKIP TO **QUESTION 13**. Please first read the explanation above question 13.

9. **Have you missed work in the last 4 weeks as a result of being sick?** *(Short-term absence)*
   - ☐ Yes, I have missed _____ **work days**
   - ☐ No

Interviewer: *The next 3 questions refer to presenteeism (lost workplace productivity).*

10. **During the last 4 weeks, have there been days in which you worked but during that time were bothered by physical or psychological problems?**
    - ☐ Yes (If yes, GO TO **QUESTIONS 11 and 12**)
    - ☐ No (If no, SKIP TO **QUESTION 13** – read the explanation above question 13)

11. **How many days at work were you bothered by physical or psychological problems?** (Only count the days at work in the last 4 weeks) _____ **work days**

12. **On the days that you were bothered by these problems, was it perhaps difficult to get as much work finished as you normally do? On these days how much work could you do on average?** Look at the figures below. A '10' indicates that you were able to do as much work as you normally do, while a '0' indicates that you were unable to do any work on these days. Circle the figure that fits best.

On these days I could not do anything				I was able to do half as much as I normally do						I was able to do just as much as I normally do
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

Appendix A. Baseline Questionnaire

Interviewer: *Productivity losses of unpaid work.*

Interviewer: Please read the following explanation to the participant.

Explanation: Even for unpaid work, you can be bothered by physical or psychological problems. Sometimes as a result you (might) do less. For example, you have trouble caring for your children or doing voluntary work. Or you are unable to run errands and pick up groceries, or to work in the garden. The following questions refer to this.

13. **Thinking only about the past four weeks, were there days in which you were forced to do less unpaid work because of physical or psychological problems?**
    - ☐ Yes (If yes, GO TO **QUESTIONS 14 AND 15**)
    - ☐ No (If no, SKIP TO **SECTION 11**)

14. **How many days did this happen?** (Only count the days in the last 4 weeks) _____ **days**

15. **Imagine that somebody, for example your partner, family member, or friend helped you on these days, and he or she did all the unpaid work that you were unable to do for you. How many hours on average did that person spend doing this on these days?**

    On average _____ hours on these days

Appendix A. Baseline Questionnaire

SECTION 11

To conclude the interview, I would like to ask you some general questions.

1. **What ethnic group or family background do you identify yourself as?** (Check ALL that apply)
   - ☐ Caucasian / White (*e.g.* European)
   - ☐ Chinese
   - ☐ South Asian (*e.g.* East Indian, Pakistani, Sri Lankan)
   - ☐ Black (*e.g.* African, Jamaican or Caribbean)
   - ☐ Filipino
   - ☐ Latin American
   - ☐ Southeast Asian (*e.g.* Cambodian, Indonesian, Laotian, Vietnamese)
   - ☐ Arab (*e.g.* Arabic speaking, Maghrebi)
   - ☐ West Asian (*e.g.* Afghan, Iranian, Israeli, Turkish)
   - ☐ Japanese
   - ☐ Korean
   - ☐ Aboriginal (*e.g.* North American Indian, Métis, Inuit)
   - ☐ Other; **Specify:** _____
   - ☐ Refused
2. **How long have you lived in Canada?**
   - ☐ Entire life
   - ☐ More than 10 years
   - ☐ 5 to 10 years
   - ☐ 2 to 5 years
   - ☐ < 2 years
3. **What type of place do you reside in?**
   - ☐ Own home (*e.g.* house, apartment, renting, basement suite, *etc.*)
   - ☐ Assisted living
   - ☐ Care home (*e.g.* nursing home - regular nursing care, *etc.*)
   - ☐ No fixed address
   - ☐ Other; **Specify:** _____
4. **Who do you reside with?** (Check ALL that apply)
   - ☐ No one (*i.e.* live alone)
   - ☐ Spouse / Partner (or equivalent)
   - ☐ Child / Children (or equivalent)
   - ☐ Parent(s) (or equivalent)
   - ☐ Friend(s) / Roommate(s)
   - ☐ Other; **Specify:** _____
5. **What language do you speak most frequently at home or with family?**

   _____

PERMISSION FOR FOLLOW-UP

Participant ID: | | | - | | | | | |

Appendix A. Baseline Questionnaire

May we have your permission to link your answers in this survey to your health care use (such as hospital visits, doctor visits, and medications) due to this injury? ☐ Yes ☐ No

May we contact you again to ask you questions about your recovery? The first follow-up will be two months from now.

☐ Yes

☐ No (withdraw from the study). **Reason** (*if provided*): _____

If yes, can you provide us your contact information?

First and Last Name: _____ **Preferred Name:** _____

Phone Number: _____ ☐ Home ☐ Mobile ☐ Work

Alternative Phone Number: _____ ☐ Home ☐ Mobile ☐ Work

Mailing Address: _____

City: _____ **Postal Code:** _____

Email Address: _____

Best Time to Contact: _____

What is your preferred method of contact?

☐ Telephone

☐ Email

☐ Mail

What is your preferred method for completing the follow-up interviews?

☐ Telephone

☐ In-person (For this option, the patient has to be willing to come to the research office at VGH)

☐ Online survey

☐ Paper survey

If we are unable to contact you, is there an alternative person we may contact with your permission? If yes, can you provide us with their contact information?

First and Last Name: _____ **Relationship:** _____

Phone Number: _____ ☐ Home ☐ Mobile ☐ Work

Email Address: _____

Best Time to Contact: _____

****DETACH THIS SHEET UPON INPUTTING DATA AND STORE SEPARATELY****

Appendix B. Follow-Up Questionnaires

Road Trauma Health Outcome Study
2- or 4-Month Follow-Up Questionnaire

Participant ID ☐☐-☐☐☐☐☐

Interview Date ☐☐ / ☐☐ / ☐☐☐☐ (m m / d d / y y y y)

Interviewer ID ☐☐

Follow-Up Month ☐☐

Site (*circle*) VGH | RCH | KGH

Method Telephone | In-Person

Please indicate who is completing the questionnaire:

☐ Participant ☐ Participant with assistance from another person

☐ Another person on behalf of the participant

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F/U Gift Card Received/Mailed/Emailed: ☐ Yes ☐ No

REDCap Data Entered: ☐☐ / ☐☐ / ☐☐ (m m / d d / y y)

Appendix B. Follow-Up Questionnaires

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Appendix B. Follow-Up Questionnaires

SECTION 1

1. **Have you fully recovered from the accident?**
   - ☐ Yes
   - ☐ No

2. **Are you back to your previous daily activities as usual (prior to the accident)?**
   - ☐ Yes
   - ☐ No

3. **Are you back to your previous activities at work or school?**
   - ☐ Yes
   - ☐ No
   - ☐ Not Applicable (I was not working or going to school prior to the accident)

4. **Are you back to your previous recreational activities as usual?**
   - ☐ Yes
   - ☐ No

5. **After you left the hospital, did you have to return to the hospital for your injury from the accident?**
   - ☐ Yes, kept in the hospital overnight
   - ☐ Yes, emergency department only
     - ☐ One time
     - ☐ More than one time
   - ☐ No

6. **Have you seen any physicians or therapists because of your injury from the accident?** (Check ALL that apply)
   - ☐ Family doctor / General Practitioner (GP)
   - ☐ Specialist
   - ☐ Physical Therapist or Physiotherapist (PT) / Occupational Therapist (OT)
   - ☐ Chiropractor
   - ☐ Other; **Please specify:** _____

7. **Did the accident cause you any financial difficulties?**
   - ☐ Yes; **Please describe:** _____
     _____
   - ☐ No

8. **Did the crash cause you any legal difficulties?**
   - ☐ Yes; **Please describe:** _____
     _____
   - ☐ No

Appendix B. Follow-Up Questionnaires

9. **Please tell us about any problems, health-related or otherwise, you might be having due to the accident:**

_____

_____

_____

_____

_____

_____

Appendix B. Follow-Up Questionnaires

SECTION 2

Please indicate which statements best describe your state of health **today**.

1. MOBILITY

- ☐ I have no problems in walking about
- ☐ I have slight problems in walking about
- ☐ I have moderate problems in walking about
- ☐ I have severe problems in walking about
- ☐ I am unable to walk about

2. SELF-CARE

- ☐ I have no problems washing or dressing myself
- ☐ I have slight problems washing or dressing myself
- ☐ I have moderate problems washing or dressing myself
- ☐ I have severe problems washing or dressing myself
- ☐ I am unable to wash or dress myself

3. USUAL ACTIVITIES (*e.g. work, study, housework, family or leisure activities)*

- ☐ I have no problems doing my usual activities
- ☐ I have slight problems doing my usual activities
- ☐ I have moderate problems doing my usual activities
- ☐ I have severe problems doing my usual activities
- ☐ I am unable to do my usual activities

4. PAIN/DISCOMFORT

- ☐ I have no pain or discomfort
- ☐ I have slight pain or discomfort
- ☐ I have moderate pain or discomfort
- ☐ I have severe pain or discomfort
- ☐ I have extreme pain or discomfort

5. ANXIETY/DEPRESSION

- ☐ I am not anxious or depressed
- ☐ I am slightly anxious or depressed
- ☐ I am moderately anxious or depressed
- ☐ I am severely anxious or depressed
- ☐ I am extremely anxious or depressed

Appendix B. Follow-Up Questionnaires

6. We would like to know how good or bad your health is <u>TODAY</u>. This scale is numbered from 0 to 100. A '100' indicates the best health you can imagine, while a '0' indicates the worst health you can imagine. Mark an 'X' on the scale to indicate how your health is <u>TODAY</u>. Then please write the number you marked on the scale in the box below.

Worst health you can imagine — Best health you can imagine

0 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Your health today = ☐

Appendix B. Follow-Up Questionnaires

SECTION 3

Now I am going to ask you about your general feelings. Please think about how you were feeling in the **past 2 weeks**.

For each question, please answer with one of the following responses:

1 = Not at all; **2** = A little bit; **3** = Moderately; **4** = Quite a bit; **5** = Extremely

---

In the past 2 weeks, how much have you been bothered by:

_____ **Repeated, disturbing memories, thoughts, or images of a stressful experience from the past?**

_____ **Repeated, disturbing dreams of a stressful experience from the past?**

_____ **Suddenly acting or feeling as if a stressful experience were happening again (as if you were reliving it)?**

_____ **Feeling very upset when something reminded you of a stressful experience from the past?**

_____ **Having physical reactions (*e.g. heart pounding, trouble breathing, or sweating)* when something reminded you of a stressful experience from the past?**

_____ **Avoid thinking about or talking about a stressful experience from the past or avoid having feelings related to it?**

_____ **Avoid activities or situations because they remind you of a stressful experience from the past?**

_____ **Trouble remembering important parts of a stressful experience from the past?**

_____ **Loss of interest in things that you used to enjoy?**

_____ **Feeling distant or cut off from other people?**

_____ **Feeling emotionally numb or being unable to have loving feelings for those close to you?**

_____ **Feeling as if your future will somehow be cut short?**

_____ **Trouble falling or staying asleep?**

_____ **Feeling irritable or having angry outbursts?**

_____ **Having difficulty concentrating?**

_____ **Being "super alert" or watchful or on guard?**

_____ **Feeling jumpy or easily startled?**

Appendix B. Follow-Up Questionnaires

SECTION 4

Please think about your health and conditions in the **past 4 weeks**.

1. **In general, would you say your health in the past 4 weeks was…?** (Check only one box)

   ☐ Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor

2. **Health and daily activities.** The following questions are about activities you might do during a typical day. Does your health limit you in these activities? If so, how much? (*Please check only one box per line*)

	Yes, limited a lot	Yes, limited a little	No, not limited at all
a. Moderate activities, such as moving a table, pushing a vacuum, bowling, or playing golf	☐	☐	☐
b. Climbing several flights of stairs	☐	☐	☐

3. **During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?** (Please answer "Yes" or "No" to each question)

	Yes	No
a. Accomplished less than you would like	☐	☐
b. Limited in the kind of work or other activities	☐	☐

4. **During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?** (Please answer "Yes" or "No" to each question)

	Yes	No
a. Accomplished less than you would like	☐	☐
b. Did not do work or other activities as carefully as usual	☐	☐

5. **During the past 4 weeks, how much did pain interfere with your normal work (including work outside the home and housework)?** (Please tick only one box)

   ☐ Not at all ☐ A little bit ☐ Moderately ☐ Quite a bit ☐ Extremely

Appendix B. Follow-Up Questionnaires

Your Feelings: Now we would like to ask about your feelings in health

These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please indicate the one answer that comes closest to the way you have been feeling. (Please check only one box per question)

6. How much time during the past 4 weeks:

	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
a. Have you felt calm and peaceful?	☐	☐	☐	☐	☐	☐
b. Did you have a lot of energy?	☐	☐	☐	☐	☐	☐
c. Have you felt downhearted and low?	☐	☐	☐	☐	☐	☐
d. Has your health limited your social activities (*e.g.* visiting friends or close relatives)?	☐	☐	☐	☐	☐	☐

Appendix B. Follow-Up Questionnaires

SECTION 5

During the past 4 weeks, how much have you been bothered by any of the following problems?

	Not bothered at all (0)	Bothered a little (1)	Bothered a lot (2)
p. Stomach pain	☐	☐	☐
q. Back pain	☐	☐	☐
r. Pain in your arms, legs, or joints (knees, hips, *etc.*)	☐	☐	☐
s. Menstrual cramps or other problems with your periods (WOMEN ONLY)	☐	☐	☐
t. Headaches	☐	☐	☐
u. Chest pain	☐	☐	☐
v. Dizziness	☐	☐	☐
w. Fainting spells	☐	☐	☐
x. Feeling your heart pound or race	☐	☐	☐
y. Shortness of breath	☐	☐	☐
z. Pain or problems during sexual intercourse	☐	☐	☐
aa. Constipation, loose bowels, or diarrhea	☐	☐	☐
bb. Nausea, gas, or indigestion	☐	☐	☐
cc. Feeling tired or having low energy	☐	☐	☐
dd. Trouble sleeping	☐	☐	☐

Appendix B. Follow-Up Questionnaires

SECTION 6

The questions in this section focus on how your injury affected your overall quality-of-life. We understand that some questions may not apply to you very well depending on the type of injuries you sustained. Please answer each question to the best of your ability.

