

Vancouver Coastal Health Regional Trauma Program

Annual Report 2005-2006



A report on the activities of the Vancouver Coastal Health Regional Trauma Program for Fiscal Year April 1st, 2005 to March 31st, 2006. Respectfully submitted by the Regional Trauma Program Leaders, December 2007.

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Vancouver Coastal Health - Regional Trauma Program

Vision, Mission and Roles

Vision:

The Regional Trauma Program (RTP) will strive to provide excellence in trauma care for all adult and pediatric persons within Vancouver Coastal Health Region as well to those members of other Health regions within British Columbia that require specialized services not available in their own regions.

The program will fully encompass the continuum of injury surveillance, injury prevention, clinical services, research, education and performance improvement.

Mission:

To create a single, integrative and inclusive Regional Trauma system within our health region that will:

- Define trauma system needs
- Define system access, capacity and configuration
- Optimize service delivery
- Define site specific roles, caseload and case mix
- Standardized care that meets or exceeds national benchmarks
- Sensitive to geographical, institutional and population needs

Linkages:

The RTP will link and partner with:

- British Columbia Trauma Advisory Committee a provincial body charged with creating integrated province-wide trauma services and injury control.
- Provincial and Regional Disaster Preparedness / Emergency Services to ensure appropriate response capability in the event of a mass casualty.
- VANOC to ensure health planning for the 2010 Olympics adequately addresses projected and potential need for injury care and is fully integrated with the VCH Trauma System.
- Provincial injury prevention programs to ensure injury surveillance and research are linked to the development of injury prevention initiatives.
- The BC Trauma Registry to ensure the data needs of national, provincial and regional trauma programs are met.
- British Columbia Ambulance Service (BCAS) to address to pre-hospital trauma system requirements and transportation issues.
- BC bedline to ensure timely and appropriate trauma referrals occur within VCH regional and the intraregional provincial system.
- Trauma related educational and training programs that are responsive to all disciplines and facilities within VCH especially the rural centers

Vancouver Coastal Health - Regional Trauma Program Annual Report, 2005-06

Executive Summary

The VCH Trauma Program was inaugurated in July 2004 following reviews of trauma services within the health region. As stated in the vision and goals, the program strives to develop a seamless integrated system of care such that injured patients receive the highest quality care in an expedited fashion. While the primary focus in the past has been on the more severely injured patients, the program also recognizes the needs of the less severely injured and those injured in rural communities who also require timely access to appropriate care. It is also recognized that the supporting pillars of injury surveillance, injury prevention, performance improvement, research and training are vital to a comprehensive injury control approach within VCH.

From its inception, therefore, the program has taken an inclusive approach to injury control and trauma systems development. This vision and program structure was presented to the reviewers from the Trauma Association of Canada during their site review of the regional trauma system in November 2005. Based on their evaluation of our regional trauma system and its designated trauma centres (Vancouver General, St. Paul's, Lions Gate) along with BC Children's Hospital, we were awarded not only a full 5-year system accreditation but also the added and unprecedented recognition of a pass with distinction. Truly the high point of the year 2005-06.

This report, the first formal annual report of the regional trauma program, provides some background information along with activity and performance data collected by the program over the last fiscal year. All data relate to the regional system rather than individual trauma centres unless otherwise indicated. Individual site activity and performance is reported locally by the site medical and program managers for trauma.

Program highlights for 2005-06 and *future initiatives*:

- | | |
|--|------------------|
| 1. Program inception | July 2004 |
| 2. Regional Trauma Advisory along with BCCH | Sept 2004 |
| 3. Region-wide CPG dissemination | July 2005 |
| 4. System-wide accreditation by TAC with distinction | November 2005 |
| 5. OAN service redesign project engagement | March 2006 |
| 6. <i>Regional LLTO "Trauma No Refusal" policy development</i> | <i>May 2006</i> |
| 7. <i>Autolaunch helicopter retrieval for trauma</i> | <i>June 2006</i> |
| 8. <i>Website development</i> | <i>Dec 2006</i> |

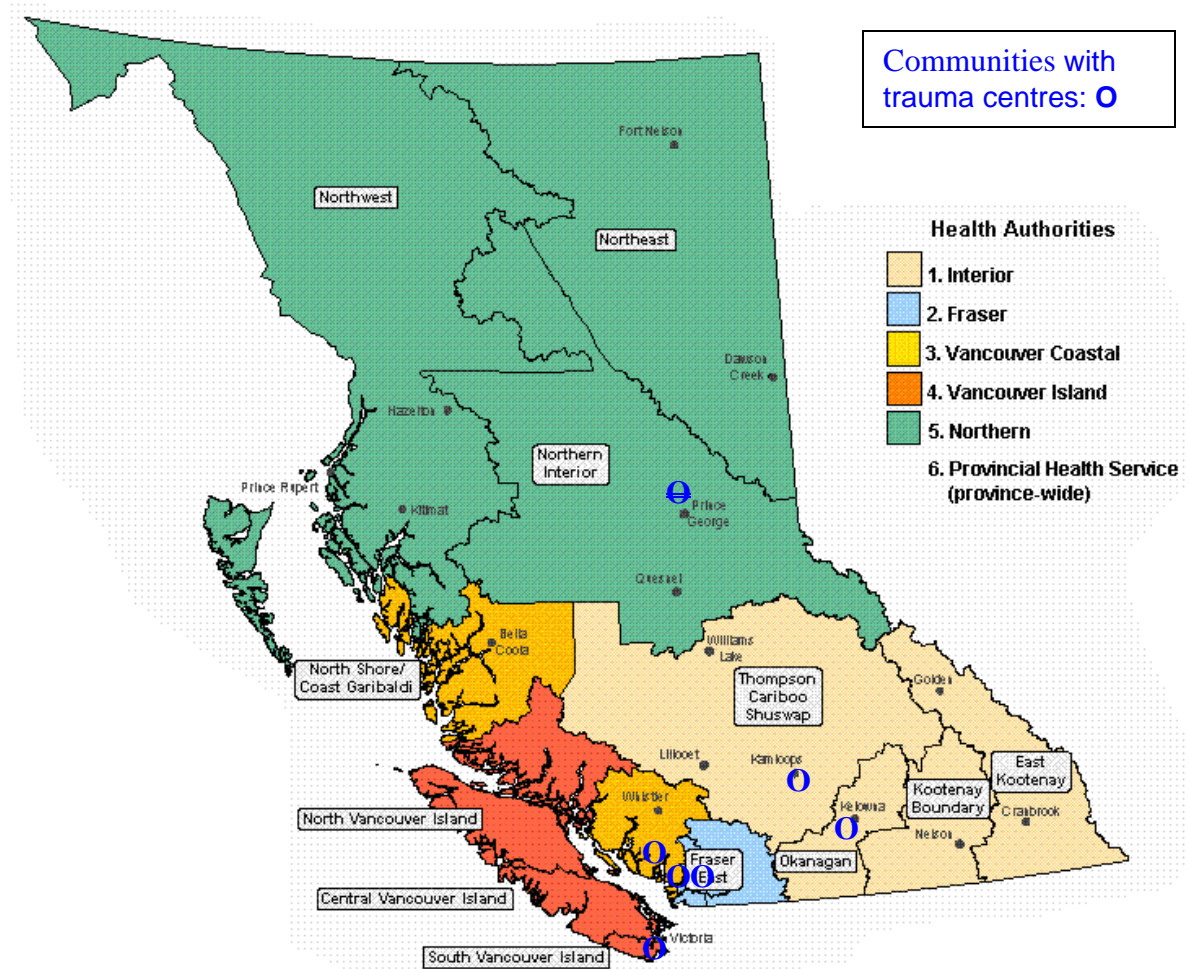
Introduction

Organizational Structure of Trauma Services

A. Provincial Trauma Services

Trauma Services are provided by the 5 geographic regional health authorities and by BC Children's Hospital under the PHSA (Fig 1.). Each health authority (HA) has designated trauma centres along with a regional trauma program, program leaders and supported by the BC Trauma Registry.

