University of Otago
Te Whare Wānanga o Otāgo
New Zealand

Cancer Control and Screening Research Group
Wellington

Cancer, Care and Comorbidity

hrc Health Research Council of New Zealand

Associate Professor Diana Sarfati

Why do we care?

Comorbidity:

- is common among cancer patients.
- has a major impact on patients.
- has a major impact on health services.
- Is an important driver of inequities.
- the effects of comorbidities are modifiable.

Talk in three parts

1. Background
   - Cancer and comorbidity
2. Recent research findings
3. Implications and ways forward

How does cancer interact with comorbidity

- How does comorbidity impact on:
  - Treatment for cancer?
  - Outcomes from cancer?
  - Inequalities in outcomes from cancer?

How does comorbidity impact on treatment?

Those with comorbidity are less likely to receive curative treatment for cancer than those without.

Impact on treatment

- Why?
  - Concern by clinician that treatment may be less effective among those with comorbidity
  - Concern by clinician or patient that comorbidity will increase toxicity of treatment.
  - Life expectancy is insufficient to justify treatment
  - Patient more likely to decline treatment

Impact on treatment

- 190 patients with stage III colon cancer
- Those with comorbidity were considerably less likely to receive chemotherapy
  - 84% without comorbidity (Charlson comorbidity score=0) cf
  - 19% with comorbidity (Charlson comorbidity score of 3+)
- Among those with highest comorbidity there was around a 60% reduction in excess risk of death if offered chemotherapy.

Sarfati D, Hill S et al. The effect of comorbidity on the use of adjuvant chemotherapy and survival from colon cancer: a retrospective cohort study. *BMC: Cancer*. 2009: 9; 16.

What a clinician needs to know…

- Is treating my patient going to cause more harm than good?

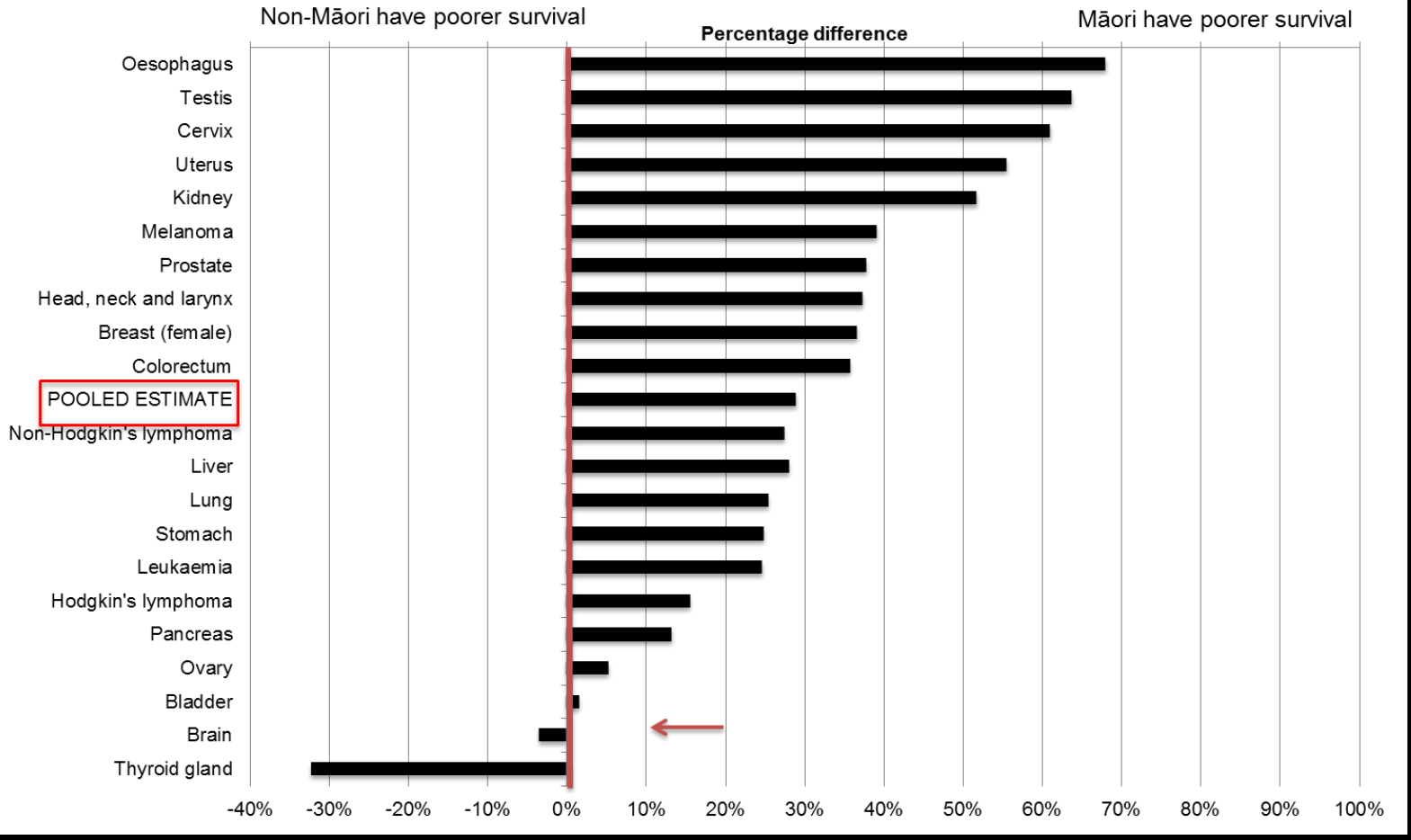
Benefits and harms of treatment

- Studies generally show that those with comorbidity who are treated do better than those who are not treated.
- Best evidence is from RCTs or observational studies that use special methods to ‘mimic’ RCTs (e.g. propensity scores)

Impact on outcomes

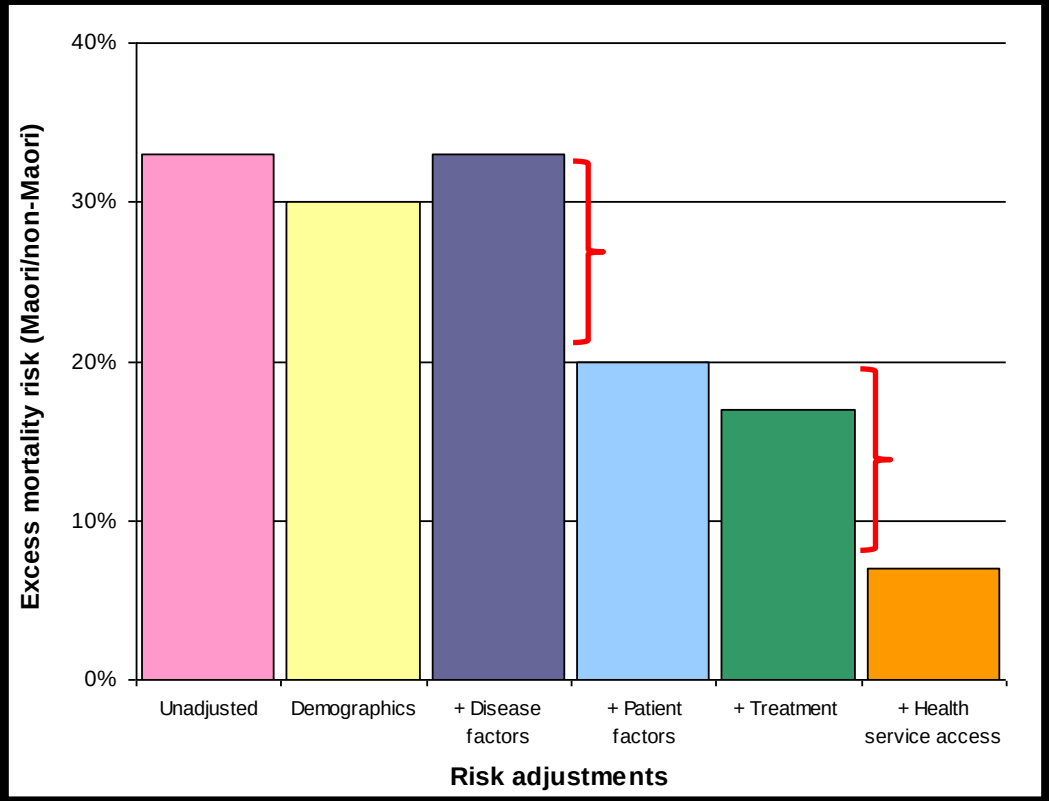
- Comorbidity has been found to have an adverse impact on survival in every cancer site investigated.
- Quality of life
- Costs of care
- Complexity of care
- Impact of cancer on comorbidity outcomes

