Number of cardiometabolic disorders increases with degree of frailty among people aging with HIV

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Conflicts of interest disclosures

- Personal funding:
  - Summer studentship, Internal Medicine Research Foundation, Dalhousie University

- Funders had no role in the study

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Cardiometabolic disorders among people with HIV

- Cardiometabolic disorders are common among people aging with HIV
  - Myocardial infarction
  - Stroke
  - Hypertension
  - Dyslipidemia
  - Diabetes Mellitus Type 2, etc.
- Higher rates than age-matched HIV-negative populations

Curr Opin HIV AIDS. 2014;9(4):332-9
Clin Infect Dis. 2015;60(4):627-38
Clin Infect Dis. 2011;53(11):1120-6

Cardiometabolic disorders and aging

- All cardiometabolic disorders are associated with aging
- At older ages, multiple cardiometabolic disorders tend to accumulate in patterns of multimorbidity
- Cardiometabolic disorders are more common in older adults who are frail than those who are fit/robust
- Frailty influences outcomes for people with cardiometabolic disorders

Clin Geriatr Med. 2011;27(1):39-52
Age Ageing. 2013;42(3):346-51

Frailty

- “Frailty is a state of increased vulnerability to poor resolution of homeostasis after a stressor event, which increases the risk of adverse outcomes” – Clegg, et al.
- Describing differing vulnerability among people of the same chronological age

Lancet. 2013;381:752

Objectives

1. To describe the prevalence of cardiometabolic disorders within a large cohort of people aging with HIV
2. To assess cross-sectional relationships between cardiometabolic disorders and frailty
3. To determine if frailty influences survival among people aging with HIV who also have cardiometabolic disorders

Setting

- Modena HIV Metabolic Clinic Cohort Study
  - Northern Italy
  - Multidisciplinary annual assessments
- All participants' first visits between 1/1/2005 and 31/12/2014

Cardiometabolic disorders

1. Cardiovascular disease
   - MI, stroke, angina, CABG, or PCI/angioplasty
2. Hypertension
   - Two BP measurements >140/90 or treated
3. Diabetes mellitus type 2
   - Fasting glucose >125 mg/dL or treated
4. Dyslipidemia
   - LDL > 100 mg/dL
5. High waist circumference
   - >102cm for men; >88cm for women

Frailty index

- Frailty measured using 30-item frailty index
  - Frailty index = # of health deficits / # of variables
  - E.g. 3 deficits / 30 variables = 0.1
- Variables must meet some basic criteria:
  - Related with age
  - Related to poor health
  - As a group, include multiple physiological systems
  - As a group, should number at least around 30
- Here, variables included in frailty index were separate from cardiometabolic disorders

Frailty index variables

1. CKD
2. NAFLD
3. Osteoporosis
4. Hypogonadism/menopause
5. Sarcopenia
6. Unemployment
7. WBC
8. Hemoglobin
9. Liver cirrhosis
10. Sodium
11. Potassium
12. Phosphorus
13. Lactic acid
14. TSH
15. Proteinuria/albuminuria
16. AST
17. ALT
18. GGT
19. Platelets
20. Bilirubin
21. PTH
22. D-dimer
23. CRP
24. Vitamin D
25. Sedentary lifestyle
26. Alcohol use
27. HCV
28. HBV
29. Polypharmacy
30. Psychosis

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Analysis

- Descriptives
- Cross-sectional relationships:
  - Frailty index in participants with and without each cardiometabolic disorder (ANOVA)
  - Correlation between total number cardiometabolic disorders and frailty index
- Survival analyses for cardiometabolic disorders and for frailty index (Cox regression)

Descriptive characteristics

- N = 3,498 participants with cardiometabolic data from first visit
  - N = 1,402 had non-missing values for frailty index

- Mean age 45.0 ± 7.0 years, 66% men
- 83% undetectable viral load
- Median CD4 cell count 543 (IQR 385-720)