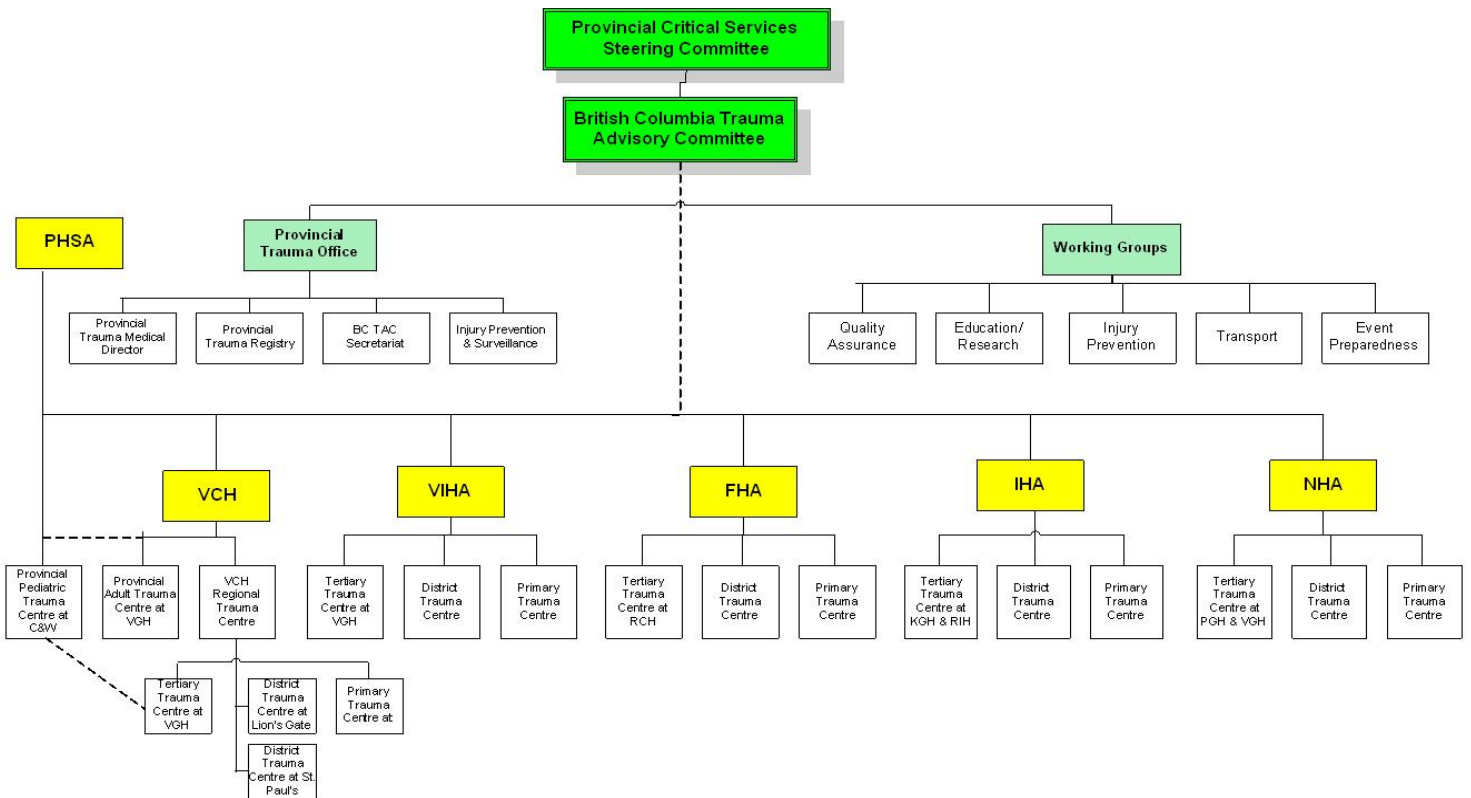
Fig 1. BC Health Authorities and Designated Trauma Centres



BC Trauma Advisory Committee: Representatives from each HA participate on the BC Trauma Advisory Committee (BC TAC) which is the provincial advisory body on trauma reporting to the Provincial Critical Services Steering Committee (PCSSC) chaired by the PHSA. BC TAC working groups provide opportunities for networking and system enhancement.

Provincial Trauma Coordinating Office: A BC TAC proposal is before Ministry to establish a provincial coordination office. A proposed outline of the integration of provincial and regional trauma services with BCTAC and a provincial coordinating office is shown below.

Figure 2. Proposed Organizational Structure: Provincial Trauma Program



B. Vancouver Coastal Regional Trauma Services

The Vancouver Coastal Health Regional Trauma System (VCH-RTS) covers a large area of southwest BC including the cities of Vancouver, Richmond, North and West Vancouver and parts of Burnaby, along with large rural areas extending up the coastline to Bella Bella and Bella Coola (Fig 1.).

VCH serves a population of approximately one million people living within the geographical region served by the Health Authority. In addition, other areas of the province have also historically depended on Vancouver General Hospital (VGH) and British Columbia Children’s Hospital (BCCH) for tertiary trauma services. Health care reorganization, along with the work of BC TAC, has reduced this dependency with the designation of regional trauma centers in each health authority. In all but one of these health regions (Northern), a full spectrum of adult tertiary trauma services is generally

available and all centers are committed to developing guaranteed access for patients in region requiring tertiary trauma services.

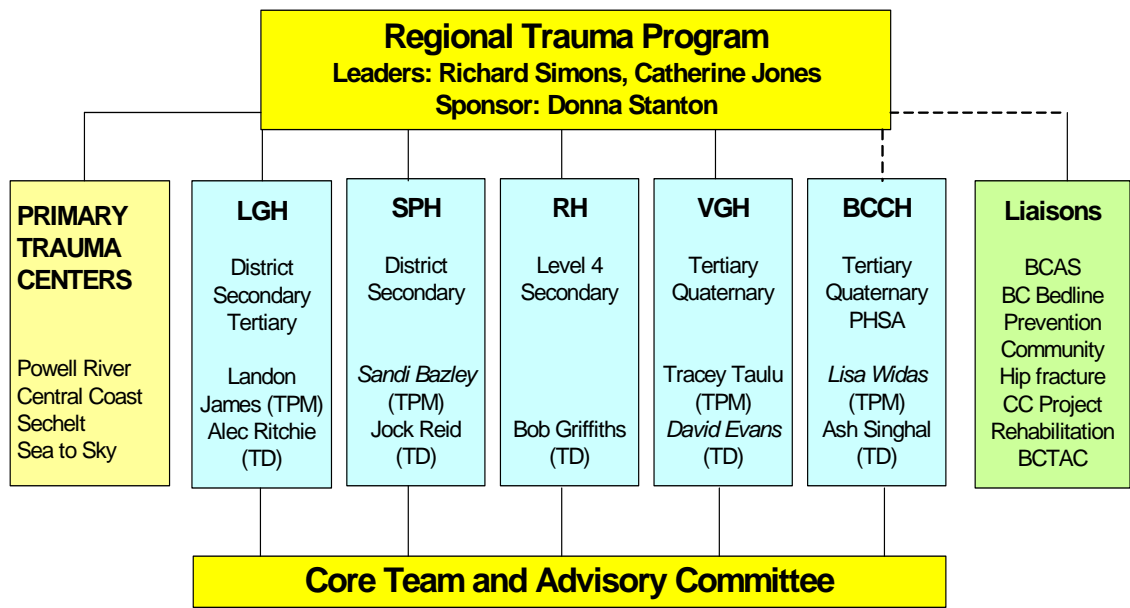
These Health Regions are now largely served by their own regional trauma centers, except for quaternary level care, reducing the demands for interfacility transfer of trauma patients into VGH. VGH and BCCH remain the referral centres for those low incidence, high acuity injuries (quaternary services) that are uniquely provided in these, the designated provincial trauma centres. These services include burns, spinal cord injury, major cardiovascular/endovascular, complex orthopedic and hepatobiliary injuries.

