# Derivation of a Charlson co-morbidity index from routine HES data

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The National Cancer Intelligence Network is hosted by Public Health England

## Overview

- "Why"s and "how"s of co-morbidity
- Computing co-morbidity
- What do we find?
- What might that tell us?
- Where we go next

## Q. Why is co-morbidity information useful?

A. So we can better understand:

- Outcomes
- Treatment decisions
- Specific interactions between particular cancers and co-morbidities

... which may allow us to:

- Improve outcomes
- Assist treatment decisions
- Deliver new actionable intelligence to clinicians

## How do we measure co-morbidity?

- Dozens of methods/variations
- Some evidence suggests exact scheme doesn't matter 'too much'*

- Basic plan:
  1. Look at patient records (medical notes, HES records, etc)
  2. Score the conditions we find there by some method
  3. Add up scores in some way
  4. Place the patient on a co-morbidity scale

*** NCIN workshop on co-morbidity data collection (October 2009) http://www.ncin.org.uk/view?rid=119**

## Clinically-led vs routine data collection

Gold standard quality

Hard/expensive to collect

We already have the data:
- At national level
- Going back 15 years

Relies on HES clinical coding

We need a process to compute it

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ACE-27

Charlson Index

## Computing co-morbidity

## Data linking

CancerHES dataset

(diagnostic information)

2009 cancer registrations

2008 cancer registrations

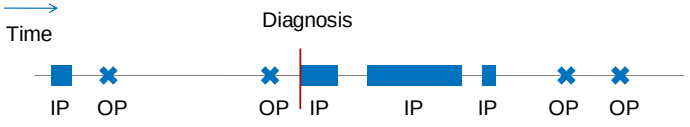
(Routes to diagnosis)

## Data linking

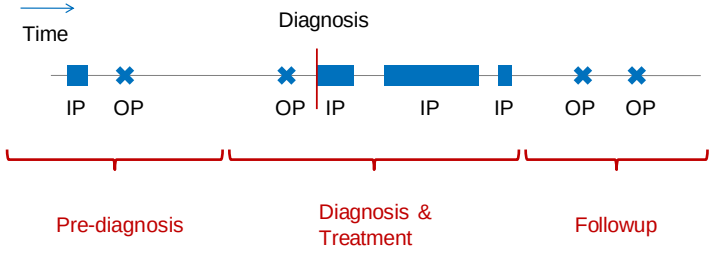

(diagnostic information)

(Routes to diagnosis)

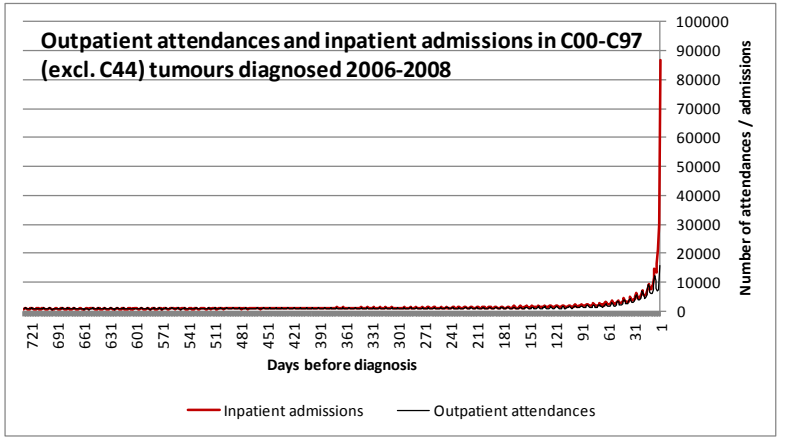
## Computing co-morbidity



# Computing co-morbidity

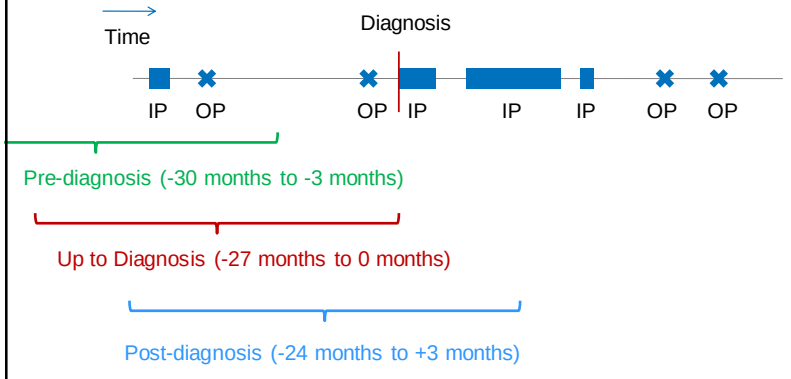



# Pre-diagnostic episode volume



# Which data collection period?

NCIN national cancer intelligence network
*Using information to improve quality & choice*




