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3 **Full title:** Trauma Resident Exposure in Canada and Operative Numbers  
4 (TraumaRECON): a study protocol for a national multicentre study of operative, non-  
5 operative, and structured educational exposures in Canada  
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8 **Brief Title:** Resident Exposure to Trauma in Canada  
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## ABSTRACT

**Background:** The landscape of Canada's trauma management has experienced a shift towards non-operative management. This reduction in operative trauma volume, coupled with the implementation of Competency-Based Medical Education (CBME), has highlighted the lack of quantitative knowledge about the volume and quality of exposure to operative trauma training experiences among Canadian general surgery residents. We aim to 1) quantify the exposure to specific operative trauma domains during residency over time and across participating Canadian training programs; and, 2) perform an environmental scan of the non-operative clinical exposure and formal/informal trauma education provided to general surgery residents across Canadian training programs.

**Methods:** TraumaRECON is a retrospective, multicentre study of operative trauma procedures involving general surgery resident participation in Canada. Participating sites will 1) populate a data abstraction form outlining operative trauma data points as abstracted from eligible trauma operative charts via each site's Trauma Registry, and 2) complete a survey of the non-operative clinical and educational opportunities in trauma care that general surgery residents are exposed to at participating general surgery training programs.

**Interpretation:** Regardless of the trend towards non-operative management in trauma care, the need for surgeon competency in operative trauma will always exist. With potentially limited operative trauma volume, however, this standard may prove difficult to achieve for the next generation of general surgery residents in Canada. Results of TraumaRECON will provide a quantitative commentary on the operative trauma volume experienced by General Surgery residents in Canada in order to inform future teaching practices in the context of CBME.

## INTRODUCTION

In Canada, there are 32 Level 1 and Level 2 trauma centres. Such trauma centres are typically part of an academic healthcare network affiliated with a University that provides General Surgery training accredited by the Royal College of Physicians and Surgeons of Canada.

General Surgery training in Canada is in the midst of both an evolution in trauma management and a changing landscape of medical education that threatens to negatively impact the exposure to learning opportunities and competency of graduating residents. Recent original research and published commentary on trauma has posited that the wider availability of high-quality diagnostic imaging, evidence-based strategies for non-operative management, and effective use of interventional/endovascular technology as contributing factors driving trauma care towards non-operative management<sup>1,2,3</sup>. Regardless of which direction trauma management is pulled, the need for competent, adequately trained trauma surgeons will always exist. With potentially limited operative trauma experiences, the competency of Canadian General Surgery graduates in operative trauma management is in question.<sup>3</sup>

The advent of Competency-Based Medical Education (CBME) also challenges the concept of competence in operative trauma management in general surgery residents, as surgical education has shifted to an educational model that assesses competency based on the breadth, depth, and frequency of essential surgical skills and procedures performed by a resident<sup>4</sup>, such as a trauma laparotomy. The lack of prior knowledge of the extent of general surgery resident participation in operative traumas makes it difficult to identify baseline competency for operative trauma. Together, these factors challenge our ability to assess and ensure the competency of general surgery graduates in operative trauma management.

Amidst the changing landscape of general surgery, a detailed and expansive investigation of resident trauma experiences should be conducted. The TraumaRECON study aims to 1) quantify the exposure to specific operative trauma domains during residency over time and across participating Canadian training programs; and, 2) perform an environmental scan of the non-operative clinical exposure and formal/informal trauma education provided to general surgery residents across Canadian training programs.

## METHODS

### Design

The TraumaRECON Study will consist of two components:

- 1) a retrospective multicentre study of all operative trauma procedures involving general surgery resident participation in Canada; and,
- 2) a survey of participating general surgery training programs to describe the non-operative clinical and educational opportunities in trauma care to which general surgery residents are exposed.

### Setting

All Canadian trauma centres affiliated with a RCPSC-accredited University General Surgery training program will be invited to participate in both components of this study. The Coordinating Study Centre, responsible for data compilation and analysis will be located in Hamilton.

### Study Site Eligibility Criteria

Hospital sites eligible to participate in this study must be Canadian trauma centres with the resources and capabilities to manage multi-system trauma patients operatively. Sites must also be affiliated with a RCPSC-accredited University General Surgery training program and provide general surgery residents clinical exposure to the trauma service at said site. Sites must possess an organized internal registry of

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3 trauma patients admitted to the site within the study period or have the means to extract trauma patients  
4 from a master site registry in order to create a site-specific trauma registry. Sites must also be able to  
5 provide evidence of surgeon, general surgery resident, and fellow attendance at operative traumas through  
6 electronic medical records, as well as record of the date, time, and type of operation performed.  
7

