

Competing Causes of Death: Quantifying the Probability of Dying from One Cause Before Another

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Background

- Which disease/cause are we more likely to die of?
 - Which causes to prioritize in treatment?
 - Can a patient die from a cause before benefiting from the treatment of another?
 - What is the burden of the specific causes?

- Competing causes:
 - The occurrence of one can prevent the others
 - The reporting of one as underlying prevents the others from being reported

- Limited view of the overall competing risk:
 - Analysis often limited to comparing a few diseases

Research questions

- Can multiple causes of death inform on the competing risk between causes?
- Are the competing risks consistent across countries or subject to difference in causes of death reporting practice and diseases burden?
- Is the probability estimated from death certificates representative of the “real” competing risk?

Data

→ Data:

- Danish Causes of Death and Population Registers
- US Multiple Causes of Death Data
- Spain National Institute of Statistics (Thanks Sergi!)

- Selected Chronic Diseases and Severe Mental Disorders Register (DK)

→Ages: 60-100+

→Sex: Females

→Period: 2016-2019

→Deaths grouped into 11 causes, based on the 10 most important ICD-10 chapters and one residual group.

Methods

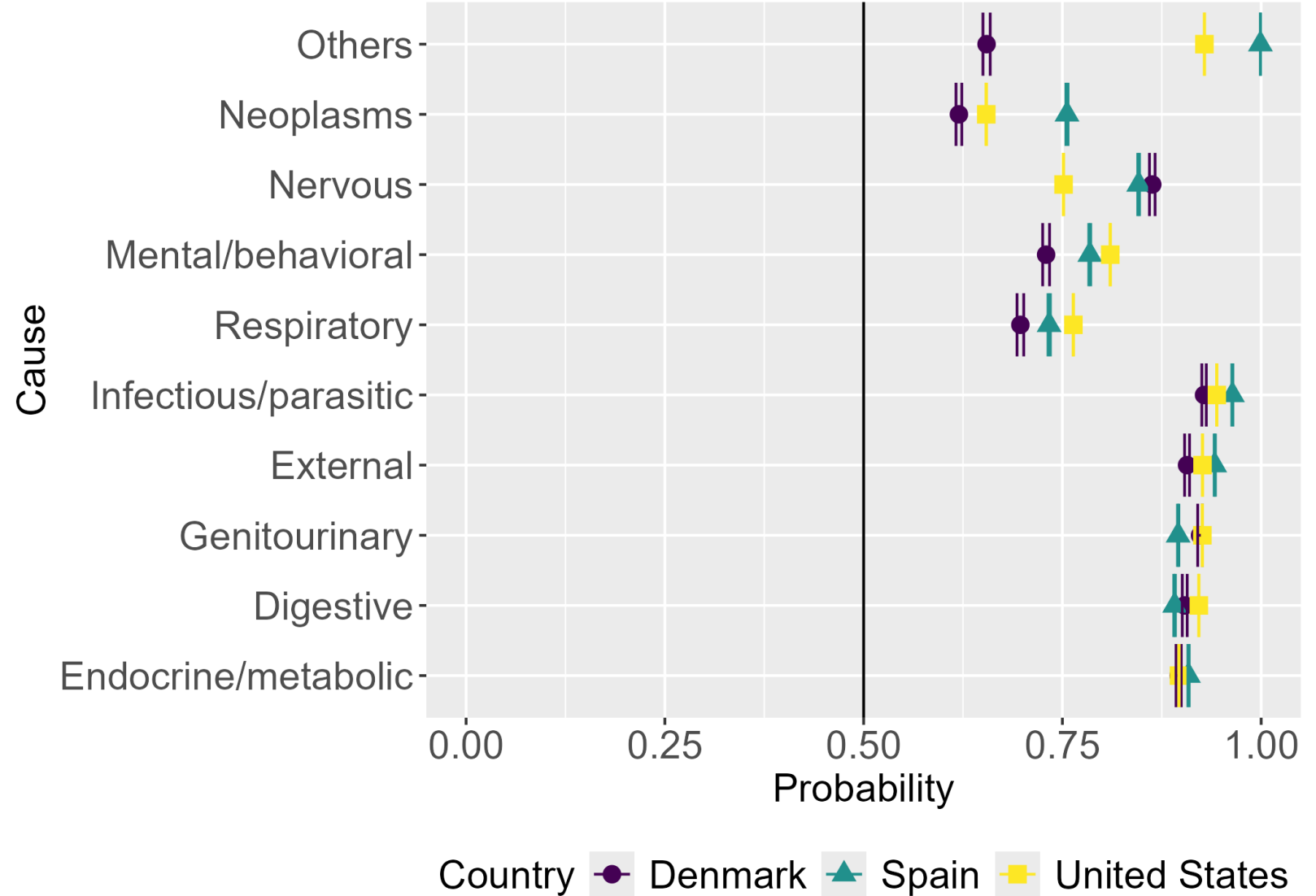
- Pairwise comparison:
 - Each cause are compared against all the others