VCH Regional Trauma Program

Team Development, Stakeholder Representation

System Leadership and Governance: VCH in collaboration with PHSA and BC Children’s Hospital are responsible for providing trauma services in SW part of BC along with unique quaternary trauma programs for the province. Following submission of a regional trauma report in 2002, The Senior Executive Team of VCH created a regional trauma program (RTP) in July 2004 and regional trauma leaders, Ms Catherine Jones and Dr Richard Simons were appointed. The regional Trauma Program is part of the One Acute Network Integration Council (OANIC) linking and coordinating acute programs within VCH. Site leaders (trauma directors and trauma program managers) were appointed for each of the designated major trauma centres (VGH, LGH, SPH and BCCH). Regional and site leaders then formed the core leadership team for the regional trauma program (Figure 3) which meets monthly.

Figure 3. Program Leadership and Advisory Committee 2005-06



Trauma System Configuration (Acute Care Facilities)

Trauma Centres: Based on the recommendations of the Regional Trauma Working Groups Report in 2002 and subsequent external review by RSEC, SET defined the interim system configuration for the Regional Trauma System in the Fall of 2003 which has since been updated to recognize the contribution of Richmond Hospital to the trauma system.

- Provincial/ Regional Tertiary Trauma Centres (TAC Levels 1 and P1)
 - Vancouver General Hospital (adult)* (quaternary, tertiary, secondary)
 - BC Children's Hospital (pediatric)* (quaternary, tertiary, secondary)
- District Trauma Centres (TAC Levels 3 and 4)
 - Lions Gate Hospital* (secondary and tertiary care)
 - St. Paul's Hospital* (predominantly secondary care)
 - Richmond General Hospital (secondary care only)
- Primary Trauma Centres (PTT, TAC Level 5)
 - All other acute care facilities in the VCH region

Facilities indicated (*) were successfully accredited by the Trauma Association of Canada (TAC) in their respective roles within the system in 2005. The system leaders have site visited and internally reviewed all acute care sites in the region to ensure compliance with TAC accreditation standards.

System Access and Trauma System Capacity

No Refusal: All designated trauma centres in VCH have no refusal/guaranteed access policies in place for major trauma under the region "Life, Limb, Threatened Organ (LLTO)" Policy. For ground ambulance responding to scene, this means that any patient meeting BCAS major trauma criteria (Code 99 trauma protocols) should be directed to the appropriate trauma centre and cannot be diverted without high-level medical input at the trauma centre. For air ambulance dispatched to on scene response or under "Autolaunch" criteria, the same is true with guaranteed access to patients retrieved in VCH region to the helipads at VGH or BCCH. For inter-facility transfers, patients meeting major trauma transfer criteria are guaranteed access under the VCH region's LLTO policies, which are specific to each site.

For non-life threatening trauma, transfers are arranged on a bed availability basis coordinated by BC Bedline. Elderly fractured hip patients have their own field triage protocols ensuring equitable distribution across the acute care system

Injury Rates in VCH and BC

BC has one of the lowest injury mortality rates in Canada (Figure 4.) Injury hospitalization rates vary considerably across BC and within our own Health Authority with the relatively urban lower mainland having low rates while rural areas (e.g. Central Coast) have high rates (Figure 5). In general, injury rates are falling in all jurisdictions.

Figure 4. Injury Death Rates in Canada (Health Canada, 1992)

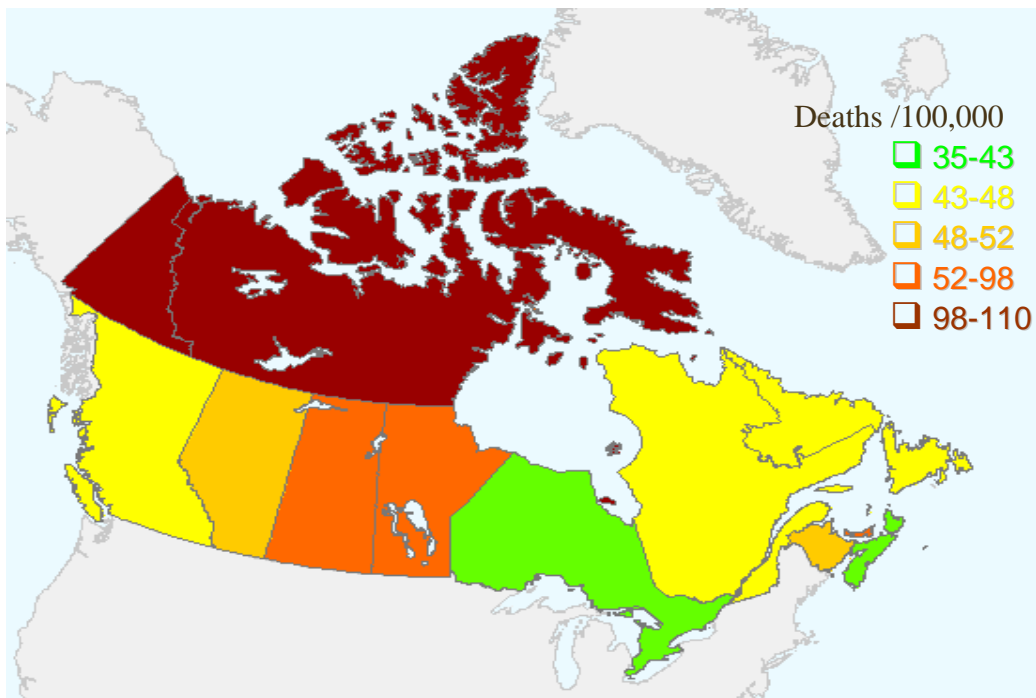
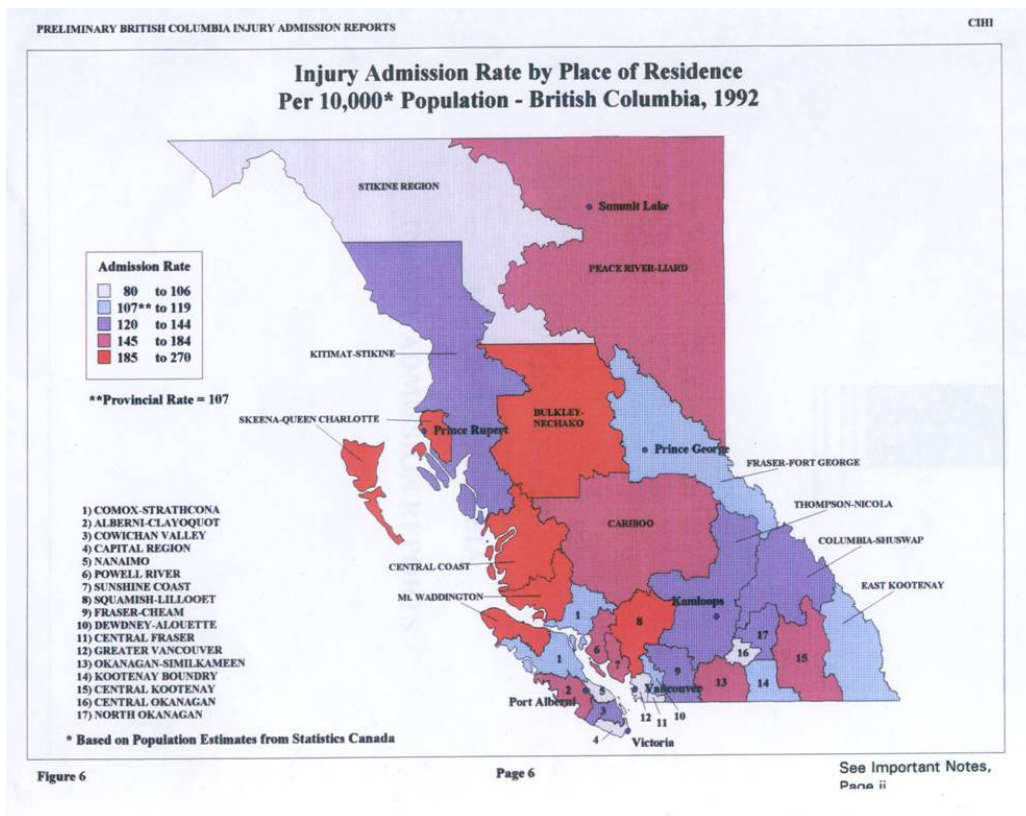