Percentage difference in cancer mortality between Māori compared to non-Māori, patients diagnosed 1991-2004



Soeberg M, Blakely T, Sarfati D et al (2012). *Cancer Trends: Trends in Survival by Ethnic and Socioeconomic Group, New Zealand 1991–2004*. Wellington: University of Otago and Ministry of Health.

Ethnic inequities in colon cancer survival



Comorbidity and treatment/health service factors each accounted for a third of the survival difference.

Hill S, Sarfati D et al. *Cancer*. 2010: 116; 3205-14.

Why does comorbidity affect survival?

- Direct effect
- Indirect effect because of reduced cancer treatment
- Effect of comorbidity on cancer progression
  - Recurrence more likely in those with diabetes even in context of RCT (Meyerhardt et al 2003)

Cancer, Comorbidity and Care (C3) projects

Health Research Council of New Zealand

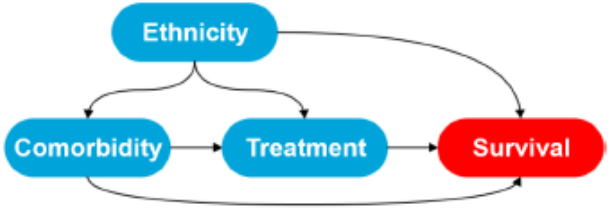
Cancer, Comorbidity and Care:

*Key findings from the **C3** (Quantitative) Study*

As people age, their chances of being diagnosed with a serious chronic illness such as heart disease or diabetes increase – so does the probability that they will be diagnosed with cancer.

Because of this, people diagnosed with cancer may also be living with one or more other chronic conditions, or comorbidities. Comorbidity may interfere with the usual care a cancer patient might expect to receive, and may also reduce their chance of surviving their cancer.

Research in New Zealand has shown that Māori patients with cancer have poorer cancer survival than non-Māori patients even if the extent of the disease is about the same.[1] Māori suffer higher rates of many cancer types, and are also known to have higher rates of many chronic diseases including heart, respiratory and kidney diseases, and diabetes.



The Effect of Comorbidity on Care and Cancer Survival Inequalities Study – known as the C3 (Quantitative) study – is one of two Cancer, Care and Comorbidity (C3) studies. This study aimed to investigate the impact of comorbidity and ethnicity on cancer care and outcomes in New Zealand. To do this, we identified a sample of 14,096 patients who had been diagnosed with one of nine cancers (bladder, breast, colon, kidney, liver, ovarian, rectal, stomach or uterine).

We used information from 1) the New Zealand Cancer Registry, 2) the administrative hospital discharge database (NMDS), 3) databases held by the main cancer treatment centres in New Zealand, and 4) the mortality database. For a subset of patients with rectal, stomach and liver cancers we also carried out a manual hospital notes review. From these sources, we collected information about the cancer (such as its extent at diagnosis), the patient (such as their age, sex, ethnicity and whether or not they had comorbidities), their cancer treatment (including surgical, chemotherapy and radiotherapy) and their outcomes.

Footnote 1: Hill S, Sarfati D, Robson B, Blakely T. Indigenous inequalities in cancer – what role for health care? *Australian and NZ Journal of Surgery* 2013; 83: 36-41

