Using routine prescribing data to identify comorbidities in cancer patients
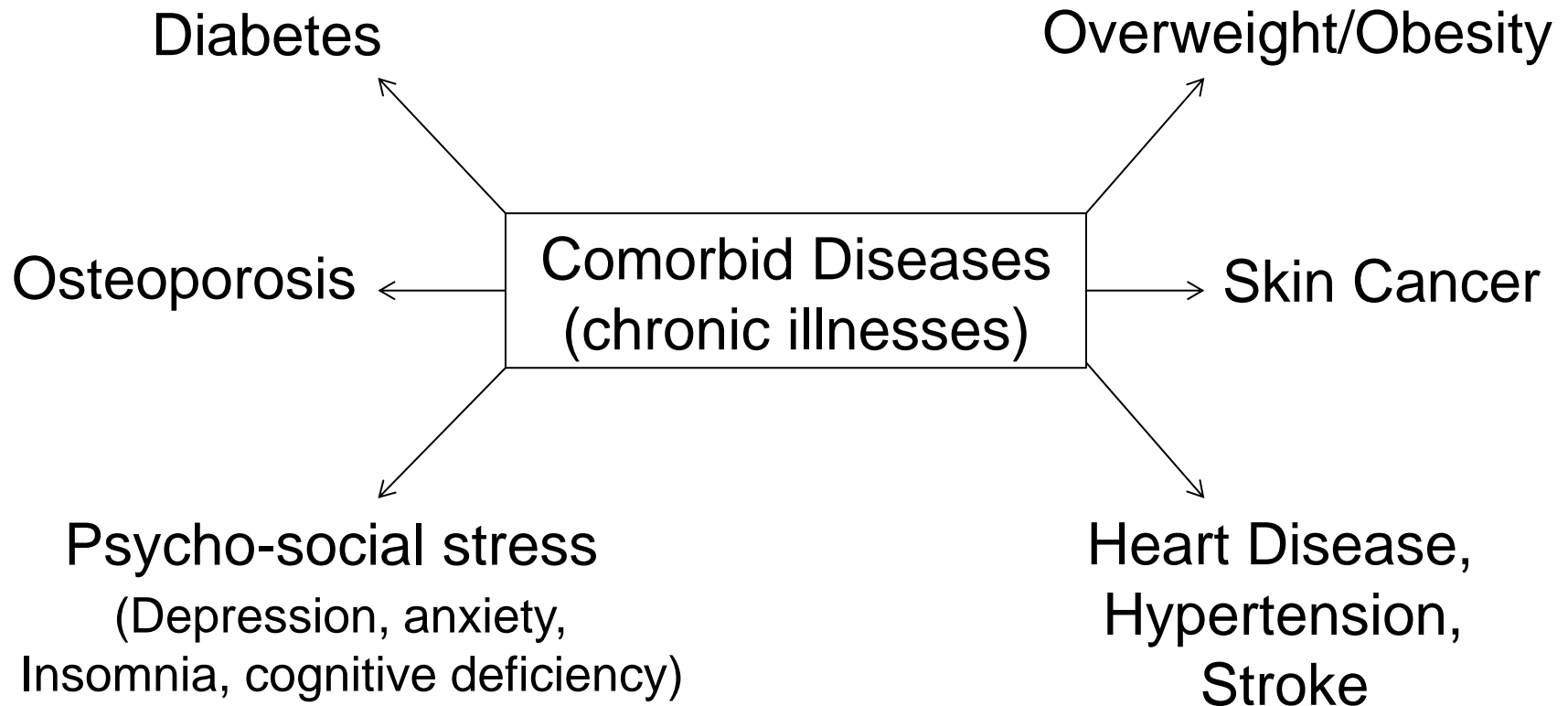
Chris Brown, Linda Sharp,
Kathleen Bennett, Ian Barron