Figure 5. Injury Death Rates in BC (Health Canada 1992)



VCH Trauma Caseload for Major Trauma, Case definition

VCH uses several definitions for major trauma including:

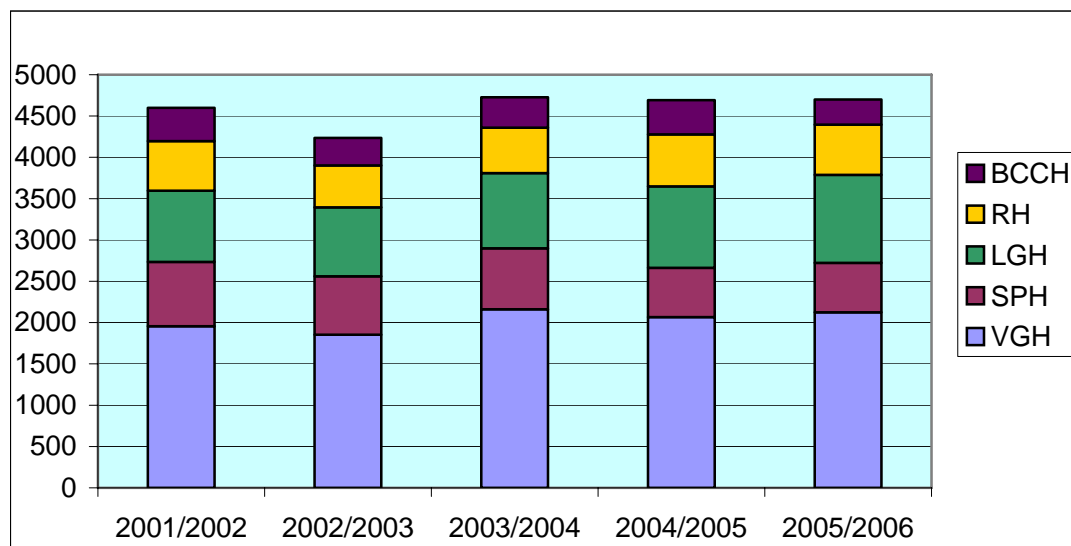
1. Field Triage Guidelines: Physiologic, Anatomic and Mechanism criteria
2. Transfer Guidelines: Physiologic, Anatomic criteria
3. Trauma Team Activation: Physiologic, Anatomic criteria
4. Caseload reporting: MCC 25 (reported by QUIST and PURRFECT)
5. Caseload reporting: ISS>15 (reported by BCTR for trauma program)

Total Caseload: The total regional trauma caseload has been relatively stable over the last 5 years consistent with national injury trends despite the increasing population (Figure 4). This is due to:

1. Decreasing regional, provincial and national injury rates
2. Increasing independence of the other BC regional trauma systems reducing the need for transfer to VGH

Population and current trauma caseload, however, appear consistent with a sustainable independent regional trauma system although further caseload consolidation may be appropriate.

Figure 6. Total Trauma Caseload Years 2001/02-2005/06 (QUIST)



(BCCH: BC Children's Hospital, RH: Richmond Hospital, LGH: Lions Gate Hospital, SPH: St. Paul's Hospital, VGH: Vancouver General Hospital)

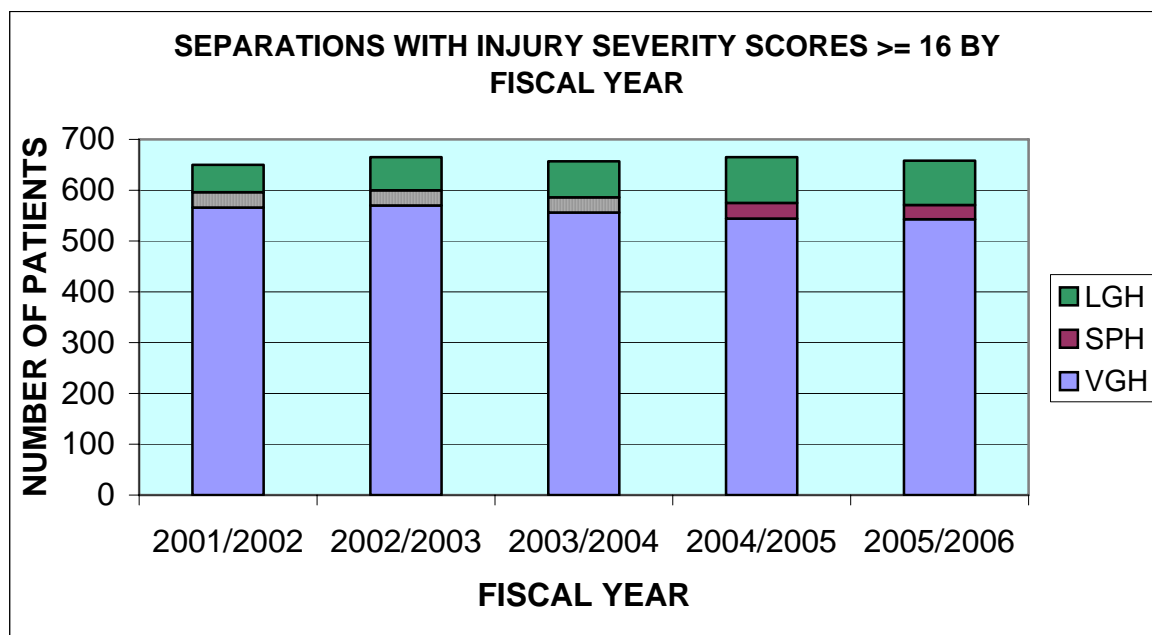
Secondary level trauma caseload: Secondary trauma caseload remains distributed to all major acute care facilities in the region predominantly to the designated tertiary and district trauma centres (Figure 6). This distributed model is clearly essential in order to maintain capacity at the tertiary trauma centres for major trauma patients.

Tertiary trauma caseload: Tertiary trauma/burn activity (as measured by ISS scores of >15) has also been stable with approximately 700 ISS >15 cases a year in the region

including pediatric cases, around 550 of which are admitted to VGH, another 100 to SPH and LGH along with the 40-50 pediatric cases to BCCH. (Figure 7.)

Quaternary trauma caseload: Some low incidence, high acuity or complex injuries are uniquely provided by the adult (VGH) and pediatric (BCCH) provincial trauma centers. This subset of tertiary caseload, or quaternary care, includes spinal cord injury, burns, endovascular services, along with complex orthopedic, plastic and torso trauma and neuro-interventional services.

Figure 7. VCH Major Trauma Caseload. Years 2001/02 - 2005/06 (BCTR)



(LGH: Lions Gate Hospital, SPH: St. Paul’s Hospital, VGH: Vancouver General Hospital. SPH data for 2001/02, 2002/03 & 2003/04 estimated, BCCH and RH data not available)

Future Caseload Projections: The Regional Trauma Program has participated in the VCH Population Demand Modeling process to predict future health care demands based on planned population growth, case rate projections and inpatient bed needs. Using conservative assumptions, particularly around the elderly demographic, it is expected that cases will increase modestly over the next 5-20 years but that inpatient days will remain at current levels.

Caseload description: Consistent with the experience of most Canadian Trauma Centres, VCH Trauma Program predominantly serves a population sustaining blunt force unintentional injury. Falls and motor vehicle collisions account for the majority of hospitalized trauma patients with falls, especially in the elderly, accounting for an increasing caseload as recorded by the BC Trauma Registry. (Figure 8)

Despite the headline grabbing hype surrounding intentional injury and interpersonal violence, we remain blessed with low and decreasing levels of this type of injury. (BCTR data for VGH, LGH and SPH shown in Figures 8 and 9.)