Please answer the first question if you are not the participant. If you are the participant, please **SKIP TO QUESTION 2A**.

Consciousness

1. Is the participant able to obey simple commands or say any words?

- ☐ Yes
- ☐ No

Independence at Home

2a. Is the assistance of another person at home essential every day for some activities of daily living?

- ☐ Yes
- ☐ No (If no, SKIP TO **QUESTION 3A**)

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

- ☐ Yes
- ☐ No

2c. Was assistance at home essential before the injury?

- ☐ Yes
- ☐ No

Independence Outside of the Home

3a. Are you able to shop without assistance?

- ☐ Yes
- ☐ No

3b. Were you able to shop without assistance before the injury?

- ☐ Yes
- ☐ No

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

- ☐ Yes
- ☐ No

4b. Were you able to travel without assistance before the injury?

- ☐ Yes
- ☐ No

Work

5a. Are you currently able to work to your previous capacity?

- ☐ Yes (If yes, GO TO **QUESTION 6A**)
- ☐ No

Appendix B. Follow-Up Questionnaires

5b. How restricted are you?

- ☐ Reduced work capacity
- ☐ Able to work only in a sheltered workshop or non-competitive job or currently unable to work

5c. Were you working or seeking employment before the injury?

- ☐ Yes
- ☐ No

Social and Leisure Activities

6a. Are you able to resume regular social and leisure activities outside home?

- ☐ Yes (If yes, GO TO **QUESTION 7A**)
- ☐ No

6b. What is the extent of restriction on your social and leisure activities?

- ☐ Participate a bit less; at least half as often as before the injury
- ☐ Participate much less or unable to participate

Family and Friendships

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

- ☐ Yes
- ☐ No (If no, SKIP TO **QUESTION 8A**)

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

- ☐ Occasional – less than weekly
- ☐ Frequent or constant – once a week or more

7c. Did you have problems with family or friends before the injury?

- ☐ Yes
- ☐ No

Return to Normal Life

8a. Are there any other current problems relating to your injury which affect your daily life?

- ☐ Yes
- ☐ No (If not, SKIP TO **QUESTION 9A)**

8b. If similar problems were present before the injury, have these become markedly worse?

- ☐ Yes
- ☐ No

Epilepsy

9a. Since the injury, have you had an epileptic fit?

- ☐ Yes
- ☐ No

9b. Have you been told you are currently at risk of developing epilepsy?

- ☐ Yes
- ☐ No

Appendix B. Follow-Up Questionnaires

SECTION 7

These are questions about your health and work following your accident.

We know we asked you the following questions before, but we want to know whether anything has changed since we last interviewed you.

1. What is the highest degree of education you have achieved?

Interviewer: Classify the participant's response under the most appropriate option.

- ☐ I never finished school or any training program
- ☐ Primary or elementary school (Kindergarten to Grade 7)
- ☐ Lower general secondary school (Grades 8 to 10)
- ☐ Higher general secondary education (Grades 11 and 12)
- ☐ Junior vocational education (1 to 2 years of trades school/apprenticeship training)
- ☐ Intermediate vocational education (3 years of trades school/apprenticeship training)
- ☐ School for higher vocational education (4 or more years of trades school/apprenticeship training)
- ☐ University (Bachelor's or Associate's degree/2-year diploma)
- ☐ I achieved another degree (Master's or Doctoral degree; or other education); **Specify:** _____

If uncertain, write participant's response here: _____

2. What do you do? Select <u>one</u> option for what you usually do.

- ☐ I go to school, I am studying (Full-time school only or full-time school, part-time work; *i.e.* more school than work)
- ☐ I am employed (Full-time work only or full-time work, part-time school; *i.e.* more work than school)
- ☐ I am self-employed
- ☐ I am a housewife or househusband
- ☐ I am unemployed
- ☐ I am unable to work, for _____%
- ☐ I am retired or on a pre-pension plan
- ☐ I do something else; **Specify:** _____

3. Do you have a paying job?

- ☐ Yes
- ☐ No (SKIP TO **QUESTION 14**)

The following questions refer to your work/job. That is work that you get paid for. If you do not have a paying job? SKIP TO **QUESTION 14**. <u>*Please first read the explanation above the question.*</u>

4. What is your occupation? _____

5. How many days a week do you currently work? _____ days

6. How many hours a week do you currently work? (Count only the hours that you get paid) _____ **hours**

Appendix B. Follow-Up Questionnaires

The following questions refer to productivity losses.

Interviewer: *The next 4 questions refer to absenteeism (absence from paid work; sick leave).*

7. Have you returned to work at all since the accident?

☐ Yes

☐ No (If no, SKIP TO **QUESTION 14)**

8. Have you worked at all in the last 4 weeks?

☐ Yes (If yes, SKIP TO **QUESTION 10)**

☐ No

9. When did you call in sick? *(Long-term absence)* ☐☐ / ☐☐ / ☐☐

m m d d y y

(This is the date that you first got sick earlier than the period of 4 weeks. This is referring to one whole uninterrupted period of missed work as a result of being sick**)**

Next: *If the participant called in sick in the last 4 weeks and earlier than the last 4 weeks,* SKIP TO **QUESTION 14**. Please first read the explanation above question 14.

10. Have you missed work in the last 4 weeks as a result of being sick? *(Short-term absence)*

☐ Yes, I have missed _____ **work days**

☐ No

Interviewer: *The next 3 questions refer to presenteeism (lost workplace productivity).*

11. During the last 4 weeks, have there been days in which you worked but during that time were bothered by physical or psychological problems?

☐ Yes (If yes, GO TO **QUESTIONS 12 and 13**)

☐ No (If no, SKIP TO **QUESTION 14** – read the explanation above question 14)

12. How many days at work were you bothered by physical or psychological problems? (Only count the days at work in the last 4 weeks) _____ **work days**

13. On the days that you were bothered by these problems, was it perhaps difficult to get as much work finished as you normally do? On these days how much work could you do on average? Look at the figures below. A '10' indicates that you were able to do as much work as you normally do, while a '0' indicates that you were unable to do any work on these days. Circle the number that fits best.

On these days I could not do anything			I was able to do half as much as I normally do					I was able to do just as much as I normally do		
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

Appendix B. Follow-Up Questionnaires

Interviewer: *Productivity losses of unpaid work.*

Interviewer: Please read the following explanation to the participant.

Explanation: Even for unpaid work, you can be bothered by physical or psychological problems. Sometimes as a result you (might) do less. For example, you have trouble caring for your children or doing voluntary work. Or you are unable to run errands and pick up groceries, or to work in the garden. The following questions refer to this.

14. **Thinking only about the past four weeks, were there days in which you were forced to do less unpaid work because of physical or psychological problems?**
    - ☐ Yes (If yes, GO TO **QUESTIONS 15 AND 16**)
    - ☐ No (If no, SKIP TO THE **NEXT SECTION**)

15. **How many days did this happen?** (Only count the days in the last 4 weeks) _____ **days**

16. **On the days that you were forced to do less unpaid work because of physical or psychological problems, how many hours per day would you need help from a family member or friend to help you with your unpaid work on these days?**

    On average _____ hours on these days

Appendix B. Follow-Up Questionnaires

POST-INTERVIEW AND PERMISSION FOR FOLLOW-UP

Thank you for taking the time to complete this questionnaire. As a reminder, your answers will remain confidential and will only be used for research purposes.

May we contact you again in 2 months to ask you questions about your recovery?

☐ Yes

☐ No (withdraw from the study). **Reason** (*if provided*): _____

How would you like to receive your $10 gift card?

☐ By Mail (**Please provide your full mailing address below to receive your gift card**)

Please select one: ☐ Starbucks ☐ Tim Hortons ☐ McDonalds ☐ Superstore

☐ Shoppers Drug Mart ☐ Save-On Foods

☐ By Email: E-gift card (**Please provide your email address below to receive your e-gift card**)

If e-gift card, please select one: ☐ Starbucks ☐ Tim Hortons ☐ Amazon ☐ Chapters

Please provide us with your contact information:

First and Last Name: _____ **Preferred Name:** _____

Phone Number: _____ ☐ Home ☐ Mobile ☐ Work

Alternative Phone Number: _____ ☐ Home ☐ Mobile ☐ Work

Mailing Address: _____

City: _____ **Postal Code:** _____

Email Address: _____

Best Time to Contact: _____

What is your preferred method of contact? ☐ Telephone ☐ Email ☐ Mail

What is your preferred method for completing the follow-up interviews?

☐ Telephone ☐ In-Person (at VGH Research Pavilion) ☐ Online Survey ☐ Paper Survey

If we are unable to contact you, is there an alternative person we may contact with your permission? If yes, can you provide us with their contact information?

First and Last Name: _____ **Relationship:** _____

Phone Number: _____ ☐ Home ☐ Mobile ☐ Work

Email Address: _____

Best Time to Contact: _____

****DETACH AND DESTROY THIS SHEET UPON INPUTTING DATA AND MAILING GIFT CARD OR EMAILING E-GIFT CARD TO PARTICIPANT****

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Predictors of poor health and functional recovery following road trauma: Protocol of a British Columbian inception cohort study

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TITLE: Predictors of poor health and functional recovery following road trauma: Protocol of a British Columbian inception cohort study.

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ABSTRACT

Introduction: Road trauma (RT) is a major public health problem affecting physical and mental health, and may result in prolonged absenteeism from work or study. It is important for health care providers to know which RT survivors are at risk of a poor outcome, and policy makers should know the associated costs. Unfortunately, outcome after RT is poorly understood, especially for RT survivors who are treated and released from an emergency department (ED) without the need for hospital admission. Currently, there is almost no research on risk factors for a poor outcome among RT survivors. This study will use current Canadian data to address these knowledge gaps.

Methods and analysis: We will follow an inception cohort of 1500 RT survivors (16 years and older) who visited a participating ED within 24 hours of the accident. Baseline interviews determine pre-existing health and functional status, and other potential risk factors for a poor outcome. Follow-up interviews at 2, 4, 6, and 12 months (key stages of recovery) use standardized health-related quality of life tools to determine physical and mental health outcome, functional recovery, and health care resource use and lost productivity costs.

Ethics and Dissemination: The *Road Trauma Outcome Study* is approved by our institutional Research Ethics Board. This study aims to provide health care providers with knowledge on how quickly RT survivors recover from their injuries and who may be more likely to have a poor outcome. We anticipate that this information will be used to improve management of all road users following RT. Health care resource use and lost productivity costs will be collected to provide a better cost estimate of the effects of RT. This information can be used by policy makers to make informed decisions on RT prevention programs.

KEYWORDS: Motor vehicle collisions, injury outcome, functional recovery, quality of life, risk factors, trauma

STRENGTHS AND LIMITATIONS

- Inception cohort design with large sample size (n=1500)
- Measures self-reported health outcomes during key phases of injury recovery
- Measures direct (healthcare) and indirect (lost productivity) costs
- Risk of recall and reporting bias, especially for pre-injury health status
- Risk of sampling or non-respondent bias and/or bias from attrition

INTRODUCTION.

In Canada, road trauma (RT) causes over 1,900 fatalities and 150,000 injuries annually, including 9,000 serious injuries,[1] with an annual cost estimated at $37 billion.[2] Injury-related disability is a public health concern,[3, 4] but outcome following RT and risk factors for a poor outcome are poorly studied, especially among cyclists, pedestrians, and motorists involved in motor vehicle crashes with a "minor injury" (emergency department (ED) visits without hospital admission). Outcomes are worse for RT survivors suffering severe injuries, but even "minor injury" crashes can result in reduced health-related quality of life (HRQoL), including psychological harm (*e.g.*, PTSD) and prolonged work absenteeism (or inability to continue the same work prior to the crash due to new physical or psychological limitations).[5] Psychological factors are important predictors of poor outcomes among RT survivors.[6] Chronic pain is more common among RT survivors suffering from depression, anxiety, severe pain, multiple somatic complaints, or PTSD in initial recovery stages.[6-8] Other psychological contributors to chronic pain include health-seeking behaviour, poor recovery expectations, higher perceived collision severity, catastrophizing, and passive coping strategies.[8-11] It is important to study injury outcomes among RT survivors (including all road users of all injury severity levels) and their associated risk factors, including baseline health status, socioeconomic and demographic factors, psychological factors, and coping strategies.

The recovery trajectory for most injuries can be viewed as occurring during four phases (Figure 1).[12] The *acute care* phase (0-8 weeks) is characterized by intensive hospital management of injuries (*e.g.*, surgery). During *rehabilitation* (1-3 months), injured individuals develop increased capacity and move towards pre-injury functioning. During *adaptation* (3-6 or more months), individuals modify their environment and personal routines to adapt to their limitations.

Finally, in most cases, injured individuals reach a *stable end situation* within 6-12 months (rarely 24 months) of injury.

Potential risk factors influence the outcome during these recovery phases. Injury severity, a major determinant of outcome, is determined by circumstances of the injury event and the individual's fragility. Injury severity varies by road user type, age, and sex. Medical factors affect all recovery phases. Socioeconomic factors impact both baseline health[13-15] and subsequent recovery through access to rehabilitation programs or resources facilitating adaptation.[16] Psychological factors may impact an individual's ability to comply with treatment, follow rehabilitation plans, or adapt to injury-related disability. Clearly, it is important to follow participants throughout the four key recovery phases.

