Critical Care Unit Capacity in Canada: Have we failed to advocate adequately?

Noel Gibney MB FRCP(C)
Disclosures

None
Critical Care Capacity

• Adequate critical care unit beds necessary to provide adequate capacity to manage:
  • Day to day admissions
  • Seasonal surges
  • Pandemics
  • Disasters

• Inadequate capacity = critical care strain
• Excess capacity = waste
Impact of delayed admission to intensive care units on mortality of critically ill patients: a cohort study

Lucienne TQ Cardoso, Cintia MC Grion*, Tiemi Matsuo, Elza HT Anami, Ivanil AM Kauss, Ludmila Seko, Ana M Bonametti
Impact of ICU night discharge on outcomes

<table>
<thead>
<tr>
<th>Author</th>
<th>Country</th>
<th>% Night discharges</th>
<th>OR mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beck</td>
<td>U.K.</td>
<td>26%</td>
<td>1.87</td>
</tr>
<tr>
<td>Goldfrad</td>
<td>U.K.</td>
<td>6%</td>
<td>1.33</td>
</tr>
<tr>
<td>Priestap</td>
<td>Canada</td>
<td>10.1%</td>
<td>1.22</td>
</tr>
<tr>
<td>Tobin</td>
<td>Australia</td>
<td>5.9%</td>
<td>1.63</td>
</tr>
<tr>
<td>Laupland</td>
<td>Canada</td>
<td>21%</td>
<td>1.20</td>
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</tbody>
</table>
Intensive Care Unit Bed Availability and Outcomes for Hospitalized Patients With Sudden Clinical Deterioration

Henry T. Stelfox, MD, PhD, FRCPC; Brenda R. Hemmelgarn, MD, PhD, FRCPC; Sean M. Bagshaw, MD, MSc, FRCPC; Song Gao, MSc; Christopher J. Doig, MD, MSc, FRCPC; Cheri Nijssen-Jordan, MD, MBA, FRCPC; Braden Manns, MD, MSc, FRCPC

Arch Int Med 2012;172:167-172

“For hospitalized patients, the number of ICU beds available at the time of sudden clinical deterioration affects processes of care.

As the number of available ICU beds decreases, patients are less likely to be admitted to the ICU and are more likely to have their goals of care changed…..”
Refusal of Intensive Care Unit Admission Due to a Full Unit
Impact on Mortality

René Robert¹, Jean Reignier², Caroline Tournoux-Facon³, Thierry Boulain⁴, Olivier Lesieur⁵, Valérie Gissot⁶, Vincent Souday⁷, Mouldi Hamrouni⁸, Cécile Chapon⁹, and Jean-Paul Gouello¹⁰, for the Association des Réanimateurs du Centre Ouest Group*  

- 10 ICUs in Western France. Consecutive patients referred for ICU admission for the first time over a 3-month period were assessed for eligibility.  
- During the study period, the mean number of days when the unit was full per ICU was 48.5%.  
- 193 patients refused ICU admission because the unit was full, 65 were never admitted to an ICU and the remaining 128 (66%) were admitted later on
Impact of refused ICU admission

B

Survival probability

Admitted immediately
Admitted after bumping of another patient
Never admitted
Admitted upon subsequent referral

0.5
0.6
0.7
0.8
0.9
1.0

Days from request for admission

P(log rank test)=0.13

Robert R et al. Am J Respir Crit Care Med Vol 185, Iss. 10, pp 1081–1087
Variation in use of intensive care for adults with diabetic ketoacidosis*

Hayley B. Gershengorn, MD; Theodore J. Iwashyna, MD, PhD; Colin R. Cooke, MD, MSc; Damon C. Scales, MD, PhD; Jeremy M. Kahn, MD, MSc; Hannah Wunsch, MD, MSc


Setting: 159 NY State acute care hospitals.