## 8 9 **Methodology Overview**

### 10 11 *Part 1: Operative Trauma Exposure*

12 At each participating site, the local trauma centre's Trauma Registry will be queried to identify all trauma  
13 patients who underwent non-orthopedic/non-neurosurgical/non-plastic trauma operations during the study  
14 period of July 1<sup>st</sup>, 2008 to June 30<sup>th</sup>, 2018. This time period was chosen to be able to capture the entire  
15 training period for a significant number of residents (5 year training period occurring within study period)  
16 as well as assess temporal trends. This list of patients will form the study cohort.  
17

18  
19 The study cohort will undergo chart-level data abstraction at each site to obtain details about the  
20 operations performed, and the presence of staff and resident surgeons. A comprehensive listing of general  
21 surgery residents in the local Residency Program during the study period will be obtained from the local  
22 Residency Program Office. The resident surgeons identified in the trauma operations will then be cross-  
23 referenced with their Post-Graduate Year (PGY) level according to the information provided by the  
24 Residency Program Office. Each site will therefore be able to create a local cohort of all trauma patients  
25 who were treated operatively, with corresponding data identifying the PGY-level of each general surgery  
26 resident present at the trauma operation.  
27

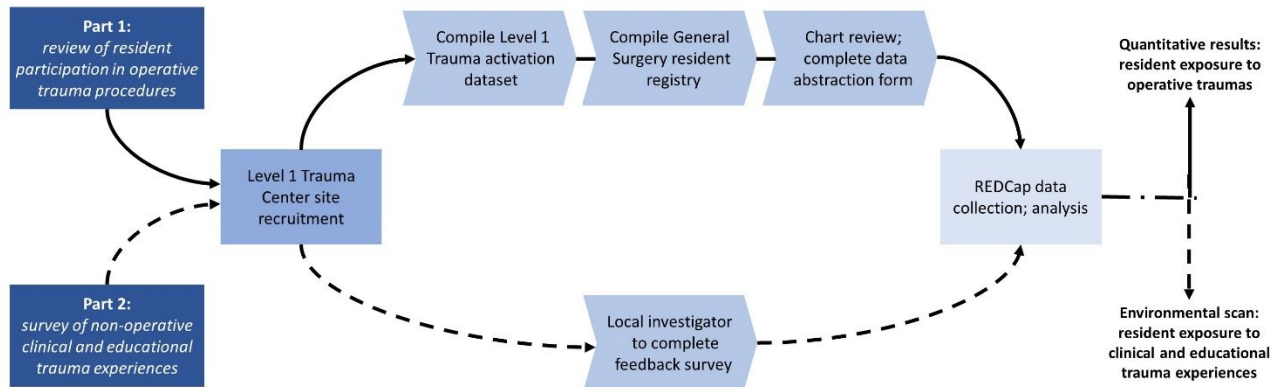
28 Since trauma patients may undergo multiple eligible surgeries, the unit of analysis for the study is the  
29 surgical event. Data on patient demographics, mechanism, time of operation, index- or repeat-operation,  
30 specific operation performed will be obtained from the Trauma Registry and chart-review, for each  
31 eligible surgery. The types of procedures participated in in relation to those operations listed in "Surgical  
32 Procedures List A" and "Surgical Procedures List B" of the RCPSC Objectives of Training in the  
33 Specialty of General Surgery document will be recorded<sup>5</sup>.  
34

### 35 36 *Part 2: Non-operative Trauma Clinical Exposure and Education*

37 Each participating site will complete a survey asking for details regarding the typical general surgery  
38 resident's clinical exposure to trauma patients during their residency. Such questions will ask about the  
39 number of dedicated trauma service rotations, the number of rotations spent at a hospital that takes care of  
40 trauma patients, the on-call responsibilities for caring for trauma patients, the involvement in trauma  
41 resuscitation and in-patient care. In addition, the survey will ask about formal and informal educational  
42 opportunities provided to residents such as ATLS, ATOM, ASSET, DSTC, academic half-day topics,  
43 presence and frequency of Trauma Rounds, and other similar such exposures. The full survey can be  
44 found in Supplemental Digital Content Appendix A. The study will ask the Local Investigator to  
45 complete the survey, with input as required from the Trauma Centre Medical Director and General  
46 Surgery Residency Program Director. The Local Investigator will be asked to take responsibility for the  
47 accuracy of the data supplied.  
48

49 Each participating site will create their study cohort and survey and submit it to the coordinating site  
50 (McMaster) in accordance with the local Research Ethics Board (REB) and Data Sharing Agreement  
51 (DSA) requirements. Data will be de-identified locally prior to transmission to the coordinating site  
52 (McMaster) via secured data transfer processes in accordance with the DSAs established with each site.  
53  
54

## 55 56 **Figure 1: Overview of TraumaRECON study**



### Sample Size

As per available Canadian Resident Matching Service (CaRMS) match data from 2008-2018, the average number of filled General Surgery residency positions is 93 annually. By auditing all RCPSC training sites over the study period, we anticipate a maximum of 9300 resident-years for analysis, which is anticipated to include the complete training duration of 6 cohorts of residents over the study period, or approximately 558 residents (see Figure 2).