Figure 8. VCH Injury admissions by mechanism, by year (BCTR)

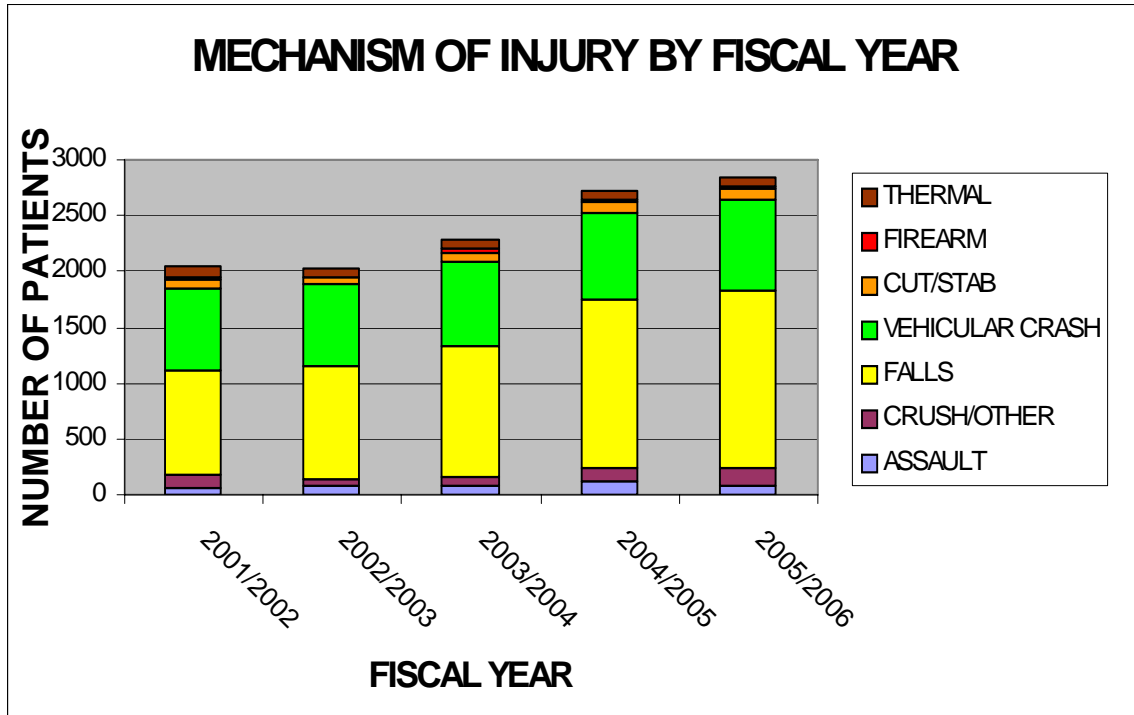
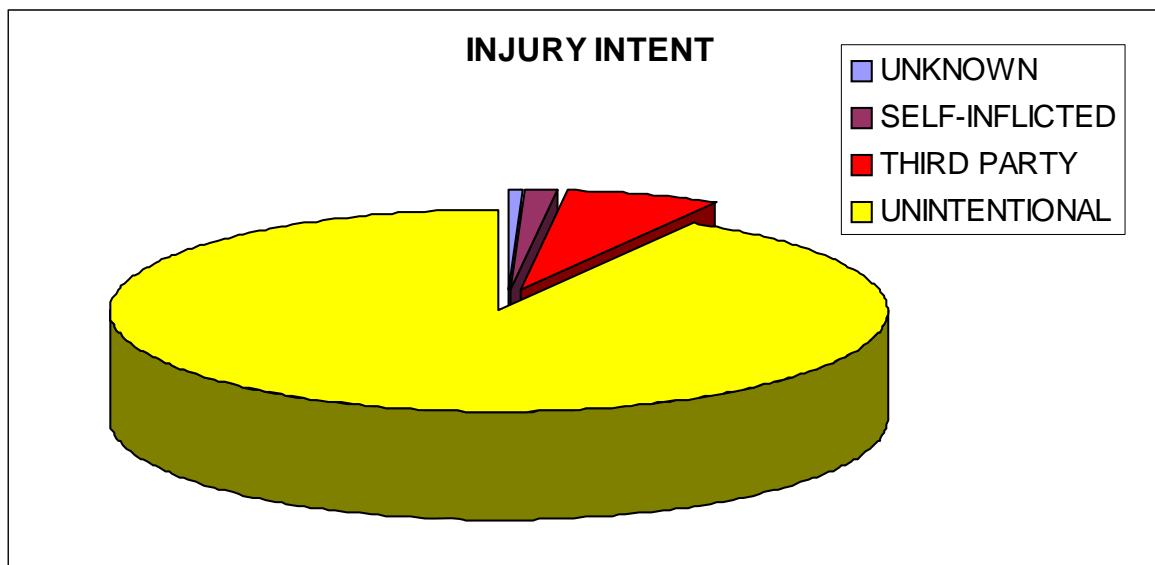


Figure 9. Injury admissions by Intent (Unintentional vs. Intentional) (BCTR)



Common mechanisms of injury vary according to patient demographics with falls predominating in the elderly and motor vehicle crashes predominating in the early and middle years of life. Combined BCTR data for VGH, LGH and SPH shown in Figure 10.

Patients originate from within VCH and from other centres. The relative contribution of direct from scene vs. transfers in to our trauma centres is reflected in Figure 11.

Transfers account for a decreasing proportion of admissions as other BC regional trauma systems mature and become more independent.

Figure 10. Percentage Injury Admissions by Mechanism and Age (BCTR)

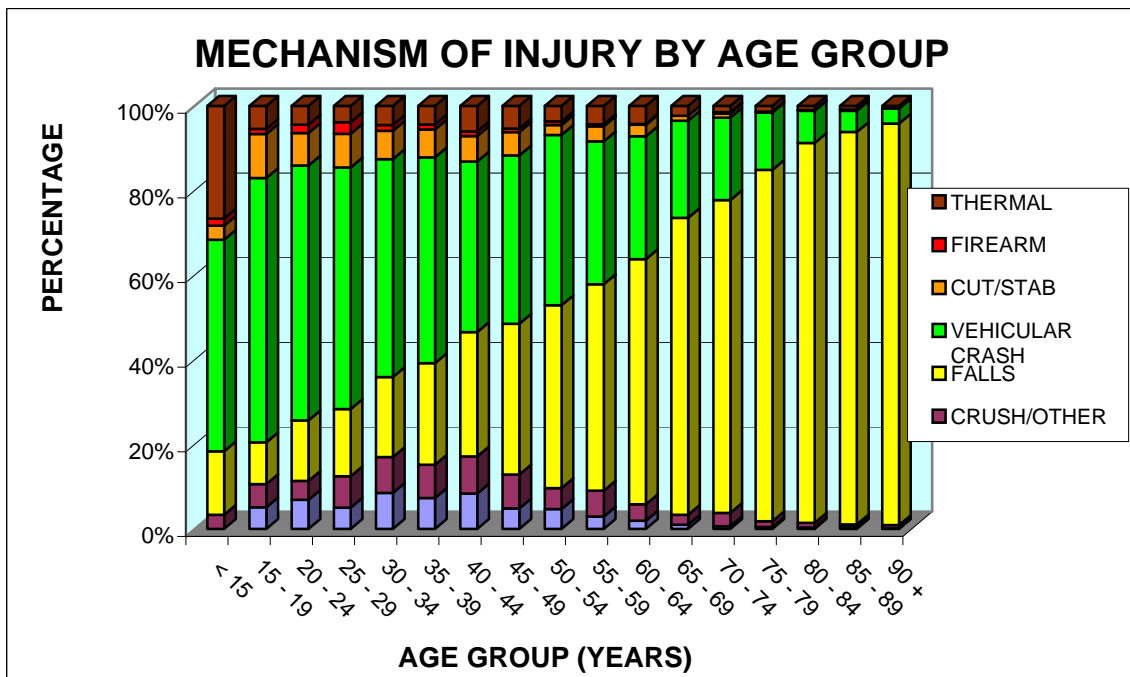
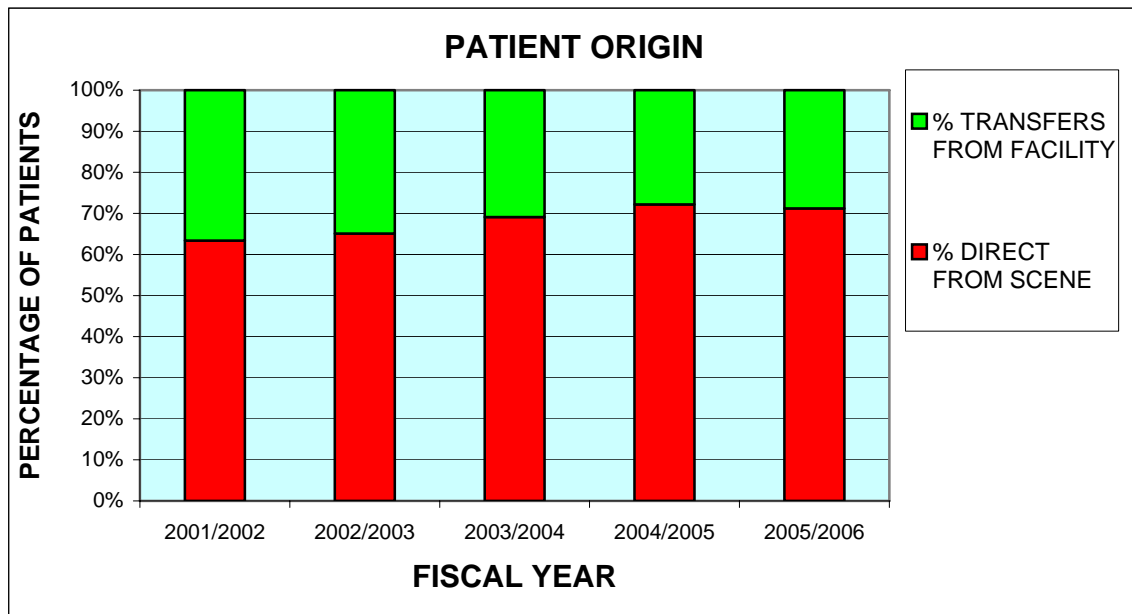


