Reassessing Inequalities in ICU Care using a New Methodology

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Introduction

- Men substantially outnumber women in Canadian ICUs
  - Calgary -- 58% are men (Laupland, Crit Care 8:R431,2004)
  - Ontario -- 60% are men (Fowler, CMAJ 177:1513,2007)
  - British Columbia -- 58% are men (Dodek, J Crit Care 24:e1,2009)
  - Manitoba -- 61% are men (Garland, in preparation)

- In Austria 58% are men (Valentin, CCM 31:1901,2003)

- In Olmsted County Minnesota 51% of ICU patients are men (Sefarian, CCM 34:2113,2006)
**Introduction**

- BUT, such differences do not necessarily equate to inequities
  - population-normalized rates are appropriate measures of utilization
  - but they can be misleading in assessing for inequities in access to care

- The difference in sex-specific rates of cardiac interventions virtually disappears when taking account of the different rates of heart disease between men and women
Introduction

- A key methodologic issue for interpreting rates of care is the denominator (normalizing factor)

- For analysis of differences in access to any health care service, the appropriate normalizing factor is NOT the number of people in the population, but the number of people who should receive such care
  - e.g. if incidence of critical illness in men was 2X that of women, then a 2-fold higher rate of ICU care for men would not represent an inequity

- In this study, we propose a new normalizing factor to assess for differences, and possible inequities, in ICU access -- i.e. an estimate of the incidence of critical illness in the population
Methods

- Population-based dataset from Manitoba, 1999-2008 (pop 1.21 million), including all residents $\geq 17$ yrs

- Includes hospital abstracts and vital statistics for all Manitobans

- Canadian hospital abstracts reliably identify existence and timing of all ICU care provided during those hospitalizations (Garland, *Med Care* 50:e1, 2012)

- Included all Level 1 and Level 2 ICUs in the province

- Constructed *episodes* of hospital and ICU care that could span multiple records in the dataset (Fransoo *BMC Med Res Meth* 12:133, 2012)
Methods

- Key concept: The appropriate normalizing factor for access to ICU care is the # of people with critical illness

- This number is difficult to acquire, but includes:
  1. those admitted to ICUs (operational identification) ***
  2. those who died without admission to ICU ***
  3. those who survived critical illness without ICU care
     - likely the smallest subset -- which is good, because we have no way to estimate it
Should We Exclude People Who Were “Not Candidates for ICU”?

• Concern is that including them violates the goal of normalizing to the number of people who “should” be admitted to ICUs

• Includes those who:
  a) died before getting to an ICU
  b) did not want ICU care, including those in palliative care
  c) might have wanted ICU care but were not accepted by decisions of the ICU gatekeepers

• BUT --- excluding them eliminates any chances of identifying biases/disparities related to a-c
  – e.g. the poor may have less access to immediate care for rapid, catastrophic illness → higher rate of death in the field
  – of these (b) seems the least prone to such issues
Methods

- We estimated yearly incidence of critical illness, as sum of:
  (i) persons who were admitted to an ICU in that year
  (ii) those who died in that year without ever being admitted to an ICU -- excluding those registered in a palliative care program within 2 years prior to death (and this was BIG, by 2007 it was 31% of ALL deaths in adults)

- Dividing # patients admitted to ICUs in any year by this factor produces: **Critical illness-based rates of ICU care**

- For comparison, we also normalized to the population → producing the usual **Population-based rates of ICU care**

- Analyzed data summed over all 9 years
Results: Estimated Rate of Critical Illness, by age
Population-Normalized Rates of ICU Care

- M>F for all ages
- Rises rapidly for both sexes, until ≈80, after which it falls
- Decline at highest ages also seen in Ontario, BC, Calgary, but not Olmsted County
Critical Illness-Normalized Rates of ICU Care

- Very different than the other pair of curves
- Rates begin to fall after 60
M:F Ratios of Rates of ICU Care

ICU rates normalized to population

ICU rates normalized to # of critically ill

20-30% (relative) excess of women in ICUs for ages 17-34

M≈F in ICUs for ages 35-79

M>F increasingly after age 75
Ruminations About These Findings

- Youngest groups: More critically ill women received ICU care
  - excess among men of traumatic or violence-related deaths that occurred in the field (CIHI. 2004 Report: Major Injury in Canada)

- Most age groups: Essentially equal

- Oldest groups: Less critically ill women received ICU care
  - women outlive men ⇒ more elderly critically ill women have no spouse ⇒ leads them to not desire aggressive care?
Discussion, Conclusions

- The observed sex difference in population-based rates of ICU care is greatly attenuated when normalizing by the more appropriate denominator of # of critically ill people

- Strength -- included 9 years of data, entire provincial population, all “high intensity” ICUs

- Weakness -- #people who survived critical illness without ICU care unknown → our new measure of the incidence of critical illness in populations is imperfect

- For assessing disparities in access to medical care, it is important to adjust to the appropriate denominator -- the number of people who should get such care
  - for assessing disparities in access to ICU care, the appropriate denominator is the # of critically ill people, not the # of people
Collaborators, Support

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- Collaborators:
  - Randy Fransoo, PhD
  - Clare Ramsey, MD, MPH
  - Kendiss Olafson, MD, MPH
  - Marina Yogendren, MS
EXTRA SLIDES
Age-Standardized Rates of ICU Care, by SES

**Per 1000 population**

- Urban and Rural per 1000 population.

**Fraction critically ill**

- Urban and Rural fraction critically ill.

Average Household Income

* indicates statistical significance.
M:F Ratios of Rates of ICU Care

ICU care normalized by
- Population
- Non-obstetrical hospitalizations
- Estimated rate of critical illness

Male:Female Ratio
Age Group (years)