**Figure 2: Theoretical distribution of resident cohorts that complete training during study period**

Resident Cohort	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
1	•	•	•	•	•					
2		•	•	•	•	•				
3			•	•	•	•	•			
4				•	•	•	•	•		
5					•	•	•	•	•	
6						•	•	•	•	•

### Data Collection and Compilation

#### Part 1: Operative Trauma Exposure

Residents from each participating Canadian General Surgery program who were enrolled in the residency program during the study period will be obtained from the General Surgery Residency Program office by each site.

Participating trauma centres will receive a data abstraction form listing data elements for abstraction (see Table 1). A compilation of trauma operations will be extracted from each trauma centre's patient database, and chart reviews will be conducted to exclude operative traumas ineligible for the study. All General Surgery, thoracic, cardiac, head and neck, bladder-related urologic, and abdominal vascular operative trauma procedures, as well as thoracotomies taking place in the Emergency Department, will be eligible for this study. All single-service orthopedic, plastic surgery, obstetrics/gynecologic, ENT, ophthalmology, and neurosurgery operative trauma procedures will be excluded. Bedside ED and all ICU

procedures (e.g., tube thoracostomy, tracheostomy and PEG insertion) will be excluded. Eligible operative traumas will be included on the data abstraction form. Residents identified on the data abstraction form will be cross-referenced with their program database to determine their year of training at the time of the operation. Resident, patient, and surgeon identification will be anonymized locally by each participating site.

A standardized spreadsheet will collect this information and sent to the coordinating centre in accordance with the local Research Ethics Board (REB) and Data Sharing Agreement (DSA) requirements. Single site data will be combined into a master cohort for analysis at the coordinating site.

**Table 1. Summary of data points to be abstracted for *Part 1*. The example provided details a single patient who underwent two separate OR visits during their admission, resulting in two data set entries for each OR visit**

Data Points		Example (procedure codes: 1=yes, 2=no)	Example (procedure codes: 1=yes, 2=no)
Participating site ID		7	7
Patient ID		25	25
Date of arrival at lead trauma centre (must be between 01-Jul-2008 and 30-Jun-2018)		25-Mar-2015	25-Mar-2015
Date of discharge or death from lead trauma centre		15-Apr-2015	15-Apr-2015
Patient age (years)		28	28
Patient sex		M	M
Injury type (Blunt, Penetrating, Other)		Blunt	Blunt
ISS		16	16
Date of OR visit (dd-mmm-yyyy, must be between 01-Jul-2008 and 30-Jun-2018)		25-Mar-2015	27-Mar-2015
Start time of operation		14:23	08:30
Laparotomy/Laparoscopy	Index laparotomy	1	0
	Second-look laparotomy	0	1
	Index laparoscopy	0	0
	Second-look laparoscopy	0	0
	Laparoscopy converted to laparotomy	0	0
Abdominal Intra-operative Procedures	Splenectomy	0	1
	Liver resection or repair	0	0
	Bowel resection or repair	0	0
	Diaphragm repair	0	1
	Retroperitoneal exploration (defined as use of left- or right-sided medial visceral rotation)	0	0
	Pancreas resection	0	0
	Duodenal repair	0	0
	Renal resection or repair	0	0
Bladder repair	0	0	

	Major abdominal vascular repair (defined as repair of named vessel)	0	0
Any-type Thoracic Operation	Thoracotomy performed in ED	0	0
	Date of thoracotomy performed in ED (dd-mmm-yyyy between 01-Jul-2008 and 30-Jun-2018)		
	Time of thoracotomy performed in ED (Enter using 24-hour clock; if procedure start time not recorded, use patient's time of arrival in ED)		
	Sternotomy performed in OR	0	0
	Thoracotomy performed in OR	0	0
	VATS	0	0
	VATS converted to thoracotomy	0	0
Thoracic Intra-operative Operation	Repair of heart	0	0
	Lung resection or repair	0	0
	Major thoracic vascular repair	0	0
Any-type Neck Exploration		0	0
Enter the surgical service for each staff surgeon present in the OR or present for the ED Thoracotomy	Surgeon #1 surgical service	General Surgery	General Surgery
	Surgeon #2 surgical service	General Surgery	
	Surgeon #3 surgical service		
	Surgeon #4 surgical service		
	Surgeon #5 surgical service		
Any general surgery residents present for this OR visit?		1	0
Enter the resident code assigned by your site for each General Surgery resident present at this OR visit	General Surgery Resident #1	19	
	General Surgery Resident #2	38	
	General Surgery Resident #3		
	General Surgery Resident #4		
	General Surgery Resident #5		
Any fellows present for this OR visit?		0	1
Enter the clinical service for each fellow present at this OR visit	Fellow #1		Traumatology
	Fellow #2		
	Fellow #3		
Please use this column to enter any additional information or comments for the Coordinating Study Centre			

### Part 2: Non-operative Trauma Clinical Exposure and Education

Surveys will be sent to the participating site Local Investigators. Survey responses from all participating sites will be anonymized at the local sites, then gathered and compiled into a master response list in Hamilton. The survey is available via Supplemental Digital Content Appendix A.

