Identifying and Addressing Inequalities in Health: Research Priorities

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Presentation Outline

• Disparities in cancer incidence and survival
  – US and Canadian gradients
• Exploring pathways to disparity induced gradients
• Recommended Next Steps
Burden of Disease

By Age-adjusted PYLL (Potential Years of Life Lost), 1996:

1) Cancers
2) Accidents
3) Heart Disease
4) Suicide
5) Respiratory Diseases

» (Statistical Report on the Health of Canadians, 1999)
Population Health Framework

"Upstream Determinants of Health"

- Political
- Social
- Cultural
- Economic

Lifecourse of Individuals

- Biological Endowment
- Gene-Environment Interactions

Physical & Social Environmental Exposures

Most Public Health Interventions

Health Outcomes

Most Public Health Interventions

CIHR IRSC
Relative Risk of Death by Income and Income Distribution

Relative Risk of Death by Income & Income Distribution

Risk of Death relative to Mean Income

Income distribution

Mean Household Income ($'s)

Relative Risk of Death by Education Level

Source: Backlund, Sorlie & Johnson, SSM, 1999, 49:10
• Reverse causality

• Contributions of various causes specific mortality rates by SES not well studied

• Steepness of CHD gradient may have increased in recent decades due to selective adoption of prevention and treatment measures by high SES
Priority Diseases: Large Preventable Burden of Disease

- **E.g. Cancer – 2/3 of cancer deaths are preventable**
  - Smoking (30% of cancer deaths)
  - Diet / obesity (30%)
  - Lack of physical activity (5%)
  - Infections (5%)
  - Excess alcohol (3%)
  - SES (3%)
  - Sun/UV/Radiation exposure (2%)
  - Environmental Pollution (2%)

**References**


2) Marrett LD, Theis B, Ashbury FD and Expert Panel. Workshop Report:


SES may influence quality of care, coverage and compliance. For example, with ↑ SES:
• ↑ screening uptake
• ↑ screening/aftercare quality
• ↑ follow-up/Rx compliance
SES may effect properties of tumour, including doubling time and metastatic potential. PNI/PNE mechanism.
For example, with ↑SES:
• ↓ stress, ↑ nutrition, ↑ exercise,
  ↓ smoking
SES may be associated with other diseases concurrent with cancer. For example:

- ↑ CHD/CVD
- ↑ NIDDM
- ↓ Survival

**SES: Comorbidity pathway**

<table>
<thead>
<tr>
<th>Well</th>
<th>Preclinical phase</th>
<th>DPCP</th>
<th>Biologic onset</th>
<th>Clinical onset</th>
<th>Treatment initiated</th>
<th>Diagnosis</th>
<th>Death</th>
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TIME
Income-associated incidence gradients: U.S. and Canada

Source: Mackillop, Zhang-Salomons et al., Cancer, 2000, 89: 901-912

Filled = U.S.
Open = Canada
QUESTIONS:

- How much of: a) the SES gradients; b) the US-Can difference for each cancer site, is due to:
  - differential screening test utilization?
  - differential “incidental early case-finding, as a side-benefit of high-care use?
Socioeconomic Gradient in Incidence of Five Major Cancers; Men, Denmark 1970-1980

Relative risks (all economically active men used as referent)

- Lymphoma
- Colorectal
- Prostate
- Bladder
- Lymphoma
- Lung

Skilled
Emp4
Emp3
Emp2
Emp1
Lowest
Occupational Rank
Highest
Socioeconomic Gradient in Incidence of Five Major Cancers; Women, Denmark 1970-1980

Relative risks (all economically active women as referent)

- Breast
- Uterine
- Colorectal
- Lymphoma
- Lung

Occupational Rank: Skilled, Emp4, Emp3, Emp2, Emp1 (Lowest to Highest)
Period effects of PSA testing: changing prostate CA incidence in LA

Source: Liu, Cozen et al., JNCI, 2001, 93: 705-709
Socioeconomic status and stage of disease: Period effects in LA county

Source: Liu, Cozen et al., JNCI, 2001, 93: 705-709
Survival rate ratios for lowest-income areas: Toronto versus Detroit. Males

Source: Gorey, Holowaty et al., AJPH, 1997, 87:1156-1163
Survival rate ratios for lowest-income areas: Toronto versus Detroit. Females

Source: Gorey, Holowaty et al., AJPH, 1997, 87:1156-1163
Survival rate ratios for lowest-income areas: Toronto versus Detroit. Issues

• Methodological issue:
  – 5 year survival conflates SES differences

• Largest TO vs Detroit differences in cancers with less effective treatments
  – Suggests lead time bias and inherent tumour aggressiveness important

• Can the shape of the gradient offer clues?
Association of income deciles and 5-y survival: Toronto and Honolulu. Breast cancer

Source: Gorey, Holowaty et al., AJPH, 2000, 90:1866-1872
Association of income deciles and 5-y survival: Toronto and Honolulu. Prostate cancer

Source: Gorey, Holowaty et al., AJPH, 2000, 90:1866-1872
Toronto and Hawaii: Gradient issues

- Gradients at tails of income distribution only
  - Not likely ITA or comorbidity pathway?

- Since treatment effective, which hypothesis fits these curves best?
  - Differential timing of diagnosis?
  - Lead time bias artifact?
  - Differential Rx and compliance?
  - “Free-access” care systems not truly equitable at SES extremes?
SES associated RR of death from cancer in the US and Canada

Next steps

- Individual level indicators of SES – more precise measurement of gradient shapes
- Control for confounders – smoking, diet, physical activity, etc.
- Sort out screening-detected cases – how?
- Decompose sources of survival differences – is it treatment, stage of dx, lead time bias etc. – e.g. subanalyze large screening RCTs by SES strata?