- Probability of dying of cause A before B:
 - Outsurvival statistics – Independent causes (not shown)
 - Cumulative Incidence Function/Multiple Decrement Life Tables – Dependent causes

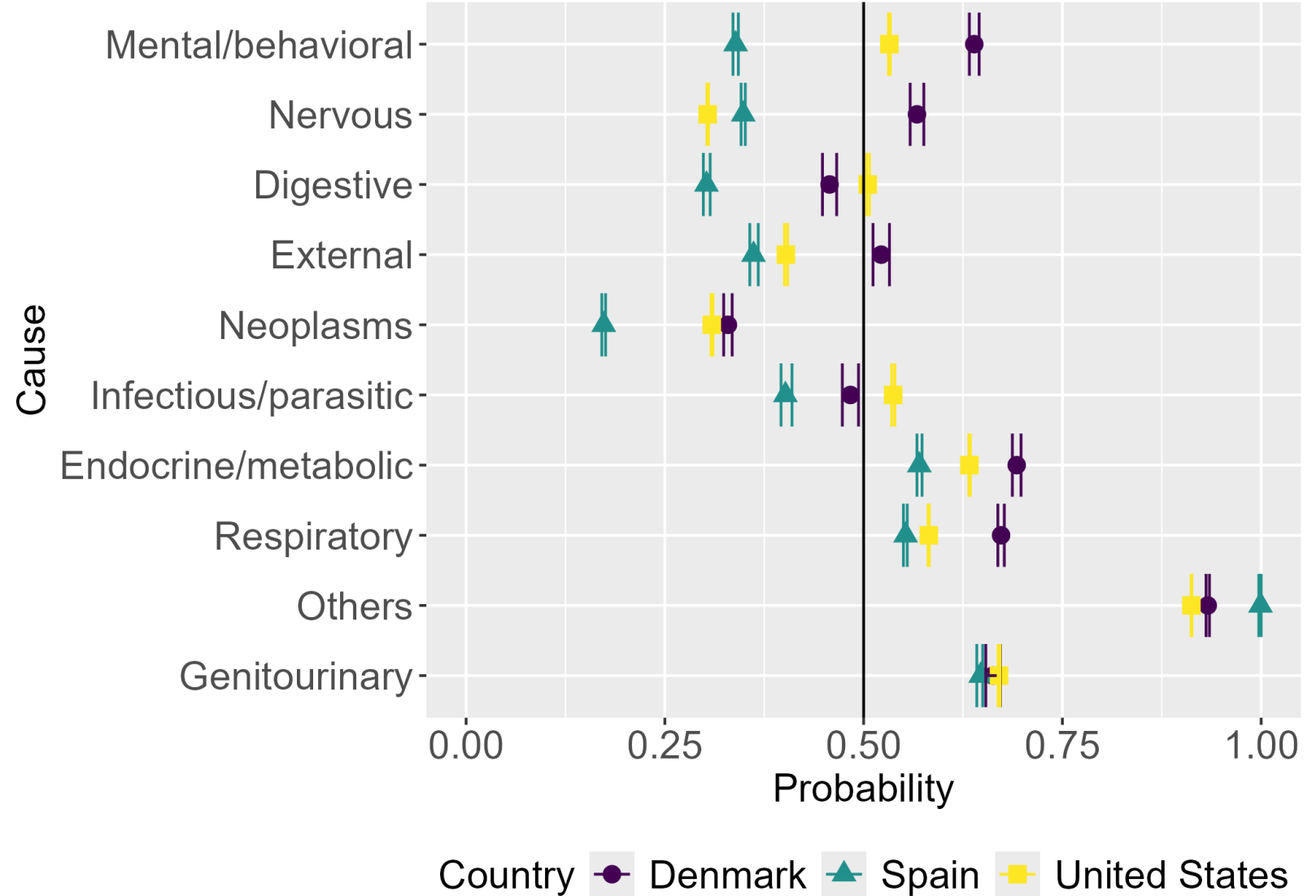
- Underlying causes (UC) or Multiple causes of death (MCoD):
 - Probability estimated from the mortality risks from the underlying cause only
 - Probability estimated from the mortality risks when both diseases compared are reported on the death certificate