Figure 11. Injury Admissions (%) by Origin (Scene Vs. Transfer) (BCTR)



Performance Improvement and Patient Safety (PIPS)

The VCH Trauma Program is committed establishing best practice in trauma care throughout the system and has implemented an integrated Performance Improvement and Patient Safety (PIPS) Program. Clinical practice guidelines have been implemented system-wide (see web site - www.vch.ca - for full list) and performance is monitored through a variety of process and outcome measures. This exceptional program has built on the vision and hard work of the site Trauma Program Managers, aided by the site Trauma Directors and supported by the BC Trauma Registry.

Process indicators are chosen to identify system delays and errors across the system that could contribute to excess mortality and morbidity and include (see Table 1.):

1. Delays in Trauma Team Activation
2. Delays in consultation
3. Delays to the operating room
4. Delays in diagnosis
5. System delays (e.g. referral, transport, resource availability e.g. CT/OR)
6. Missed diagnosis
7. Errors in technique, judgment, communication
8. Lack of compliance with clinical practice guidelines (CPGs)

**Table 1: Audit of Process indicators for 2005 and 2006.
(Regional data based on focused audits with *ranges between sites*)**

| Code | <i>Regional Trauma Audit 2005 & 2006</i> | 2005 | | 2006 | |
|------|---|---------------|-----------------|--------------|------------------|
| | | Region | Range | Region | Range |
| 9002 | Total Number of pts who met TTA criteria | 98 | | 88 | |
| | Total Number of Actual TTA's (including delays) | 68 | | 71 | |
| | Of Above, Total # of delayed TTA | 0 | | 0 | |
| | Total Number of Missed TTA's (9002) | 23 | | 17 | |
| | No documentation | 7 | | 0 | |
| | Regional Trauma Indicator % (Target: <30% Delay in Activation) | 25.27% | <i>(0-60%)</i> | 19% | <i>(4-41%)</i> |
| 9004 | Total Number of Delays in TTA's - MD Response (Facility Guidelines) | 9 | | 2 | |
| | Regional Trauma Indicator % (Target: < 30% MD Delay in Response) | 9.89% | <i>(0-29%)</i> | 2.27% | <i>(0-3%)</i> |
| 9005 | Total Number of Patients Meeting Trauma Consult Criteria (Facility Guidelines) | 127 | | 113 | |
| | Total Number of Missed Trauma Consults (Facility Guidelines) | 16 | | 8 | |
| | Regional Trauma Indicator % (Target: < 30% Missed Trauma Consults) | 12.60% | <i>(3-39%)</i> | 7% | <i>(2.3-23%)</i> |
| 9001 | Total Number of Patients Admitted from ED | 206 | | 169 | |
| | Total Number of Delays to Disposition (>4hrs) | 73 | | 35 | |
| | 4-8 hrs | 40 | | 22 | |
| | >8hrs | 33 | | 13 | |
| | No Delay to Leaving ED (<4 hrs) | 133 | | 134 | |
| | Regional Trauma Indicator (Target: > 70% <4hrs To ED Discharge) | 64.00% | <i>(36-76%)</i> | 79 | <i>(22-84%)</i> |

Outcome measures currently include:

1. Length of stay (Adjusted to Injury Severity Score) Fig 12.
2. ICU length of stay (Adjusted to Injury Severity Score)
3. Discharge disposition (an indicator of functional status at discharge) Fig 13.
4. Crude mortality rates Fig 14-15.
5. Risk adjusted injury mortality (TRISS methodology) Fig 16 -17.

Figure 12. Average length of hospital stay (BCTR)