### Data Analysis

#### Part 1: Operative Trauma Exposure



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3 Trauma operations will be categorized according to weekdays and weekends and by start time day (i.e.,  
4 07:00 – 14:59 as daytime; 15:00 – 22:59 as evening; and 23:00 – 06:59 as overnight). The operative role  
5 of the resident will be inferred using an algorithm developed by the study team. The algorithm includes  
6 factors such as the number of staff surgeons present, training level of said resident, and presence of  
7 additional residents or fellows present (see Supplemental Digital Content Appendix B for resident  
8 operative role algorithm). We will also quantify “potential missed trauma exposure opportunity” defined  
9 as any operative trauma that did not involving at least one general surgery resident. Descriptive statistics  
10 will be presented as frequencies for categorical variables and means with standard deviation or medians  
11 with quartile ranges for continuous variables (e.g., mean resident trauma operation exposure by study site,  
12 and according to type of operation, day and time of operation, operative role). Mean and median number  
13 of operative traumas participated in by PGY year will be reported.  
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16 A multivariable logistic regression analysis will be performed to determine factors associated with  
17 operative trauma volume during general surgery residency training. Model fit will be assessed using the  
18 Akaike’s Information Criteria and Hosmer-Lemeshow goodness of fit test. Multicollinearity will be  
19 assessed using the variance inflation factor. Deviance residuals will be assessed for the presence of  
20 influential outliers.  
21

### 22 *Part 2: Non-operative Trauma Clinical Exposure and Education*

23 Resident program data will be described according to the formal and informal trauma curriculum factors  
24 asked in the survey. Programs will be anonymized and information will be presented in such a way that  
25 no program can be identified. Data will be analyzed using SPSS version 25 (IBM Corporation).  
26

### 27 **Ethics and Support**

28 Hamilton Integrated Research Ethics Board (HiREB) provided approval for the completed pilot study  
29 performed at McMaster University, and separate full approval has been obtained from HiREB for this  
30 nation-wide multi-centre study. Local REB approvals at each participating site will be required; local  
31 REB applications will be the responsibility of the participating centre, using this study protocol and case  
32 report forms as references.  
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35 The TraumaRECON study is formally supported by the Canadian Collaborative on Urgent Care Surgery  
36 (CANUCS) of the Canadian Association of General Surgeons.  
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## 38 **INTERPRETATION**

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41 The changing landscape of both trauma management and surgical education at a resident level  
42 necessitates an investigation into the degree of trauma operative exposure, clinical experience, and formal  
43 teaching opportunities that General Surgery residents receive at RCPSC-accredited training programs.  
44 This investigation is essential, as Canadian medicine will always have a need for general surgeons  
45 competent in operative trauma care, regardless of the changes to trauma management. The  
46 TraumaRECON study aims to provide novel insight into the specific trauma experiences, procedures, and  
47 roles our residents are offered throughout the duration of their training.  
48

## 49 **CONCLUSION**

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52 The results of this study will provide a quantitative and qualitative understanding of the current status of  
53 operative trauma training for Canadian General Surgery residents. We believe our results will inform  
54 future trauma teaching practices in the context of CBME, with the goal of contributing to the training of  
55 General Surgery graduates competent in operative trauma care.  
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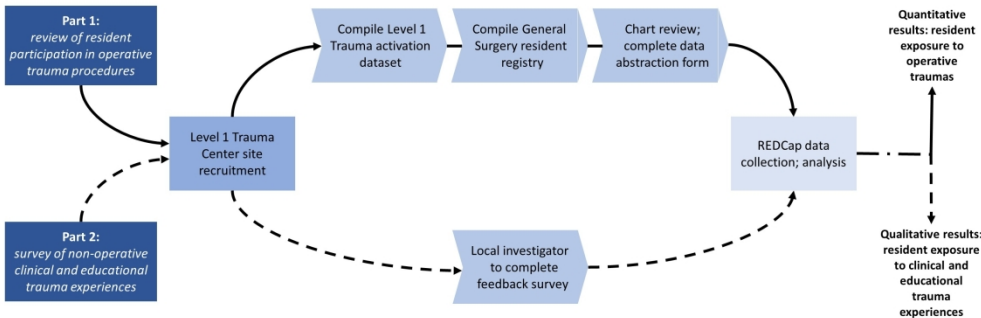


Figure 1: Overview of TraumaRECON study

762x508mm (96 x 96 DPI)

<b>Resident Cohort</b>	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
1	•	•	•	•	•					
2		•	•	•	•	•				
3			•	•	•	•	•			
4				•	•	•	•	•		
5					•	•	•	•	•	
6						•	•	•	•	•

Figure 2: Theoretical distribution of resident cohorts that complete training during study period