- Real vs MCoD approach:
 - Real risk for Denmark: Population with both diseases being compared and die of either one of them

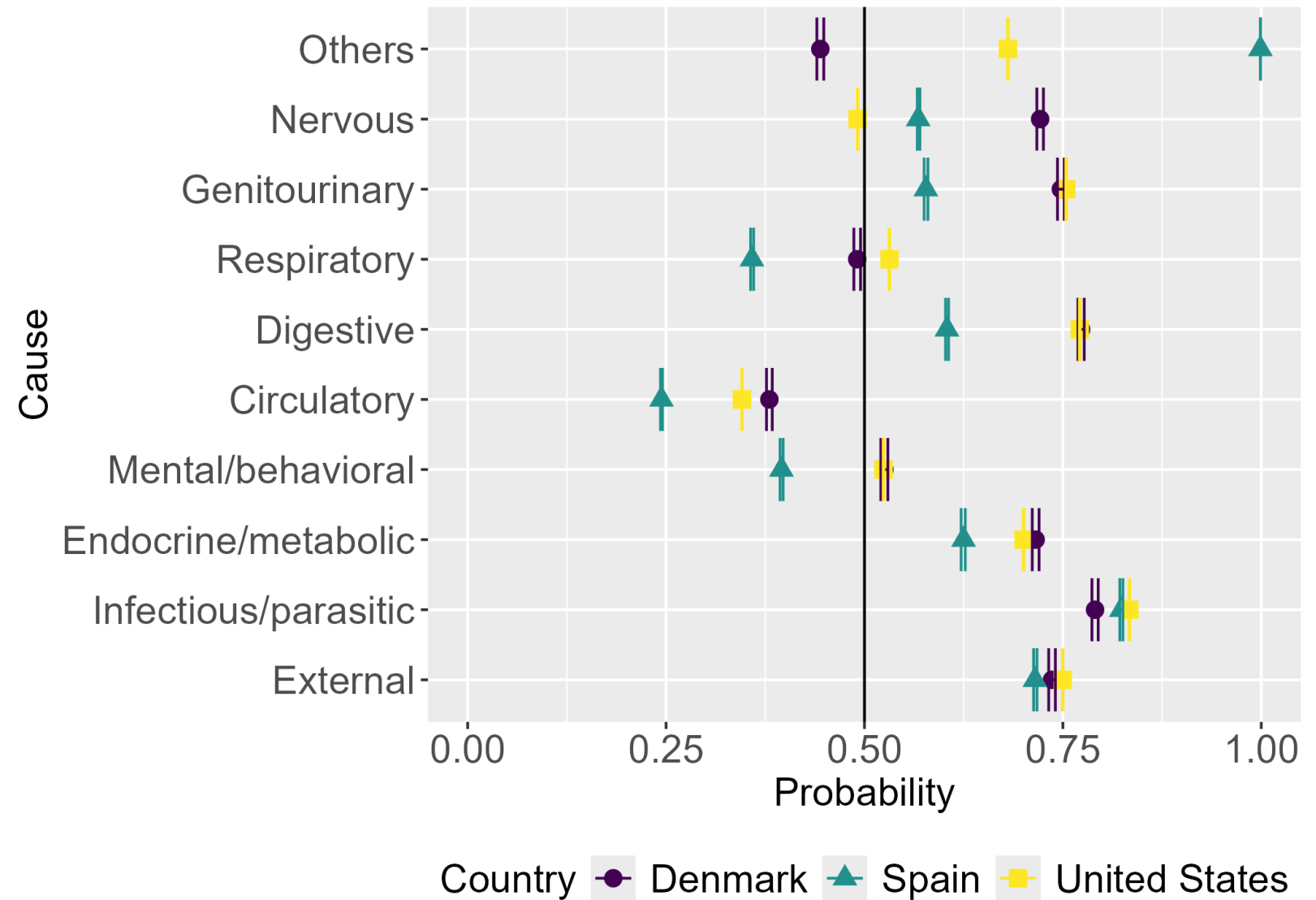
