

From Anthony Henday to Big Box Superstores: Trends in Canadian Trauma Care

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When looking forward, it is often useful to explore the past. I would like to begin this address by revisiting recent history, attempting to learn lessons which may help us understand future trends.

In 1754, Anthony Henday was dispatched by the Hudson's Bay Company to seek out new territories and trading partners for the lucrative fur trade. He paddled down the Hayes River and crossed overland to the site of present day Red Deer, Alberta. He encountered the vast herds of buffalo and established contact with the Blackfoot Nation. He is often credited as being the first European to visit the Canadian western plains. On closer inspection, however, his mission for the Bay was in response to the activities of the adventurous son of the Governor of Trois Riviere, Quebec, Monsieur Verendrye. Verendrye had already established a chain of trading posts that extended to the Rocky Mountains. The Blackfoot were well supplied with French trading goods. The horse, too, had arrived, preceding Henday by 30 years.

"He visited a Blackfoot camp just south of present day Red Deer, Alberta. The camp consisted of 322 teepees and 2500 people [Fig. 1]. He noted that they rode horses complete with stirrups and pad saddles stuffed with buffalo hair. He experienced the thrill of a mounted buffalo hunt. It was all he could do to control his horse, he reported, while the Indians galloped with both hands free, and felled buffalo with as few as two arrows."¹

In 1759, Quebec fell to the British; the French competition was quickly replaced by small groups of Scottish and American colonial traders. Effective competition emerged with the formation of the Northwest Company in 1774. The Hudson's Bay Company awoke from its sleep by the frozen sea and unleashed several extraordinary explorers. In 1771, Samuel Hearne reached the Arctic Ocean. In 1793, Alexander



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Mackenzie crossed the Rocky Mountains and left his famous mark by the Pacific, ". . . from Canada by land. The 22nd of July, one thousand seven hundred and ninety-three."² The Northwest Company responded by luring David Thompson from the Bay. By 1811, David Thompson mapped the Upper Columbia River and, eventually, reached the Pacific. The frontiers of Canada were now established.

Within 100 years, the buffalo and the free-roaming Blackfoot confederacy were gone, the cities and towns of Canada were established, and the population was growing rapidly. The 20th century saw the establishment of the general store and the general hospital. As a child growing up in the 1960s, these institutions possessed an aura of grandeur

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Fig. 1. Fur trader (copyright Glenbow Archives NA-1406-57).



Fig. 2. Calgary General Hospital “creative destruction,” 1997 (copyright permission given by the Calgary Herald).

and seemed as permanent as the pyramids of ancient Egypt. The pace of change, however, can be rapid, and seemingly invincible structures and organizations have fallen. The full-service department stores, Woodward’s and Eaton’s are gone, replaced by high-volume discount and specialty stores.

The general hospital, too, is rapidly passing. Not only do we have trauma centers, but bone and joint, women’s health, heart health, ambulatory surgery, eye, and prostate centers have emerged, to name but a few. Dr. Sherry Cooper, Chief Economist and Senior Vice-President with the Bank of Montreal Investment Group discussed the phenomenon of creative destruction in her recent book *The Cooper Files*: “Enormous volatility will remain. Old businesses will die only to be replaced by new ones. New ones will come and go. The technology life-cycle is very short. Obsolescence is rapid. . . .

This creative destruction [Fig. 2], a phrase coined by Harvard economist Joseph Schumpeter, in 1942, is a necessary part of economic progress. . . . It is also very difficult, fraught with human costs.”³

In the midst of this sea of change, where do we stand today? To plan for future change, we must understand present trends. A look at macroindicators, or the big picture, is in order.

“Total healthcare spending surpasses \$100 billion,” reports the Canadian Institute for Health Information. Indeed, health care costs in Canada have risen from approximately \$40 billion in 1975 to \$100 billion today. When adjusted for

inflation, the numbers are less impressive but remain significant.

In 1975, health care accounted for 7% of gross domestic product (GDP). Today, it accounts for over 9.5%. Recently, annual increases in health care spending have averaged 7%. To some extent, this is making up for the cutbacks of the early 1990s. However, despite the debate over privatization of health care in Canada, public sector funding has actually increased, rising from 70.2% of the total in 1997 to 72.6% today.⁴ Another useful perspective is our ranking among fellow developed nations. As a percentage of GDP spent on health care, Canada currently ranks third in the world, tied with France at 9.9%, behind Germany at 10.3% and the United States at 12.9% (1999 figures).

