Canadian Major Trauma Cohort Research Program

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Key Implications for Decision Makers

- In Canada, regionalization of trauma care services results in significant reductions of trauma-related mortality.

- Regionalization of trauma care must involve designating tertiary (level I) trauma hospitals, implementing patient triage protocols, establishing efficient and effective pre-hospital care, and centralizing co-ordination of these services.

- When planning and organizing trauma care services in Canada and allocating resources, emphasis should be placed on centralizing control and concentrating specialized services in dedicated trauma centres, with an established network for the transfer of patients to these centres from less-specialized institutions.

- The implementation of triage protocols aimed at identifying severely injured patients and transporting them to the appropriate trauma centres is also necessary.

- Finally, resources should be allocated towards properly staffing and equipping trauma centres so that the demands of patient care can be addressed.
Executive Summary

Trauma is the fourth highest cause of death in North America and is the leading cause of death for individuals under the age of 45 years. Because of trauma’s prevalence and the large number of lives lost each year to this preventable and often treatable condition, many government and healthcare systems have looked for ways to prevent trauma and decrease trauma-related morbidity and mortality.

Regionalization of trauma care, or the shift in trauma care management from an individual, hospital-based approach to a systems approach, has been repeatedly shown to decrease mortality in many systems throughout the world. In addition to improving outcomes, trauma care regionalization also serves to pool resources, maximize efficiency, and minimize costs.

In Canada, trauma care services range from no organization at all to fully integrated and regionalized systems. This variation in the organization of trauma care services results in inequality and sub-optimal care for many Canadian trauma patients. Trauma system models that were developed in the United States may not be appropriate for Canada because of the specific trauma epidemiology, geographical distribution, and healthcare system. The current challenge is to identify the ideal composition and level of centralization of trauma care services that are required within distinct regions of Canada. The current study assessed the effect of different components of trauma care regionalization on trauma-related mortality in Canada to identify those components that should be considered as critical in the design and implementation of Canadian trauma care systems.

The research studies conducted as part of this program are retrospective observational cohort studies, which included all trauma patients that were treated at acute care hospitals in Canada between 1995 and 2001. The data used to conduct these studies were obtained from the National
and Provincial Trauma Registries and a survey of Canadian hospitals treating trauma patients. The program studies specifically evaluated the impact of variation in the type, organization, and components of trauma services between Canadian regions on trauma-related mortality. Specifically, trauma centre regionalization, hospital designation, patient triage and transport protocols, pre-hospital treatment, and the rural/urban differences were evaluated. The primary outcome measure was trauma-related mortality, which was defined as death prior to discharge.

The program was based on 1,509,203 patients treated for injuries in Canadian acute care hospitals between 1995 and 2001. The mean (SD) age of the patients was 46.2 (23.3) years; 42.5 percent were females. The following are the salient observations from the studies conducted:

i. Implementation of trauma system regionalization produces a significant 80-percent reduction in the risk for trauma-related mortality. This is after adjusting for patient age and injury severity.

ii. After adjusting for age and injury severity, patients treated in hospitals that are accredited as tertiary (level I) trauma centres and fulfill the American College of Surgeons’ requirements for this classification have significantly reduced adjusted risk of mortality by 81 percent, when compared to patients treated at other hospitals that do not have this level of specialization in trauma care.

iii. Trauma-related mortality, adjusted for patient’s age, injury severity, and type of hospital, is significantly reduced by 96 percent in regions where patient triage protocols have been implemented.
iv. With respect to pre-hospital on-site procedures, the results of the program study showed that endo-tracheal intubation (to assist breathing) is possibly beneficial in reducing trauma-related mortality by 25 percent. However, the use of on-site intravenous line access and fluid replacement was of no benefit. The use of on-site cardiopulmonary resuscitation was shown to increase the risk of trauma-related mortality by a factor of 15. This is an alarming observation that indicates inappropriate use of the procedure. This is consistent with concerns of inadequate training of pre-hospital personnel. The use of anti-shock trousers in cases of blood loss was shown to be beneficial. However, these devises have been shown to be harmful for severely injured patients in randomized clinical trials. This observation may be due to highly selective use of this intervention in very rare cases.

v. Patients that are treated in rural centres have a 20-percent increased adjusted mortality rate when compared to similar patients treated at urban centres.

The results of these studies show that regionalization of trauma care services with trauma centre designation and implementation of patient triage protocols is essential for the effective prevention of trauma-related mortality in Canada. Special consideration should be given to rural areas, with emphasis on the establishment of patient transfer policies by which severely injured patients are transferred from rural centres to highly specialized trauma hospitals within minimal delay. Allocation of resources towards this goal is critical. Finally, with respect to pre-hospital care, the study identified a potential lack of adequate training of emergency medical personnel. The observed benefit of endo-tracheal intubation is consistent with the current state of knowledge, and this intervention should be incorporated in all Canadian pre-hospital care systems.