- Mean frailty index 0.28 ± 0.10

- Mean follow-up 3.9 ± 3 years
- Mortality rate 1.8%

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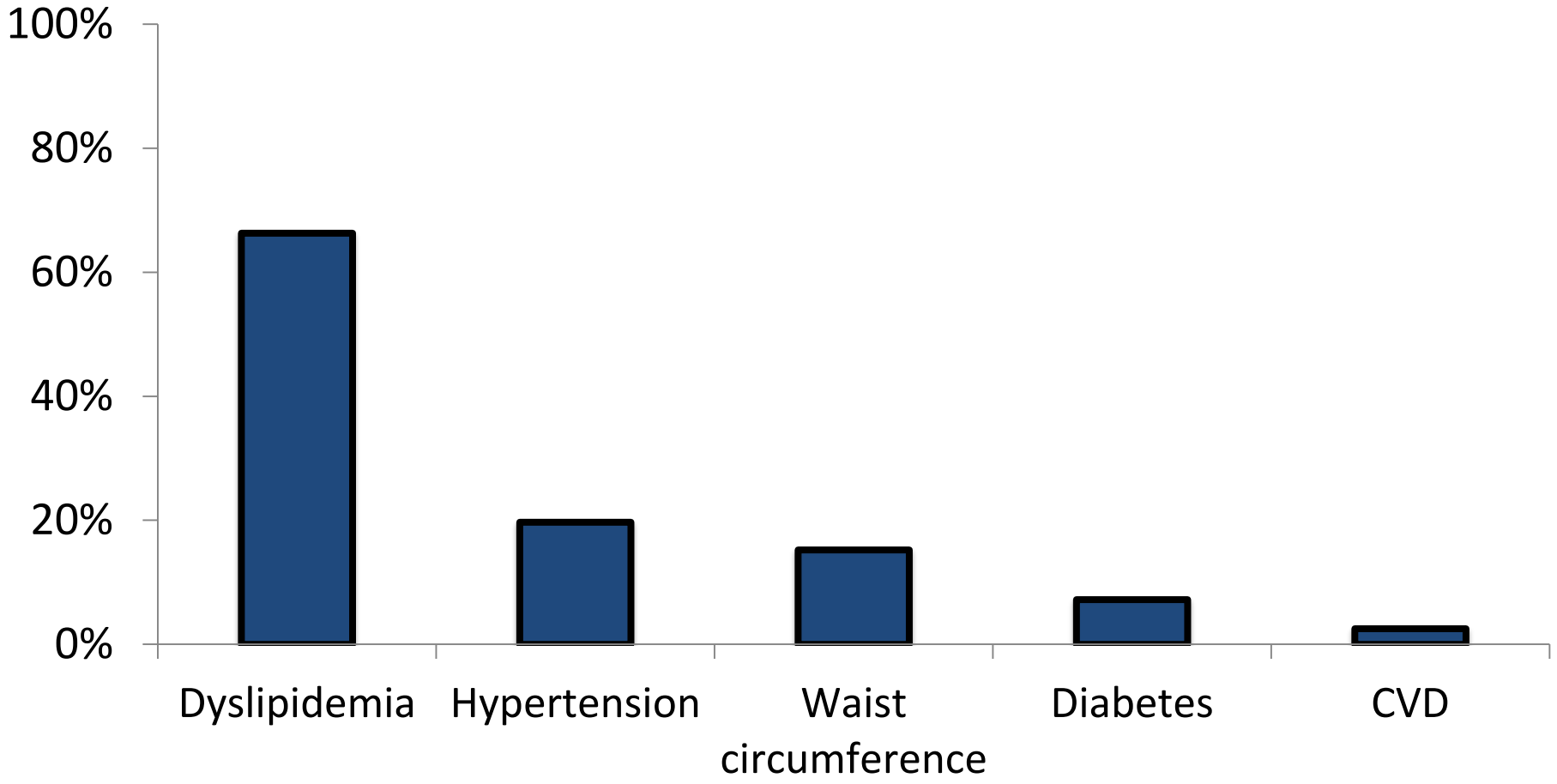
Prevalence of cardiometabolic disorders