Previous RT research has methodological flaws limiting validity, generalizability, and utility. One instance is use of retrospective cohorts of RT survivors who are enrolled after filing insurance claims, weeks following the crash,[17, 18] or after already developing symptoms as a result of the crash.[19, 20] Retrospective cohorts can result in selection bias if they exclude RT survivors who recover quickly from their injuries. Delayed enrolment can increase the likelihood of recall bias, especially related to pre-injury HRQoL and accident details. Other RT research has limited generalizability as many studies excluded RT survivors involved in minor injury crashes,[21] most excluded cyclists and pedestrians,[9, 22] and the majority excluded people with language barriers (non-native speakers).[10, 23]. These are important gaps considering the increasing number of minor injury crashes in Canada, comprising the majority of RT cases, and their associated health care costs.[24] Motor vehicle crashes involving cyclists and pedestrians will likely increase as active transportation (*e.g.*, cycling, walking) becomes more prevalent.[25] Inclusion of non-native speakers may identify certain groups (*e.g.,* new immigrants) who may be at higher risk of RT and may

experience worse outcomes. Additionally, many studies failed to conduct follow-up during key recovery phases, while others used idiosyncratic definitions or insurance company data to define outcomes.[26] Many RT outcome studies have limited ability to identify risk factors for a poor outcome due to small sample sizes,[27-29] not considering key risk factors (*e.g.*, psychological), or failure to identify or adjust for confounders like pre-existing health problems.[21] Finally, current North American RT outcome research is limited as most studies have been conducted in Europe or Australia. These study design choices limit the impact of the research and ability to inform policy to improve outcomes of RT survivors.

Currently, research into risk factors for a poor outcome following RT is lacking, and methodological improvements are needed to address limitations of prior RT outcome research. The objective herein is to present the methodology of a multi-centre study on the health and functional recovery of RT survivors who visited a participating ED in British Columbia (BC), Canada. This methodology addresses many limitations of current RT outcome research.

METHODS AND ANALYSIS

Study Design and Setting. This prospective observational study involves an inception cohort of RT survivors, with all injury severity levels. The study started recruitment in July 2018 and will run for five years. Participants are recruited from three BC EDs: Vancouver General Hospital (Vancouver), Royal Columbian Hospital (New Westminster), and Kelowna General Hospital (Kelowna). These hospitals serve rural, suburban, and urban populations similar to those served by other trauma centres across Canada.

Patient and Public Involvement. The study was designed in consultation with public health stakeholders. Patients and/or general public were not involved in study design.

Inclusion and Exclusion Criteria. Road trauma survivors (motorists, cyclists, and pedestrians) aged 16 years and older who arrive in the ED within 24 hours of injuries sustained in a collision involving at least one motorized vehicle are included. Collisions not involving a motorized vehicle are excluded. Children younger than 16 years old are excluded as they have a different recovery trajectory and require different tools to measure HRQoL. Non-BC residents are also excluded as health care use during the recovery phase is not available for out-of-province participants. Cognitively impaired survivors are included if consent and study information could be obtained from a reliable proxy (*e.g.*, partner, parent). Non-English speakers are interviewed through a translator (*e.g.*, family) or multi-lingual research assistant. RT survivors who are inappropriate to approach (suicidal, violent/aggressive, high alcohol or drug impairment, or in police custody) for the entire duration of their hospital visit or admission are excluded as reliable information cannot be obtained and it may be unsafe for research staff to approach the patient. For alcohol or drug impairment, individuals intoxicated on arrival at the ED, but subsequently sober during the same visit are included. Fatalities within 30 days following the hospital visit or admission are excluded.

Recruitment. Over 1.5 years of recruitment, it was estimated that 6,600 RT survivors would be treated at participating EDs with at least 1,200 severely injured patients admitted to hospital (Figure 2). Given the large disproportion between minor (discharged home directly from the ED) and severely injured RT cases, all severely injured survivors and a 1/3 representative sample of survivors with minor injuries are approached. A systematic sampling strategy is used to recruit a representative sample of RT survivors with minor injuries. Research assistants (RAs) recruit participants from the ED for an average of 8 hours per day on a rotating schedule covering all times of day and days of the week (holidays included) throughout the year. Reasons for refusal to participate and failure to approach potential participants are recorded. The recruitment goal for the

study is 1,500 RT survivors (approximately 225 pedestrians, 300 cyclists, and 975 motorists), including at least 750 who require hospital admission.

Data Sources and Data Management. Data are collected from baseline interviews, medical records, follow-up interviews and administrative health records. Follow-up interviews at 2, 4, 6, and 12 months correspond to key phases of recovery: acute treatment, rehabilitation, adaptation, and stable end situation.[12] (Figure-1) We use the Research Electronic Data Capture (REDCap) online database for data management.[30]

Baseline Interviews. Baseline interviews determine pre-existing health and functional status and other potential risk factors for a poor outcome. Baseline interviews are conducted in-person by RAs during ED visits or hospital admissions, or by telephone within one-week post-event in some cases, to collect demographic and socioeconomic information, baseline health, crash/injury details, and recovery expectations. Participants are approached as early as possible during their ED visit or hospital admission while respecting and prioritizing their recovery. RT survivors who sustained severe injuries and are admitted to hospital are approached during their hospital admission. RT survivors with minor injuries are approached in the ED during their ED visit. All RT survivors are approached multiple times until a decision on participation in the study was obtained. RT survivors with minor injuries, who are discharged from the ED before they were able to decide whether to participate, are offered the opportunity to be consented and interviewed by telephone within 7 days of their ED visit.

The baseline interview (Supplementary files, Appendix A) includes the following domains: i) crash details; ii) medical history (cardiorespiratory, neurological, gastrointestinal, musculoskeletal, psychiatric, other); iii) pre-event anxiety and depression with the PHQ-4;[31, 32] iv) somatic symptoms with the PHQ-15;[33] and v) pain catastrophizing and coping with the Pain

Catastrophizing Scale (PCS).[34] Baseline HRQoL is measured with the five-level EuroQol instrument (EQ-5D-5L – day before injury) and the Short Form 12 survey (SF12 – four weeks prior to event). The EQ-5D-5L and SF12 are validated tools assessing mental health (depression, anxiety), discomfort/pain, restrictions to bending or lifting, ambulation, self-care, and daily and social activities. These tools have Canadian population norms and can be used retrospectively to determine HRQoL. Pre-injury productivity four weeks prior to the motor vehicle accident is assessed using the iMTA Productivity Cost Questionnaire (iPCQ).[35] Participants are also asked about their expectations for recovery ("How long do you think it will take for you to fully recover from your injuries?").

Follow-up Interviews. RT survivors' recovery trajectory and outcomes are assessed by follow-up interviews at 2, 4, 6, and 12-months post-baseline interview. Follow-up interviews (Supplementary files, Appendix B) include the EQ-5D-5L, SF12, PHQ-15, Glasgow Outcome Scale (GOS-E), PTSD checklist (PCL-S), and iPCQ. The EQ-5D-5L and SF12 are suitable for assessing individuals living independently whereas the GOS-E differentiates based on level of severe disability. The PCL-S is designed to detect PTSD following a traumatic event.[36] The iPCQ is used to determine productivity losses related to absenteeism and reduced productivity at paid and unpaid work (*e.g.*, housework). Questions on recovery progress and return to daily activities are included. For example, participants are asked "Have you fully recovered from the accident?" (options: "yes", "no", and "don't know") Self-reported health care utilization (*e.g.*, physician visits, paramedical services) and quality of life difficulties (financial, legal, general) are also included in follow-up interviews.

Follow-up interviews are conducted by telephone, online survey, self-filled paper questionnaire, or in-person depending on participant preference. For each follow-up interview,

participants are contacted via telephone and email up to five times each. To maximize retention, more thorough and evidence-based retention strategies are applied including financial compensation and using alternate contact information (home, work and cell number, email, family or friend). Participants receive honorariums for completing the baseline ($15) and follow-up ($10 each) interviews. For those unable to complete interviews independently (*e.g.*, cognitive disability, language barrier), a proxy may either assist the participant or complete the questionnaire on the participant's behalf.

Medical Chart Review. Medical chart review of the index visit for all participants is the sole source of information for i) injury type (*e.g.*, fracture) and location (*e.g.*, lower extremity); ii) injury severity (ICISS);[37, 38] iii) ED visit details (*e.g.*, arrival mode, acuity, duration, discharge diagnosis); and iv) ED investigations: diagnostic tests (*e.g.*, x-rays) and procedures (*e.g.*, sutures). Chart reviews are also used to supplement baseline interviews for information on: i) accident details: road user type, location, single *vs* multiple-vehicle collision, seatbelt/helmet use; ii) medical history; and iii) medication history. Medical charts of participating hospitals include ambulance run sheets which typically include accident details.

Standardized forms and protocols guide data extraction to ensure accuracy and consistency between RAs. A committee of experienced clinicians will review interview responses and medical charts to identify major discrepancies (*e.g.*, patient denies prior health problems, but medical record indicates hospital admissions) and arbitrate discrepancies (decide which data is most accurate). The number and type of major discrepancies will be reported and sensitivity analyses excluding those cases will be conducted.

Administrative Health Records. To measure health care resource use and calculate comorbidity scores, administrative health records including hospital admissions (Discharge Abstracts

Database, DAD), medical service plan billings (BC MSP), ED visits (National Ambulatory Care Reporting System, NACRS), and prescriptions (BC Pharmanet) are used. For participants who consent to Personal Health Number (PHN) usage, records will be requested through PopDataBC, a health data depository supporting research with access to individual-level, de-identified longitudinal data on BC residents.[39] Data will be collected for one year prior to and one year following the crash to compare health care resource use pre- and post-accident. Health care services not covered by public health insurance will be identified during follow-up interviews.

Analysis. The following dichotomous outcomes will be assessed: i) self-reported incomplete recovery; ii) reduction from baseline "pre-event" values on EQ-5D-5L, SF12 and PHQ-15 exceeding Minimal Clinically Important Difference (MCID) values reported for these scales; iii) evidence of PTSD; and iv) have not returned to work, school, or usual activities. At each follow-up period, the percentage of participants who experience each of the above poor outcomes will be reported. Descriptive statistics will be generated for all study participants, disaggregated by sex, age group, socioeconomic factors, road user type, and disposition (discharged from ED or admitted to hospital).

The following candidate risk factor categories will be examined: 1) demographic and socioeconomic variables (sex, age, ethnicity, residence location, marital status, employment status, and education level); 2) baseline health status (pre-injury SF-12 and EQ-5D-5L scores, chronic disease score, self-reported medical history, previous year hospital admissions, and physician visits); 3) psycho-social factors (anxiety, depression, and catastrophizing/coping); 4) injury type, location, and severity; and 5) road user type (pedestrian, cyclist, and motorist) and accident details.

For outcomes i) to iv) defined above, separate mixed effects log-binomial regression models (generalized linear mixed models (GLMMs) using log link function), will be fitted to

estimate relative risks (RRs) and confidence intervals for associations between risk factors and poor outcomes measured at 2, 4, 6, and 12 months. The nested structure of the data will be accounted for by including a random intercept for hospital site and participants nested within each site. Since GLMMs can be unstable in the presence of many predictors, separate models for each risk factor to obtain unadjusted RRs for poor outcome will be fitted first. These models will also include follow-up period (2, 4, 6, or 12 months) as a categorical predictor and an interaction term between period and risk factor. This will allow estimation of recovery trajectories and risk factor impact at different recovery stages. Next, a single model to identify independent predictors of outcome and estimate adjusted RRs will be built. This model will include multiple candidate risk factors identified using Harrell's approach.[40] A L1-penalized estimation will also be used as this method combines shrinkage with variable selection for GLMMs and works well when there are many influential predictors.[41] A Bonferroni-adjusted significance level will be used.

Missing Data. The percentage of participants with missing baseline data is expected to be <4% based on pilot research. Assuming missing data are not related to the outcome, no bias will result from excluding these subjects.[42] For partially complete follow-up interview responses, guidelines of each validated tool will be followed to obtain on outcome score. As a mixed-effects log-binomial regression model is proposed, missing response data for participants who are lost to follow-up will be ignored. GLMMs use all available data and provide unbiased estimates if data are missing at random (unobserved data depend only on observed data). Further statistical testing using t-tests for continuous risk factors and chi-squared tests for categorical risk factors will be performed to explore differences between RT survivors who complete the study and those who are lost to follow-up.

Sample Size Considerations. Sample size calculation is for outcome data at 12 months and conducted for three road user types (pedestrians, cyclists, and motorists). A conservative 40% attrition is assumed such that 12-month outcome data will be available for at least 135 pedestrians, 180 cyclists, and 585 motorists. With an estimated prevalence of 35% for outcomes and 50% for risk factors, and using a significance level of 0.0125 corrected for multiple outcomes, this study will have 80% power to detect RRs of 2.3, 2.0, and 1.5 for pedestrians, cyclists, and motorists, respectively. These estimates are based on two-sided comparison of independent proportions using the Normal approximation described by Woodward.[43]

Health Care Resource Use. A total health care cost will be obtained for every study participant, supplemented by lost productivity costs. Generalized linear models (GLMs) will be fit to explore variation in health care and lost productivity costs according to road user type, injury severity, age range, sex, and disposition. Study participants will be differentiated by those who complete follow-ups and those who are lost to follow-up with respect to baseline characteristics.

ETHICS AND DISSEMINATION

Ethics Approval. This study is approved by the research ethics board of the University of British (Approval Certificate Number: H18-00284) and by research ethics boards for the other participating study sites: Fraser Health Authority (New Westminster, BC) and Interior Health Authority (Kelowna, BC). Note that there is a harmonized ethics review process for BC sites. Ethics approval is renewed annually and updated throughout the duration of the study.

Columbia. Participants provide informed written or verbal consent. For minors (16-18 years old), parental/guardian permission is obtained in addition to participant assent. For participants unable to provide consent (*e.g.,* comatose), proxy consent is obtained from a designated caregiver.

Importance of this research. The *Road Trauma Outcome Study (RTOS)* is designed to overcome many limitations of previous RT outcome research. It uses a robust methodology that will add to the RT outcome knowledge base. Firstly, it recruits an inception cohort of RT survivors during their ED visit (or hospital admission) following a crash. Inception cohorts are ideal for studying outcome and prognostic factors and are less prone to sampling bias compared to retrospective cohorts.[44, 45] To maximize generalizability, recruited RT survivors include: all road user types with all injury severity levels; non-native speakers (utilizing translators); and those with cognitive limitations (with history obtained from caregivers). Another strength is the use of patient-reported outcomes to study the effects of injury on daily lives of RT survivors; this study uses validated standardized tools to study HRQoL from physical and psychological domains during key recovery phases.[4, 12] This study includes a large sample size, determines health care costs associated with RT, and includes productivity loss estimates at work and home. The sample of 1,500 RT survivors provides sufficient power to study key risk factors for a poor outcome. It is also important to study RT outcome in North America as many risk factors for poor recovery, including recovery expectations and crash severity perception,[10] are likely related to cultural factors that vary between countries.