Diseases of the circulatory system - UC



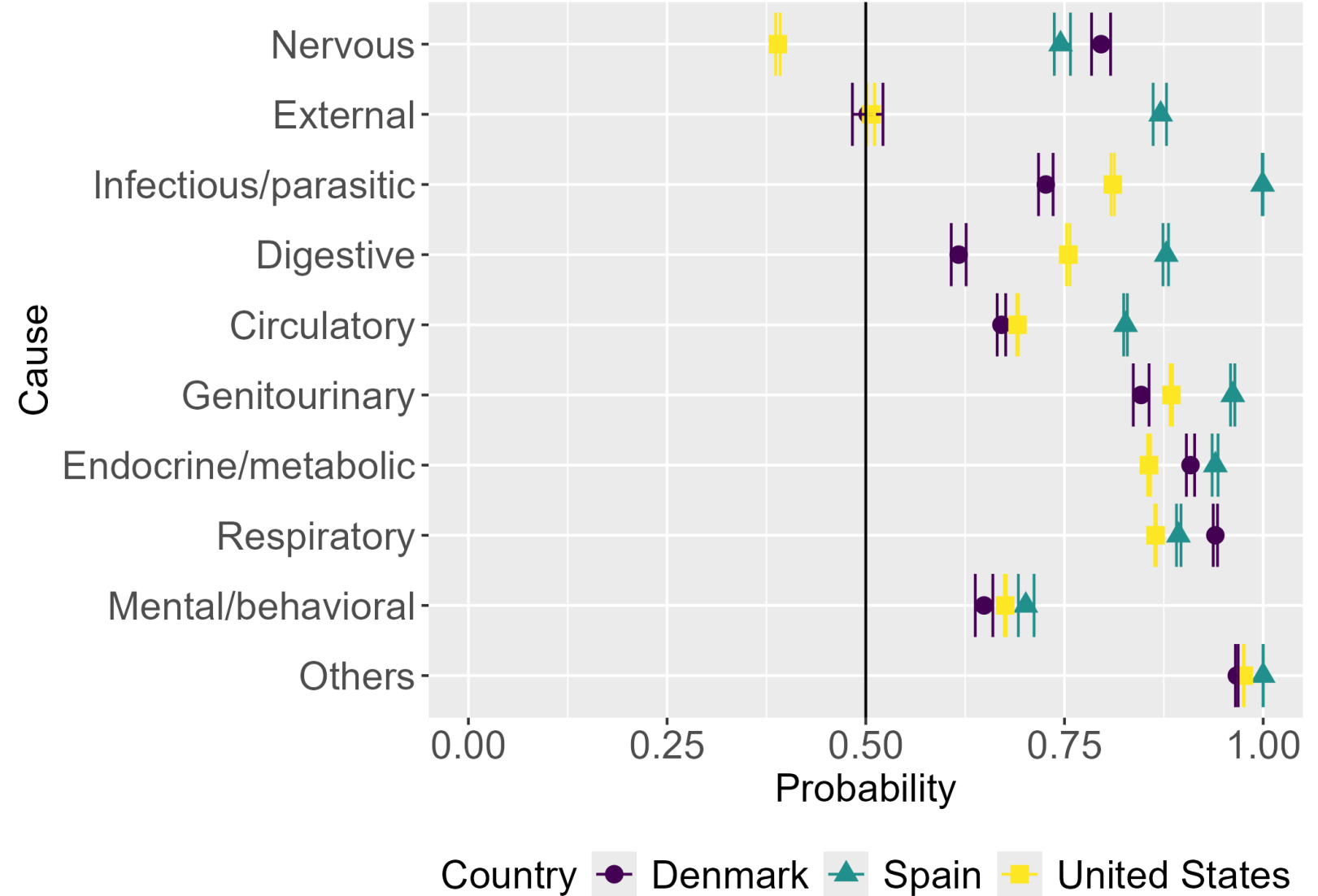
Diseases of the circulatory system - MCoD