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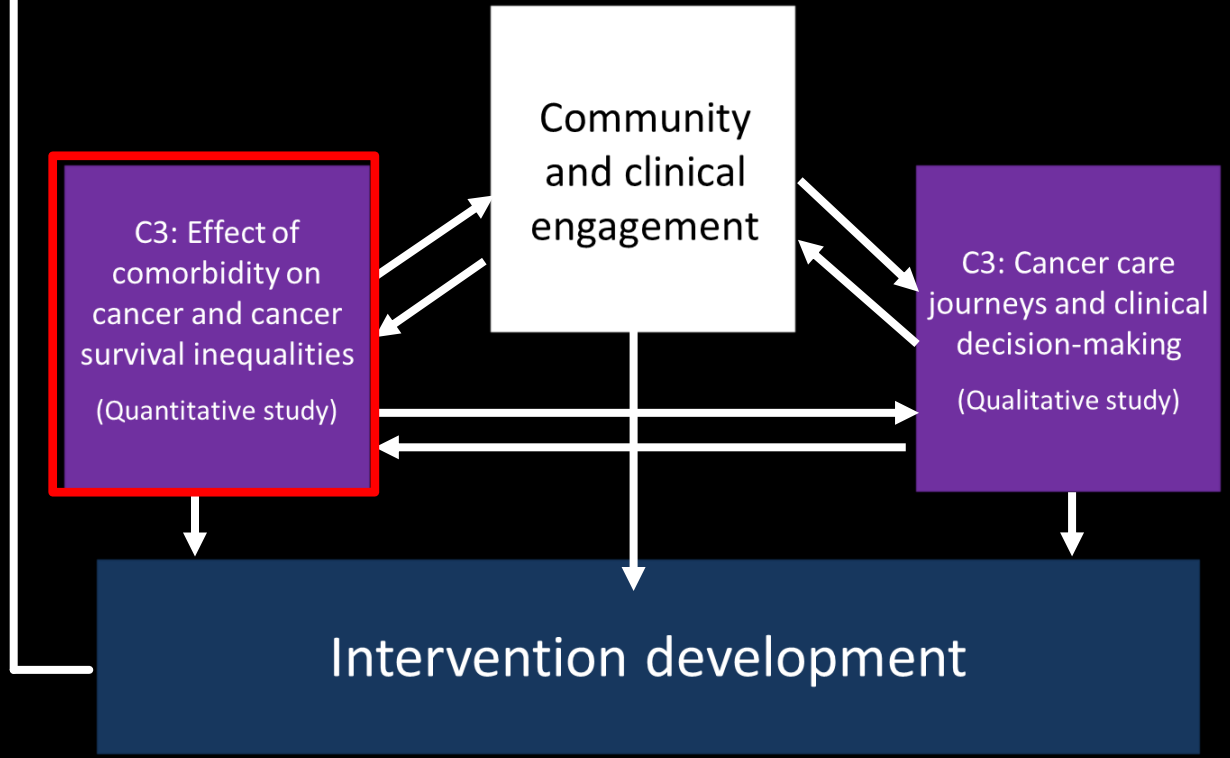
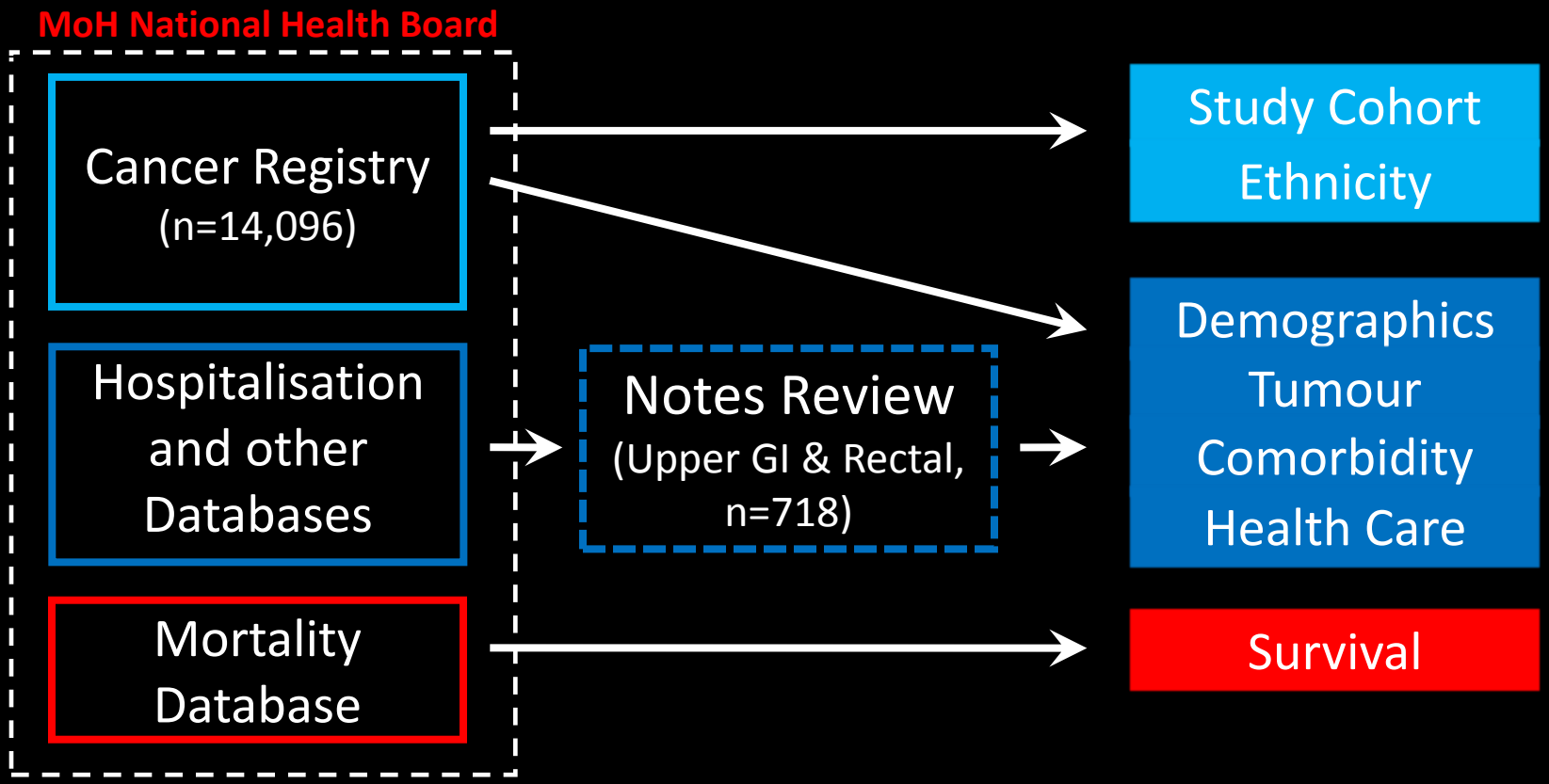
Improving cancer survival; and Reducing inequalities between Māori and non-Māori



The ‘C3’ Studies:
Cancer, Comorbidity and Care



Measuring Comorbidity

1. No gold standard exists.
2. Measure depends on:
    1. Specificity vs generalisability requirements
    2. Data availability
    3. Resource availability
    4. Study questions
3. Recommendations:
    1. Administrative data (large populations)
    2. Inclusive of conditions
    3. More than one data source

ELSEVIER

Journal of Clinical Epidemiology 65 (2012) 924–933

Journal of Clinical Epidemiology

REVIEW ARTICLE

Review of methods used to measure comorbidity in cancer populations: No gold standard exists

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The C3 Index:

is a cancer-specific compilation of comorbid conditions, weighted according to their association with non-cancer death.

major eye conditions
connective tissue disorders
inner ear disorders
anxiety/behavioural disorders
hypertension
venous insufficiency
cardiac arrythmia
angina
nutritional disorders
major psychiatric disorders
obesity
cardiac valve disorders
hepatitis
congestive heart failure
copd/asthma
anaemia
joint/spinal disorders
pulmonary circulation disorder
alcohol abuse
other malignancy
renal disease
nerve/muscle disorder
sleep disorders
diabetes with complications
other cardiac conditions
peripheral vascular disease
endocrine disorders
inflammatory bowel disease
neurological disorders
cerebrovascular disease
epilepsy
myocardial infarction
dementia
paralysis
liver disease
metabolic conditions
osteoporosis/bone disorders
blood disorders

Sarfati, Gurney, et al. J Clin Epi. 2013 (font sizes = condition weights)

Two approaches to measuring comorbidity in cancer populations

Hospitalisation data for 5 years prior to diagnosis

↓

Identification of all important concurrent conditions that were likely to have an impact on function or length of life

↓

n=50 conditions

↓

C3 Index

Sarfati D, Gurney J, Stanley J, et al *J Clin Epidemiol* 2014; 67(5): 586-95.

Pharmaceutical data in year* prior to diagnosis

↓

Identification of all important concurrent conditions that were likely to have an impact on function or length of life

↓

n=19 conditions

↓

PBCI

*excl 3 months immediately prior

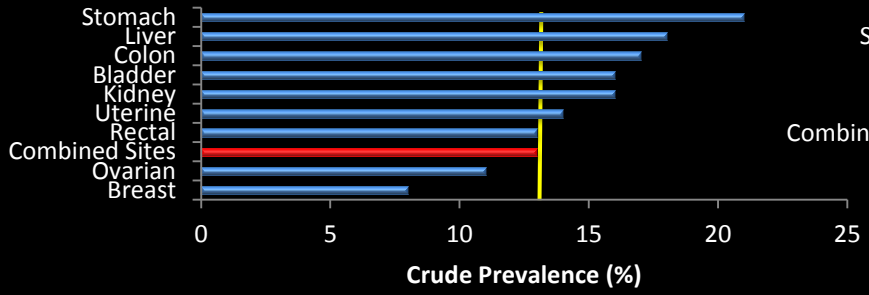
Sarfati D, Gurney J, Stanley J, et al *Medical Care;* 2014; 52(7): 586-93.

AIDS
Alcohol abuse
Anemia deficiency
Angina
Anxiety& Behavioral disorders
Bowel disease: inflammatory
Cardiac arrhythmias
Cardiac diseases: other
Cardiac valve disease
Cerebrovascular diseases
Chronic pulmonary disease
Chronic renal disease
Coagulopathy & blood disorders
Congestive heart failure
Connective tissue disease
Dementia
Diabetes: uncomplicated
Diabetes: with complications
Drug abuse
Endocrine disorders
Epilepsy
Eye problems
GI ulcer & upper GI disease
Hepatitis: chronic viral
Hypertension: primary
Immune system disorders
Infection: chronic NOS
Inner ear disorder

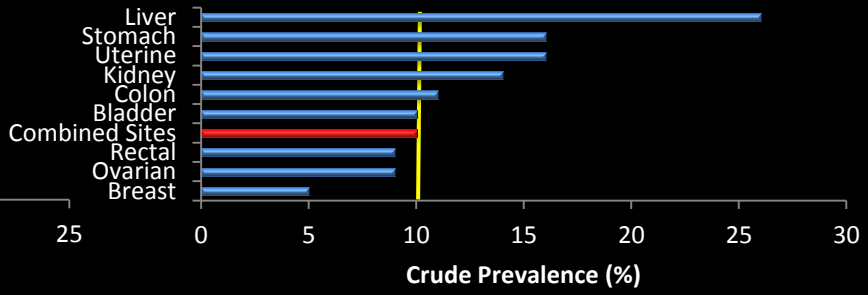
Comorbidity is **highly prevalent** among cancer patients…

…but prevalence **varies** by cancer type.