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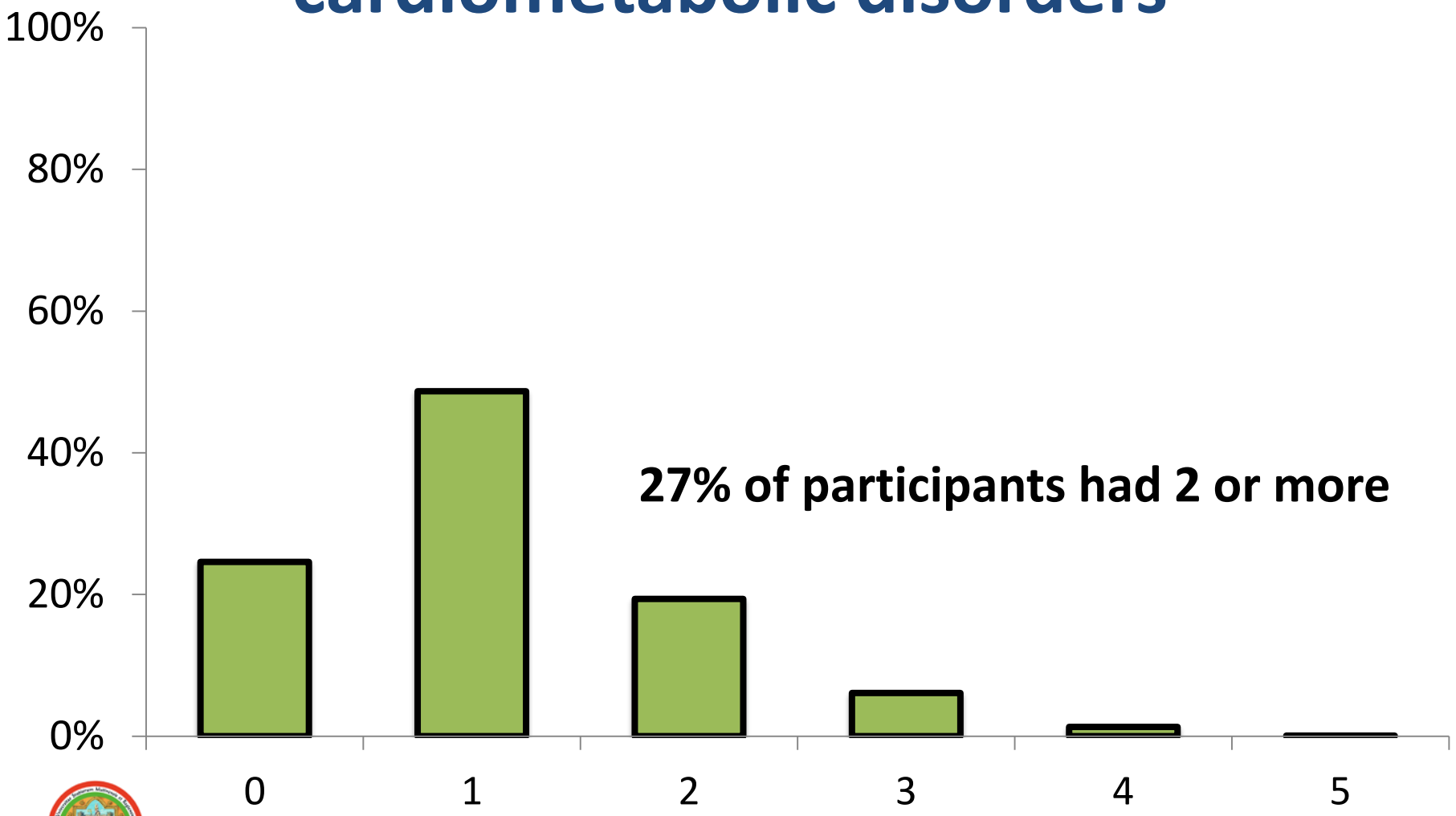
Number of cardiometabolic disorders