Patients: 15,994 adult (≥18) hospital admissions with a primary diagnosis of diabetic ketoacidosis

Results: Use of intensive care for diabetic ketoacidosis patients varied widely across hospitals (adjusted range: 2.1% to 87.7%), but was not associated with hospital length of stay or mortality.
A comparison of intensive care unit utilization in Alberta and western Massachusetts
Rapoport, John PhD; Teres, Daniel MD FCCM; Barnett, Robert MBBS; Jacobs, Philip PhD; Shustack, Alan MD; Lemeshow, Stanley PhD; Norris, Colleen MN; Hamilton, Stewart MD  Crit Care Med 1995;23;1336-1346

Setting: Administrative data for Alberta and four counties of western Massachusetts 1990 to 1991. Detailed data on consecutive ICU admissions from two Alberta hospitals, one western Massachusetts hospital, and 24 other U.S. hospitals for 3 months in 1991 were used.

Results: ICU use and hospital mortality rates were compared for 50,030 hospital admissions.

- ICU days per million population were two to three times higher in western Massachusetts than Alberta.
- The hospital mortality rate in western Massachusetts was similar to, or higher than, the mortality rate in Alberta.
- In Alberta, a much higher proportion of ICU patients received mechanical ventilation.
Population requirement for adult critical-care beds: a prospective quantitative and qualitative study

Ronan A Lyons, Kathie Wareham, Hayley A Hutchings, Ed Major, Bruce Ferguson


To estimate the need for adult critical-care beds for a population of 500 000 in the UK served by five hospitals.

<table>
<thead>
<tr>
<th></th>
<th>ICU beds/100,000 pop</th>
<th>HDU beds/100,000 pop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available</td>
<td>5.8</td>
<td>11.2</td>
</tr>
<tr>
<td>To meet needs 95%</td>
<td>7.8</td>
<td>13.8</td>
</tr>
<tr>
<td>To meet needs 99%</td>
<td>8.6</td>
<td>15.0</td>
</tr>
</tbody>
</table>
Health Expenditure as share of GDP OECD 2010

Health expenditure as a share of GDP, OECD countries, 2010
Definition of ICU/Definition of ICU Bed

• Governmental administrative database:
  • ICU and ICU beds are whatever the agency providing the information says they are.

• Registry:
  • U.K.
    • Level 1 ward bed
    • Level 2 high dependency unit-no ventilation
    • Level 3 intensive care unit-ventilation and one other organ support

• Survey
  • Ontario/British Columbia/Alberta
    • Level 2 –support single failed organ system, no invasive ventilation
    • Level 3 intensive care unit-invasive ventilation and multiple organ support
ICU Beds/100,000 Population

Hospital Referral Regions Exceeding Critical Care Capacity by % of Population Experiencing Sudden Critical Illness

<table>
<thead>
<tr>
<th>ICU beds/100,000 pop</th>
<th>0.01%</th>
<th>0.02%</th>
<th>0.03%</th>
<th>0.04%</th>
<th>0.05%</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>0</td>
<td>16.7</td>
<td>58.8</td>
<td>90.9</td>
<td>97.4</td>
</tr>
</tbody>
</table>

Carr B et al JAMA 2010:303;1371-1372
European ICU Capacity

Clinical review: International comparisons in critical care - lessons learned

Srinivas Murthy¹ and Hannah Wunsch²,³

Murthy and Wunsch Critical Care 2012, 16:218

- Germany
- Belgium
- Croatia
- United States
- Canada
- France
- Netherlands
- Spain
- South Africa (private)
- New Zealand
- China
- South Africa (public)
- United Kingdom

Graph showing comparison of countries.
What about Provinces?

Beds/100,000 population

Germany
United States
Belgium
Croatia
CANADA?
France
Spain
ONTARIO
Australia
CANADA?
United Kingdom
Netherlands
South Africa (Private)
ALBERTA
BRITISH COLUMBIA
New Zealand
Critical care beds vs acute care beds

Critical care beds / 100,000 population vs Acute care beds / 100,000 population

Canada, Alberta/BC, and Ontario are highlighted in the graph.
Critical care beds vs. acute care hospital beds

Wunsch H et al, Crit Care Med, 2008; 36: 2787-2793
Health care spending per capita vs ICU beds

Wunsch H et al, Crit Care Med, 2008; 36: 2787-2793
Although Canada spends slightly more per capita on health, it trails many countries in ICU bed capacity.

