

The Role of Multimorbidity in Predicting Outcomes of Post-Stroke Rehabilitation

Adrian Melnic, Anastasia Rotăreanu, Iana
Sandrosean, Alisa Tăbîrță

Nicolae Testemițanu State University of Medicine and Pharmacy
Department of Medical Rehabilitation, Physical Medicine and Manual Therapy
Chișinău, Republic of Moldova

Disclosure statement

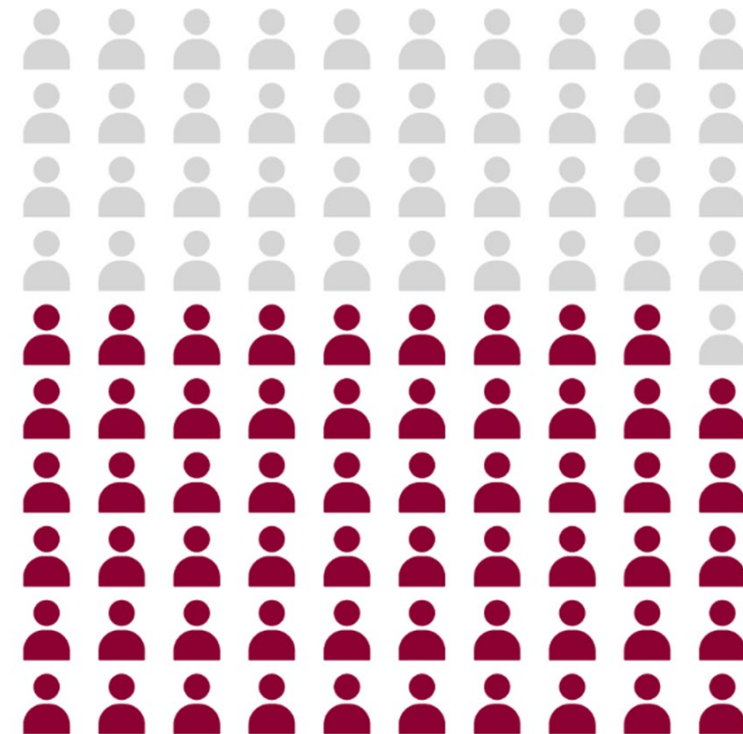
**I have no actual or potential conflict of interest in relation to this
program/presentation.**

Why does it matter?

- Most stroke survivors live with more than one chronic condition.
- Comorbidity burden influences complications, length of stay, discharge destination, and long-term independence.
- It does not replace stroke severity, but it refines prognosis and helps tailor rehabilitation.

59% of stroke survivors in the UK are also living with **3 or more** of any comorbidity.

This is an estimated **770,000** people.



What are we measuring?

Comorbidity = diseases coexisting with stroke as the index event.

Multimorbidity = two or more chronic conditions, without a single main disease.

Burden may be expressed by counts, weighted scores (CCI/ECI), frailty, or functional reserve.

The clinically useful question is not only how many diseases, but also which cluster limits recovery.

Instrument	Nr. de Patologii	Unitate Destinație	Scop
CIRS (Cumulative Illness Rating Scale)	13 (19)	Spitale generale și specializate	Starea fizică
CCI (Charlson Comorbidity Index)	17	Studii clinice și cercetare	Mortalitatea
Elixhauser Comorbidity Index	30	Spitale, clinici și studii epidemiologice	Gruparea pacienților / Resurse intraspital
Self-Administered Comorbidity Questionnaire (SCQ)	13	Îngrijire primară și urgențe	Monitorizarea longitudinală a sănătății

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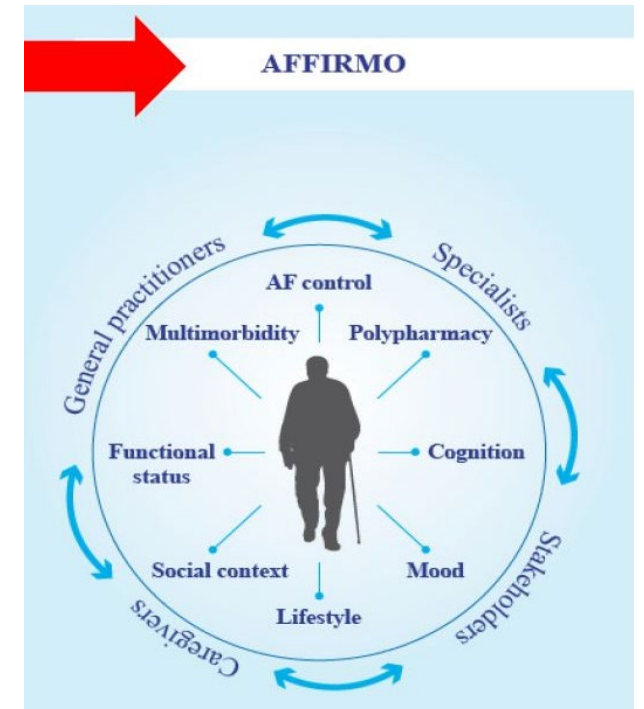
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How does comorbidity translate into disability?