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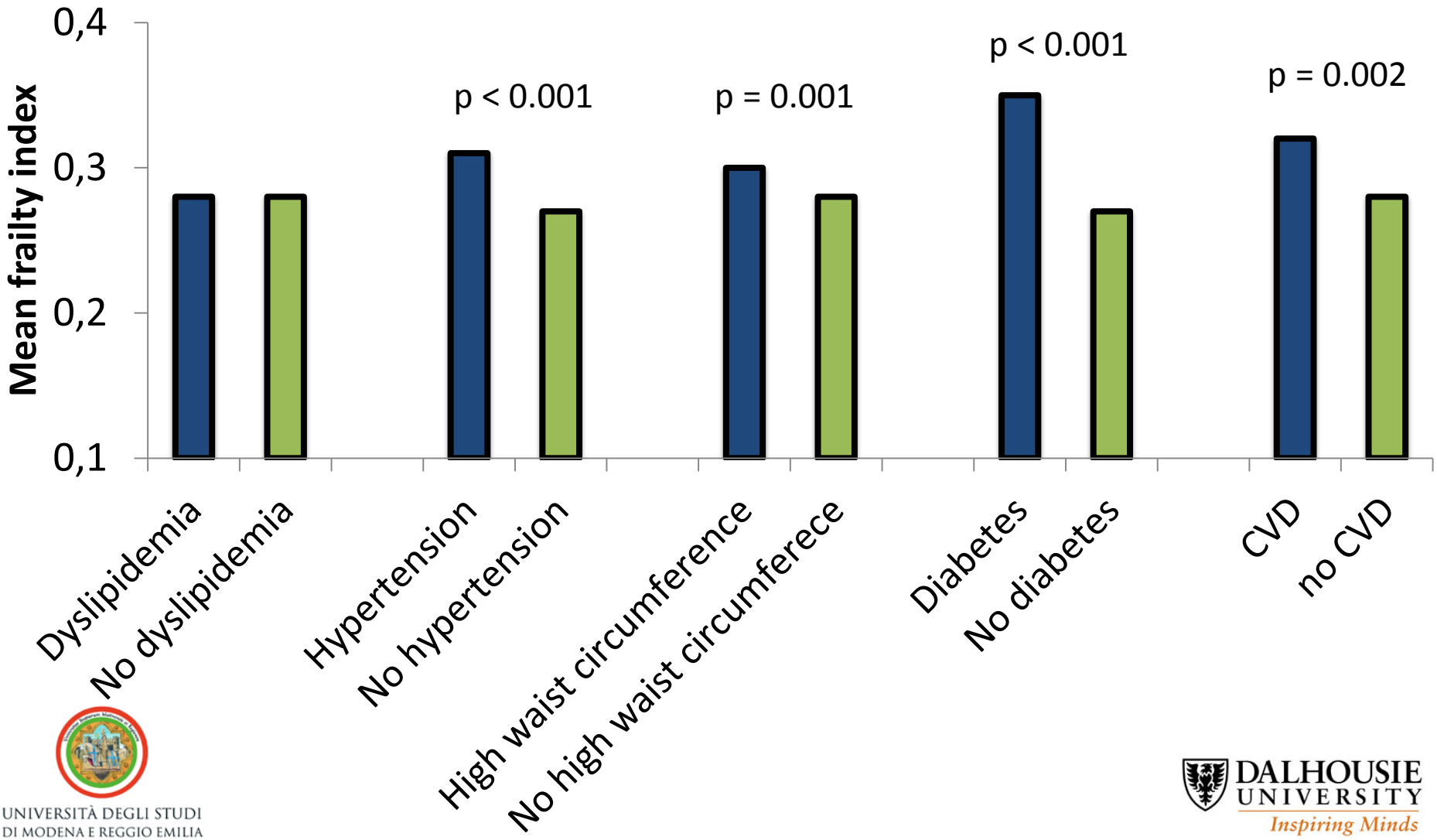
Participants with cardiometabolic disorders are frailer than those without