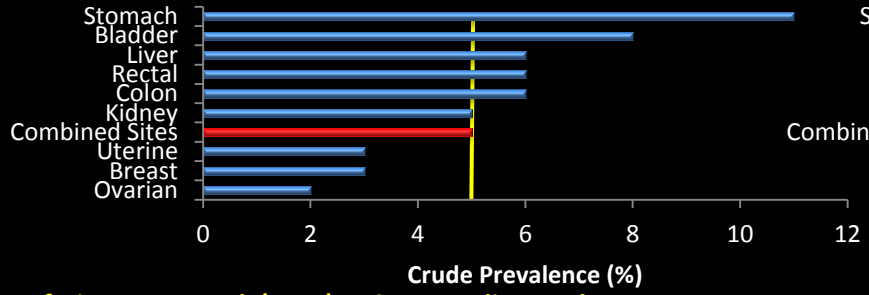
Hypertension (Primary)



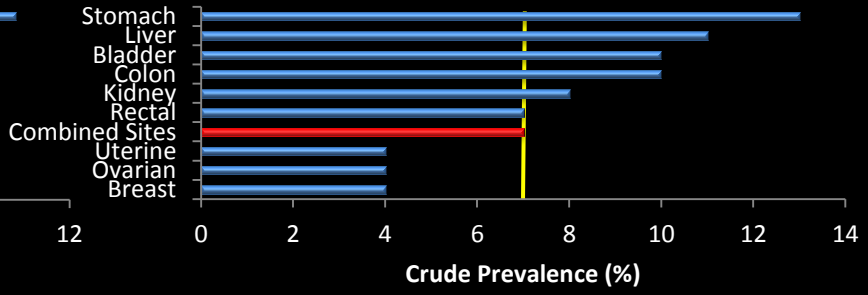
Diabetes (Any)