- Lower physiological reserve and worse tolerance to acute stress, immobility, infection, and intensive therapy.
- Higher risk of systemic complications, polypharmacy, delirium, depression, and treatment interactions.
- Reduced participation in rehabilitation, slower motor learning, and lower functional gain.
- More complex discharge planning, caregiver burden, and reduced community reintegration.



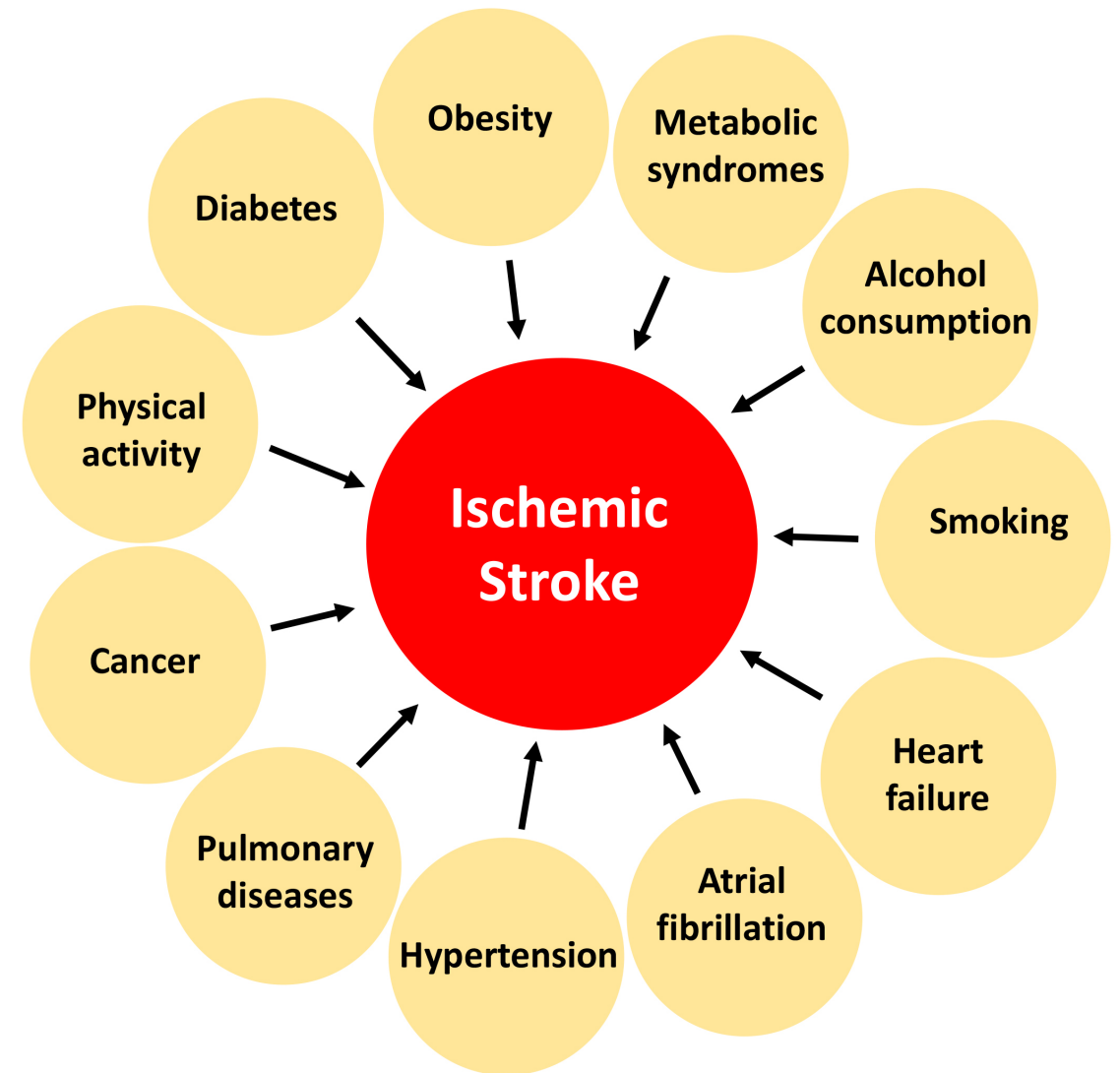
What do the key studies suggest?

- Goldstein et al. validated Charlson-based comorbidity adjustment for ischemic stroke outcome studies.
- Bushnell et al. found that higher prestroke Charlson burden was independently associated with poorer 90-day mRS in women.
- Tam and Bayley reported heterogeneous evidence, but severe diabetes and other active comorbidities may worsen rehabilitation outcomes.
- Jiang et al. supported the overall association between multiple chronic conditions and worse post-stroke functional outcome.