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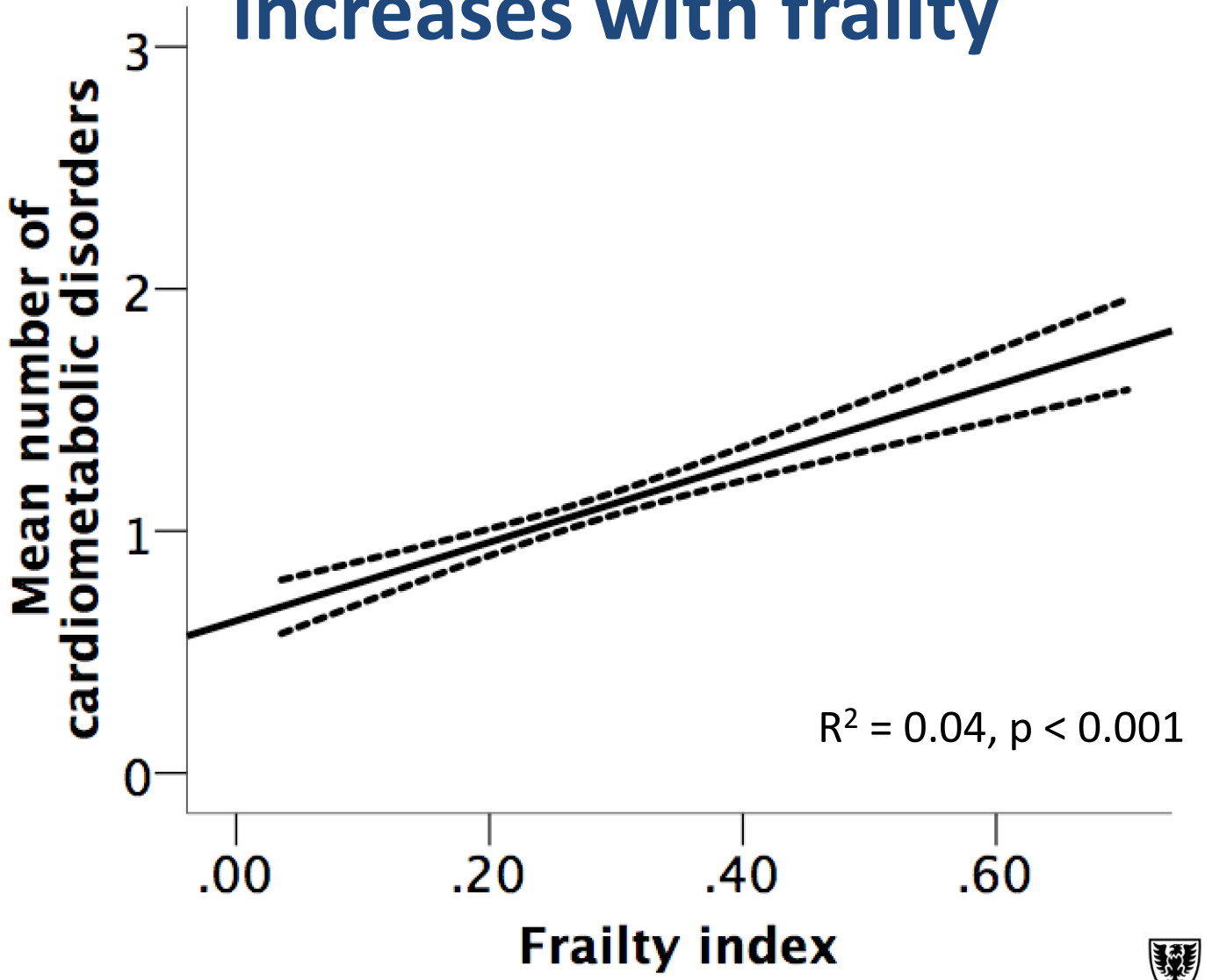
Number of cardiometabolic disorders increases with frailty



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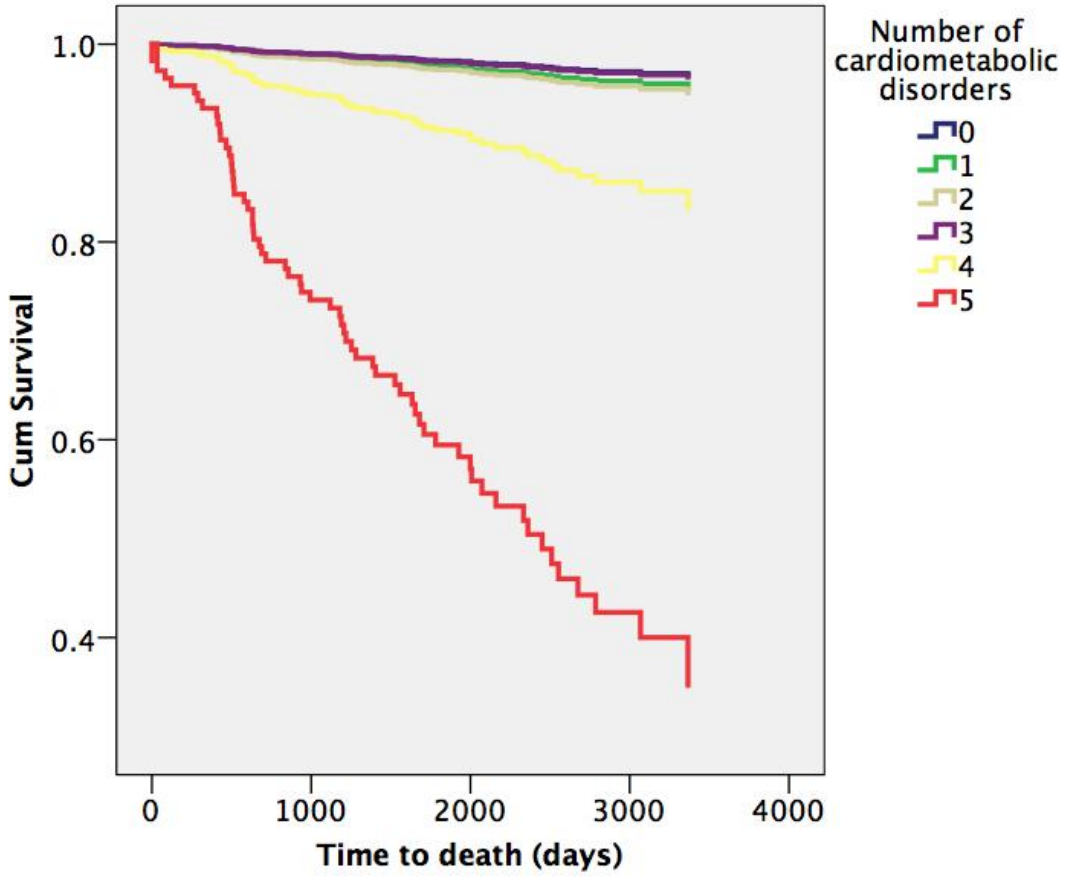
Frailty is associated with survival among people with each individual disorder