COPD/Asthma

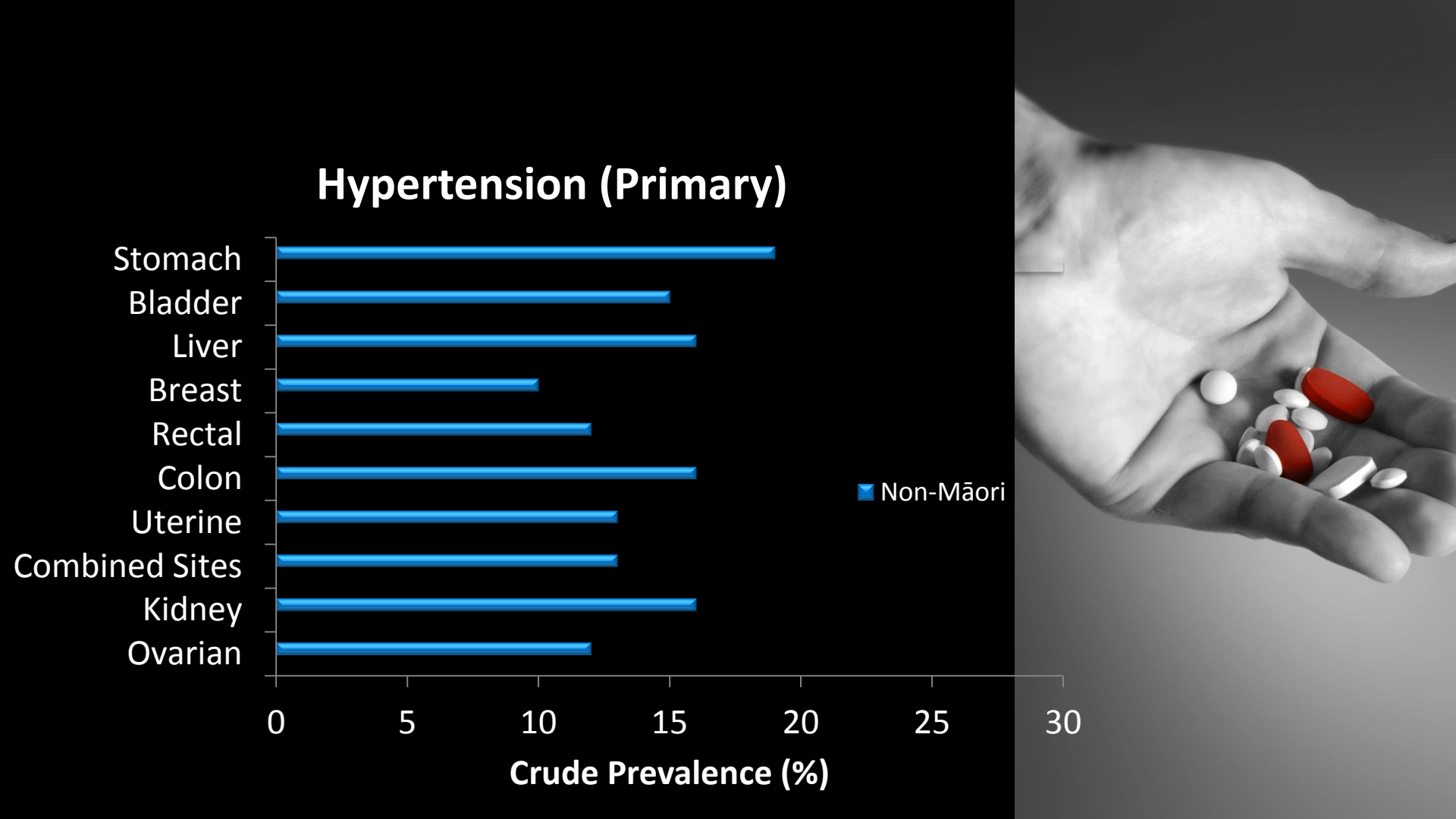


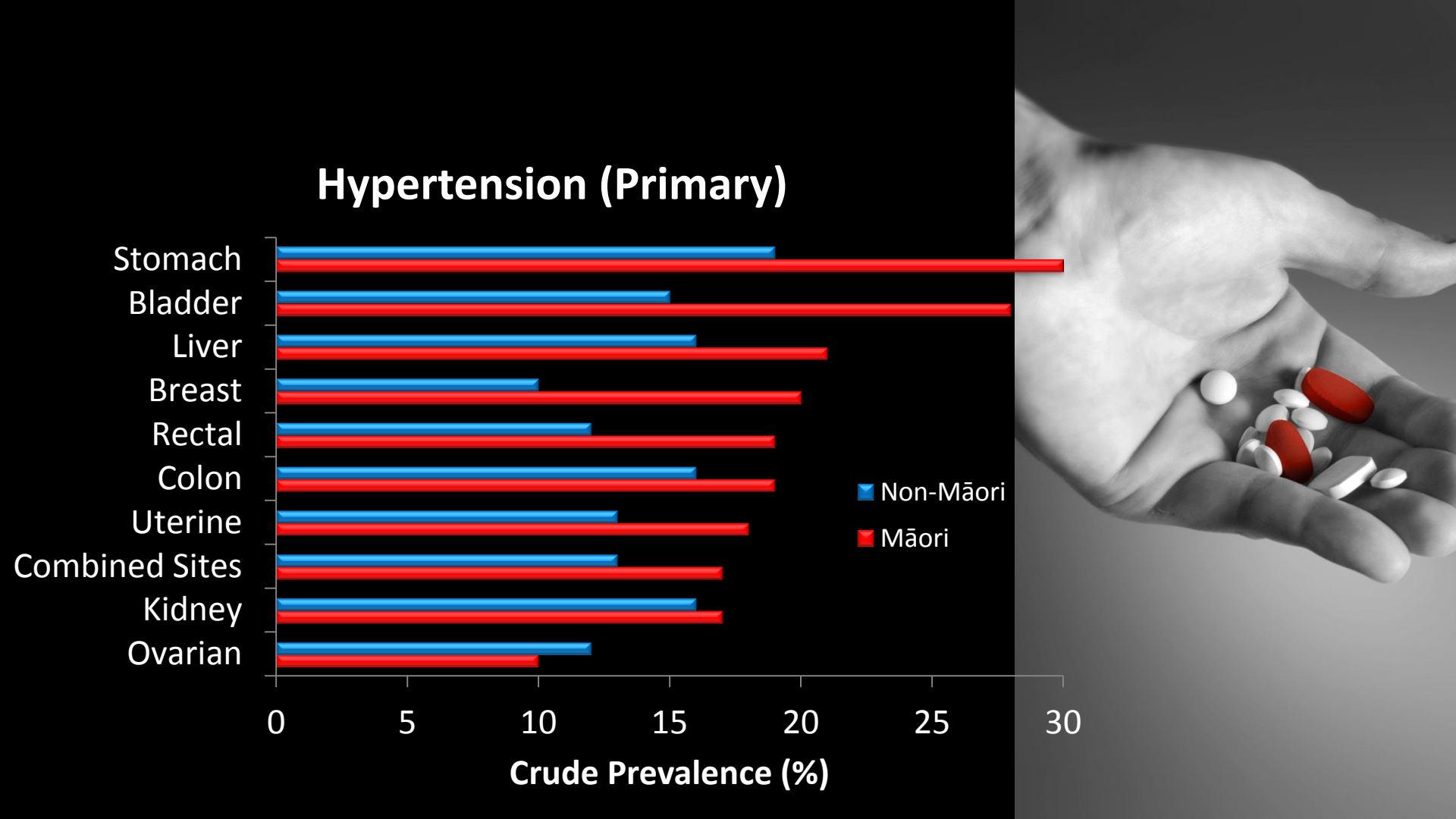
Cardiac Arrhythmia

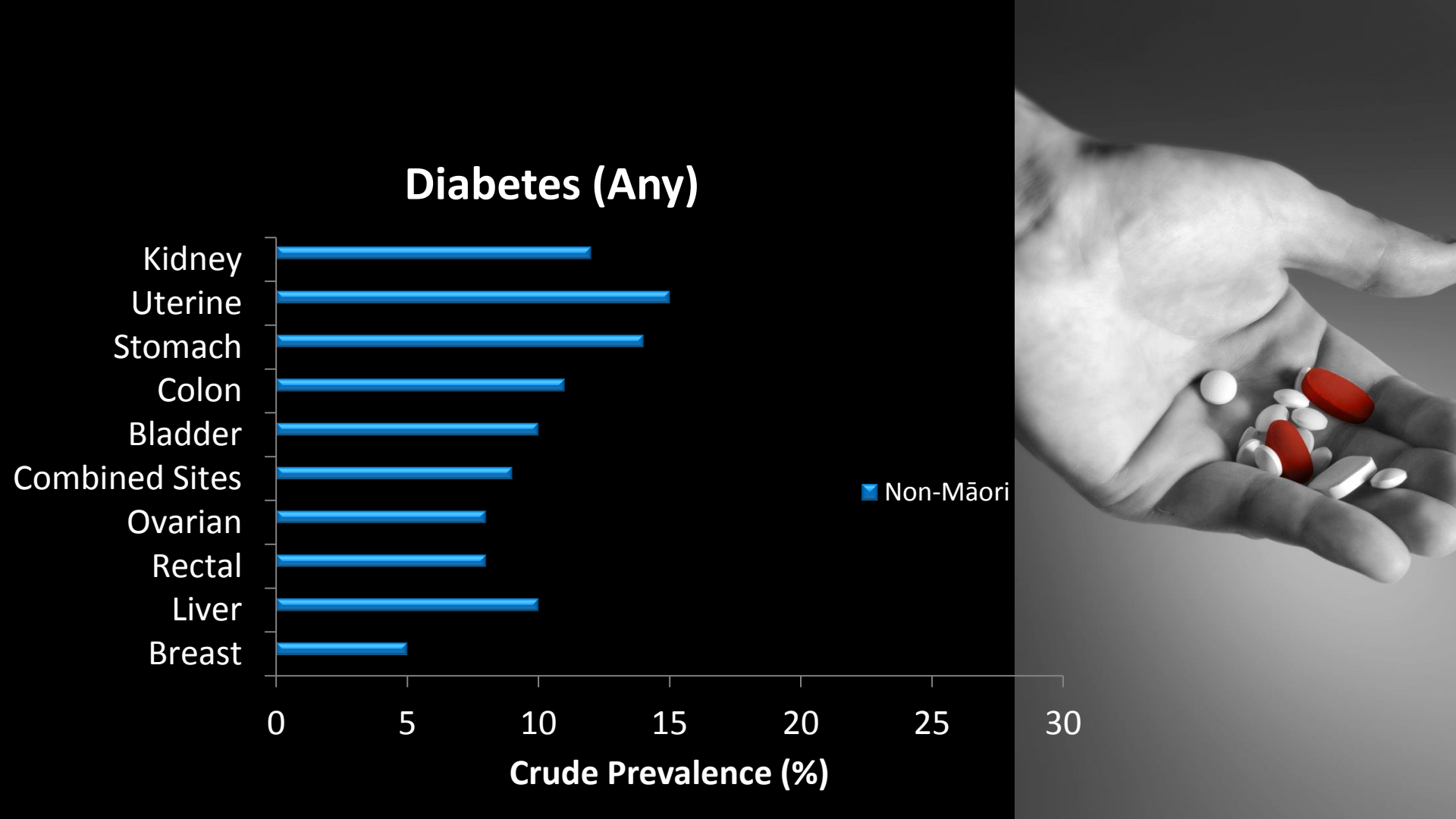


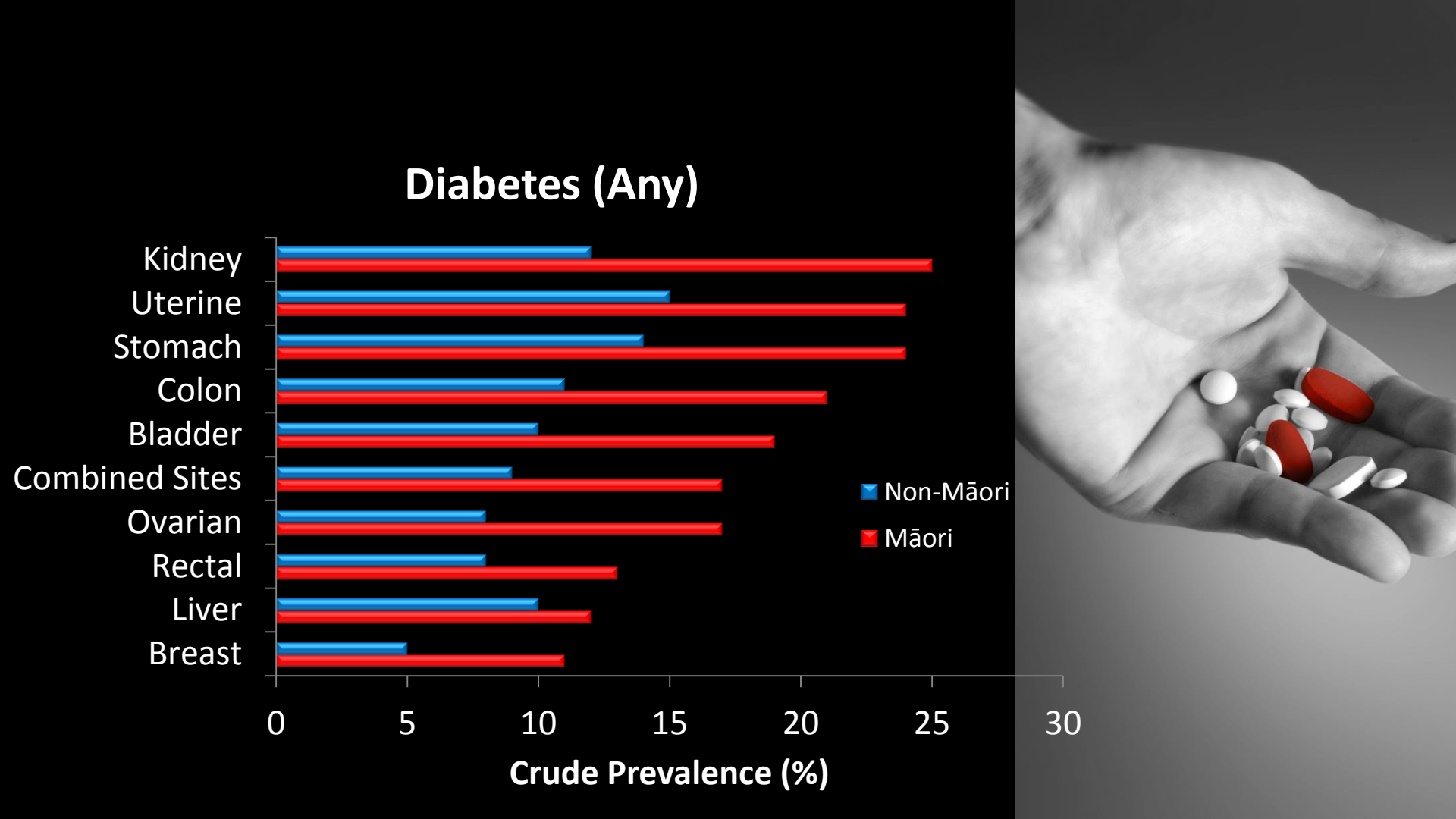
Sarfati, Gurney, et al. (2013). Asia-Pac J Clin Oncol.

Māori cancer patients tend to have a **greater comorbidity burden**.