# Computing co-morbidity

NCIN national cancer intelligence network
*Using information to improve quality & choice*

- Take the conditions we find in the HES diagnosis fields
- Look them up and assign points according to a published* scheme

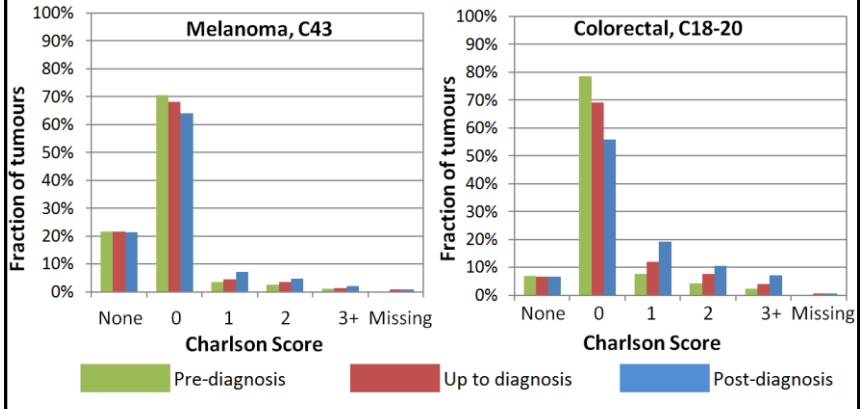
*** Quan *et al*, Medical Care 43 1130-1139 (2005)**

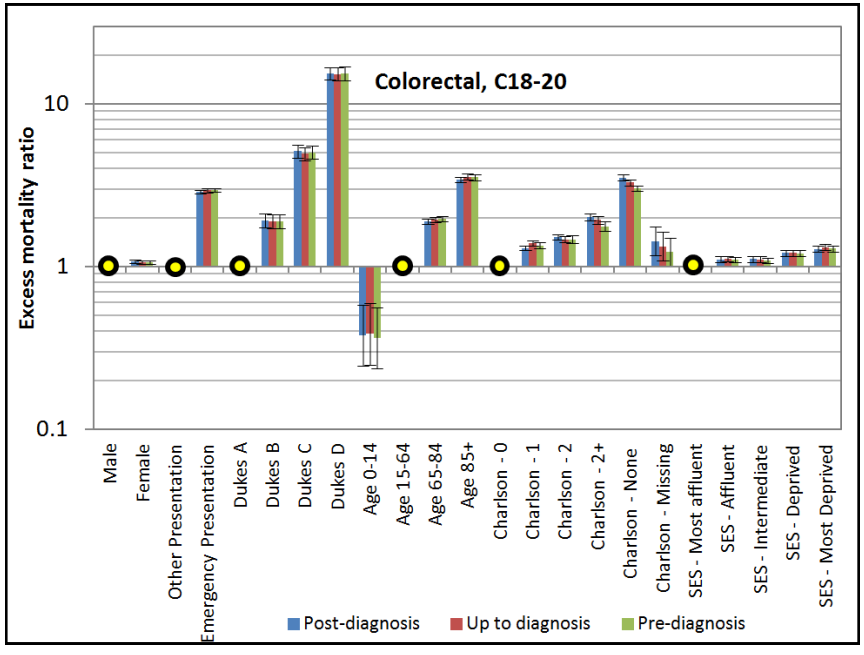
| Charlson Group | Description | ICD-10 | Charlson Index | Notes |
|---|---|---|---|---|
| 1 | Acute Myocardial Infarction | I21.x, I22.x, I25.2 | 1 | |
| 2 | Congestive Heart Failure | I09.9, I11.0, I13.0, I13.2, I25.5, I42.0, I42.5-I42.9, I43.x, I50.x, P29.0 | 1 | |
| 3 | Peripheral Vascular Disease | I70.x, I71.x, I73.1, I73.8, I73.9, I77.1, I79.0, I79.2, K55.1, K55.8, K55.9, Z95.8, Z95.9 | 1 | |
| 4 | Cerebral Vascular Accident | G45.x, G46.x, H34.0, I60.x-I69.x | 1 | |
| 5 | Dementia | F00.x-F03.x, F05.1, G30.x, G31.1 | 1 | |
| 6 | Pulmonary Disease | I27.8, I27.9, J40.x-J47.x, J60.x-J67.x, J68.4, J70.1, J70.3 | 1 | |
| 7 | Connective Tissue Disorder | M05.x, M06.x, M31.5, M32.x-M34.x, M35.1, M35.3, M36.0 | 1 | |
| 8 | Peptic Ulcer | K25.x-K28.x | 1 | |
| 9 | Diabetes | E10.0, E10.1, E10.6, E10.8, E10.9, E11.0, E11.1, E11.6, E11.8, E11.9, E12.0, E12.1, E12.6, E12.8, E12.9, E13.0, E13.1, E13.6, E13.8, E13.9, E14.0, E14.1, E14.6, E14.8, E14.7 | 1 | Only highest index is counted |
| 10 | Diabetes Complications | E10.2-E10.5, E10.7, E11.2-E11.5, E11.7, E12.2-E12.5, E12.7, E13.2-E13.5, E13.7, E14.2-E14.5, E14.7 | 2 | |
| 11 | Paraplegia | G04.1, G11.4, G80.1, G80.2, G81.x, G82.x, G83.0-G83.4, G83.9 | 2 | |
| 12 | Renal Disease | I12.0, I13.1, N03.2-N03.7, N05.2-N05.7, N18.x, N19.x, N25.0, Z49.0-Z49.2, Z94.0, Z99.2 | 2 | |
| 13 | Cancer | C00.x-C26.x, C30.x-C34.x, C37.x-C41.x, C43.x, C45.x-C58.x, C60.x-C76.x, C81.x-C85.x, C88.x, C90.x-C97.x | 2 | Derived from cancer registry data rather than HES data. |
| 14 | Metastatic Cancer | N/A | N/A | |
| 17 | Liver Disease | B18.x, K70.0-K70.3, K70.9, K71.3-K71.5, K71.7, K73.x, K74.x, K76.0, K76.2-K76.4, K76.8, K76.9, Z94.4 | 1 | Only highest index is counted |
| 15 | Severe Liver Disease | I85.0, I85.9, I86.4, I98.2, K70.4, K71.1, K72.1, K72.9, K76.5, K76.6, K76.7 | 3 | |
| 16 | HIV | B20.x-B22.x, B24.x | 6 | |