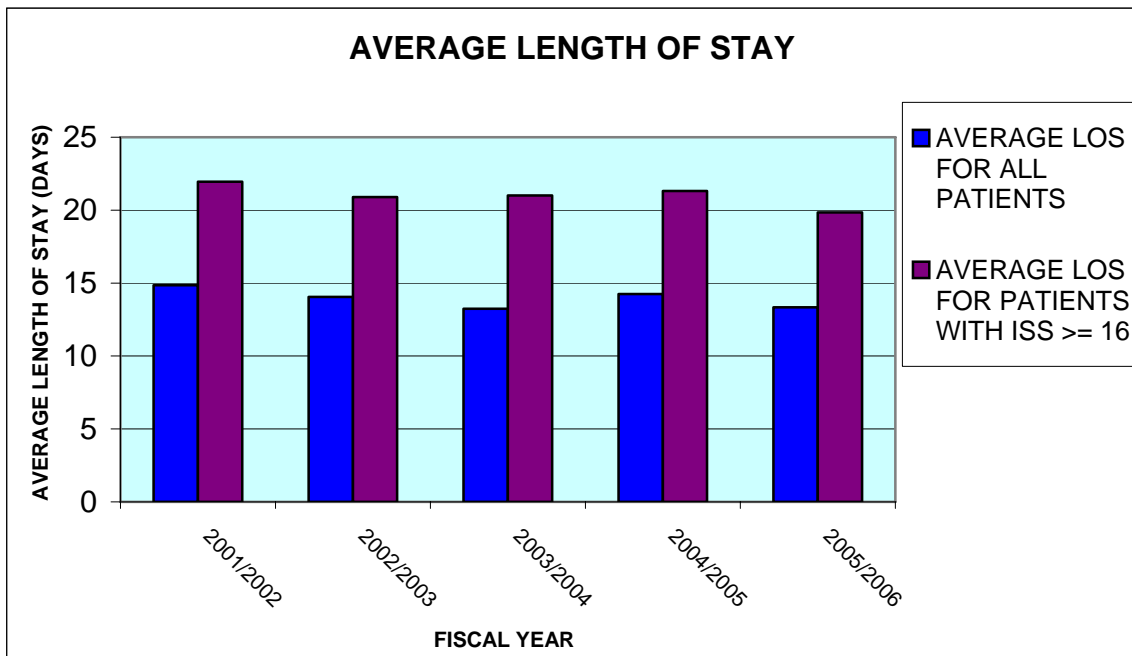
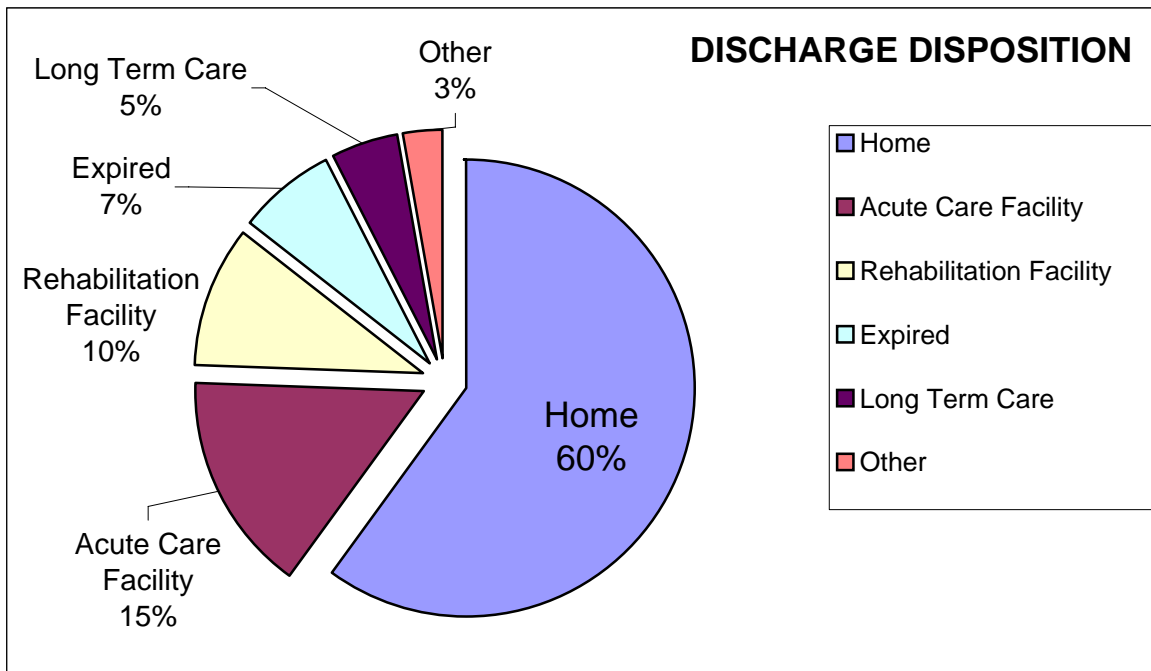


Figure 13. Discharge Disposition VCH Trauma Patients (BCTR)



Injury mortality: The program tracks both crude injury mortality rates for discrete injury populations based on mechanism and injury severity. (Fig 14. & 15.)

Figure 14. Crude Injury Mortality Rates by Mechanism of Injury (BCTR)

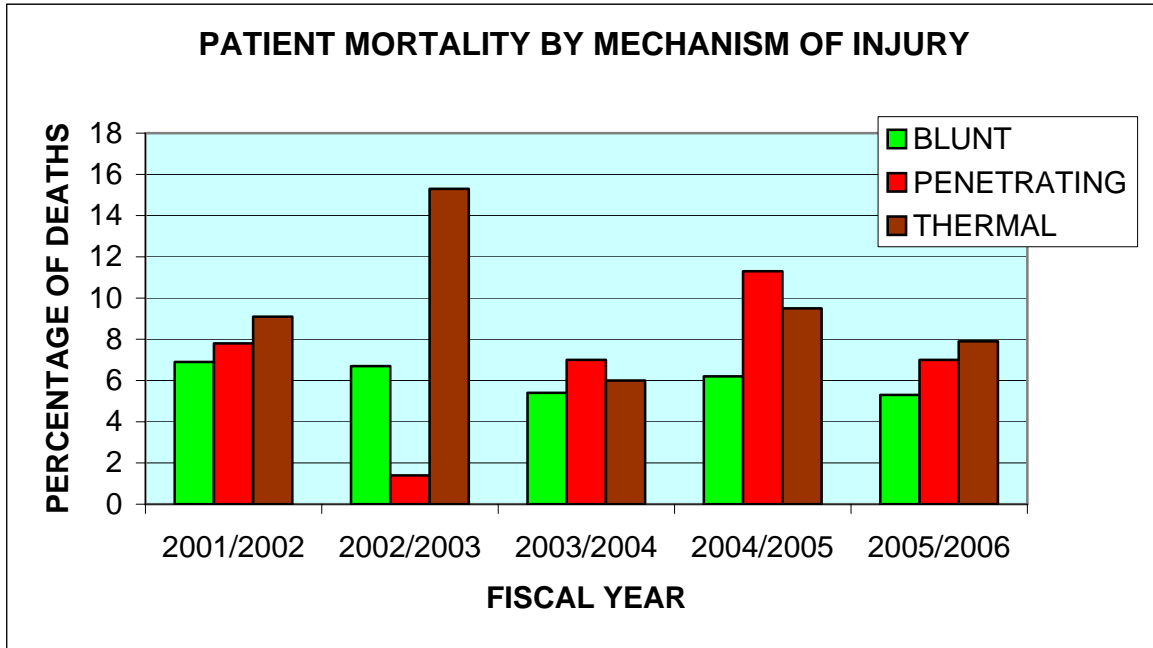
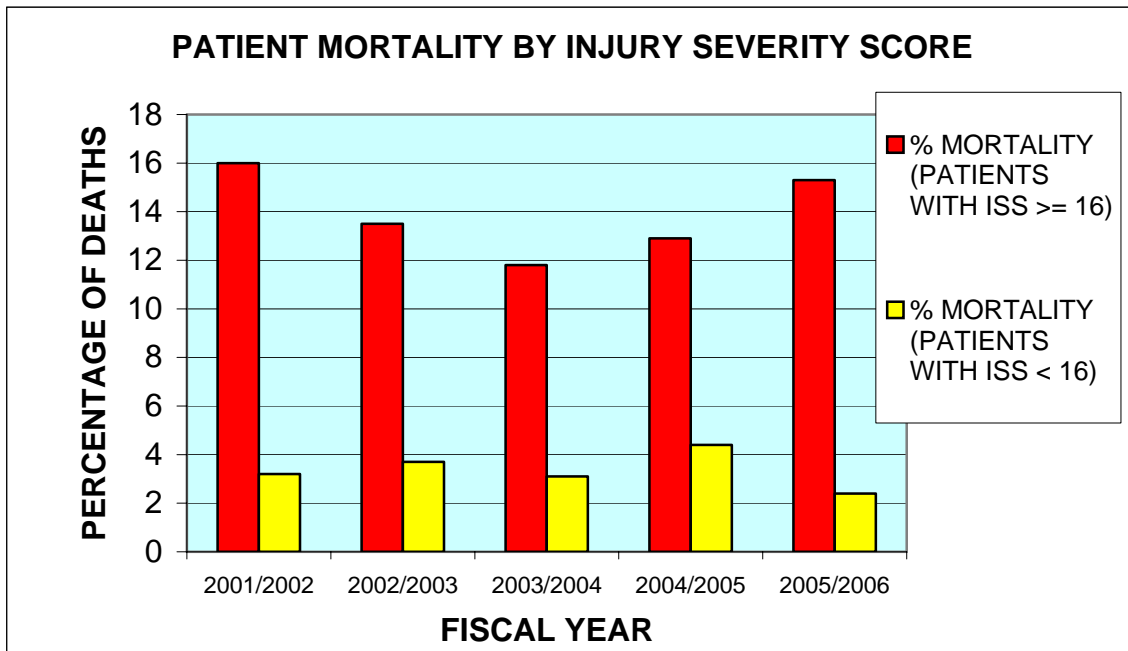


Figure 15. Crude Injury Mortality Rates by Injury Severity Score (BCTR)



Risk adjusted mortality is calculated utilizing TRISS methodology as a benchmarking tool to define performance against historical international benchmarks. In general, the TRISS z statistic indicates whether the observed survivors in the trauma system exceed (+) or are less than (-) what would be predicted based on the Major Trauma Outcome Study (MTOS). As can be seen for the following charts, VCH z scores are in positive territory for most years indicating improved survival over predicted outcomes (Figures 16. & 17.) W statistics are reported when the z score is sufficiently positive to be statistically different from MTOS norms. The W score indicates the number of additional survivors (+) or deaths (-) per 100 trauma admissions.