- Hazard ratios (95% CI) for 0.1 increase in frailty index:
  - Dyslipidemia: 2.81 (1.77 – 4.44)
  - Hypertension: 2.72 (1.67 – 4.45)
  - Waist circumference: 2.87 (1.77 – 4.63)
  - Diabetes: 2.73 (1.67 – 4.45)
  - CVD: 2.85 (1.80 – 4.51)
- All $p<0.001$

Number of cardiometabolic disorders is associated with survival

HR 1.30 (95% CI 1.01-1.67), p=0.04



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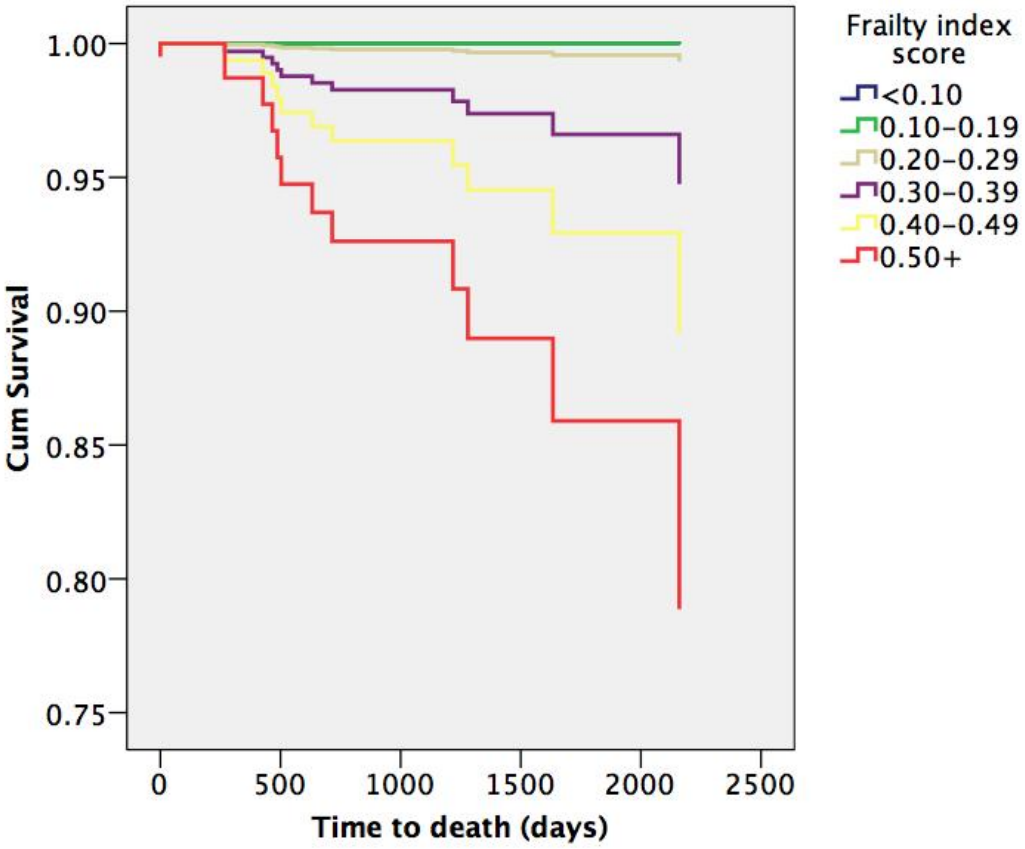
Frailty index score is associated with survival