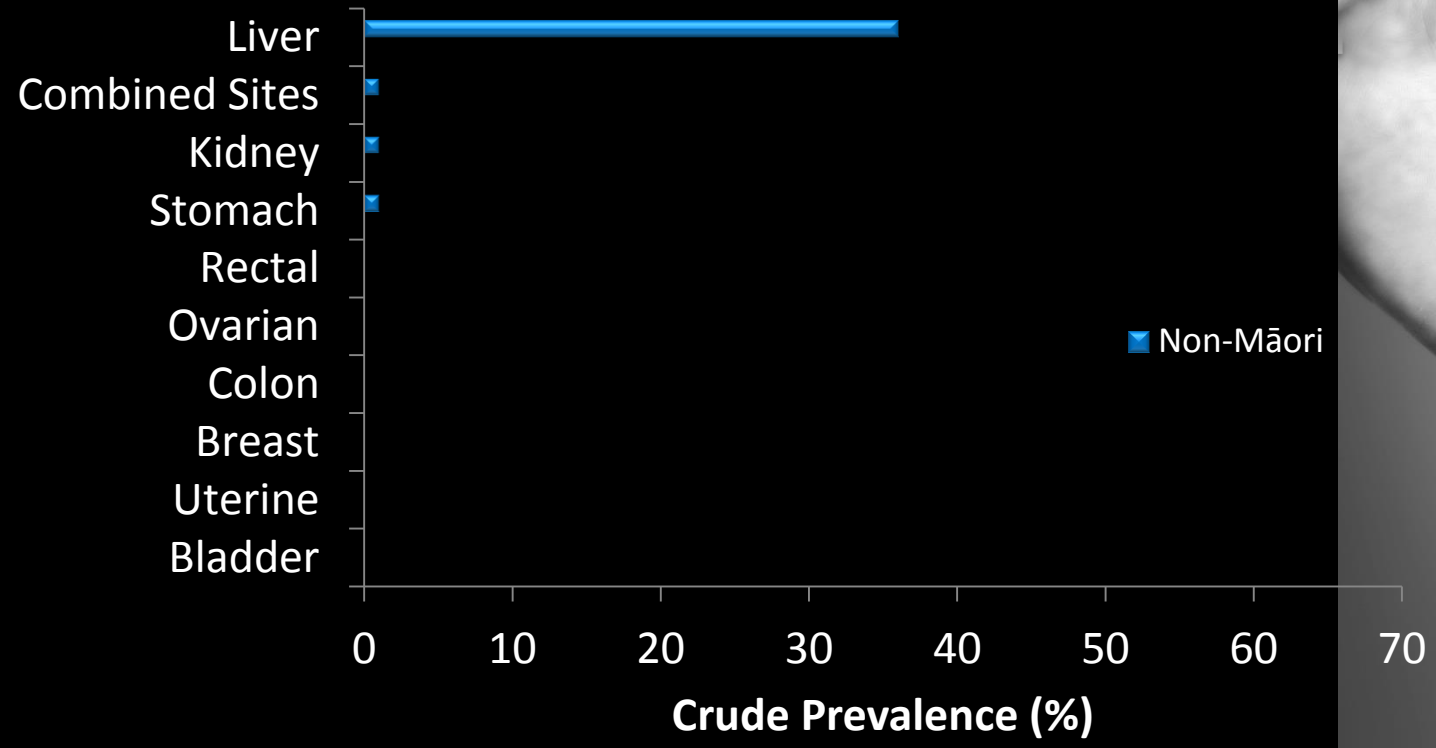

Hypertension (Primary)
Stomach
Bladder
Liver
Breast
Rectal
Colon
Uterine
Combined Sites
Kidney
Ovarian
Non-Māori
0
5
10
15
20
25
30
Crude Prevalence (%)


Hypertension (Primary)
Stomach
Bladder
Liver
Breast
Rectal
Colon
Uterine
Combined Sites
Kidney
Ovarian
Non-Māori
Māori
0
5
10
15
20
25
30
Crude Prevalence (%)