New outcome measures are being developed to monitor short and long-term morbidity and disability.

Figure 16. Risk Adjusted Mortality vs. MTOS Benchmark (BCTR – see text)

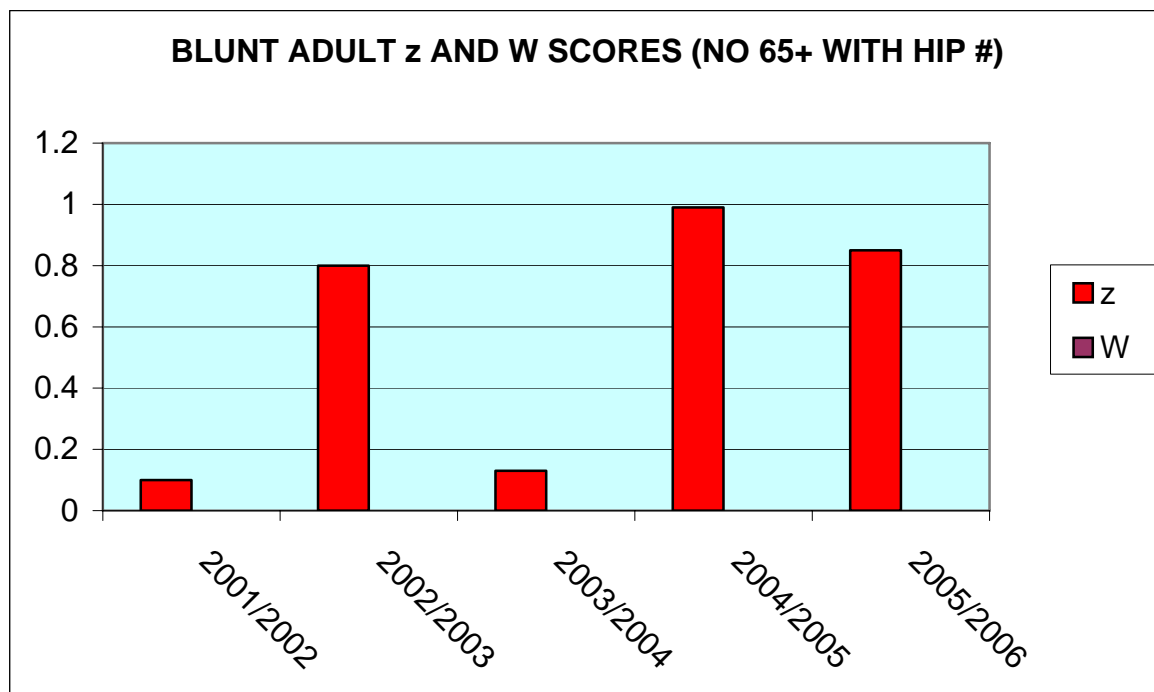
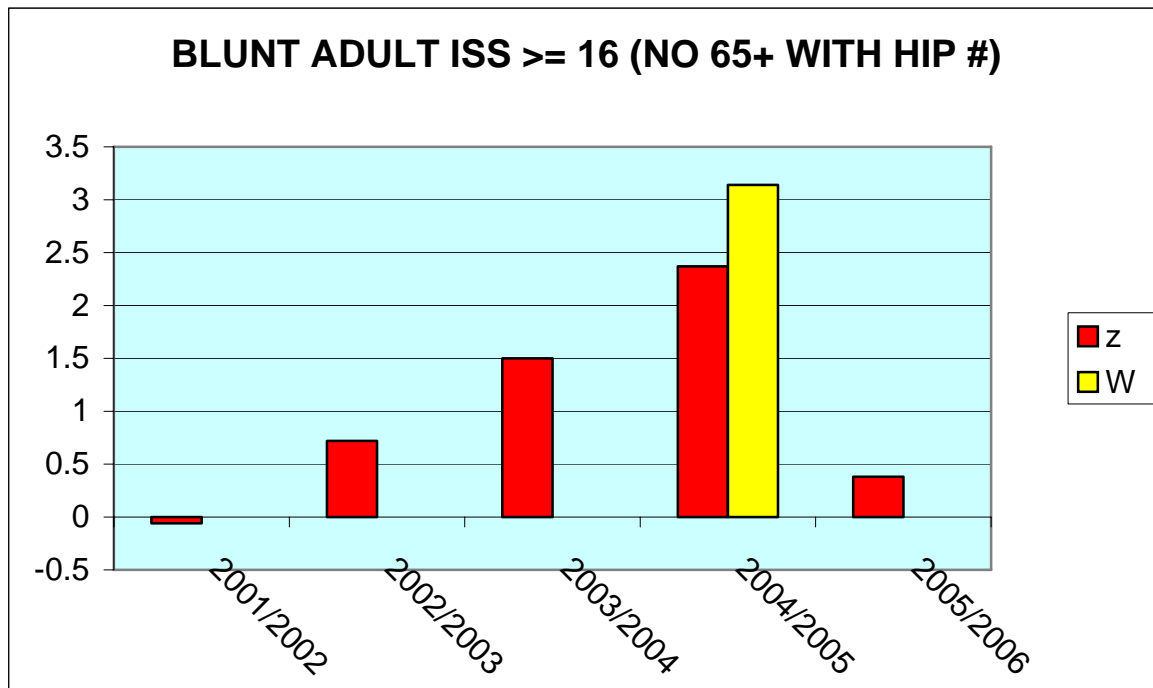


Figure 17. Risk Adjusted Mortality ISS \geq 16 vs. Benchmark (BCTR – see text)



Education and Training Initiatives:

UBC undergraduate, postgraduate trauma training programs. The consolidation of most major blunt trauma in the VCH region to one site (VGH) has allowed for the development of specialty trauma services and dedicated trauma units. These permit development of comprehensive training programs for undergraduate medical training (UBC), postgraduate (residency and fellowship) training and the first ever civilian based Canadian Forces Trauma Training Centre. High case volumes are essential to maintain these programs.

Educational outreach programs are critical to trauma care providers in rural and remote communities. The program currently ensures that the Advance Trauma Life Support course for physicians and the Trauma Nurse Core course or equivalent for nurses is available.

Regional Trauma Rounds: Regional Trauma Rounds are now being presented monthly by each of the major VCH trauma centres in turn and are being made available through telehealth to a wider audience as more Primary Trauma Centers come on line.

Canadian Forces Trauma Training Centre (West). The CFTTC(W) is a tremendous credit to the VCH Trauma Program creating a first of its kind in Canada joint civilian/military trauma training facility. The importance of this program is not lost when one realizes that the vast majority of CF Health Professionals deployed in Afghanistan have

received their pre-deployment trauma training at VGH to the gratitude of the Forces and their injured soldiers.

Injury Prevention:

Vital to the optimization of regional trauma services, is the need for trauma systems and a holistic injury control perspective within the region, congruent with developing national and provincial programs. Although attention is currently focused on the Regional Trauma Program, integration of other important elements is required to diminish the burden of injury in our community.

Linkage with BC Injury Prevention Centre at VGH has been well established for the last decade or so and continues to evolve in partnership with the trauma program with its specific target being the school age children and recreational injury in youth. A visit to the BCIPC website is encouraged www.injuryfreezone.com

Other groups at various sites across VCH are actively engaged in injury prevention from domestic violence prevention, burn injury prevention and alcohol free driving to name a few.

Research Activities

New knowledge, particularly about the care we provide, is essential to ongoing system improvement. Throughout the regional program there are active research initiatives investigating new and better ways to care for our patients. Support for these activities comes from federal and provincial granting agencies along with local support from the Hospital Foundations and individual programs.