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@CStatsAU   @IrishCancerReg

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Comorbidities are common

National Cancer Registry Ireland

~ 2 in 3 patients

Diabetes

Overweight/Obesity

Osteoporosis ← **Comorbid Diseases (chronic illnesses)** → Skin Cancer

Psycho-social stress
(Depression, anxiety,
Insomnia, cognitive deficiency)

Heart Disease,
Hypertension,
Stroke

We know it matters

National Cancer Registry Ireland

Cancer and Comorbidity

Redefining Chronic Diseases

Karen S. Ogle, M.D.
G. Marie Swanson
Nancy Woods, R.N.
Faouzi Azzouz, M.S

[1] Department of Family
University,

[2] Cancer C
Lansing, M

[3] Departm
Women's F
versity of W

Lost Productivity and Burden of Illness in Cancer Survivors With and Without Other Chronic Conditions

Emily C. Dowling, MHS[1]; Neetu Chawla, PhD, MPH[2]; Laura P. Forsythe, PhD, MPH[2]; Janet de Moor, PhD, MPH[2]; Timothy McNeel, BA[3]; Heather M. Rozjabek, MPH[2]; Donatus U. Ekwueme, PhD[4]; and K. Robin Yabroff, PhD, MBA[2]

DIFFERENTIAL PROGNOSTIC IMPACT OF COMORBIDITY IN HEAD AND NECK CANCER

Olli-Pekka Alho, MD,[1] Kalle Hannula, MD,[1] Antti Luokkala, MD,[1] Heikki Teppo, MD,[1] Petri Koivunen, MD,[1] Saara Kantola, DDS[2]

[1] Department of Otorhinolaryngology, University of Oulu, P.O. Box 5000, Oulu FIN-90014, Finland. E-mail: opalho@cc.oulu.fi
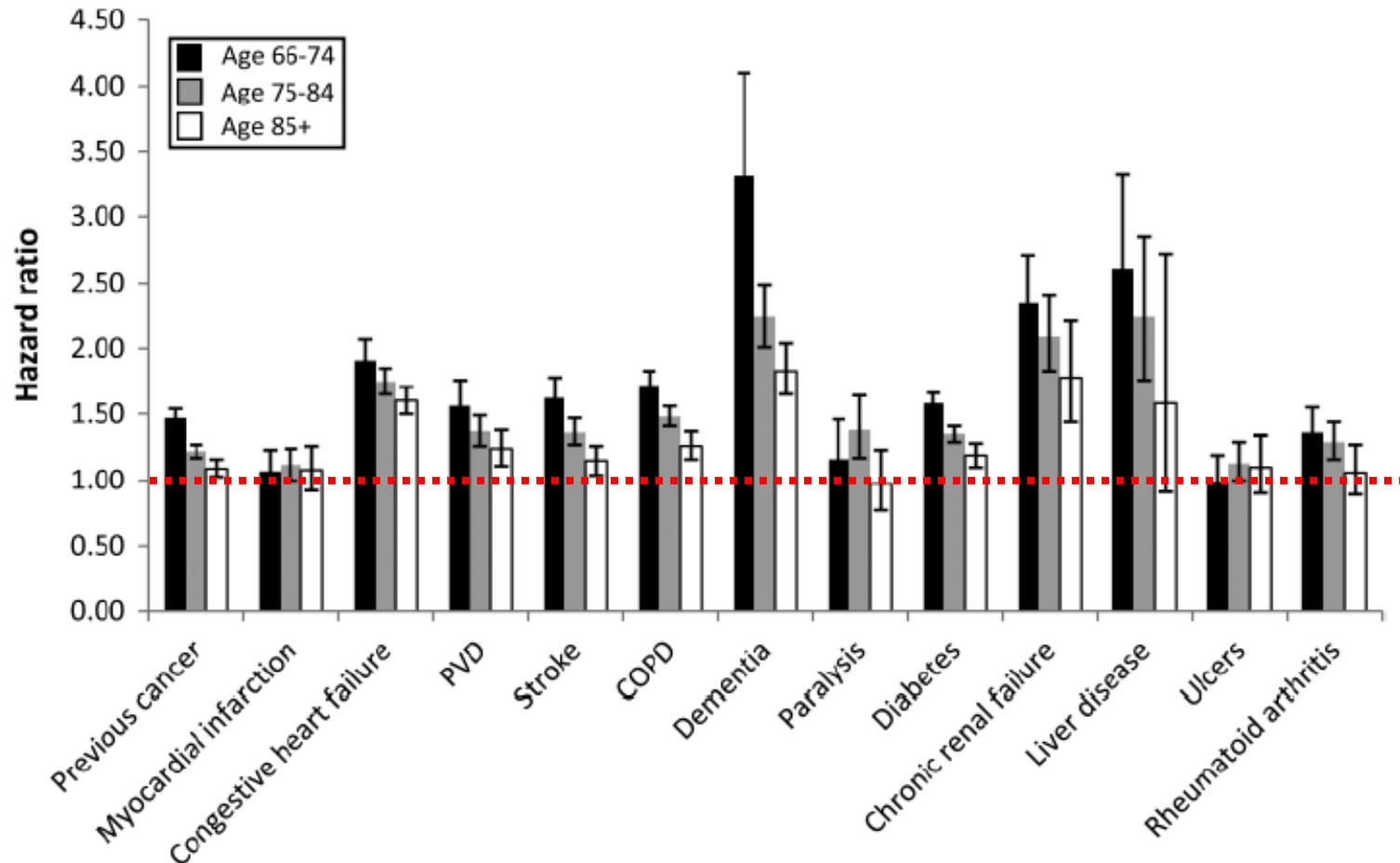[2] Department of Diagnostics and Oral Medicine, University of Oulu, P.O. Box 5000, Oulu FIN-90014, Finland