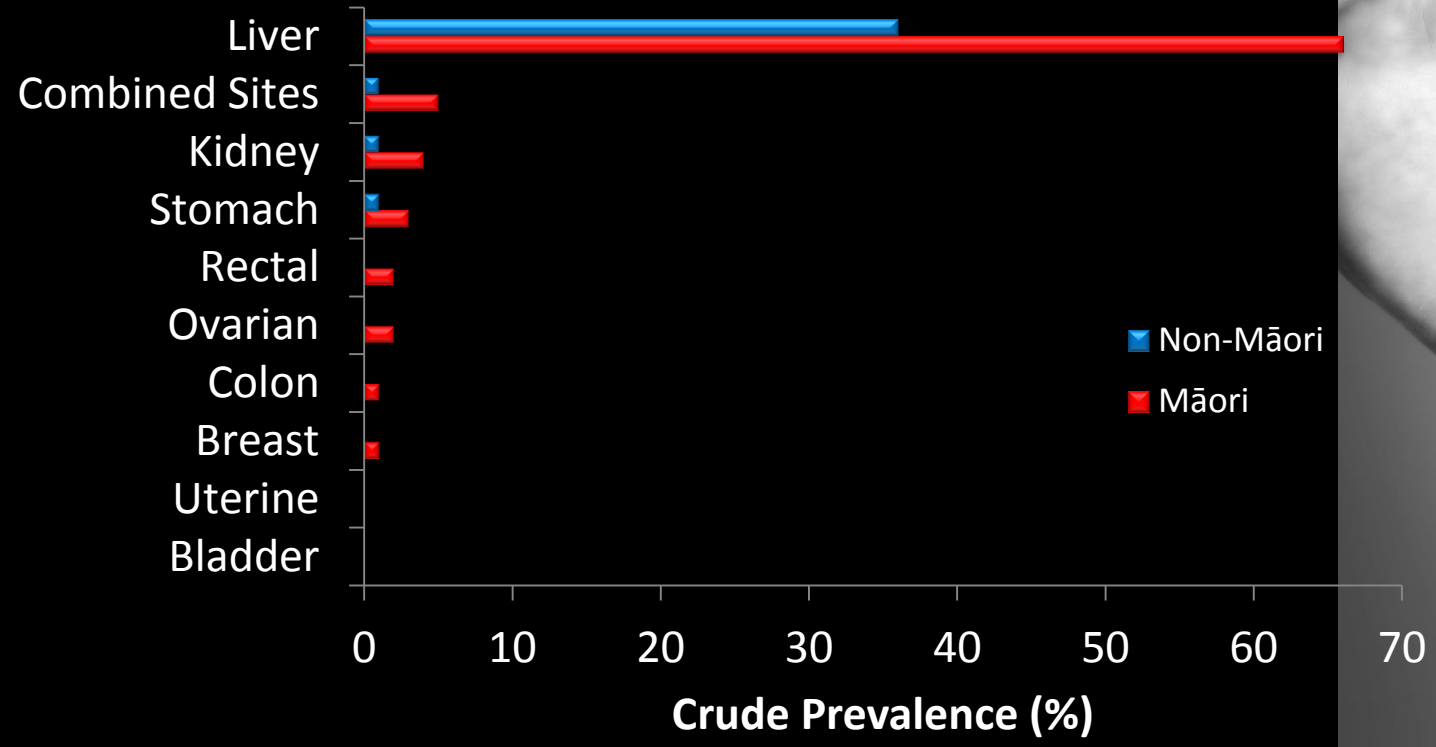

Diabetes (Any)
Kidney
Uterine
Stomach
Colon
Bladder
Combined Sites
Ovarian
Rectal
Liver
Breast
Non-Māori
0
5
10
15
20
25
30
Crude Prevalence (%)


Diabetes (Any)
Kidney
Uterine
Stomach
Colon
Bladder
Combined Sites
Ovarian
Rectal
Liver
Breast
Non-Māori
Māori
0
5
10
15
20
25
30
Crude Prevalence (%)

Hepatitis (Chronic Viral)

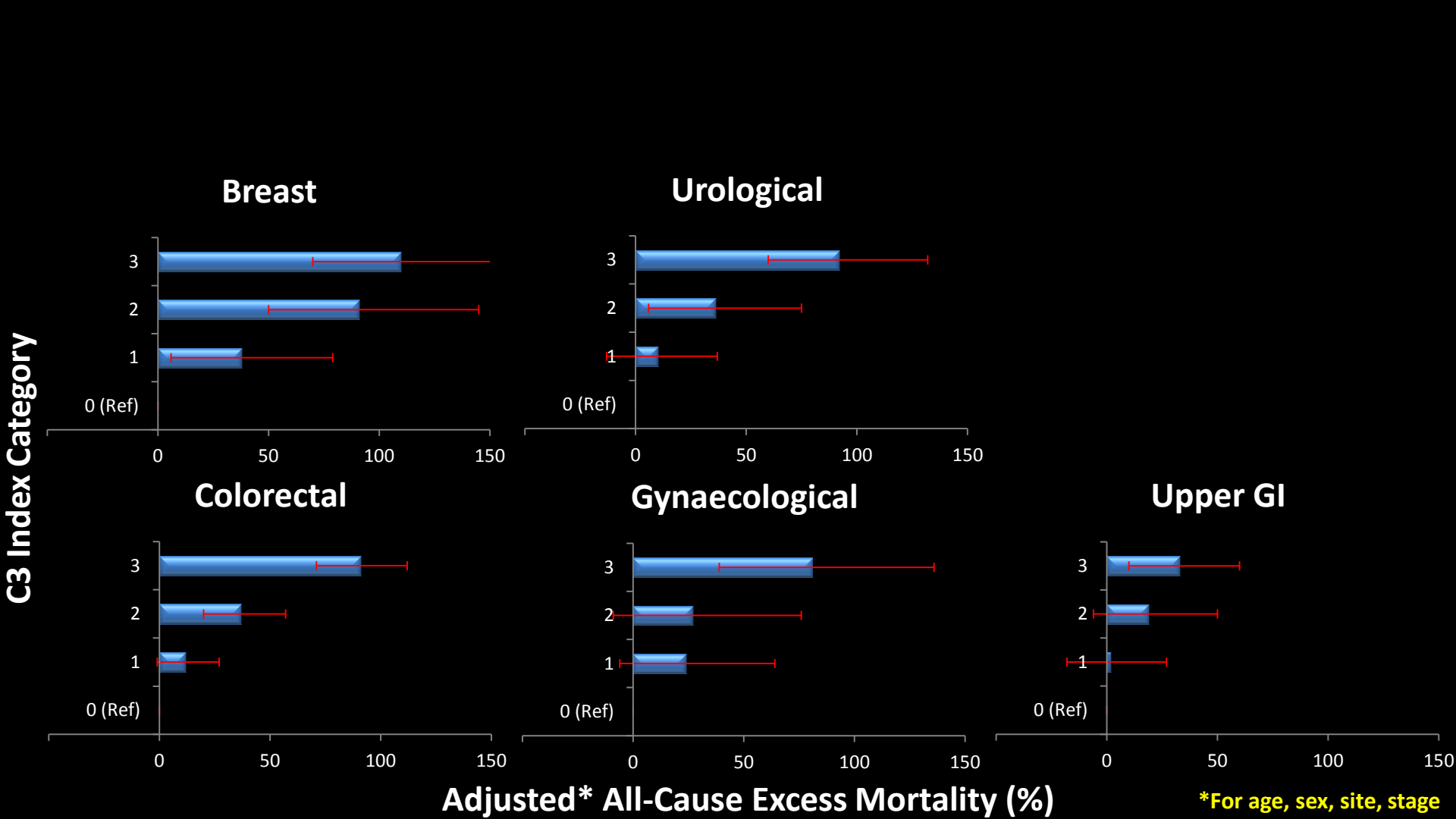


Hepatitis (Chronic Viral)