636x292mm (96 x 96 DPI)

Data Points		Example (procedure codes: 1=yes, 2=no)	Example (procedure codes: 1=yes, 2=no)
Participating site ID		7	7
Patient ID		25	25
Date of arrival at lead trauma centre (must be between 01-Jul-2008 and 30-Jun-2018)		25-Mar-2015	25-Mar-2015
Date of discharge or death from lead trauma centre		15-Apr-2015	15-Apr-2015
Patient age (years)		28	28
Patient sex		M	M
Injury type (Blunt, Penetrating, Other)		Blunt	Blunt
ISS		16	16
Date of OR visit (dd-mmm-yyyy, must be between 01-Jul-2008 and 30-Jun-2018)		25-Mar-2015	27-Mar-2015
Start time of operation		14:23	08:30
Laparotomy/Laparoscopy	Index laparotomy	1	0
	Second-look laparotomy	0	1
	Index laparoscopy	0	0
	Second-look laparoscopy	0	0
	Laparoscopy converted to laparotomy	0	0
Abdominal Intra-operative Procedures	Splenectomy	0	1
	Liver resection or repair	0	0
	Bowel resection or repair	0	0
	Diaphragm repair	0	1
	Retroperitoneal exploration (defined as use of left- or right-sided medial visceral rotation)	0	0
	Pancreas resection	0	0
	Duodenal repair	0	0
	Renal resection or repair	0	0
	Bladder repair	0	0
Major abdominal vascular repair (defined as repair of named vessel)	0	0	
Any-type Thoracic Operation	Thoracotomy performed in ED	0	0
	Date of thoracotomy performed in ED (dd-mmm-yyyy between 01-Jul-2008 and 30-Jun-2018)		
	Time of thoracotomy performed in ED (Enter using 24-hour clock; if procedure start time not recorded, use patient's time of arrival in ED)		
	Sternotomy performed in OR	0	0

	Thoracotomy performed in OR	0	0
	VATS	0	0
	VATS converted to thoracotomy	0	0
Thoracic Intra-operative Operation	Repair of heart	0	0
	Lung resection or repair	0	0
	Major thoracic vascular repair	0	0
Any-type Neck Exploration		0	0
Enter the surgical service for each staff surgeon present in the OR or present for the ED Thoracotomy	Surgeon #1 surgical service	General Surgery	General Surgery
	Surgeon #2 surgical service	General Surgery	
	Surgeon #3 surgical service		
	Surgeon #4 surgical service		
	Surgeon #5 surgical service		
Any general surgery residents present for this OR visit?		1	0
Enter the resident code assigned by your site for each General Surgery resident present at this OR visit	General Surgery Resident #1	19	
	General Surgery Resident #2	38	
	General Surgery Resident #3		
	General Surgery Resident #4		
	General Surgery Resident #5		
Any fellows present for this OR visit?		0	1
Enter the clinical service for each fellow present at this OR visit	Fellow #1		Traumatology
	Fellow #2		
	Fellow #3		
Please use this column to enter any additional information or comments for the Coordinating Study Centre			

## **TraumaRECON Supplemental Digital Content**

### **Appendix A: Non-operative clinical exposures and trauma education survey**

Dear Local Investigator,

Please answer the following questions for the currently enrolled **General Surgery residents** within your program. Please solicit input from your corresponding Trauma Medical Director and General Surgery Residency Program Director as needed. Prior to final survey data submission, you will be asked to personally attest to the veracity of the submitted responses.

#### **Residency Rotations**

- How many residents do you currently have in your program?

<b><u>PGY</u></b>	<b><u># of residents</u></b>
1	
2	
3	
4	
5	
Research	
Other, specify:	

- Do your residents rotate on a dedicated trauma-only in-patient service? YES / NO
  - If Yes, please specify how many blocks they spend in each of their PGY years:

<b><u>PGY</u></b>	<b><u># blocks on dedicated Trauma service</u></b>
1	
2	
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- Do your residents rotate on a service that provides Most-Responsible-Physician in-patient care for both Trauma *and* ACS/EGS patients (NOTE: consult-only General Surgery care provided to trauma patients does not qualify)? YES / NO
  - If Yes, please specify how many blocks they spend in each of their PGY years:

<b><u>PGY</u></b>	<b><u># blocks on combined Trauma&amp;ACS Service</u></b>
1	
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- Do your residents rotate on a service that provides Most-Responsible-Physician in-patient care for ACS/EGS patients and *consult-only* care to Trauma patients? YES / NO

- If Yes, please specify how many blocks they spend in each of their PGY years:

<b>PGY</b>	<b># blocks on ACS/EGS service</b>
1	
2	
3	
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- Are your residents formally scheduled to be on-call as Trauma Team Leader or sub-Trauma Team Leader? YES / NO

- If Yes, please specify how many blocks they spend in each of their PGY years:

<b>PGY</b>	<b># blocks scheduled as TTL or sub-TTL</b>
1	
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5	

- Do your senior residents fulfill the role of Trauma Team Leader or sub-Trauma Team Leader? YES / NO

- If Yes, please describe the frequency and details

- At your trauma center, is there **always** at least one junior resident on-call? YES / NO

- If NO, please explain:

- If YES, does the junior resident on-call stay in house? YES / NO

- What is the typical PGY level of the junior resident on-call?