Accepted 7 December 2006
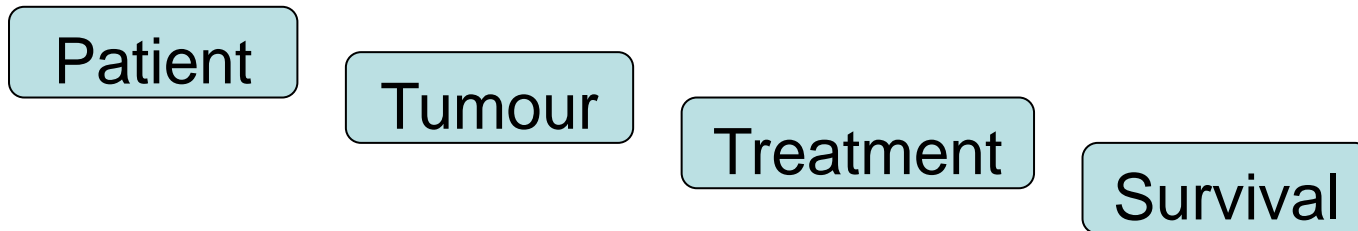*Published online 17 May 2007 in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/hed.20608*

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Impact on survival

Adjusted hazard ratios of comorbidities on all-cause mortality (stratified analyses) SEER data

*Patnaik JL, Byers T, DiGuiseppi C, Denberg TD, Dabelea D. **The Influence of Comorbidities on Overall Survival Among Older Women Diagnosed With Breast Cancer**. JNCI J Natl Cancer Inst*

Cancer registries

Most cancer registries haven't routinely collected data on comorbidities…

Patient

Tumour

Treatment

Survival

…but increasingly have access to sources of in-patient records + community prescribing data.