Total economic cost attributed to an injury is a combination of direct costs (health care costs from injuries) and indirect costs (due to reduced productivity from hospitalization, disability, and premature death).[46, 47] This study will determine health care and lost productivity costs for RT survivors, providing a more accurate and complete economic assessment and subsequently informing policy towards improving health delivery programs. Several instruments measure productivity loss; we utilized the iPCQ as it has been tested in the general population.[35] Moreover, the iPCQ allows for separate quantification of productivity losses due to absenteeism,

presenteeism, and unpaid work.[35, 48] The value of time lost from work and homemaking due to injury is measured by earnings data and market value of unperformed homemaking services, respectively.[46] This study addresses knowledge gaps including health and financial consequences, productivity impacts, and risk factors for a poor outcome following RT.

Limitations of Study Design. Although our study design improves on previous research, it still has limitations which have been addressed as best as possible to minimize their effects. These limitations include recall and reporting bias from using self-reported standardized tools, especially related to pre-crash health. The "good-old-days" bias, where patients knowingly or unknowingly exaggerate their preinjury HRQoL, is common following injury.[49-51] To minimize "good-old-days" and recall bias, baseline interviews were conducted as soon as possible following the crash, ideally within 7 days.[12] Administrative health records, including calculated chronic disease score, will be used as an objective measure of pre-injury health.[49] Participants are assured their responses are confidential, and identifying as health researchers strengthens rapport and improves response rate and quality.[52] Another limitation is sampling bias or non-respondent bias which may occur if those who are missed or decline to participate differ in important ways from participants. Refusals are tracked and differences between participants and those who refused to participate with respect to age, sex, road user type, and hospital admission required will be reported. Additionally, using modest honorariums and assurance of confidentiality is intended to minimize refusals, and the analysis plan also considers non-response bias. Inherently, our study cannot be generalized to RT survivors who never seek medical care in a hospital setting or seek care days later. Finally, attrition may affect the study findings in terms of overall response rate and baseline characteristics of those who complete follow-ups compared to those lost to follow-up. Different contact methods are used

to minimize attrition rate. These strategies to minimize bias and missing data are applied during recruitment and analysis to help reduce the effects of these limitations.

Expected Outcomes and Benefits. This research will advance understanding of the impact of RT on individuals treated in hospital for RT injuries. It will identify risk factors for poor outcomes and provide better estimates of direct and indirect RT costs. These findings are relevant to RT survivors and their families, health care providers, public health officials, health care and traffic policy makers, and researchers. Understanding recovery trajectory and risk factors for a poor outcome following RT may inform the development of rehabilitation programs and help clinicians identify RT survivors who would benefit from more intensive care, possibly earlier in their recovery trajectory. These findings may also help RT survivors and their families set expectations for recovery, possibly reducing the adverse psychological consequences commonly experienced by RT survivors. This research will also provide a better understanding of the impact of RT on health care costs and productivity and provide data and tools that other researchers can use for future economic analyses of RT prevention programs. Traffic policy makers and public health officials may use these cost estimates to make better decisions about allocating limited resources for expensive RT prevention programs. Thus, these findings will have practical implications for RT survivors and their families, health care providers, policy makers, public health officials, and other researchers.

Summary. The *RTOS* is a large inception cohort study that will provide a comprehensive description of outcome after RT including motor vehicle crashes of all severity levels for all road users, identify risk factors for poor outcomes, and determine direct health care and lost productivity costs associated with RT. This information can be used by numerous stakeholders who have an interest in preventing RT or improving outcome for RT survivors.

Abbreviations

RT: Road trauma; ED: Emergency department; HRQoL: Health-related quality of life; PTSD: Post-traumatic stress disorder; BC: British Columbia; RA: Research assistant; REDCap: Research Electronic Data Capture; PHQ-4: Patient Health Questionnaire for Depression and Anxiety; PHQ-15: Patient Health Questionnaire somatic symptom severity scale; PCS: Pain Catastrophizing Scale; EQ-5D-5L: Five-level EQ-5D; SF12: Short Form 12; iMTA: Institute for Medical Terminology Assessment; iPCQ: iMTA Productivity Cost Questionnaire; GOS-E: Extended Glasgow Outcome Scale; PCL-S: PTSD Checklist (specific); ICISS: International Classification of Diseases based Injury Severity Score; DAD: Discharge Abstract Database; MSP: Medical Services Plan; NACRS: National Ambulatory Care Reporting System; PHN: Personal health number; PopDataBC: Population Data BC; MCID: Minimal Clinically Important Difference; GLMM: Generalized linear mixed model; RR: Relative risk; GLM: Generalized linear model; RTOS: Road Trauma Outcome Study; REB: Research ethics board.

DECLARATIONS

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Competing Interests. The authors declare that they have no competing interests.

Author's Contributions. This research study methodology was conceptualized and developed by JRB (principal investigator) and HC. SE and LXP assisted with the data analysis plans. LKS

drafted the manuscript and is coordinating the study. All authors reviewed and approved the final manuscript.

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Figure Legends:

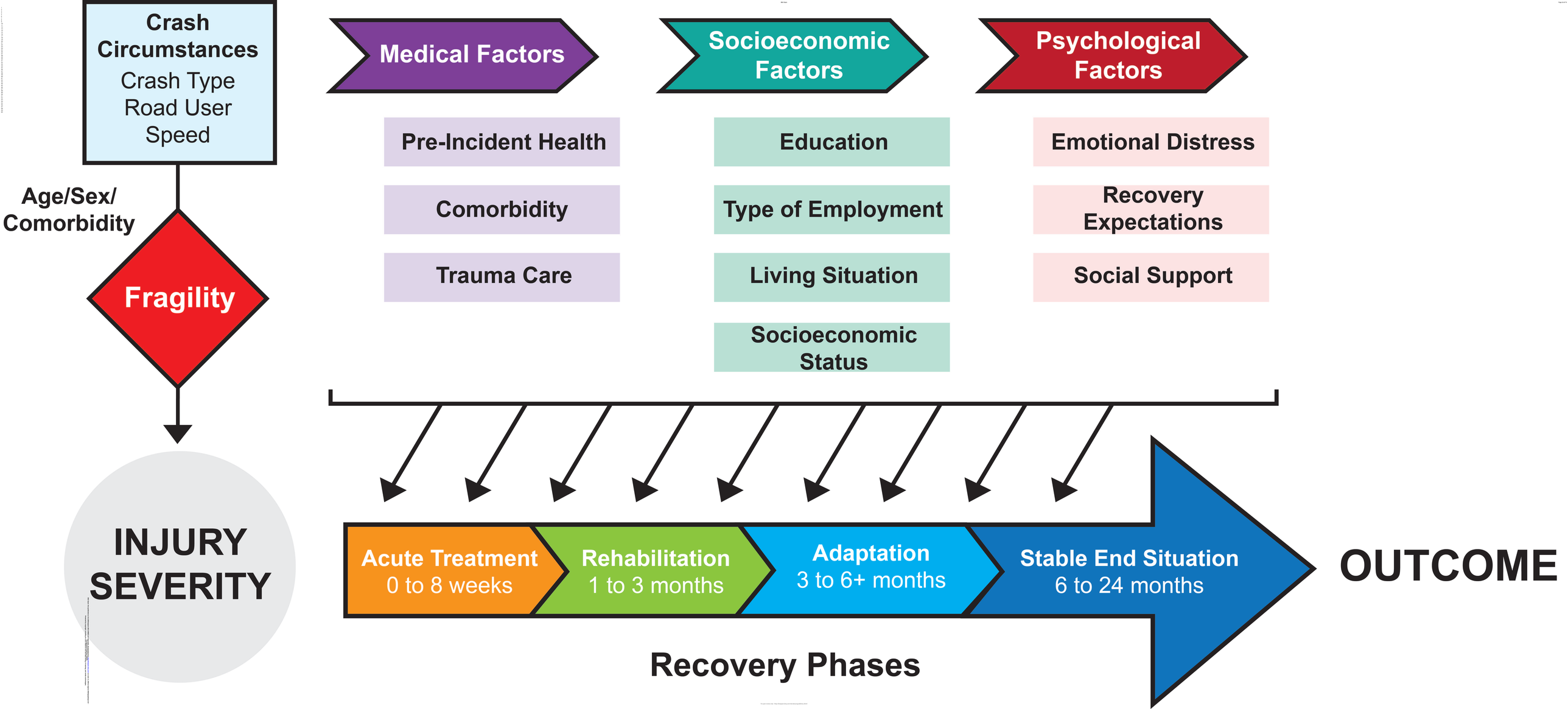
Caption for Figure 1

Figure 1. Factors affecting post RT outcome. This conceptual diagram shows how potential risk factors act during different stages of recovery. Injury severity, a major determinant of outcome, depends on crash factors (transfer of kinetic energy) and the victim's fragility. Medical factors affect all stages of the recovery process. Socio-economic factors impact both baseline health,[13-15] and access to rehabilitation programs or to resources that facilitate adaptation.[16] Psychological factors may impact ability to comply with treatment or rehabilitation plans, or ability to adapt to injury related disability.

Caption for Figure 2.

Figure 2. Recruitment Flow Chart. Anticipated recruitment and follow-up numbers over the duration of the study. This diagram illustrates estimated patient numbers for this study.

1. **Admitted to Hospital and Discharged from ED:** It was estimated that 4,400 RT survivors per year would be treated at participating study sites. Of these, approximately 18% would be admitted to hospital and the rest would be discharged home directly from the ED.
2. **Approached:** RAs approach *all* admitted RT survivors and use a systematic sampling strategy (based on the time of ED visit) to approach 1/3 of those who were discharged from the ED.
3. **Eligible:** Approximately 85% of RT survivors meet the inclusion and exclusion criteria.
4. **Consent:** Consent rates differ between those who were admitted to hospital and those who were discharged from the ED. It was estimated that 75% of admitted RT survivors and 50% of those discharged from the ED would consent to participate.
5. **Study Sample:** With these estimates, the recruitment goal of 1,500 participants would be achieved within two years.
6. **Follow-Up:** The power calculations were based on a conservative 40% attrition rate (918 followed for 12 months). Attrition will not affect access to administrative data.


Crash Circumstances
Crash Type
Road User
Speed
Age/Sex/ Comorbidity
Fragility
INJURY SEVERITY
Medical Factors
Socioeconomic Factors
Psychological Factors
Pre-Incident Health
Comorbidity
Trauma Care
Education
Type of Employment
Living Situation
Socioeconomic Status
Emotional Distress
Recovery Expectations
Social Support
Acute Treatment
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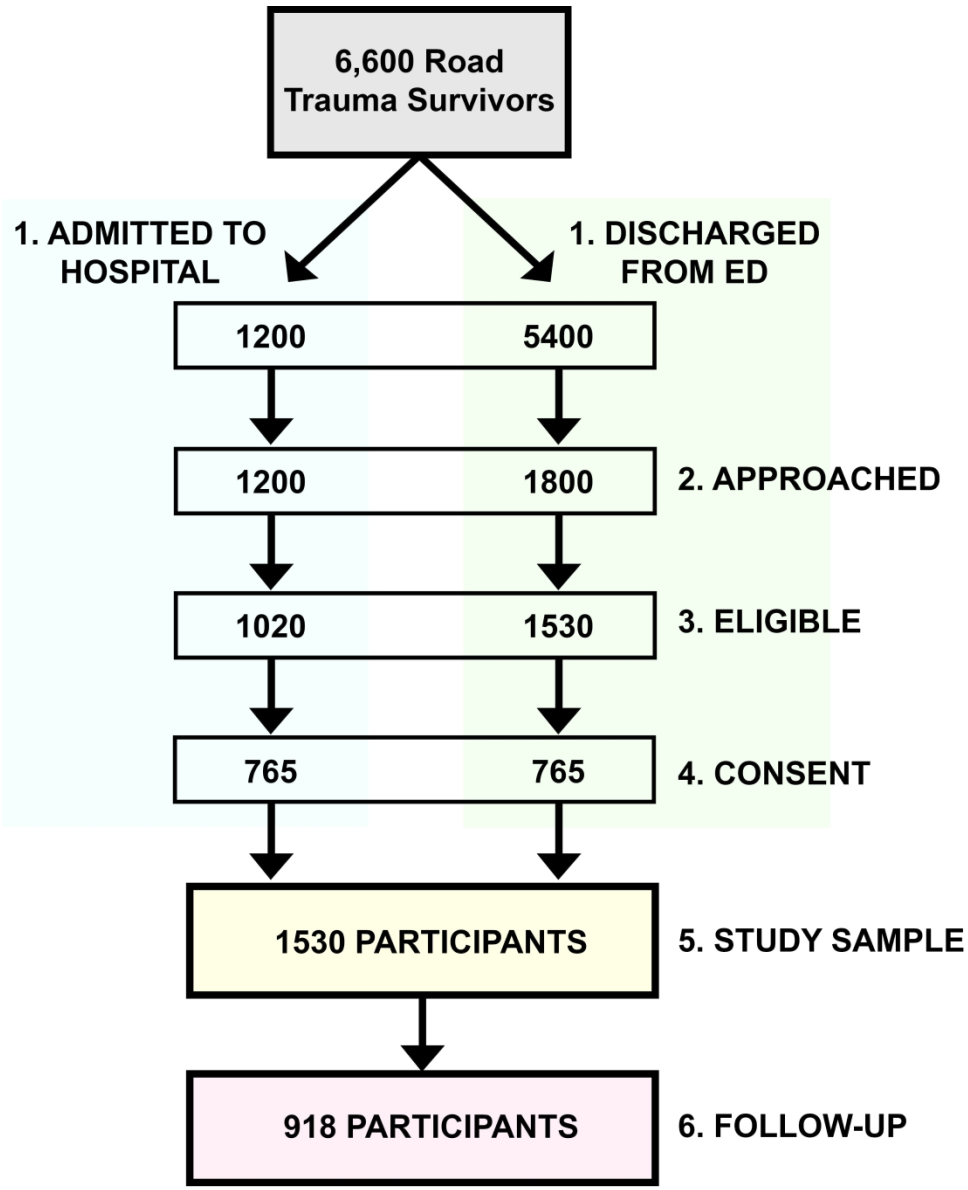
Adaptation
3 to 6+ months
Stable End Situation
6 to 24 months
OUTCOME
Recovery Phases