- Always PGY-1
- PGY1 or PGY2
- Other, please explain:

- At your trauma center, is there **always** more than one junior resident on-call? YES/ NO

- If YES, how is the work divided (i.e. one junior manages ward issues, the other junior attends to ER/trauma consults?). Please explain:

- At your trauma center, is there **always** a senior resident on-call? YES / NO

- If NO, please explain:

- If YES, does the senior resident on-call stay in-house? YES / NO

- What is the typical PGY level of the senior resident?

- PGY 3-5
- PGY 4 or 5
- only PGY 5
- Other, please explain:

- When your residents are on-call at a trauma center, in what capacity do they provide care to trauma patients?



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<u>PGY</u>	<u>Part of the Trauma Team that responds to ALL trauma activations (all tiers)</u>	<u>Part of Trauma Team that responds only to highest-tier activations</u>	<u>Sees trauma patient in ER only if consulted by EM physician</u>	<u>Sees trauma patient only if going to the</u> <u>OR</u>	<u>Other, please specify</u>
Junior (ie. PGY 1&2)	Yes / No	Yes / No	Yes / No	Yes / No	
Senior (ie. PGY 3-5)	Yes / No	Yes / No	Yes / No	Yes / No	

- Do your General Surgery residents receive any formal FAST training? YES / NO
- When your residents are on call at your trauma center, is the expectation that they are routinely responsible for performing the FAST during any trauma activations?
- Do your residents typically participate in **elective** or **mandatory** trauma rotations at other major trauma centers? NO / YES, specify:

<u>Rotation Type (elective or mandatory)</u>	<u>PGY</u>	<u>Country</u>	<u>Hospital Name</u>	<u>Duration of Rotation (# months/blocks)</u>

- At your trauma center, do any of the following off-service residents typically rotate on your trauma service?
  - Orthopedic surgery? YES / NO
  - Plastic Surgery? YES / NO
  - Neurosurgery? YES / NO
  - Radiology? YES / NO
  - Pathology? YES / NO
  - Internal Medicine? YES / NO
  - Family Medicine? YES / NO
  - Emergency Medicine? YES / NO

**Structured Trauma Education**

Please complete each square of the table below with the dropdown answers:

	<u>ATLS Student</u>	<u>ATLS Instructor</u>	<u>ATLS Refresher</u>	<u>ATOM</u>	<u>ASSET</u>	<u>DSTC</u>	<u>Other: Specify</u>
Is it mandatory for incoming residents to have completed this course <i>prior</i> to starting residency?	Y/N	--	--	Y/N	Y/N	Y/N	Y/N
Is it mandatory for residents to complete this course <i>during</i> residency?	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
During <i>which year of residency</i> are they expected to complete this course?	1 2 3 4 5 any	1 2 3 4 5 any	1 2 3 4 5 any	1 2 3 4 5 any	1 2 3 4 5 any	1 2 3 4 5 any	1 2 3 4 5 any
Who pays for this course?	-Resident in Full -Program in Full -Cost Shared, specify: percentage paid by resident:						
Where is this course provided?	-At local site -at another University -at resident discretion						

- Which of the above courses are run under the auspices of your trauma program?
- Which of the above courses are run privately/independent on your trauma program?
- Please describe the formal trauma education that your residents receive within the curriculum presented at Academic Half Days:
  - How many Academic Half-Days are dedicated to *trauma* topics within the curriculum?
    - 1 per year
    - 2 per year
    - 3 per year
    - 1 per 2 years
    - 2 per 2 years
    - 3 per 2 years

- Other, specify:
  - Who typically teaches the trauma topics for Academic Half Days (click all that apply):
    - General Surgeon with formal Trauma Fellowship
    - Any General Surgeon (no formal Trauma Fellowship)
    - Other, specify:
- Please describe any other trauma education that your residents receive during their training:

Trauma Education Event	Frequency Event Held	When do residents attend?	Content of Event?
Trauma Rounds	-Weekly -Q2Weekly -Monthly -Quarterly -Other, specify:	-Every week regardless of their hospital assignment -Every week when assigned to trauma hospital -Every week only when assigned to trauma service -completely voluntary	-M&Ms (specify frequency): -Didactic (specify frequency): -Case Presentation (specify frequency):
Local Trauma Conference		-mandatory -voluntary	
Trauma Topic Discussions on the Trauma Service	-Weekly -Other, specify:	-while on service -while in the same hospital -other, specify: -completely voluntary	
Cadaveric Trauma Lab	-Annually -Other, specify:	-mandatory -completely voluntary	
Simulation Training, specify type: -Trauma-specific simulation -CRM simulation (non-trauma) -CRM simulation (trauma)	Weekly Monthly 4 times per year 3 times per year 2 times per year	-mandatory -completely voluntary	

specify participants: -residents only -residents + multidisciplinary staff	Once per year Other, specify:		
Other, specify:			