Measuring comorbidities

National Cancer Registry Ireland

Medical history based
ICDX / ICDX-CM

Cumulative Illness Rating Scale (CIRS) 68'

Kaplan-Feinstein Classification (KFC) 74'

ACE-27

Hierarchical Coexisting Conditions (HCC) 89'

Index of Co-existent Disease (ICED) 91'

Charleson Index 87'

Klabunde

D'Hoore

Elixhauser 98'

Ambulatory Care Groups (ACGs) 91'

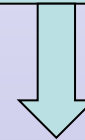Diagnosis-Related Groups (DRGs) 95'

Prescription based
ATC

Chronic Disease Scale (CDS) 92' / 95'

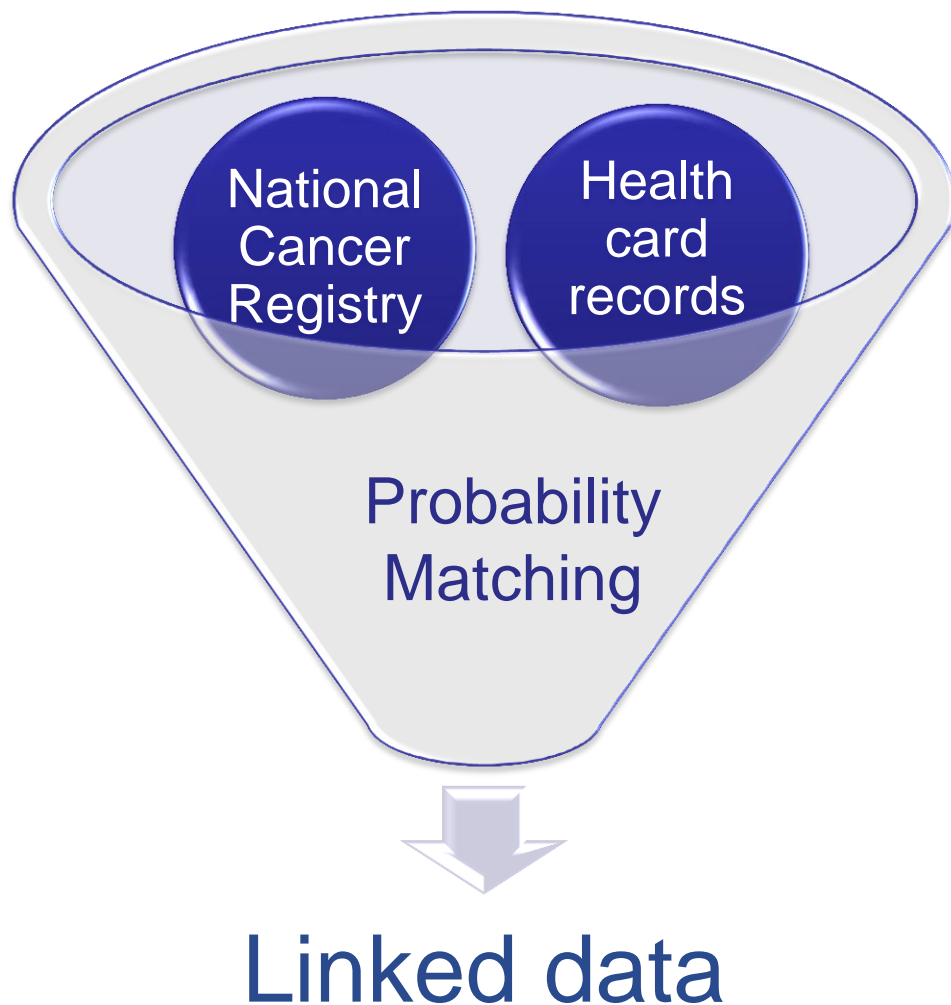Rx-Risk 03'
Rx-Risk-V 03'

Distinct Medication Classes (DMC) 01'