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139x171mm (1000 x 1000 DPI)

Supplementary Files

Appendix A. Baseline Questionnaire

Road Trauma Health Outcome Study
Baseline Interview

Participant ID ☐☐-☐☐☐☐☐☐

Interview Date ☐☐ / ☐☐ / ☐☐☐☐ (m m / d d / y y y y)

Interviewer ID ☐☐

Site (*circle*) **VGH** | **RCH** | **KGH**

Please indicate who is completing the questionnaire:

☐ Participant ☐ Participant with assistance from another person

☐ Another person on behalf of the participant

For Office Use Only

Baseline Gift Card Received: ☐ Yes ☐ No

REDCap Data Entered: ☐☐ / ☐☐ / ☐☐ (m m / d d / y y)

Appendix A. Baseline Questionnaire

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Appendix A. Baseline Questionnaire

TEMPORARY TRACKING SHEET

****DETACH AND DESTROY THIS SHEET AFTER DATA ENTRY****

Participant ID | | | - | | | | | |

Site Code ID Number

Medical Record Number (MRN): _____

Following data entry, separate this page from the survey and shred it immediately

Appendix A. Baseline Questionnaire

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Appendix A. Baseline Questionnaire

SECTION 1

1. Date of Interview			/			/			**Time of Interview**			:		
	m	m		d	d		y	y		24-hour clock				
2. ED Date			/			/			**ED Arrival Time**			:		

Interviewer: *Please rate the level of consciousness and speech of participant.*

3. Level of Participant's Consciousness (Check the <u>one</u> that best fits)

- ☐ Alert (eyes open spontaneously)
- ☐ Restless (pressured speech, constantly in motion, easily distracted)
- ☐ Agitated (yelling, threatening, combative)
- ☐ Drowsy (eyes closed but open to voice)
- ☐ Sleeping (does not open eyes to voice)
- ☐ Comatose (does not open eyes to pain)

4. Participant's Speech:

***Interviewer* PROMPT**: "Do you know what time of day it is?"

☐ Yes ☐ No ☐ Don't Know

<u>Participant's Status</u>:

- ☐ Normal conversation and speech, oriented (knows where they are, the date, and their name)
- ☐ Normal conversation, but slurred speech, oriented
- ☐ Confused or disoriented, but speaking in sentences using recognizable words
- ☐ Nonsense or incomprehensible words or phrases, moaning

<u>INTERVIEWER</u>

<u>To give consent, the participant must be alert/oriented.</u>

1. ***If participant is alert and oriented, proceed with consent process and interview.***
2. ***If participant is not alert and oriented, try again later.***
3. ***If participant remains confused or comatose, obtain consent from an appropriate proxy (someone who knows the patient well, e.g. a family member) and interview the proxy.***

Appendix A. Baseline Questionnaire

Interviewer: *Unless the participant requests otherwise, the interview should be conducted one-on-one.*

5. Is anyone else present during this interview?

☐ Yes
☐ No (SKIP TO **QUESTION 6**)

5a. Has the participant specifically requested someone else to be present?

☐ Yes
☐ No

5b. What is the person/people's relationship(s) to the patient? (Check ALL that apply)

☐ Partner / Spouse
☐ Family member other than spouse; **Specify:** _____
☐ Friend
☐ Police
☐ Ambulance / Paramedics
☐ Other; **Specify:** _____
☐ Not Applicable

6. Participant's Consent

☐ Yes (Ensure consent/assent form is signed – verbal or written)
☐ No

Interviewer: For the remaining questions in the interview, please use the following codes to indicate participant's responses when applicable.

- When a participant answers: "Don't know", write **"DK"** besides the question
- When a participant refuses to answer a question, write **"R"** besides the question
- If a question does not apply to the participant and there is no option for 'Not applicable', write **"NA"** besides the question

Note: All questions can only have ONE response, unless otherwise stated right beside the question

Appendix A. Baseline Questionnaire

SECTION 2

I am going to ask you some questions about the accident. **Please tell me what happened to you during the accident.**

1. Were you a…?

- ☐ Driver
- ☐ Passenger
- ☐ Motorcyclist
- ☐ Pedestrian
- ☐ Cyclist

2. When did this accident occur?

Date (MM/DD/YY): _____

Time (24-hour clock): _____

Interviewer: *If more than 24-hours have passed between the time of the accident and the time of this interview, stop the interview and thank the participant for their time. For admitted patients, the interview can be completed at any time during their admission to the hospital from the time of the accident – try to enrol them as soon as possible.*

Participant's Study Eligibility:

- ☐ Yes (*i.e.* accident occurred within 24 hours of the interview **OR** patients are interviewed about their accident at some point during their admission to the hospital for ADMITTED patients only → proceed with the interview)
- ☐ No (*i.e.* accident occurred over 24 hours ago → stop the interview and thank the participant for their time)

If the participant was a driver or motorcyclist, SKIP TO **SECTION 2A** (page 8).
If the participant was a passenger, SKIP TO **SECTION 2B** (page 10).
If the participant was a pedestrian, SKIP TO **SECTION 2C** (page 12).
If the participant was a cyclist, SKIP TO **SECTION 2D** (page 13).

Appendix A. Baseline Questionnaire

SECTION 2A: DRIVER/MOTORCYCLIST

A1. What type of vehicle were you driving?

- ☐ Car, sedan, or convertible (small-sized vehicle)
- ☐ SUV, jeep, light truck, or minivan (medium-sized vehicle)
- ☐ Commercial vehicle, bus, semi-truck, or big truck (large-sized vehicle)
- ☐ Motorcycle / Scooter

A2. How many vehicles were involved in this accident?

- ☐ One (*i.e.* single vehicle – including crashing into parked cars)
- ☐ Two (including your vehicle)
- ☐ Three or more

A3. Do you know the type of the other vehicle(s) involved? (Check ALL that apply)

- ☐ Car, sedan, or convertible (small-sized vehicle)
- ☐ SUV, jeep, light truck, or minivan (medium-sized vehicle)
- ☐ Commercial vehicle, bus, semi-truck, or big truck (large-sized vehicle)
- ☐ Motorcycle / Scooter
- ☐ Not Applicable (*e.g.* single vehicle accidents)
- ☐ Don't Know

A4. Where did the accident occur?

- ☐ Main street (*e.g.* multi-lanes, lots of traffic, *etc.*)
- ☐ Side street (*e.g.* less traffic, residential area, *etc.*)
- ☐ Ramp (*e.g.* exit or entrance ramp, *etc.*)
- ☐ Highway

If uncertain, write participant's response here: _____

A5. Did this accident occur at an intersection?

- ☐ Yes
- ☐ No

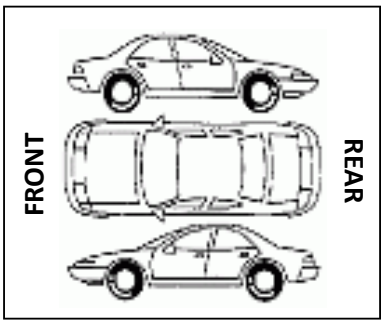
A6. How fast was your vehicle travelling?

- ☐ Slow speed (< 30 km/hr)
- ☐ Moderate speed (30-60 km/hr)
- ☐ High speed (> 60 km/hr)
- ☐ Don't Know

A7. What side of your vehicle was hit? (Check ALL that apply)

Interviewer: Circle the area(s) of impact on the diagram to the right.

- ☐ Side (right side angle)
- ☐ Side (left side angle)
- ☐ Side (right side swipe)
- ☐ Side (left side swipe)
- ☐ Back (rear-ended)



Appendix A. Baseline Questionnaire

☐ Front (head-on collision)

A8. Were you wearing a seatbelt? (If the vehicle was a motorcycle/scooter: Were you wearing a helmet?)

☐ Yes
☐ No

A9. Was the airbag deployed?

☐ Yes
☐ No
☐ Not Applicable

A10. Did you strike the windshield or any object in the car/motorcycle?

☐ Yes
☐ No
☐ Not Applicable

A11. Was your vehicle severely damaged? For example: Did the vehicle have to be towed away? Was the vehicle drivable after the accident? Could you open the vehicle door? Was there major damage or intrusion into the vehicle**?**

☐ Yes
☐ No
☐ Don't Know

Next: Go to **Section 3** (Page 15)

Appendix A. Baseline Questionnaire

SECTION 2B: PASSENGER

B1. What type of motor vehicle were you a passenger in?

- ☐ Car, sedan, or convertible (small-sized vehicle)
- ☐ SUV, jeep, light truck, or minivan (medium-sized vehicle)
- ☐ Commercial vehicle, bus, semi-truck, or big truck (large-sized vehicle)
- ☐ Motorcycle / Scooter

B2. How many vehicles were involved in this accident?

- ☐ One (*i.e.* single vehicle – including crashing into parked cars)
- ☐ Two (including your vehicle)
- ☐ Three or more

B3. Do you know the type of the other vehicle(s) involved? (Check ALL that apply)

- ☐ Car, sedan, or convertible (small-sized vehicle)
- ☐ SUV, jeep, light truck, or minivan (medium-sized vehicle)
- ☐ Commercial vehicle, bus, semi-truck, or big truck (large-sized vehicle)
- ☐ Motorcycle / Scooter
- ☐ Not Applicable (For single-vehicle accidents)
- ☐ Don't Know

B4. Where did the accident occur?

- ☐ Main street (*e.g.* multi-lanes, lots of traffic, *etc.*)
- ☐ Side street (*e.g.* less traffic, residential area, *etc.*)
- ☐ Ramp (*e.g.* exit or entrance ramp, *etc.*)
- ☐ Highway

If uncertain, write participant's response here: _____

B5. Did this accident occur at an intersection?

- ☐ Yes
- ☐ No

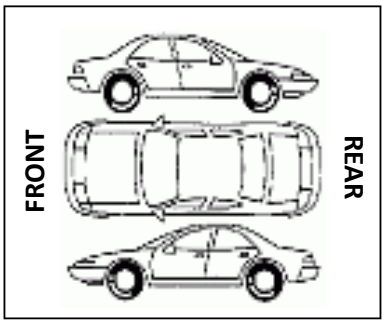
B6. How fast was the vehicle travelling?

- ☐ Slow speed (< 30 km/hr)
- ☐ Moderate speed (30-60 km/hr)
- ☐ High speed (> 60 km/hr)
- ☐ Don't Know

B7. What side of the vehicle was hit? (Check ALL that apply)

Interviewer: Circle the area(s) of impact on the diagram to the right.

- ☐ Side (right side angle)
- ☐ Side (left side angle)
- ☐ Side (right side swipe)
- ☐ Side (left side swipe)
- ☐ Back (rear-ended)



Appendix A. Baseline Questionnaire

☐ Front (head-on collision)

Appendix A. Baseline Questionnaire

B8. What was your seating location when the accident occurred (vehicle passenger)?

- ☐ Front row: passenger seat
- ☐ Back or middle row: right seat
- ☐ Back or middle row: middle seat
- ☐ Back or middle row: left seat
- ☐ Passenger seat (motorcycle)

B9. Were you wearing a seatbelt (If the vehicle was a motorcycle/scooter: Were you wearing a helmet?)

- ☐ Yes
- ☐ No

B10. Was the airbag deployed?

- ☐ Yes
- ☐ No
- ☐ Not Applicable

B11. Did you strike the windshield or any object in the car/motorcycle?

- ☐ Yes
- ☐ No
- ☐ Not Applicable

B12. Was your vehicle severely damaged? For example: Did the vehicle have to be towed away? Was the vehicle drivable after the accident? Could you open the vehicle door? Was there major damage or intrusion into the vehicle**?**

- ☐ Yes
- ☐ No
- ☐ Don't Know

Next: Go to **Section 3** (Page 15)

Appendix A. Baseline Questionnaire

SECTION 2C: PEDESTRIAN

C1. What type of motor vehicle hit you?

- ☐ Car, sedan, or convertible (small-sized vehicle)
- ☐ SUV, jeep, light truck, or minivan (medium-sized vehicle)
- ☐ Commercial vehicle, bus, semi-truck, or big truck (large-sized vehicle)
- ☐ Motorcycle / Scooter
- ☐ Don't Know

C2. What was the speed of the vehicle that hit you?

- ☐ Slow speed (< 30 km/hr)
- ☐ Moderate speed (30-60 km/hr)
- ☐ High speed (> 60 km/hr)
- ☐ Don't Know

C3. Where did the accident occur?

- ☐ Main street (*e.g.* multi-lanes, lots of traffic, *etc.*)
- ☐ Side street (*e.g.* less traffic, residential area, *etc.*)
- ☐ Ramp (*e.g.* exit or entrance ramp, *etc.*)
- ☐ Highway

If uncertain, write participant's response here: _____

C4. Did the accident occur at an intersection?

- ☐ Yes
- ☐ No

C5. What side of your body did the vehicle hit? (Check ALL that apply)

- ☐ Front
- ☐ Back
- ☐ Left
- ☐ Right

C6. What was the vehicle doing at the time of impact?

- ☐ Turning right
- ☐ Turning left
- ☐ Driving straight
- ☐ Reversing

C7. Which part of the vehicle hit you?

- ☐ Front (*i.e.* vehicle struck you head-on)
- ☐ Back (*i.e.* vehicle was reversing)
- ☐ Side (*e.g.* side swipe)

Next: Go to **Section 3** (Page 15)

Appendix A. Baseline Questionnaire

SECTION 2D: CYCLIST

D1. How fast were you travelling?

- ☐ Slow speed (*e.g.* not going faster than a walking pace / brisk walk)
- ☐ Moderate speed (*e.g.* faster than a brisk walk, but slower than traffic)
- ☐ High speed (*e.g.* with or faster than the speed of traffic)

D2. What type of motor vehicle hit you?