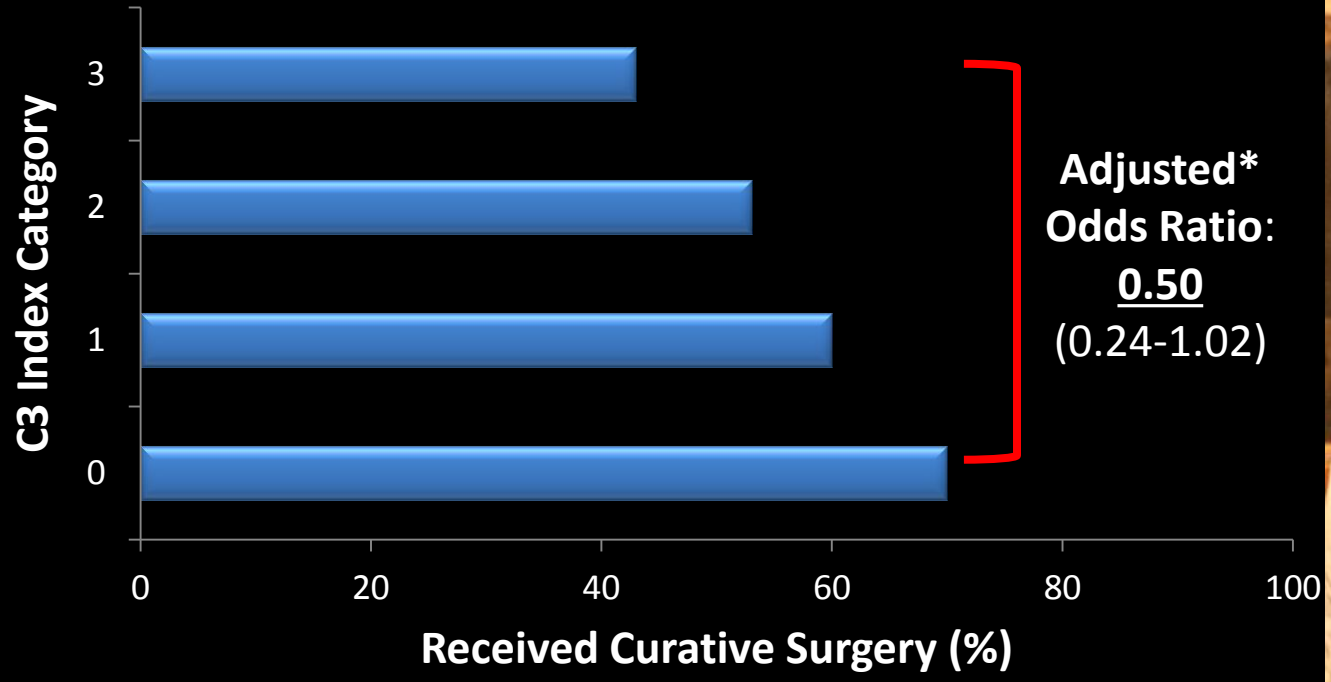


A high comorbidity burden **increases** likelihood of mortality…

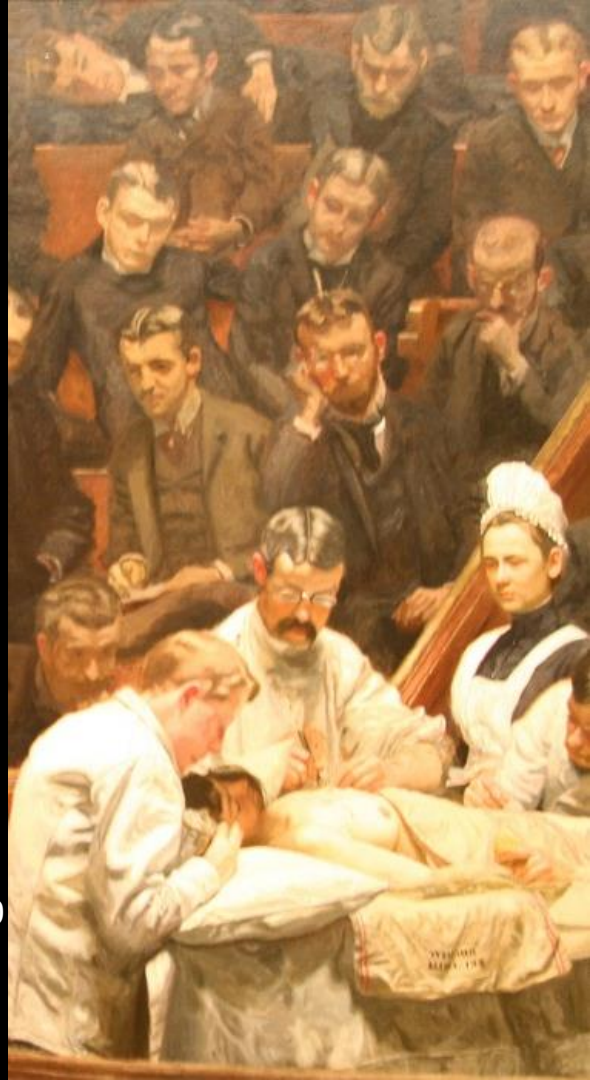
…but the extent of this **varies by cancer**.


Breast
Urological
Colorectal
Gynaecological
Upper GI
C3 Index Category
3
2
1
0 (Ref)
0
50
100
150
Adjusted* All-Cause Excess Mortality (%)
*For age, sex, site, stage

Upper GI – Stage I-III Surgery



*For age, sex, site, ethnicity, deprivation



What is happening?

- Improving our evidence base
  - Propensity score analysis of CRC patients to assess impact of specific conditions on treatment and outcomes
- 'De-siloing' cancer care
  - Feasibility study to assess active identification and treatment of comorbidity in acute cancer setting
- Developing novel models of care
  - Pilot study of incorporating the Flinders model into acute cancer setting
- Skill development for clinicians
  - Development of clinical tools e.g. polypharmacy, life expectancy calculators
- Building research collaborations
  - NHMRC funded CoRE: *Discovering Indigenous Strategies to improve Cancer Outcomes Via Engagement, Research Translation and Training (DISCOVER-TT)*; led from Queensland Institute of Medical Research.
  - Proposed CoRE on cancer and comorbidity led from Flinders University under consideration.
  - Across NZ collaborations developing for C3 'programme' of work.

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Recent publications on cancer and comorbidity

1. Sarfati D. Review of methods to measure comorbidity in cancer populations: no gold standard exists. *J Clin Epidemiol* 2012; 65: 924-933.
2. Sarfati D, Gurney J, Lim BT, et al. Identifying important comorbidity among cancer populations using administrative data: prevalence and impact on survival. *Asia Pacific J Clin Oncol* 2013: doi:10.1111/ajco.12130.)
3. Swart E, Sarfati D, Cunningham R, et al. Ethnicity and rectal cancer management in New Zealand . *NZ Med J* 2013; 126 (1384): 42-52.
4. Chamberlain J, Sarfati D, Cunningham R, et al. Incidence and management of hepatocellular carcinoma among Māori and non-Māori New Zealanders. *Aust NZ J Public Health* 2013; 37: 520-6.
5. Sarfati D, Gurney J, Stanley J, et al. Cancer-specific administrative data-based comorbidity indices provided valid alternative to Charlson and NHI indices. *J Clin Epidemiol* 2014; 67(5): 586-95.
6. Sarfati D, Lim BT, Gurney J, McSherry C. Development of a pharmacy-based comorbidity Index for patients with cancer. *Medical Care* 2014; 52(7): 586-93.
7. Sarfati D, Gurney J, Stanley J, Koea J. A retrospective cohort study of patients with stomach and liver cancers: the impact of comorbidity and ethnicity on cancer care and outcomes. *BMC Cancer (IF 3.3; Q2 in Oncology)* 2014, 14:821 DOI: 10.1186/1471-2407-14-821.
8. Dew K, Stubbe M, Signal L, et al. Cancer Care Decision Making in Multidisciplinary Meetings. *Qualitative Health Research* 2015; 25(3): 397-407.
9. Stairmand J, Signal L, Sarfati D et al. Consideration of ethnicity and comorbidity in treatment decision-making in multidisciplinary cancer team meetings: a review. *Annal Oncol*) 2015; Advance access.

http://annonc.oxfordjournals.org/content/early/2015/01/20/annonc.mdv025.full.pdf