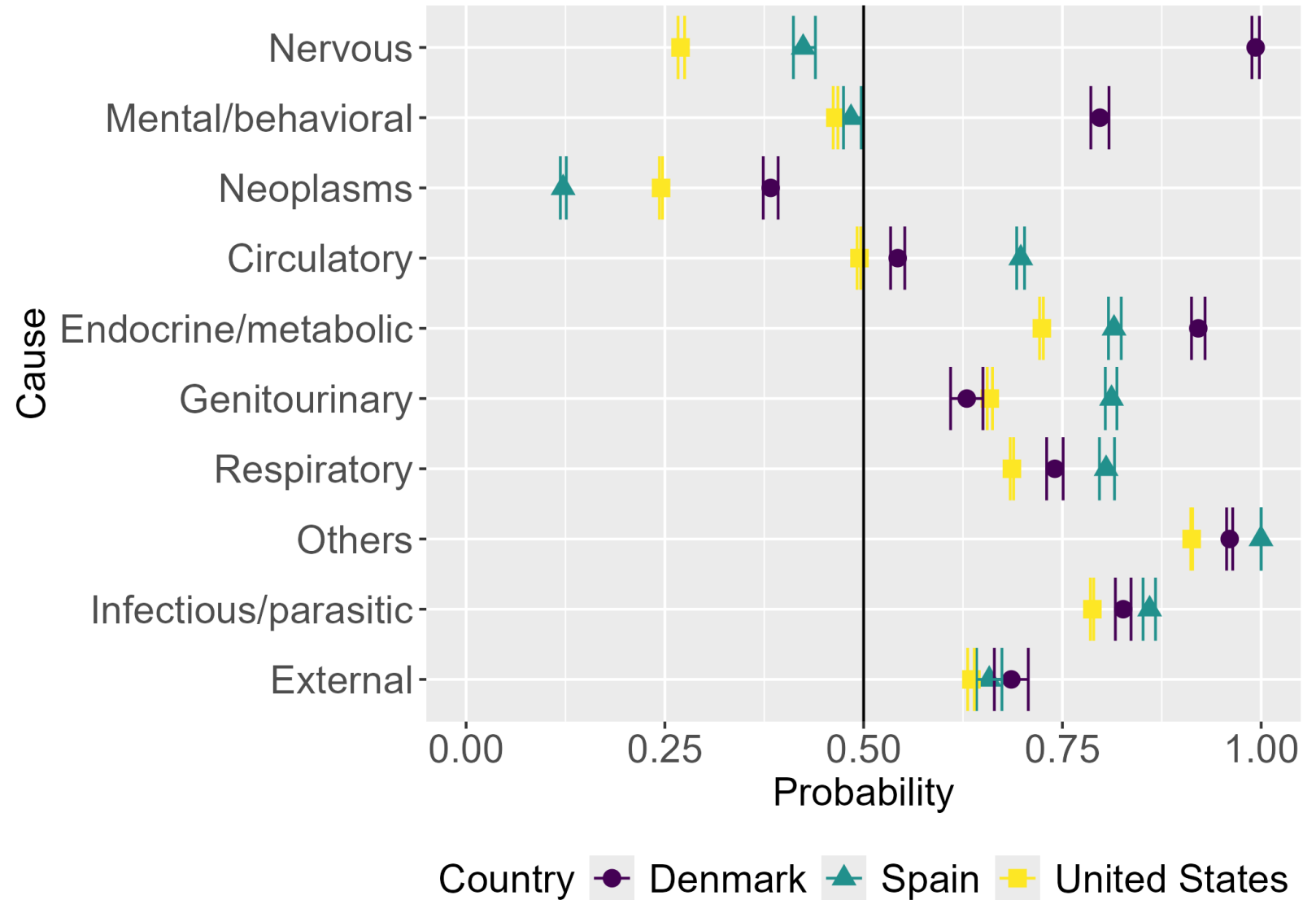
Neoplasms - UC



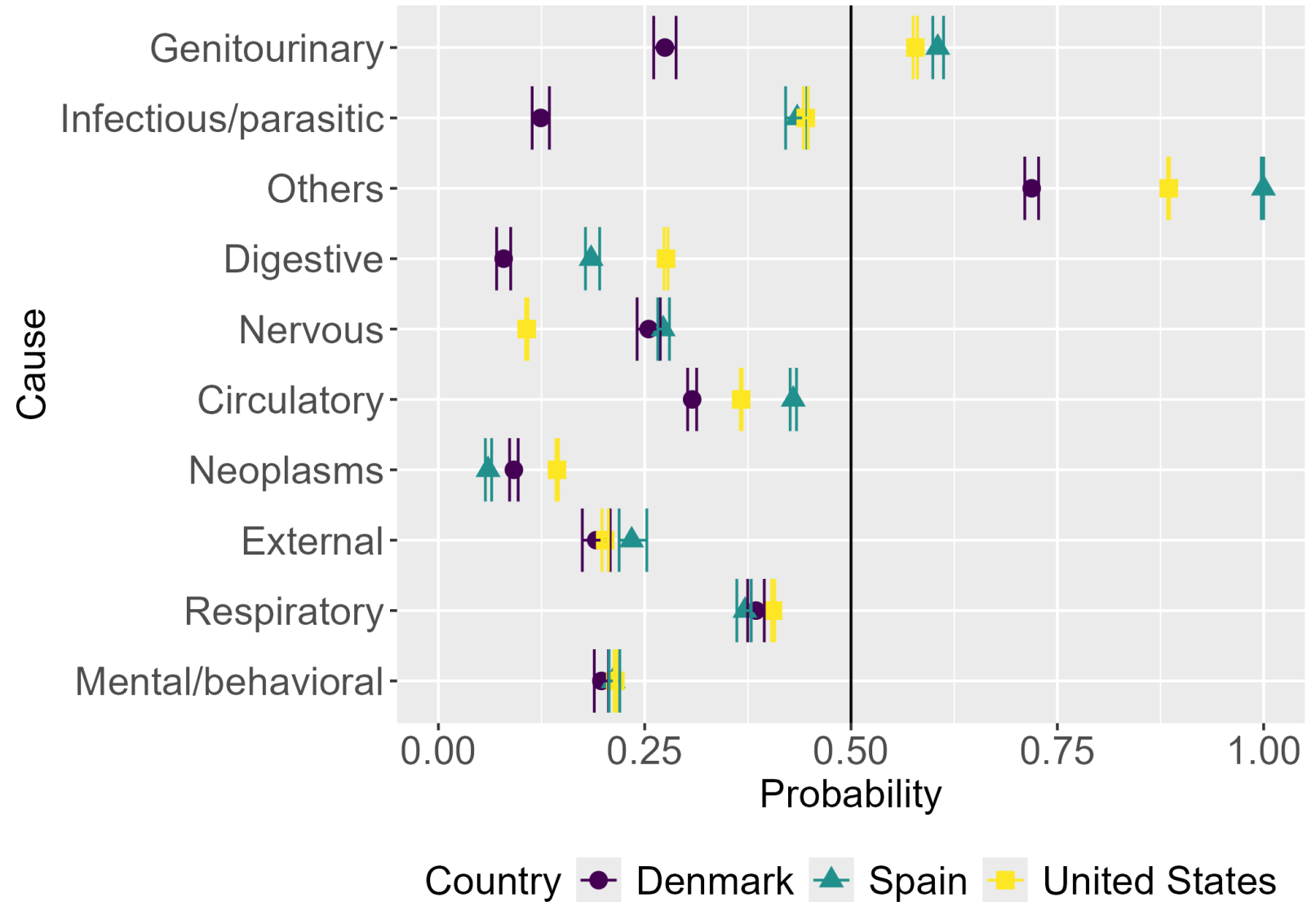
Neoplasms- MCoD



Diseases of the digestive system-MCoD



Endocrine, nutritional and metabolic diseases- MCoD



MCoD vs “real” competing risk

Die of A before B	Real	MCoD
COPD before Dementia	77.3 [75.6,78.9]	62.3 [58.1,66.4]
COPD before Diabetes	91.8 [90.9,92.8]	80.6 [77.1,84.5]
Dementia before Diabetes	88.0 [86.3,89.5]	73.1 [66.3,77.6]

Discussion

- Some diseases have a higher chance of being the UC
- Consistencies across countries are found, with notable exceptions
- Probability changes when both diseases compared are reported on death certificate

- Pairwise comparison - Oversimplification
- Data quality

- Next steps:
 - Confidence intervals
 - More countries?
 - More diseases to be included in the "real" risk analysis

Thank you!



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