Wunsch H et al, Crit Care Med, 2008; 36: 2787-2793
Canada 1867

New Brunswick, Nova Scotia and Canada are united in a federal state, the Dominion of Canada, by the British North America Act (July 1, 1867). The province of Canada is divided into Ontario and Quebec. The United States of America proclaims the purchase of Alaska from Russia (June 20).
Confederation 1867

*Constitution Act, 1867,*
Provinces responsible for establishing, maintaining and managing hospitals, asylums, charities and charitable institutions Federal government was given jurisdiction over marine hospitals and quarantine.
Canada Health Act 1984

Principles

- Public Administration
- Comprehensiveness,
- Universality and
- Portability
- Accessibility
- Medically Necessary
- Sustainability
Governance of Health Systems across Canada

- Hospital Boards
- Local Health Integrated Networks (LHINs)
- Regional Health Authorities
- Provincial Health Authorities
- Provincial Health Ministries
- Canada Health
- Public Health Agency of Canada
Canadian Provinces – E.U. Member States
Individual Health Systems with Federal Oversight Legislation
• Collects, analyzes and publishes data and information in a standardized way.


• Mandate: To lead the development and maintenance of comprehensive and integrated health information that enables sound policy and effective health system management that improve health and health care.

• Values: Respect, integrity, collaboration, excellence, innovation
CIHI CMDB Acute Care Hospital Database

- All active treatment hospitals in Canada
- Self reported by hospitals
- Acute care and specialty staffed beds in use
  - Intensive Care
  - Obstetrics
  - Pediatrics
  - Psychiatry
  - Rehabilitation

- Completely inaccurate for Intensive Care
- Medical Intensive Care Nursing Unit
- Surgical Intensive Care Nursing Unit
- Trauma Intensive Care Nursing Unit
- Combined Medical/Surgical Intensive Care Nursing Unit
- Burn Intensive Care Nursing Unit
- Cardiac Surgery Intensive Care Nursing Unit
- Coronary Intensive Care Nursing Unit
- Neonatal Intensive Care Nursing Unit
- Neurosurgery Intensive Care Nursing Unit
- Pediatric Intensive Care Nursing Unit
- Respirology Intensive Care Nursing Unit
CIHI CMDB Acute Care Hospital Database

- Medical Intensive Care Nursing Unit
- Surgical Intensive Care Nursing Unit
- Trauma Intensive Care Nursing Unit
- Combined Medical/Surgical Intensive Care Nursing Unit
- Burn Intensive Care Nursing Unit
- Cardiac Surgery Intensive Care Nursing Unit
- **Coronary Intensive Care Nursing Unit**
- **Neonatal Intensive Care Nursing Unit**
- Neurosurgery Intensive Care Nursing Unit
- Pediatric Intensive Care Nursing Unit
- Respirology Intensive Care Nursing Unit
Hospital Governance in a Crisis: Governance of Ontario Hospitals during SARS

by Lynne Golding and George T. Mahoney

PUBLIC HEALTH

SARS outbreak in the Greater Toronto Area: the emergency department experience

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Identification of Severe Acute Respiratory Syndrome in Canada
Ontario Critical Care Strategy

About the Critical Care Strategy

Transforming critical care service delivery is integral to keeping Ontarians healthy, ensuring better access to care, reduced wait times for services, and providing an environment within which all healthcare practitioners can deliver their best.

The Critical Care Strategy is based on the recommendations outlined in the Ontario Critical Care Steering Committee Final Report and organized into a highly integrated 7-part program. Together, these programs enable and enhance accountability, empowerment, and coordination at the hospital, LHIN and provincial levels to support new and ongoing improvements to critical care access, quality and system integration.