HR 3.00 (95% CI 1.82-4.96), p<0.001



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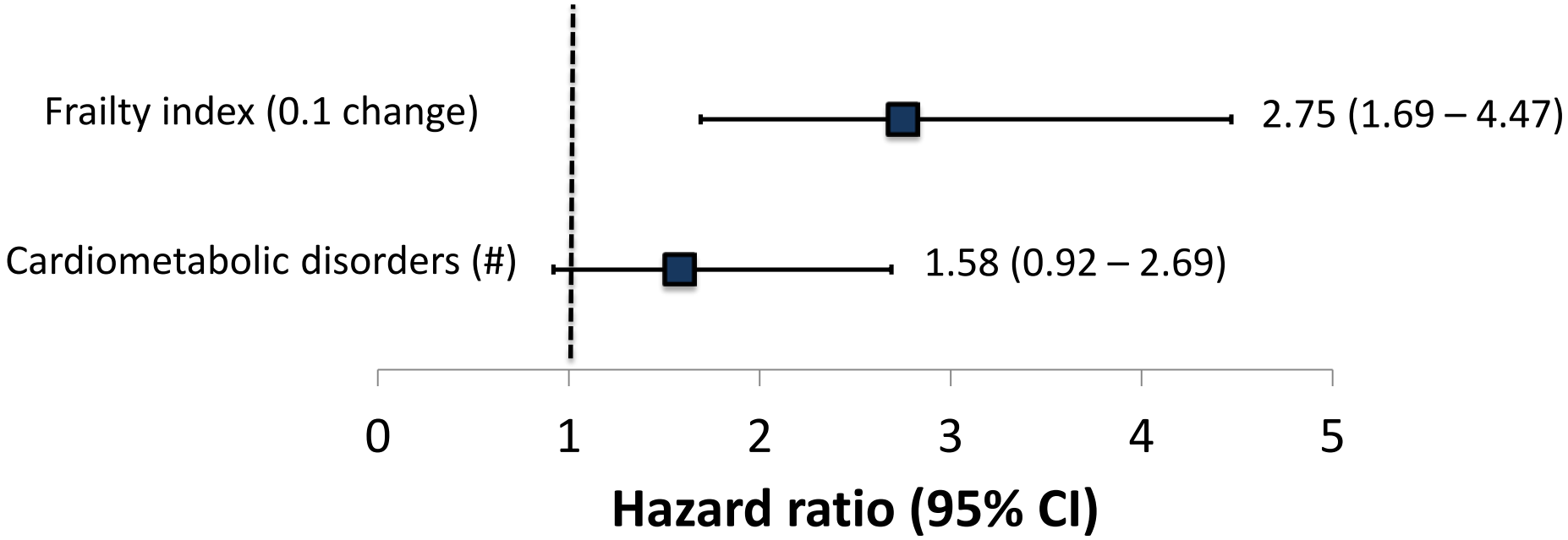
Frailty predicts survival after controlling for number of cardiometabolic disorders



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Summary

1. Cardiometabolic disorders are common among people aging with HIV, and tend to accumulate
2. As people with HIV develop more cardiometabolic disorders, their degree of frailty indecreases
3. People with more cardiometabolic disorders generally had a higher mortality rate
4. Risk of death significantly increased in relation to frailty, even after controlling for the presence of cardiometabolic disorders

Acknowledgments

- All study participants
- Dalhousie:
  - Kenneth Rockwood
  - Susan Kirkland
  - Arnold Mitnitski
  - Lindsay Wallace
  - B. Lynn Johnston
  - Olga Theou
  - Sherri Fay
- McGill:
  - Julian Falutz
- Modena:
  - Giovanni Guaraldi
  - Andrea Malagoli
  - Antonella Santoro
  - Chiara Stentarelli
  - Cristina Mussini
  - Stefano Zona
  - Marianna Menozzi
  - Giovanni Dolci

Personal funding:

- Dalhousie University Internal Medicine Research Foundation
- Travel award, Richard Payzant Ward Travel Fund
- Young Investigator registration, HIV & Aging Workshop 2015

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