- ☐ Car, sedan, or convertible (small-sized vehicle)
- ☐ SUV, jeep, light truck, or minivan (medium-sized vehicle)
- ☐ Commercial vehicle, bus, semi-truck, or big truck (large-sized vehicle)
- ☐ Motorcycle / Scooter

D3. What was the speed of the vehicle that hit you?

***Interviewer* PROMPT:** Was the vehicle driving over the speed limit?

- ☐ Slow speed (< 30 km/hr)
- ☐ Moderate speed (30-60 km/hr)
- ☐ High speed (> 60 km/hr)
- ☐ Don't Know

D4. Where did the accident occur?

- ☐ Main street (*e.g.* multi-lanes, lots of traffic, *etc.*)
- ☐ Side street (*e.g.* less traffic, residential area, *etc.*)
- ☐ Ramp (*e.g.* exit or entrance ramp, *etc.*)
- ☐ Highway

If uncertain, write participant's response here: _____

D5. Did the accident occur at an intersection?

- ☐ Yes
- ☐ No

D6. Did the vehicle hit you, your bike, or both?

- ☐ Yes, hit cyclist only
- ☐ Yes, hit bike only
- ☐ Yes, hit cyclist and bike

D7. What side of your body did the vehicle hit? (Check ALL that apply)

- ☐ Front
- ☐ Back
- ☐ Left
- ☐ Right

Appendix A. Baseline Questionnaire

D8. What was the vehicle doing at the time of impact?

- ☐ Turning right
- ☐ Turning left
- ☐ Driving straight
- ☐ Reversing

D9. Which part of the vehicle hit you?

- ☐ Front (*i.e.* vehicle struck you head-on)
- ☐ Back (*i.e.* vehicle was reversing)
- ☐ Side (*e.g.* side swipe)

D10. Were you wearing a helmet?

- ☐ Yes
- ☐ No

D11. Besides a helmet, were you wearing any outfit/gear that can provide you some protection from injury?

- ☐ Yes; **Please describe:** _____

  _____
- ☐ No

Next: Go to **Section 3** (Page 15)

Appendix A. Baseline Questionnaire

SECTION 3

1. **Can you tell me the location and type of injury you sustained?** Use the picture and describe the injuries. (Check ALL that apply)

i. Head (skull and brain)
- ☐ Superficial injury
- ☐ Fracture
- ☐ Burn
- ☐ Eye injury
- ☐ Internal injury

ii. Neck
- ☐ Superficial injury
- ☐ Fracture
- ☐ Sprain / Strain

iii. Chest
- ☐ Superficial injury
- ☐ Fracture
- ☐ Burn
- ☐ Internal injury

iv. Abdomen
- ☐ Superficial injury
- ☐ Burn
- ☐ Internal injury

v. Pelvis
- ☐ Superficial injury
- ☐ Fracture
- ☐ Internal injury

vi. Spine (vertebrae)
- ☐ Fracture
- ☐ Dislocation

vii. Back
- ☐ Superficial injury
- ☐ Fracture
- ☐ Internal injury

viii. Upper Extremity
- ☐ Superficial injury
- ☐ Fracture
- ☐ Burn

ix. Lower Extremity
- ☐ Superficial injury
- ☐ Fracture
- ☐ Burn

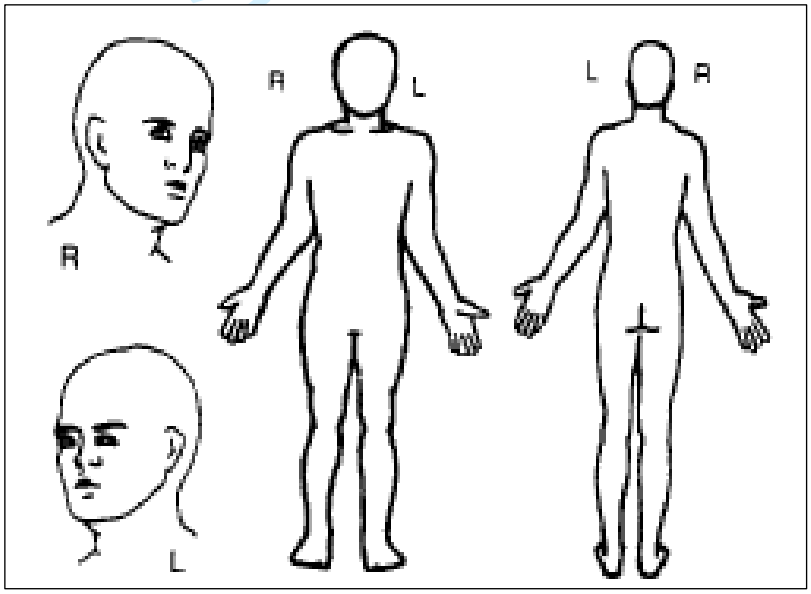
x. Other: _____

_____

_____

_____

_____



Appendix A. Baseline Questionnaire

2. Have you ever had any complaints in the involved body area(s) before this accident?

☐ Yes ☐ No ☐ Don't Know

If yes, were they present at the time of the accident? ☐ Yes ☐ No ☐ Don't Know

If yes, can you tell me about these complaints prior to the accident?

_____

_____

3. At the time of the accident, did you feel any pain immediately after the accident? (Check ALL that apply)

Interviewer: *Prompt the following symptoms.*

☐ Headache
☐ Chest pain
☐ Back pain
☐ Stiff back
☐ Neck pain
☐ Stiff neck
☐ Irritability
☐ Numbness in toes
☐ Face flushed
☐ Cold hands
☐ Cold feet
☐ Shortness of breath
☐ Pins and needles (arms)
☐ Pins and needles (legs)
☐ Ringing in ears
☐ Dizziness
☐ Tension
☐ Memory loss
☐ Other; **Please specify:**

_____

_____

☐ None

4. On a scale of 0 to 10, where '0' is no pain and '10' is the worst pain possible, how much pain are you currently experiencing?

No Pain		Mild		Moderate		Severe		Very Severe		Worst Pain Possible
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

Current pain level = ☐

5. How long do you think it will take for you to fully recover from your injuries?

☐ Less than a week
☐ 1 week to less than a month
☐ 1 month to less than 3 months
☐ 3 months to less than 6 months
☐ 6 months or more

Appendix A. Baseline Questionnaire

SECTION 4

The next questions are about your medical history. For the first question, I will ask if you have ever been diagnosed with specific diseases and you can answer "Yes" or "No". **If** you answer "Yes" to any disease, I would appreciate if you can also tell me if you are/have been treated for it or if it has remained untreated.

1. Has a healthcare professional ever diagnosed you with the following?

	Yes	No	Don't Know / Refused	Treating /Treated	Untreated	Don't Know / Refused	Not Applicable
a. Eye disease	☐	☐	☐	☐	☐	☐	☐
b. Arthritis	☐	☐	☐	☐	☐	☐	☐
c. Diabetes	☐	☐	☐	☐	☐	☐	☐
d. Respiratory disease (*e.g.* COPD)	☐	☐	☐	☐	☐	☐	☐
e. Heart disease	☐	☐	☐	☐	☐	☐	☐
f. Hypertension	☐	☐	☐	☐	☐	☐	☐
g. Cerebrovascular accident (CVA) / Stroke	☐	☐	☐	☐	☐	☐	☐
h. Epilepsy	☐	☐	☐	☐	☐	☐	☐
i. Kidney disease	☐	☐	☐	☐	☐	☐	☐
j. Psychiatric disease	☐	☐	☐	☐	☐	☐	☐
k. Other: _____	☐	☐	☐	☐	☐	☐	☐

2. Are you currently taking any prescribed medications? (Refer to Medical Record Forms)

Interviewer: *Ask the patient to list medications they are currently taking and, if their Medical Record Form is available, ask the patient if they are taking the listed medications (skip those already mentioned).*

_____

_____ ☐ None

3. Are you taking any over-the-counter medications?

☐ Yes; **Specify:** _____

☐ No

4. Do you take any medications for…?

	Yes	No	Don't Know	Refused	Not Applicable
a. Sleep	☐	☐	☐	☐	☐

Appendix A. Baseline Questionnaire

b. Anxiety	☐	☐	☐	☐	☐
c. Pain	☐	☐	☐	☐	☐
d. Depression	☐	☐	☐	☐	☐

5a. Do you ever drink alcohol (including beer, wine, hard liquor, *etc.*)?

- ☐ Yes
- ☐ No (SKIP TO **QUESTION 6A**)

5b. During the last 4 weeks, how often did you have any kind of drink containing alcohol?

- ☐ Daily or almost daily (6 or 7 times a week)
- ☐ Three to five times a week
- ☐ Once or twice a week
- ☐ Less than once a week
- ☐ None in the last 4 weeks

6a. Do you ever use marijuana (including medical marijuana)?

- ☐ Yes
- ☐ No (SKIP TO **QUESTION 7A**)

6b. During the last 4 weeks, how often did you use marijuana (including medical marijuana)?

- ☐ Daily or almost daily (6 or 7 times a week)
- ☐ Three to five times a week
- ☐ Once or twice a week
- ☐ Less than once a week
- ☐ None in the last 4 weeks

7a. Do you ever use any other recreational drugs such as cocaine, heroin, or methamphetamine?

- ☐ Yes
- ☐ No (SKIP TO **SECTION 5**)

7b. Which other recreational drugs have you ever used?

- ☐ Cocaine
- ☐ Heroin (or other opiates such as fentanyl or morphine)
- ☐ Methamphetamine
- ☐ Ecstasy (MDMA)
- ☐ Other; **Please specify:** _____

7c. During the last 4 weeks, how often did you use any of these drugs?

- ☐ More than once a week
- ☐ Less than once a week
- ☐ None in the last 4 weeks

Appendix A. Baseline Questionnaire

Appendix A. Baseline Questionnaire

SECTION 5

Please indicate which statements best describe your own health state **a day before the accident**.

1. MOBILITY

- ☐ I have no problems in walking about
- ☐ I have slight problems in walking about
- ☐ I have moderate problems in walking about
- ☐ I have severe problems in walking about
- ☐ I am unable to walk about

2. SELF-CARE

- ☐ I have no problems washing or dressing myself
- ☐ I have slight problems washing or dressing myself
- ☐ I have moderate problems washing or dressing myself
- ☐ I have severe problems washing or dressing myself
- ☐ I am unable to wash or dress myself

3. USUAL ACTIVITIES (*e.g. work, study, housework, family or leisure activities)*

- ☐ I have no problems doing my usual activities
- ☐ I have slight problems doing my usual activities
- ☐ I have moderate problems doing my usual activities
- ☐ I have severe problems doing my usual activities
- ☐ I am unable to do my usual activities

4. PAIN/DISCOMFORT

- ☐ I have no pain or discomfort
- ☐ I have slight pain or discomfort
- ☐ I have moderate pain or discomfort
- ☐ I have severe pain or discomfort
- ☐ I have extreme pain or discomfort

5. ANXIETY/DEPRESSION

- ☐ I am not anxious or depressed
- ☐ I am slightly anxious or depressed
- ☐ I am moderately anxious or depressed
- ☐ I am severely anxious or depressed
- ☐ I am extremely anxious or depressed

Appendix A. Baseline Questionnaire

6. **We would like to know how good or bad your health was a day before the accident.** This scale is numbered from 0 to 100. A '100' indicates the best health you can imagine, while a '0' indicates the worst health you can imagine. Mark an 'X' on the scale to indicate how your health is a day before the accident. Then please write the number you marked on the scale in the box below.

Worst health you can imagine — Best health you can imagine

0 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Your health a day before = ☐

Appendix A. Baseline Questionnaire

SECTION 6

Now I am going to ask you about your general feelings. Please think about how you were feeling in the **past 2 weeks before this accident.**

Over the past 2 weeks, how often have you been bothered by the following problems? (Circle only one answer per question)

	Not at all	Several days	More than half the days	Nearly everyday
1. Feeling nervous, anxious, or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Little interest or pleasure in doing things	0	1	2	3
4. Feeling down, depressed, or hopeless	0	1	2	3

Appendix A. Baseline Questionnaire

SECTION 7

Please think about your health and conditions **4 weeks prior to this accident**.

1. **In general, would you say your health before this crash was…?** (Check only one box)

☐ Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor

2. **Health and daily activities before this crash.** The following questions are about activities you might do during a typical day. Does your health limit you in these activities? If so, how much? (*Please check only one box per line*)

	Yes, limited a lot	Yes, limited a little	No, not limited at all
a. **Moderate activities, such as moving a table, pushing a vacuum, bowling, or playing golf**	☐	☐	☐
b. **Climbing several flights of stairs**	☐	☐	☐

3. **During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?** (Please answer "Yes" or "No" to each question)

	Yes	No
a. **Accomplished less than you would like**	☐	☐
b. **Limited in the kind of work or other activities**	☐	☐

4. **During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?** (Please answer "Yes" or "No" to each question)

	Yes	No
a. **Accomplished less than you would like**	☐	☐
b. **Did not do work or other activities as carefully as usual**	☐	☐

5. **During the past 4 weeks, how much did pain interfere with your normal work (including work outside the home and housework)?** (Please check only one box)

☐ Not at all ☐ A little bit ☐ Moderately ☐ Quite a bit ☐ Extremely

Appendix A. Baseline Questionnaire

Your Feelings: Now we would like to ask about your feelings in health.

These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please indicate the one answer that comes closest to the way you have been feeling. (Please check only one box per question)

6. How much time during the past 4 weeks:

	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
a. Have you felt calm and peaceful?	☐	☐	☐	☐	☐	☐
b. Did you have a lot of energy?	☐	☐	☐	☐	☐	☐
c. Have you felt downhearted and low?	☐	☐	☐	☐	☐	☐
d. Has your health limited your social activities (*e.g.* visiting friends or close relatives)?	☐	☐	☐	☐	☐	☐

Appendix A. Baseline Questionnaire

SECTION 8

In the 4 weeks prior to your injury, how much have you been bothered by any of the following problems?