Where is this money going? Hospitals remain the largest category, accounting for 31.9% of total health care spending in 1999. This, however, represents an absolute drop of 13.7% points from its historic high of 45.2% in 1976. Pharmaceutical costs rank second at 14.9%; they are growing rapidly, with an average annual growth rate of 10%. Health care spending on physician services, one of the drivers for the formation of universal Canadian health care in the 1960s, ranked third at 13.6% of total health care spending in 1999. The share of total health expenditures on physician services has been falling gradually.⁴

The macroindicators for trauma are equally important. The Canadian National Trauma Registry, one of the sentinel accomplishments of this organization, gives us more specific information on Canadian injury data. The registry, housed and managed by the Canadian Institute for Health Information (CIHI) in Ottawa, was set up through the combined efforts of CIHI and a number of dedicated Trauma Association of Canada members over the past decade.

The Canadian National Trauma Registry consists of three major sources of data: (1) the minimal data set, which includes information on all admissions resulting from injury in Canadian acute care hospitals; (2) a comprehensive data set, which provides information on major trauma patients hospitalized in 23 participating lead trauma hospitals; and (3) a death data set, which is currently under development, and will include data on all deaths in the country, resulting from injury, regardless of hospitalization.

What are the numbers? The 2002 summary covers the year 2001 data. There were 197,000 acute care admissions caused by injury. The age-standardized hospitalization rate was 62 cases per 10,000 population. Injured patients occupied 1.8 million days in hospital. The mean hospital length of stay (LOS) was 9 days, with a median of 4 days. The average age of all hospitalized cases was 50 years. Three percent of all injury admissions died. Eighty percent of the in-hospital injury deaths were in persons 65 years of age or older. The trends are significant. Injury admissions have decreased by 8% over the previous 5 years, perhaps reflecting efforts at injury control. The mean age has increased from 47 to 50 years in the same period, reflecting our aging population. The

mean LOS decreased from 10 days to 9 days, perhaps representing greater efficiency or simply a reflection of the greater pressures on hospitals today. Finally, the age-standardized injury admission rate decreased by 16%, from 74 per 10,000 population to 62 per 10,000.⁵

What were the causes of these injuries? Unintentional falls continue to lead, responsible for 54%, followed by motor vehicle collisions at 15%; assault was a distant fourth at 4%. When looking at major trauma admissions, the picture is somewhat different. Here, motor vehicle crashes account for almost half of all reported severe injuries, 48%. Unintentional falls are second, 27%, followed by other causes at 10%, and homicide/assault at 8%.⁶

Potential years of life lost (PYLL) remains an important indicator of the impact of a disease on society. In Canada, annually there are 1.04 million PYLL from all causes. Deaths resulting from trauma are the second leading cause at 305,439 PYLL. For those aged 1 to 44 years, death resulting from trauma remains the leading cause of PYLL, accounting for 47% in 1996.⁵

Trauma remains a significant public health issue in Canada, and the quality of trauma care should concern us all. Where do we excel? Well-trained urban Emergency Medical Services (EMS) and air transport systems, a cadre of well-trained, highly professional emergency physicians and personnel, and a supporting complement of well-trained medical and surgical specialists.

Where do we fail? Variable rural EMS systems and significant delays in reaching tertiary care services; heterogeneous in-hospital care; multiple providers; inconsistent access to emergency surgery; and delayed recognition of significant occult injuries and increased morbidity because of lack of expertise, interest, and commitment of varied admitting services. More recently of concern is tertiary system diversion resulting from lack of coordination of regionalized intensive care unit and acute care resources.

The focus on prehospital and emergency care has been good. Across the country, initial trauma care is reasonably standardized, particularly at larger tertiary and regional facilities, with the adoption of Advanced Trauma Life Support principles of trauma care. Trauma care, however, is much more than the "golden hour." Responsibilities of trauma centers and trauma systems are well summarized in the literature. These include a systems approach, registry and outcomes analysis, participation in injury prevention, promotion of outreach and education, and provision of complete and coordinated efficient care throughout the hospital continuum, from acute care to rehabilitation.

Accessing the traditional array of surgical specialists on which trauma centers depend is increasingly challenged by the demands of multisite care in specialized institutions, changing professional expectations, rising acuity and volume in trauma centers, and lack of remuneration for emergency trauma care compared with scheduled urgent and elective work.

It is clear that for trauma care to avoid mediocrity, not only will improved standards have to be championed by committed surgeons, but alternate payment for surgical trauma services will have to be implemented. Remuneration must be linked to privileges and opportunities in community practice. Many areas in Canada are in a fortunate strategic position to cope with these changes, with the creation of large regional health boards, and the existence of a single payer in the form of the Provincial Ministries of Health.

As a general surgeon, I feel obliged to comment on our role in trauma. Several trauma or combined trauma/emergency surgery services have evolved across the country. Responsibilities include the following: (1) attendance at major trauma resuscitations, supporting the emergency department physician in initial resuscitation; (2) mobilizing the hospital's resources for major trauma; (3) providing immediate operating room access for truncal hemorrhage; and (4) serving as a designated receiving service for the management of nonventilated, acute care, multisystem trauma patients. Many of these services can, and are, provided by other committed surgeons; however, the control of initial hemorrhage relies on an accessible team of general surgeons with both knowledge of and commitment to trauma care.