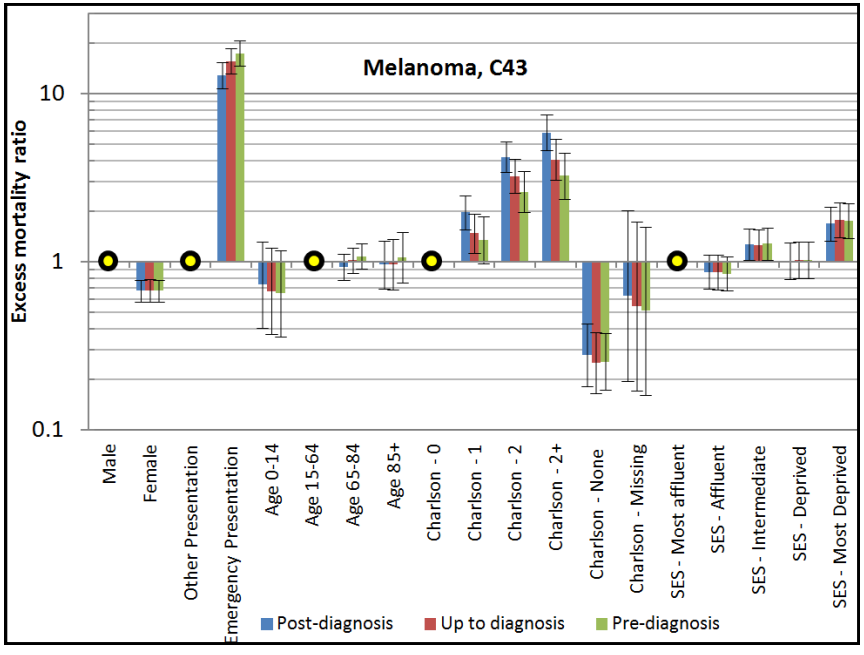
## What do we find?

1. Look at how the period chosen changes recorded co-morbidity
2. Look at how co-morbidity influences 1-year mortality

## What do we find?




Colorectal, C18-20
Excess mortality ratio
10
1
0.1
Male
Female
Other Presentation
Emergency Presentation
Dukes A
Dukes B
Dukes C
Dukes D
Age 0-14
Age 15-64
Age 65-84
Age 85+
Charlson - 0
Charlson - 1
Charlson - 2
Charlson - 2+
Charlson - None
Charlson - Missing
SES - Most affluent
SES - Affluent
SES - Intermediate
SES - Deprived
SES - Most Deprived
Post-diagnosis
Up to diagnosis
Pre-diagnosis


Melanoma, C43
Excess mortality ratio
10
1
0.1
Male
Female
Other Presentation
Emergency Presentation
Age 0-14
Age 15-64
Age 65-84
Age 85+
Charlson - 0
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Post-diagnosis
Up to diagnosis
Pre-diagnosis

## Conclusions

- Using routinely collected data seems practical
- It shows a clear influence on outcomes
- Period not that important – but best not to include diagnosis & treatment
- We can suspect multiple mechanisms behind missing HES records

## Still to do...

- Expand to “BigHES”
- Explore missing data further
- Build process into CAS system to make co-morbidity routinely available to PHE/ SSCRGs
- Compare/ calibrate routine data co-morbidity with clinician led co-morbidity


**www.ncin.org.uk**