	Not bothered at all (0)	Bothered a little (1)	Bothered a lot (2)
a. Stomach pain	☐	☐	☐
b. Back pain	☐	☐	☐
c. Pain in your arms, legs, or joints (knees, hips, *etc.*)	☐	☐	☐
d. Menstrual cramps or other problems with your periods (WOMEN ONLY)	☐	☐	☐
e. Headaches	☐	☐	☐
f. Chest pain	☐	☐	☐
g. Dizziness	☐	☐	☐
h. Fainting spells	☐	☐	☐
i. Feeling your heart pound or race	☐	☐	☐
j. Shortness of breath	☐	☐	☐
k. Pain or problems during sexual intercourse	☐	☐	☐
l. Constipation, loose bowels, or diarrhea	☐	☐	☐
m. Nausea, gas, or indigestion	☐	☐	☐

Appendix A. Baseline Questionnaire

n. Feeling tired or having low energy	☐	☐	☐
o. Trouble sleeping	☐	☐	☐

Appendix A. Baseline Questionnaire

SECTION 9

Interviewer: Read the following to the participant.

Everyone experiences painful situations at some point in their lives. Such experience may include headaches, tooth pain, joint or muscle pain. People are often exposed to situations that may cause pain such as illness, injury, dental procedures or surgery.

We are interested in the types of thoughts and feelings that you have when you are in pain. Listed below are 13 statements describing different thoughts and feelings that may be associated with pain. Using the following scale, please indicate the degree to which you have these thoughts and feelings when you are experiencing pain.

Interviewer: The PCS is a validated questionnaire. Make sure the participant understands that we are asking about their response to physical pain (**not** psychological/emotional or overall pain).

Please tell me how you would describe your different thoughts and feelings about pain ***before this accident.***

0 = Not at all; **1** = To a slight degree; **2** = To a moderate degree; **3** = To a great degree; **4** = All the time

When I'm in pain:

_____ **I become afraid that the pain will get worse.**

_____ **I feel I can't stand it anymore.**

_____ **I can't seem to keep it out of my mind.**

_____ **There's nothing I can do to reduce the intensity of the pain.**

_____ **I wonder whether something serious may happen.**

_____ **It's awful and I feel that it overwhelms me.**

_____ **I worry all the time about whether the pain will end.**

_____ **I keep thinking about how much it hurts.**

_____ **I keep thinking about how badly I want the pain to stop.**

_____ **I feel I can't go on.**

_____ **It's terrible and I think it's never going to get any better.**

_____ **I keep thinking of other painful events.**

_____ **I anxiously want the pain to go away.**

Appendix A. Baseline Questionnaire

SECTION 10

These are questions about your general health and work.

1. **What is the highest degree of education you have achieved?**

   Interviewer: Classify the participant's response under the most appropriate option.

   - ☐ I never finished school or any training program
   - ☐ Primary or elementary school (Kindergarten to Grade 7)
   - ☐ Lower general secondary school (Grades 8 to 10)
   - ☐ Higher general secondary education (Grades 11 and 12)
   - ☐ Junior vocational education (1 to 2 years of trades school/apprenticeship training)
   - ☐ Intermediate vocational education (3 years of trades school/apprenticeship training)
   - ☐ School for higher vocational education (4 or more years of trades school/apprenticeship training)
   - ☐ University (Bachelor's degree or Associate's degree/2-year diploma)
   - ☐ I achieved another degree (Master's or Doctoral degree; or other education); **Specify:** _____

   If uncertain, write participant's response here: _____

2. **What do you do?** Select one option for what you usually do.
   - ☐ I go to school, I am studying (Full-time school, part-time work; *i.e.* more school than work)
   - ☐ I am employed (Full-time work, part-time school; *i.e.* more work than school)
   - ☐ I am self-employed
   - ☐ I am a housewife or husband
   - ☐ I am unemployed
   - ☐ I am unable to work, for _____%
   - ☐ I am retired or on a pre-pension plan
   - ☐ I do something else; **Specify:** _____

3. **Do you have a paying job?**
   - ☐ Yes
   - ☐ No (SKIP TO **QUESTION 13**)

The following questions refer to your work/job. That is work that you get paid for. If you do not have a paying job? SKIP TO **QUESTION 13**. *Please first read the explanation above the question.*

4. **What is your occupation?** _____

5. **How many days a week do you work?** _____ **days** (on average)

6. **How many hours a week do you work?** (Count only the hours that you get paid) _____ **hours**

Appendix A. Baseline Questionnaire

The following questions refer to productivity losses.

Interviewer: *The next 3 questions refer to absenteeism (absence from paid work; sick leave).*

7. **Have you worked at all in the last 4 weeks?**
   - ☐ Yes (If yes, SKIP TO **QUESTION 9)**
   - ☐ No

8. **When did you call in sick?** *(Long-term absence)* ☐☐ / ☐☐ / ☐☐
   m m d d y y

   (This is the date that you first got sick earlier than the period of 4 weeks. This is referring to one whole uninterrupted period of missed work as a result of being sick**)**

   Next: *If the participant has not worked in the last 4 weeks and earlier than the last 4 weeks,* SKIP TO **QUESTION 13**. Please first read the explanation above question 13.

9. **Have you missed work in the last 4 weeks as a result of being sick?** *(Short-term absence)*
   - ☐ Yes, I have missed _____ **work days**
   - ☐ No

Interviewer: *The next 3 questions refer to presenteeism (lost workplace productivity).*

10. **During the last 4 weeks, have there been days in which you worked but during that time were bothered by physical or psychological problems?**
    - ☐ Yes (If yes, GO TO **QUESTIONS 11 and 12**)
    - ☐ No (If no, SKIP TO **QUESTION 13** – read the explanation above question 13)

11. **How many days at work were you bothered by physical or psychological problems?** (Only count the days at work in the last 4 weeks) _____ **work days**

12. **On the days that you were bothered by these problems, was it perhaps difficult to get as much work finished as you normally do? On these days how much work could you do on average?** Look at the figures below. A '10' indicates that you were able to do as much work as you normally do, while a '0' indicates that you were unable to do any work on these days. Circle the figure that fits best.

On these days I could not do anything				I was able to do half as much as I normally do						I was able to do just as much as I normally do
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

Appendix A. Baseline Questionnaire

Interviewer: *Productivity losses of unpaid work.*

Interviewer: Please read the following explanation to the participant.

Explanation: Even for unpaid work, you can be bothered by physical or psychological problems. Sometimes as a result you (might) do less. For example, you have trouble caring for your children or doing voluntary work. Or you are unable to run errands and pick up groceries, or to work in the garden. The following questions refer to this.

13. **Thinking only about the past four weeks, were there days in which you were forced to do less unpaid work because of physical or psychological problems?**
    - ☐ Yes (If yes, GO TO **QUESTIONS 14 AND 15**)
    - ☐ No (If no, SKIP TO **SECTION 11**)

14. **How many days did this happen?** (Only count the days in the last 4 weeks) _____ **days**

15. **Imagine that somebody, for example your partner, family member, or friend helped you on these days, and he or she did all the unpaid work that you were unable to do for you. How many hours on average did that person spend doing this on these days?**

    On average _____ hours on these days

Appendix A. Baseline Questionnaire

SECTION 11

To conclude the interview, I would like to ask you some general questions.

1. **What ethnic group or family background do you identify yourself as?** (Check ALL that apply)
   - ☐ Caucasian / White (*e.g.* European)
   - ☐ Chinese
   - ☐ South Asian (*e.g.* East Indian, Pakistani, Sri Lankan)
   - ☐ Black (*e.g.* African, Jamaican or Caribbean)
   - ☐ Filipino
   - ☐ Latin American
   - ☐ Southeast Asian (*e.g.* Cambodian, Indonesian, Laotian, Vietnamese)
   - ☐ Arab (*e.g.* Arabic speaking, Maghrebi)
   - ☐ West Asian (*e.g.* Afghan, Iranian, Israeli, Turkish)
   - ☐ Japanese
   - ☐ Korean
   - ☐ Aboriginal (*e.g.* North American Indian, Métis, Inuit)
   - ☐ Other; **Specify:** _____
   - ☐ Refused
2. **How long have you lived in Canada?**
   - ☐ Entire life
   - ☐ More than 10 years
   - ☐ 5 to 10 years
   - ☐ 2 to 5 years
   - ☐ < 2 years
3. **What type of place do you reside in?**
   - ☐ Own home (*e.g.* house, apartment, renting, basement suite, *etc.*)
   - ☐ Assisted living
   - ☐ Care home (*e.g.* nursing home - regular nursing care, *etc.*)
   - ☐ No fixed address
   - ☐ Other; **Specify:** _____
4. **Who do you reside with?** (Check ALL that apply)
   - ☐ No one (*i.e.* live alone)
   - ☐ Spouse / Partner (or equivalent)
   - ☐ Child / Children (or equivalent)
   - ☐ Parent(s) (or equivalent)
   - ☐ Friend(s) / Roommate(s)
   - ☐ Other; **Specify:** _____
5. **What language do you speak most frequently at home or with family?**

   _____

PERMISSION FOR FOLLOW-UP

Participant ID: | | | - | | | | | |

Appendix A. Baseline Questionnaire

May we have your permission to link your answers in this survey to your health care use (such as hospital visits, doctor visits, and medications) due to this injury? ☐ Yes ☐ No

May we contact you again to ask you questions about your recovery? The first follow-up will be two months from now.

☐ Yes

☐ No (withdraw from the study). **Reason** (*if provided*): _____

If yes, can you provide us your contact information?

First and Last Name: _____ **Preferred Name:** _____

Phone Number: _____ ☐ Home ☐ Mobile ☐ Work

Alternative Phone Number: _____ ☐ Home ☐ Mobile ☐ Work

Mailing Address: _____

City: _____ **Postal Code:** _____

Email Address: _____

Best Time to Contact: _____

What is your preferred method of contact?

☐ Telephone

☐ Email

☐ Mail

What is your preferred method for completing the follow-up interviews?

☐ Telephone

☐ In-person (For this option, the patient has to be willing to come to the research office at VGH)

☐ Online survey

☐ Paper survey

If we are unable to contact you, is there an alternative person we may contact with your permission? If yes, can you provide us with their contact information?

First and Last Name: _____ **Relationship:** _____

Phone Number: _____ ☐ Home ☐ Mobile ☐ Work

Email Address: _____

Best Time to Contact: _____

****DETACH THIS SHEET UPON INPUTTING DATA AND STORE SEPARATELY****

Appendix B. Follow-Up Questionnaires

Road Trauma Health Outcome Study
2- or 4-Month Follow-Up Questionnaire

Participant ID ☐☐-☐☐☐☐☐

Interview Date ☐☐ / ☐☐ / ☐☐☐☐ (m m / d d / y y y y)

Interviewer ID ☐☐

Follow-Up Month ☐☐

Site (*circle*) VGH | RCH | KGH

Method Telephone | In-Person

Please indicate who is completing the questionnaire:

☐ Participant ☐ Participant with assistance from another person

☐ Another person on behalf of the participant

For Office Use Only

F/U Gift Card Received/Mailed/Emailed: ☐ Yes ☐ No

REDCap Data Entered: ☐☐ / ☐☐ / ☐☐ (m m / d d / y y)

Appendix B. Follow-Up Questionnaires

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Appendix B. Follow-Up Questionnaires

SECTION 1

1. **Have you fully recovered from the accident?**
   - ☐ Yes
   - ☐ No

2. **Are you back to your previous daily activities as usual (prior to the accident)?**
   - ☐ Yes
   - ☐ No

3. **Are you back to your previous activities at work or school?**
   - ☐ Yes
   - ☐ No
   - ☐ Not Applicable (I was not working or going to school prior to the accident)

4. **Are you back to your previous recreational activities as usual?**
   - ☐ Yes
   - ☐ No

5. **After you left the hospital, did you have to return to the hospital for your injury from the accident?**
   - ☐ Yes, kept in the hospital overnight
   - ☐ Yes, emergency department only
     - ☐ One time
     - ☐ More than one time
   - ☐ No

6. **Have you seen any physicians or therapists because of your injury from the accident?** (Check ALL that apply)
   - ☐ Family doctor / General Practitioner (GP)
   - ☐ Specialist
   - ☐ Physical Therapist or Physiotherapist (PT) / Occupational Therapist (OT)
   - ☐ Chiropractor
   - ☐ Other; **Please specify:** _____

7. **Did the accident cause you any financial difficulties?**
   - ☐ Yes; **Please describe:** _____
     _____
   - ☐ No

8. **Did the crash cause you any legal difficulties?**
   - ☐ Yes; **Please describe:** _____
     _____
   - ☐ No

Appendix B. Follow-Up Questionnaires

9. **Please tell us about any problems, health-related or otherwise, you might be having due to the accident:**

_____

_____

_____

_____

_____

_____

Appendix B. Follow-Up Questionnaires

SECTION 2

Please indicate which statements best describe your state of health **today**.

1. MOBILITY

- ☐ I have no problems in walking about
- ☐ I have slight problems in walking about
- ☐ I have moderate problems in walking about
- ☐ I have severe problems in walking about
- ☐ I am unable to walk about

2. SELF-CARE

- ☐ I have no problems washing or dressing myself
- ☐ I have slight problems washing or dressing myself
- ☐ I have moderate problems washing or dressing myself
- ☐ I have severe problems washing or dressing myself
- ☐ I am unable to wash or dress myself

3. USUAL ACTIVITIES (*e.g. work, study, housework, family or leisure activities)*

- ☐ I have no problems doing my usual activities
- ☐ I have slight problems doing my usual activities
- ☐ I have moderate problems doing my usual activities
- ☐ I have severe problems doing my usual activities
- ☐ I am unable to do my usual activities

4. PAIN/DISCOMFORT

- ☐ I have no pain or discomfort
- ☐ I have slight pain or discomfort
- ☐ I have moderate pain or discomfort
- ☐ I have severe pain or discomfort
- ☐ I have extreme pain or discomfort

5. ANXIETY/DEPRESSION

- ☐ I am not anxious or depressed
- ☐ I am slightly anxious or depressed
- ☐ I am moderately anxious or depressed
- ☐ I am severely anxious or depressed
- ☐ I am extremely anxious or depressed

Appendix B. Follow-Up Questionnaires

6. We would like to know how good or bad your health is <u>TODAY</u>. This scale is numbered from 0 to 100. A '100' indicates the best health you can imagine, while a '0' indicates the worst health you can imagine. Mark an 'X' on the scale to indicate how your health is <u>TODAY</u>. Then please write the number you marked on the scale in the box below.