In 1999, Richard Simons reported on the impact of introducing a clinical trauma service in a provincial trauma center.⁷ Significant improvement occurred in trauma unit LOS, performance measures, and outcome. This article should be required reading for Canadian trauma directors and administrators.⁷ Abdication of surgical responsibility for trauma care is of historic interest. Organized surgical inpatient trauma care must become a Canadian standard if we are to take excellence in trauma care seriously.

How do we perform? We owe a debt of gratitude to our colleagues in Australia, at the Liverpool Hospital, who first published their performance indicators in the public domain, on the World Wide Web, thus opening the door for those of us interested to follow.

For the past 2 years, following the Australians' lead, the Calgary Health Region has published its adult and pediatric performance indicators in our annual report, and on the Web. We have done this to demonstrate and maintain accountability in our system. We have also done this in the hope that other Canadian institutions will do the same, allowing us to identify areas at home that require attention and improvement. Sharing this information will also provide us with a competitive lever to support our efforts at securing resources to maintain and improve our trauma program.

A current debate is whether to wait for level 1 evidence for each of these indicators, before adopting or measuring it. In my view, this would be a mistake, inevitably leading to inertia and poor quality care, supported by so-called lack of evidence. One might argue about the specifics of any of these indicators, but we all would acknowledge measures of performance in which we would take pride, and those in which we would not.

Outcome, in terms of mortality, is always the simplest indicator, and absolute mortality in patients with an Injury Severity Score ≥ 12 was 11.9% last year in the Calgary adult trauma program. The Major Trauma Outcome Study (MTOS), published by Champion et al. in 1990,⁸ finally provided a tool that would allow comparison to a national standard, adjusting for case mix, with scoring for injury severity and acute physiologic derangements. TRISS analysis has been an important tool and has allowed us to lobby for improved standards and support for trauma care. Its limitations have been reported and have led to the ASCOT modification and the NISS score, among others. The principal limitation, as it is currently used in Canadian trauma centers, is the exclusion of many of our sickest patients in the analysis, all those who arrive intubated, and in whom a Glasgow Coma Scale score cannot be applied. This results in regression toward the mean. In addition, centers with smaller volumes and resulting large deviations will likely remain within 2 SD of the MTOS data.

Potentially larger differences in trauma care and outcome can be masked by relying solely on this approach. Although *z* and *W* scores are included in our report, these limitations justify the inclusion of additional indicators. Some examples of the greater than 20 indicators published for the adult and pediatric programs, in Calgary, include the following: (1) known transport time by EMS from scene to trauma center (average, 16.6 minutes); (2) attendance of the general surgery team leader within 20 minutes, when activated by the emergency department and physician (compliance, 97.4%); (3) craniotomy for acute epidural or subdural hematoma within 4 hours of arrival at the trauma center (compliance, 89.5%); (4) was the laparotomy therapeutic (92.6%); (5) operative management of femur fractures within 24 hours of admission (compliance, 88.9%); (6) operative management of open fractures within 6 hours for grade III or 12 hours for grade I and II fractures (compliance, 92%); (7) was the admitting physician a surgeon or intensivist (98.3%); and (8) delayed diagnosis or missed injury (5.3%).⁹

I would encourage each of you, when returning home, to ask your directors and administrators, "Where's the beef?" In a recent editorial published by Hoey et al. in the *Canadian Medical Association Journal*, "When high quality report cards are available on services provided at public expense, it is difficult to see how the withholding of this information serves the public interest . . . naming and taking responsibility are mature . . . behaviors. Public disclosure should be the norm, unless there is a clear and demonstrable potential for net harm. Society stands to benefit from greater transparency

and such transparency gives researchers, editors, and journalists that additional responsibility, providing guidance on how to interpret and use the information they make available. Physicians and their institutions should prepare themselves."¹⁰

The Trauma Association of Canada is poised to support implementation of a high standard of care across the country. The continued penetration of the Trauma Association of Canada accreditation process, the new Clinical Multicentre Trials Group, headed by Dr. David Evans, and the Canadian Major Trauma Database and Outcome Study, headed by Dr. John Sampalis—these initiatives can and will make a difference. I encourage all of you to become involved in the work of these groups and committees.

Like Anthony Henday and his fellow explorers, we must discover new approaches to current problems. We can improve existing trauma systems and provide optimal care in ever-changing circumstances. It has been an honor to have served as President of this organization, and it has been a privilege to have had the opportunity to present to you today. Thank you.

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