The Critical Care Strategy will:

- Establish a province-wide system for critical care performance measurement and quality improvement;
- Improve the degree of standardization of best practices and critical care training across Ontario;
Critical care services in Ontario: a survey-based assessment of current and future resource needs

Services en soins critiques en Ontario: une évaluation basée sur un questionnaire concernant les besoins en ressources actuels et futurs

Andrea D. Hill, MSc · Eddy Fan, MD · Thomas E. Stewart, MD · William J. Sibbald, MD · Eric Nauenberg, PhD · Bernard Lawless, MD · Jocelyn Bennett, RN · Claudio M. Martin, MD
Helping Hospitals Manage Spikes in Critical Care

January 19, 2009 10:15 AM

McGuinty Government Improves Access To Services For Critically Ill Patients

Ontario is launching a new program to help hospitals better manage sudden increases in demand for critical care services.

The surge capacity management program will give hospitals and staff the tools they need to better handle dramatic increases in volume of patients who are in life-threatening situations. The program will:

- Ensure patients are transferred from the emergency room or operating room to critical care services, as quickly as possible. This new program has the potential to reduce ambulance offload delays as well as emergency room and surgery wait times.
- Mobilize hospital staff, equipment and technology from other parts of the hospitals to handle the short-term increase in demand in the critical care department.
- Improve communication between hospitals in each of the regions covered by the province’s 14 Local Health Integration Networks (LHIN).

“I’m proud of the progress the Champlain LHIN has made with the Surge Management Program. Ottawa-area hospitals are now better equipped to handle a sudden influx of critical care patients. I look forward to seeing hospitals across the province have similar success as they begin to implement this program.”

- David Caplan
  Minister of Health and Long-Term Care

“The Surge Capacity Management plan will assist hospitals in the planning for surge events when demand exceeds the resources. It will help guide the provincial health care system in planning and ensuring patients have timely access to care.”

- Dr. Chris Mazza
  Ornge president and CEO and Physician Advisor Surge Capacity Management
Alberta Provincial H1N1 Bed Utilization, Non-ICU versus ICU: Suspected and Confirmed Cases as of 07:00 hr on Tuesdays and Fridays

- Hospitalized Cases - Non-ICU
- Hospitalized Cases - ICU

Date (2009 - 2010)

Number of adult ICU beds ~ 170
Staffed/Funded Beds ~ 120
Usual number of ventilated ICU patients ~ 100
Peak number of ventilated ICU patients ~ 170
Peak number of H1N1 ICU patients ~ 120
Our mission is to promote and enhance Critical Care Medicine in Canada.

We espouse the philosophy of collaborative multidisciplinary practice to promote research, education and patient care in Critical Care Medicine.

To that end, our Society is involved in Critical Care Medicine education in association with the Royal College of Physicians and Surgeons of Canada, and in CCM research with the Canadian Critical Care Trials Group.
The Australian and New Zealand Intensive Care Society is the leading advocate on all intensive care related matters.

ANZICS leads the world in intensive care research through its Clinical Trials Group and patient databases, including the Adult Patient Database, the Paediatric Intensive Care Registry and Critical Care Resources.

The Society is devoted to all aspects of intensive care medical practice through ongoing professional education, the provision of leadership in medical settings, clinical research and analysis of critical care resources.

Our Vision
'Advocate for Intensive Care throughout Australia and New Zealand'
You can’t manage if you don’t measure

Beds/100,000 population

- Germany
- United States
- Belgium
- Croatia
- CANADA?
- France
- Spain
- ONTARIO
- Australia
- CANADA?
- United Kingdom
- Netherlands
- South Africa (Private)
- ALBERTA
- BRITISH COLUMBIA
- New Zealand
Conclusions

• We have done a poor job of advocating for critical care capacity in Canada
• We have little usable data
• The existing data is not accurate
• However, it seems we have less Critical Care capacity than many similar countries
• A Canadian Critical Care Registry is required
  • Similar to ICNARC, ANZICS
• We need the Canadian Critical Care Society to take lead in concert with Canadian Critical Care Trials Group and CIHI
Thank you for your attention!