RxRisk: Prescription groups

|			
Alcohol dependence	End stage renal disease	Ischaemic heart disease/hypertension	Chronic airways disease
Allergies	Epilepsy	Inflammatory bowel disease	Smoking cessation
Anti-coagulation therapy	Gastric-oesophageal reflux disorder & Ulcer	Liver failure	Systemic corticosteroids
Anti-platelet therapy	Glaucoma	Malignancies	Transplant
Anxiety	Gout	Migraine	Tuberculosis
Arrhythmia	Hepatitis C	Osteoporosis/Pagets	Asthma
Benign prostate hypertrophy	HIV	Pain (Opiates)	liver Disease
Bipolar disorder	Hyperkalaemia	Inflammation/pain	Rheumatoid Arthritis
Chronic heart failure	Hyperlipidemia	Pancreatic insufficiency	Thyroid Disorder
Dementia	Hypertension	Parkinsons disease	Neurogenic Bladder / Urinary Incontinence
Depression	Hypothyroidism	Psoriasis	Ostomy
Diabetes	Angina	Psychotic illness	

Project objective

- Evaluate the utility of using prescribing data to identify comorbidities in ovarian cancer patients in Ireland
  - ➤ Using **RxRisk**, **DMC** methods based on prescriptions in the **year prior** to diagnosis.

- Determine prognostic value of estimated comorbidities on:
  - ➤ Initial treatment (logistic regression)
  - ➤ Overall survival (Cox regression)

Prescription data linkage

National Cancer Registry Ireland

National Cancer Registry

Health card records

Probability Matching

Linked data

All women diagnosed with invasive ovarian cancer (ICD10-C56) between 2001-2010 were linked to health card records
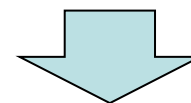
Prescribing history for matched cases

Observed comorbidities

National Cancer Registry Ireland

- 1,542 (50%) of the 3,097 incident ovarian cancers had a health cards for a year prior to diagnosis.

	Comorbidity	Incidence	% of cohort
1	Gastric Acid	606	39.4%
2	Hypertension	553	36.0%
3	Antiplat	482	31.4%
4	Hyperlipidaemia	482	31.4%
5	Inflam Pain	433	28.2%
6	Ischaemic heart disease	386	25.1%
7	Pain	353	23.0%
8	Depression	303	19.7%
9	Anxiety	244	15.9%
10	Reactive airways	223	14.5%