### **Trauma Education for Medical Students**

- For medical students in **pre-clerkship** years, do they receive any formal teaching on trauma care?
  - If Yes, please describe:
  - Do General Surgery residents provide any of this teaching?
    - If Yes, please describe:
- For medical students in **clerkship** on their Surgery rotations, do they receive any formal teaching on trauma care?
  - If Yes, please describe:
  - Do General Surgery residents provide any of this teaching?
    - If Yes, please describe:
- Is there **any other** formal trauma care training that medical students at your University receive?
  - If Yes, please describe:

### **Characteristics of Trauma Training Exposure**

- Please list the number of *trauma admissions* to your hospital for the most recently available calendar year (Jan-Dec) by ISS [obtain directly from your trauma registry]:
  - ISS 9-12:
  - ISS 13-15:
  - ISS 16-24:
  - ISS  $\geq 25$ :
- Please list the number of trauma team activations at your hospital for the most recently available calendar year (Jan-Dec) [obtain directly from your trauma registry]:
  - All Tiers:
  - Highest Tier:
- How many general surgeons rotate on the Trauma or Trauma/ACS Service at your trauma center?
- Please describe the characteristics of the General Surgeons who staff your Trauma or Trauma/ACS service:

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<u>Surgeon</u>	<u>FRCS General Surgery</u>	<u>Formal Trauma Fellowship*</u>	<u>Formal Acute Care Surgery Fellowship**</u>	<u>Formal Critical Care Fellowship^</u>	<u>Vascular Surgery^^</u>	<u>Other, Specify</u>	<u>Participates in TTL call roster?</u>
1	Yes / No	Canada USA Other, specify:	Canada USA Other, specify:	Canada USA Other, specify:	Canada USA Other, specify:	Canada USA Other, specify:	Yes / No
2							Yes / No
3							Yes / No
4							Yes / No
5							Yes / No
6							Yes / No
7							Yes / No
8							Yes / No
9							Yes / No
10							Yes / No
etc							

\*completed >=1year period of fellowship training in trauma care including trauma surgery

\*\*completed >=1year period of fellowship training in Acute Care Surgery that included exposure to trauma patients

^completed RCPSC Critical Care (Canada), American Board of Surgery Surgical Critical Care (USA), or Other, Specify:

^^completed RCPSC Vascular Surgery (Canada), American Board of Surgery Vascular Surgery (USA), or Other, Specify:

- Are your Trauma Team Leader monthly call schedules filled 100% all the time? Yes / No
  - If No, what percent of monthly shifts are typically filled?
    - 10%
    - 20%
    - 30%
    - 40%

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- 50%
  - 60%
  - 70%
  - 80%
  - 90%
  - 100%
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- What proportion of the Trauma Team Leader monthly call schedule is filled by surgeons (of any type) at your institution?
    - 10%
    - 20%
    - 30%
    - 40%
    - 50%
    - 60%
    - 70%
    - 80%
    - 90%
    - 100%
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- Does your institution have Fellows who are schedule on the Trauma Team Leader roster? YES / NO
    - If so, how many 12-hour shifts does your fellow do on average in a month?
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      - 2
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### **Trauma Fellowship**

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- Does your institution currently have a fellowship in **Trauma Care/Trauma Surgery/Traumatology**? Yes/No
    - Is this fellowship conducted under the auspices of your local University PGME Office? Yes / No
      - If No, is it conducted under the auspices of your Trauma Center Hospital? Yes / No
        - If No, please explain:
    - Does your fellowship include training in Trauma Surgery? Yes / No
    - How long is your trauma fellowship? 1year / 2 years / other, specify:

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- Does your institution currently have a fellowship in **Acute Care Surgery**? Yes / No
    - Does your fellowship include exposure to trauma patients? Yes / No
    - Does your fellowship include training in Trauma Surgery? Yes / No
    - How long is your ACS fellowship? 1 year / 2 years / other, specify:
  
  - Does your institution currently have a fellowship in **Trauma & Acute Care Surgery**?  
Yes / No
    - Does your fellowship include exposure to trauma patients? Yes / No
    - Does your fellowship include training in Trauma Surgery? Yes / No
    - How long is your Trauma&ACS fellowship? 1 year / 2 years / other, specify:
  
  - How many Trauma/ACS fellows are at your trauma center at any given time?
    - 1
    - 2
    - 2+
    - Other, Please explain:
  