Worst health you can imagine — Best health you can imagine

0 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Your health today = ☐

Appendix B. Follow-Up Questionnaires

SECTION 3

Now I am going to ask you about your general feelings. Please think about how you were feeling in the **past 2 weeks**.

For each question, please answer with one of the following responses:

1 = Not at all; **2** = A little bit; **3** = Moderately; **4** = Quite a bit; **5** = Extremely

---

In the past 2 weeks, how much have you been bothered by:

_____ **Repeated, disturbing memories, thoughts, or images of a stressful experience from the past?**

_____ **Repeated, disturbing dreams of a stressful experience from the past?**

_____ **Suddenly acting or feeling as if a stressful experience were happening again (as if you were reliving it)?**

_____ **Feeling very upset when something reminded you of a stressful experience from the past?**

_____ **Having physical reactions (*e.g. heart pounding, trouble breathing, or sweating)* when something reminded you of a stressful experience from the past?**

_____ **Avoid thinking about or talking about a stressful experience from the past or avoid having feelings related to it?**

_____ **Avoid activities or situations because they remind you of a stressful experience from the past?**

_____ **Trouble remembering important parts of a stressful experience from the past?**

_____ **Loss of interest in things that you used to enjoy?**

_____ **Feeling distant or cut off from other people?**

_____ **Feeling emotionally numb or being unable to have loving feelings for those close to you?**

_____ **Feeling as if your future will somehow be cut short?**

_____ **Trouble falling or staying asleep?**

_____ **Feeling irritable or having angry outbursts?**

_____ **Having difficulty concentrating?**

_____ **Being "super alert" or watchful or on guard?**

_____ **Feeling jumpy or easily startled?**

Appendix B. Follow-Up Questionnaires

SECTION 4

Please think about your health and conditions in the **past 4 weeks**.

1. **In general, would you say your health in the past 4 weeks was…?** (Check only one box)

   ☐ Excellent ☐ Very good ☐ Good ☐ Fair ☐ Poor

2. **Health and daily activities.** The following questions are about activities you might do during a typical day. Does your health limit you in these activities? If so, how much? (*Please check only one box per line*)

	Yes, limited a lot	Yes, limited a little	No, not limited at all
a. Moderate activities, such as moving a table, pushing a vacuum, bowling, or playing golf	☐	☐	☐
b. Climbing several flights of stairs	☐	☐	☐

3. **During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?** (Please answer "Yes" or "No" to each question)

	Yes	No
a. Accomplished less than you would like	☐	☐
b. Limited in the kind of work or other activities	☐	☐

4. **During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?** (Please answer "Yes" or "No" to each question)

	Yes	No
a. Accomplished less than you would like	☐	☐
b. Did not do work or other activities as carefully as usual	☐	☐

5. **During the past 4 weeks, how much did pain interfere with your normal work (including work outside the home and housework)?** (Please tick only one box)

   ☐ Not at all ☐ A little bit ☐ Moderately ☐ Quite a bit ☐ Extremely

Appendix B. Follow-Up Questionnaires

Your Feelings: Now we would like to ask about your feelings in health

These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please indicate the one answer that comes closest to the way you have been feeling. (Please check only one box per question)

6. How much time during the past 4 weeks:

	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
a. Have you felt calm and peaceful?	☐	☐	☐	☐	☐	☐
b. Did you have a lot of energy?	☐	☐	☐	☐	☐	☐
c. Have you felt downhearted and low?	☐	☐	☐	☐	☐	☐
d. Has your health limited your social activities (*e.g.* visiting friends or close relatives)?	☐	☐	☐	☐	☐	☐

Appendix B. Follow-Up Questionnaires

SECTION 5

During the past 4 weeks, how much have you been bothered by any of the following problems?

	Not bothered at all (0)	Bothered a little (1)	Bothered a lot (2)
p. Stomach pain	☐	☐	☐
q. Back pain	☐	☐	☐
r. Pain in your arms, legs, or joints (knees, hips, *etc.*)	☐	☐	☐
s. Menstrual cramps or other problems with your periods (WOMEN ONLY)	☐	☐	☐
t. Headaches	☐	☐	☐
u. Chest pain	☐	☐	☐
v. Dizziness	☐	☐	☐
w. Fainting spells	☐	☐	☐
x. Feeling your heart pound or race	☐	☐	☐
y. Shortness of breath	☐	☐	☐
z. Pain or problems during sexual intercourse	☐	☐	☐
aa. Constipation, loose bowels, or diarrhea	☐	☐	☐
bb. Nausea, gas, or indigestion	☐	☐	☐
cc. Feeling tired or having low energy	☐	☐	☐
dd. Trouble sleeping	☐	☐	☐

Appendix B. Follow-Up Questionnaires

SECTION 6

The questions in this section focus on how your injury affected your overall quality-of-life. We understand that some questions may not apply to you very well depending on the type of injuries you sustained. Please answer each question to the best of your ability.

Please answer the first question if you are not the participant. If you are the participant, please **SKIP TO QUESTION 2A**.

Consciousness

1. Is the participant able to obey simple commands or say any words?

- ☐ Yes
- ☐ No

Independence at Home

2a. Is the assistance of another person at home essential every day for some activities of daily living?

- ☐ Yes
- ☐ No (If no, SKIP TO **QUESTION 3A**)

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

- ☐ Yes
- ☐ No

2c. Was assistance at home essential before the injury?

- ☐ Yes
- ☐ No

Independence Outside of the Home

3a. Are you able to shop without assistance?

- ☐ Yes
- ☐ No

3b. Were you able to shop without assistance before the injury?

- ☐ Yes
- ☐ No

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

- ☐ Yes
- ☐ No

4b. Were you able to travel without assistance before the injury?

- ☐ Yes
- ☐ No

Work

5a. Are you currently able to work to your previous capacity?

- ☐ Yes (If yes, GO TO **QUESTION 6A**)
- ☐ No

Appendix B. Follow-Up Questionnaires

5b. How restricted are you?

- ☐ Reduced work capacity
- ☐ Able to work only in a sheltered workshop or non-competitive job or currently unable to work

5c. Were you working or seeking employment before the injury?

- ☐ Yes
- ☐ No

Social and Leisure Activities

6a. Are you able to resume regular social and leisure activities outside home?

- ☐ Yes (If yes, GO TO **QUESTION 7A**)
- ☐ No

6b. What is the extent of restriction on your social and leisure activities?

- ☐ Participate a bit less; at least half as often as before the injury
- ☐ Participate much less or unable to participate

Family and Friendships

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

- ☐ Yes
- ☐ No (If no, SKIP TO **QUESTION 8A**)

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

- ☐ Occasional – less than weekly
- ☐ Frequent or constant – once a week or more

7c. Did you have problems with family or friends before the injury?

- ☐ Yes
- ☐ No

Return to Normal Life

8a. Are there any other current problems relating to your injury which affect your daily life?

- ☐ Yes
- ☐ No (If not, SKIP TO **QUESTION 9A)**

8b. If similar problems were present before the injury, have these become markedly worse?

- ☐ Yes
- ☐ No

Epilepsy

9a. Since the injury, have you had an epileptic fit?

- ☐ Yes
- ☐ No

9b. Have you been told you are currently at risk of developing epilepsy?

- ☐ Yes
- ☐ No

Appendix B. Follow-Up Questionnaires

SECTION 7

These are questions about your health and work following your accident.

We know we asked you the following questions before, but we want to know whether anything has changed since we last interviewed you.

1. What is the highest degree of education you have achieved?

Interviewer: Classify the participant's response under the most appropriate option.

- ☐ I never finished school or any training program
- ☐ Primary or elementary school (Kindergarten to Grade 7)
- ☐ Lower general secondary school (Grades 8 to 10)
- ☐ Higher general secondary education (Grades 11 and 12)
- ☐ Junior vocational education (1 to 2 years of trades school/apprenticeship training)
- ☐ Intermediate vocational education (3 years of trades school/apprenticeship training)
- ☐ School for higher vocational education (4 or more years of trades school/apprenticeship training)
- ☐ University (Bachelor's or Associate's degree/2-year diploma)
- ☐ I achieved another degree (Master's or Doctoral degree; or other education); **Specify:** _____

If uncertain, write participant's response here: _____

2. What do you do? Select <u>one</u> option for what you usually do.

- ☐ I go to school, I am studying (Full-time school only or full-time school, part-time work; *i.e.* more school than work)
- ☐ I am employed (Full-time work only or full-time work, part-time school; *i.e.* more work than school)
- ☐ I am self-employed
- ☐ I am a housewife or househusband
- ☐ I am unemployed
- ☐ I am unable to work, for _____%
- ☐ I am retired or on a pre-pension plan
- ☐ I do something else; **Specify:** _____

3. Do you have a paying job?

- ☐ Yes
- ☐ No (SKIP TO **QUESTION 14**)

The following questions refer to your work/job. That is work that you get paid for. If you do not have a paying job? SKIP TO **QUESTION 14**. <u>*Please first read the explanation above the question.*</u>

4. What is your occupation? _____

5. How many days a week do you currently work? _____ days

6. How many hours a week do you currently work? (Count only the hours that you get paid) _____ **hours**

Appendix B. Follow-Up Questionnaires

The following questions refer to productivity losses.

Interviewer: *The next 4 questions refer to absenteeism (absence from paid work; sick leave).*

7. Have you returned to work at all since the accident?

☐ Yes

☐ No (If no, SKIP TO **QUESTION 14)**

8. Have you worked at all in the last 4 weeks?

☐ Yes (If yes, SKIP TO **QUESTION 10)**

☐ No

9. When did you call in sick? *(Long-term absence)* ☐☐ / ☐☐ / ☐☐

m m d d y y

(This is the date that you first got sick earlier than the period of 4 weeks. This is referring to one whole uninterrupted period of missed work as a result of being sick**)**

Next: *If the participant called in sick in the last 4 weeks and earlier than the last 4 weeks,* SKIP TO **QUESTION 14**. Please first read the explanation above question 14.

10. Have you missed work in the last 4 weeks as a result of being sick? *(Short-term absence)*

☐ Yes, I have missed _____ **work days**

☐ No

Interviewer: *The next 3 questions refer to presenteeism (lost workplace productivity).*

11. During the last 4 weeks, have there been days in which you worked but during that time were bothered by physical or psychological problems?

☐ Yes (If yes, GO TO **QUESTIONS 12 and 13**)

☐ No (If no, SKIP TO **QUESTION 14** – read the explanation above question 14)

12. How many days at work were you bothered by physical or psychological problems? (Only count the days at work in the last 4 weeks) _____ **work days**

13. On the days that you were bothered by these problems, was it perhaps difficult to get as much work finished as you normally do? On these days how much work could you do on average? Look at the figures below. A '10' indicates that you were able to do as much work as you normally do, while a '0' indicates that you were unable to do any work on these days. Circle the number that fits best.

On these days I could not do anything			I was able to do half as much as I normally do					I was able to do just as much as I normally do		
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

Appendix B. Follow-Up Questionnaires

Interviewer: *Productivity losses of unpaid work.*

Interviewer: Please read the following explanation to the participant.

Explanation: Even for unpaid work, you can be bothered by physical or psychological problems. Sometimes as a result you (might) do less. For example, you have trouble caring for your children or doing voluntary work. Or you are unable to run errands and pick up groceries, or to work in the garden. The following questions refer to this.

14. **Thinking only about the past four weeks, were there days in which you were forced to do less unpaid work because of physical or psychological problems?**
    - ☐ Yes (If yes, GO TO **QUESTIONS 15 AND 16**)
    - ☐ No (If no, SKIP TO THE **NEXT SECTION**)

15. **How many days did this happen?** (Only count the days in the last 4 weeks) _____ **days**

16. **On the days that you were forced to do less unpaid work because of physical or psychological problems, how many hours per day would you need help from a family member or friend to help you with your unpaid work on these days?**

    On average _____ hours on these days

Appendix B. Follow-Up Questionnaires

POST-INTERVIEW AND PERMISSION FOR FOLLOW-UP

Thank you for taking the time to complete this questionnaire. As a reminder, your answers will remain confidential and will only be used for research purposes.

May we contact you again in 2 months to ask you questions about your recovery?

☐ Yes

☐ No (withdraw from the study). **Reason** (*if provided*): _____

How would you like to receive your $10 gift card?

☐ By Mail (**Please provide your full mailing address below to receive your gift card**)

Please select one: ☐ Starbucks ☐ Tim Hortons ☐ McDonalds ☐ Superstore

☐ Shoppers Drug Mart ☐ Save-On Foods

☐ By Email: E-gift card (**Please provide your email address below to receive your e-gift card**)

If e-gift card, please select one: ☐ Starbucks ☐ Tim Hortons ☐ Amazon ☐ Chapters

Please provide us with your contact information:

First and Last Name: _____ **Preferred Name:** _____

Phone Number: _____ ☐ Home ☐ Mobile ☐ Work

Alternative Phone Number: _____ ☐ Home ☐ Mobile ☐ Work

Mailing Address: _____

City: _____ **Postal Code:** _____

Email Address: _____

Best Time to Contact: _____

What is your preferred method of contact? ☐ Telephone ☐ Email ☐ Mail

What is your preferred method for completing the follow-up interviews?

☐ Telephone ☐ In-Person (at VGH Research Pavilion) ☐ Online Survey ☐ Paper Survey

If we are unable to contact you, is there an alternative person we may contact with your permission? If yes, can you provide us with their contact information?

First and Last Name: _____ **Relationship:** _____

Phone Number: _____ ☐ Home ☐ Mobile ☐ Work

Email Address: _____

Best Time to Contact: _____

****DETACH AND DESTROY THIS SHEET UPON INPUTTING DATA AND MAILING GIFT CARD OR EMAILING E-GIFT CARD TO PARTICIPANT****