Correlation of methods

RxRisk groups
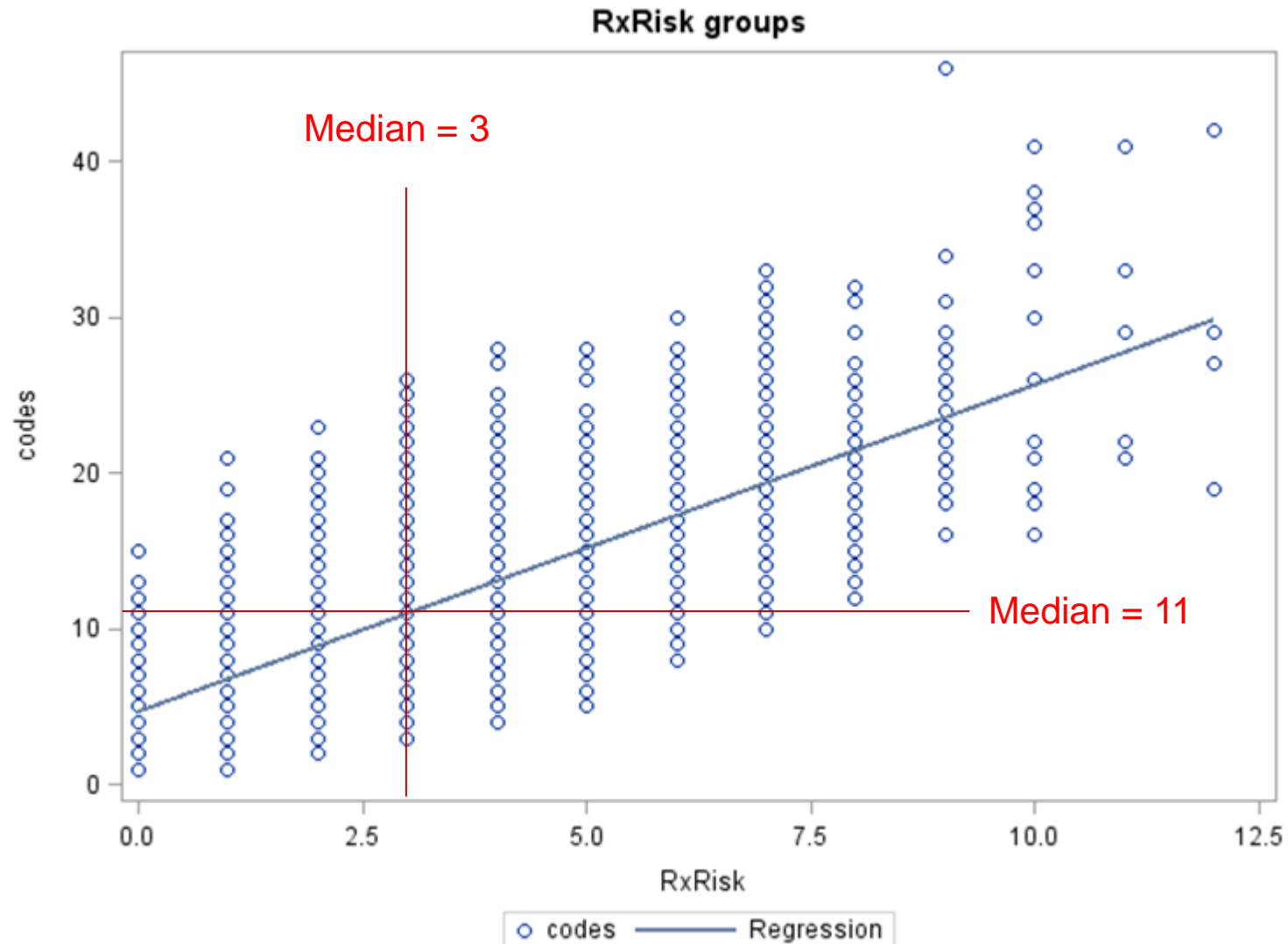
Association with age
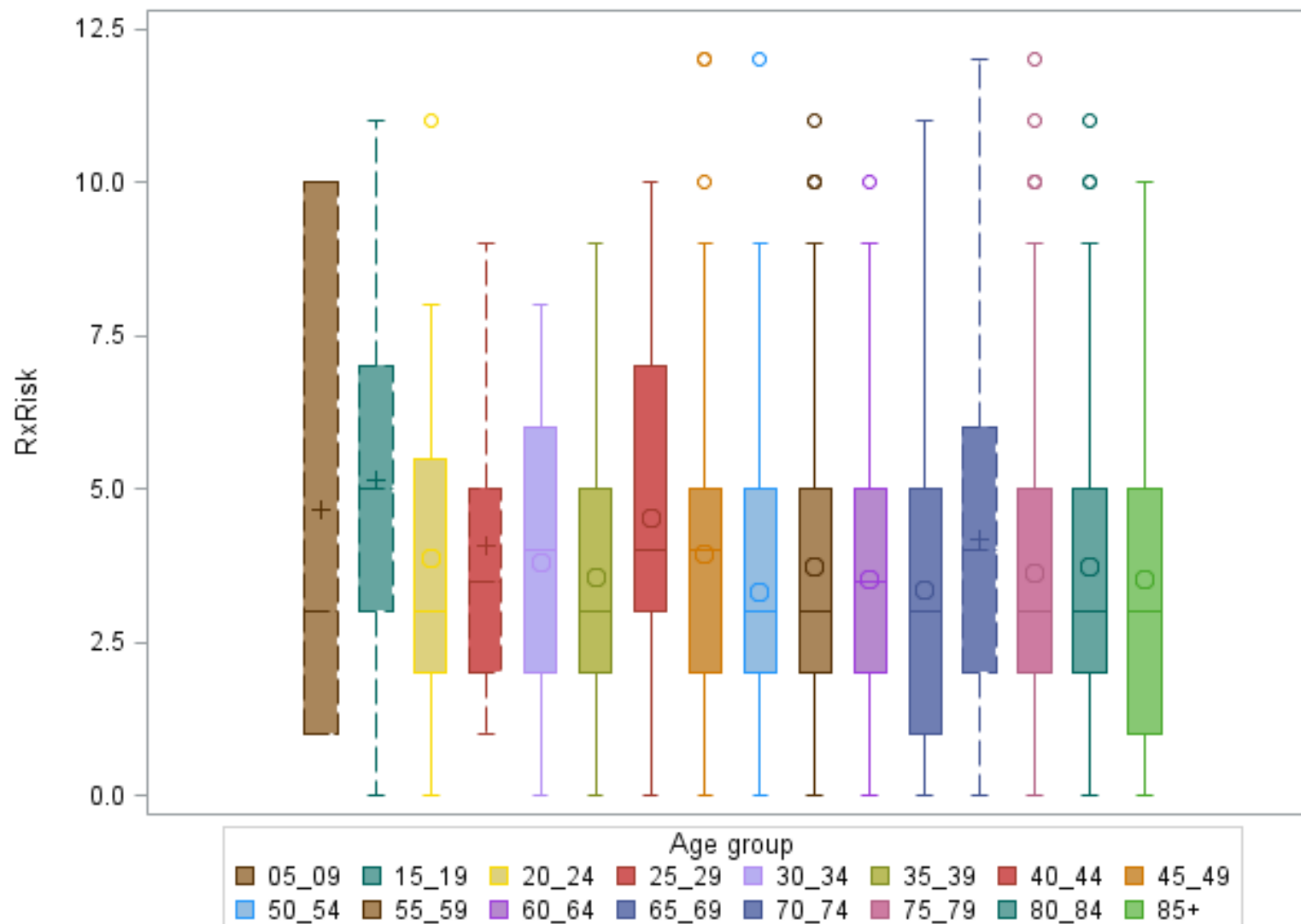
Association with treatment