  - In your fellowship, do the *Fellows* operate on the same cases as *senior General Surgery residents*? Yes / No
  - In your fellowship, does your fellow do independent call as a trauma team leader? Yes / No
  - In your fellowship, does your fellow do independent call as a trauma surgeon? Yes / No
  - In your fellowship, does your fellow do independent call as the general surgeon? Yes / No
  - In your fellowship, does your fellow do independent weeks of acute care surgery? Yes / No
  - In your fellowship, does your fellow have to be eligible for independent licensure or equivalent? Yes / No
  
  - How many residents from your General Surgery program have pursued trauma fellowships after graduation?
    - Graduated in 2018:
    - Graduated in 2017:
    - Graduated in 2016:
    - Graduated in 2015:
    - Graduated in 2014:
    - Graduated in 2013:
    - Graduated in 2012:
    - Graduated in 2011:
    - Graduated in 2010:
    - Graduated in 2009:
    - Graduated in 2008:



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3 **Other**

4 If you have additional information regarding the trauma exposure your residents receive as part  
5 of their General Surgery residency that was not covered by the questions above, please describe  
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### Appendix B: Algorithm for determination of resident operative role

Trauma staff 1	Trauma staff 2	Trauma fellow	Other service staff surgeon*	Other service fellow	Most senior resident	Other resident	Most senior resident role BEST	Most senior resident role WORST	Other resident BEST	Other resident WORST
Y	N	N	N	N	Y	N	Operator	1 <sup>st</sup>	Missed	Missed
Y	Y	N	N	N	Y	N	1 <sup>st</sup>	2 <sup>nd</sup>	Missed	Missed
Y	N	N	N	N	Y	Y	Operator	1 <sup>st</sup>	1 <sup>st</sup>	2 <sup>nd</sup>
Y	Y	N	N	N	Y	Y	1 <sup>st</sup>	2 <sup>nd</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>
Y	N	N	N	N	N	N	Missed	Missed	Missed	Missed
Y	Y	N	N	N	N	N	Missed	Missed	Missed	Missed
Y	N	Y	N	N	Y	N	Operator	2 <sup>nd</sup>	Missed	Missed
Y	N	Y	N	N	Y	Y	Operator	2 <sup>nd</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>
Y	Y	Y	N	N	Y	N	2 <sup>nd</sup>	3 <sup>rd</sup>	Missed	Missed
Y	Y	Y	N	N	Y	Y	2 <sup>nd</sup>	3 <sup>rd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>
Y	N	N	Y	N	N	N	Missed	Missed	Missed	Missed
Y	N	N	Y	N	Y	N	1 <sup>st</sup>	2 <sup>nd</sup>	Missed	Missed
Y	N	N	Y	N	Y	Y	1 <sup>st</sup>	2 <sup>nd</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>
Y	Y	N	Y	N	Y	N	2 <sup>nd</sup>	3 <sup>rd</sup>	Missed	Missed
Y	Y	N	Y	N	Y	Y	2 <sup>nd</sup>	3 <sup>rd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>
Y	N	Y	Y	N	N	N	Missed	Missed	Missed	Missed
Y	N	Y	Y	N	Y	N	2 <sup>nd</sup>	3 <sup>rd</sup>	Missed	Missed
Y	N	Y	Y	N	Y	Y	2 <sup>nd</sup>	3 <sup>rd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>
Y	Y	Y	Y	N	N	N	Missed	Missed	Missed	Missed
Y	Y	Y	Y	N	Y	N	2 <sup>nd</sup>	4 <sup>th</sup>	Missed	Missed
Y	Y	Y	Y	N	Y	Y	2 <sup>nd</sup>	4 <sup>th</sup>	3 <sup>rd</sup>	5 <sup>th</sup>
Y	N	N	Y	Y	N	N	Missed	Missed	Missed	Missed
Y	N	N	Y	Y	Y	N				Missed

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Y	N	N	Y	Y	Y	Y				
Y	N	N	N	Y	N	N	Missed	Missed	Missed	Missed
Y	N	N	N	Y	Y	N			Missed	Missed
Y	N	N	N	Y	Y	Y				
Y	Y	N	Y	Y	N	N			Missed	Missed
Y	Y	N	Y	Y	Y	N			Missed	Missed
Y	Y	N	Y	Y	Y	Y				
Y	Y	N	N	Y	N	N	Missed	Missed	Missed	Missed
Y	Y	N	N	Y	Y	N			Missed	Missed
Y	Y	N	N	Y	Y	Y				
Y	N	Y	Y	Y	N	N	Missed	Missed	Missed	Missed
Y	N	Y	Y	Y	Y	N			Missed	Missed
Y	N	Y	Y	Y	Y	Y				
Y	N	Y	N	Y	N	N	Missed	Missed	Missed	Missed
Y	N	Y	N	Y	Y	N			Missed	Missed
Y	N	Y	N	Y	Y	Y				
Y	Y	Y	Y	Y	N	N	Missed	Missed	Missed	Missed
Y	Y	Y	Y	Y	Y	N			Missed	Missed
Y	Y	Y	Y	Y	Y	Y				