- Surgery (within year of diagnosis)

	OR	95% CI	AOR	95% CI
RxRisk	0.99	(0.95, 1.03)	1.00	(0.95,1.06)
# Codes	0.99	(0.98, 1.01)	1.00	(0.98,1.02)

- Chemotherapy (within year of diagnosis)

	OR	95% CI	AOR	95% CI
RxRisk	0.98	(0.94,1.02)	0.97	(0.93, 1.02)
# Codes	0.99	(0.98, 1.01)	1.00	(0.98, 1.02)

Association with survival

National Cancer Registry Ireland

- Comorbidity adversely affected survival

	HR	95% CI	P-Value
RxRisk	1.026	(1.002, 1.050)	0.032
# Codes	1.010	(1.001, 1.018)	0.026

- Models adjusted for: Marital status, smoking, loco/regional, urban/rural, age.

Parameter	Adjusted HR	95% CI	P-Value
RxRisk	1.028	(1.003, 1.053)	0.027
# Codes	1.008	(0.999, 1.017)	0.079

Specific comorbidities

National Cancer Registry Ireland

Modelling all comorbidities simultaneously….

	HR*	95% HR CI*	P-Value*
Depression	1.16	(1.00, 1.34)	0.049
Hyperlipidaemia	1.14	(1.01, 1.29)	0.034
Pain	0.86	(0.75, 0.99)	0.035
Reactive airways	1.28	(1.09, 1.50)	0.0028

Small numbers!

*Unstable model subject to colinearlity

Summary

National Cancer Registry Ireland

Comorbidities can be estimated by the NCRI using routine prescribing data

We observed some association with survival in the Irish ovarian cancer cohort

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Acknowledgements

- Staff at **National Cancer Registry of Ireland**, in particular:
  - ➤ **The data team** for linkage of GMS records,
  - ➤ **Tumour registration officers** for collecting registry data

- **Primary Care Reimbursement Service** for providing the data

- Project funding from **Irish Health Research Board**

Further information

c.brown@ncri.ie   *@CStatsAU*

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