Aim of the Study

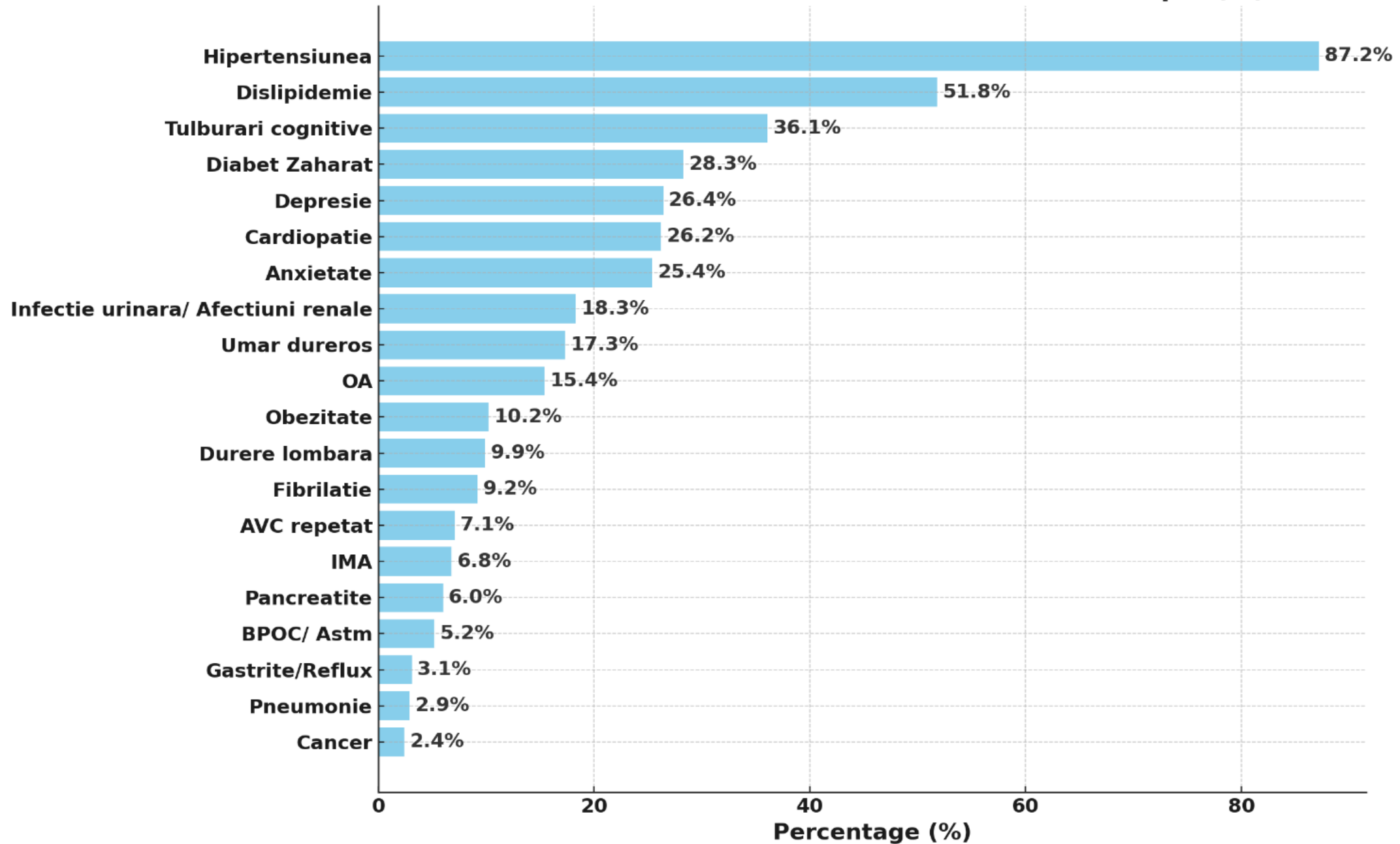
- To investigate how specific **post-stroke comorbidities** influence the core dimensions of recovery:
 - 🧑 **Functional independence** (evaluated using the Barthel Index)
 - ❤️ **Quality of life** (measured through the EQ-VAS scale)
- The predictive potential of comorbidity scores for functional outcomes



Materials and Methods

- **Design** -  Cross-sectional study on 382 post-stroke patients in subacute/chronic rehabilitation. (demographic data)
- **Comorbidities:**  Identified via clinical records (ICD-10); included in regression as binary variables. NUMBER / CCI , CIRS
- **Outcomes:**
 -  **Barthel Index, mRs**— for functional independence
 -  **EQ-VAS** – for perceived quality of life
- **Analysis:**
 -  Multivariable linear regression / ROC curve
 -  Significance set at **p < 0.001**

Prevalence of Medical Conditions in Total Sample (%)



Comorbidities and Barthel Index

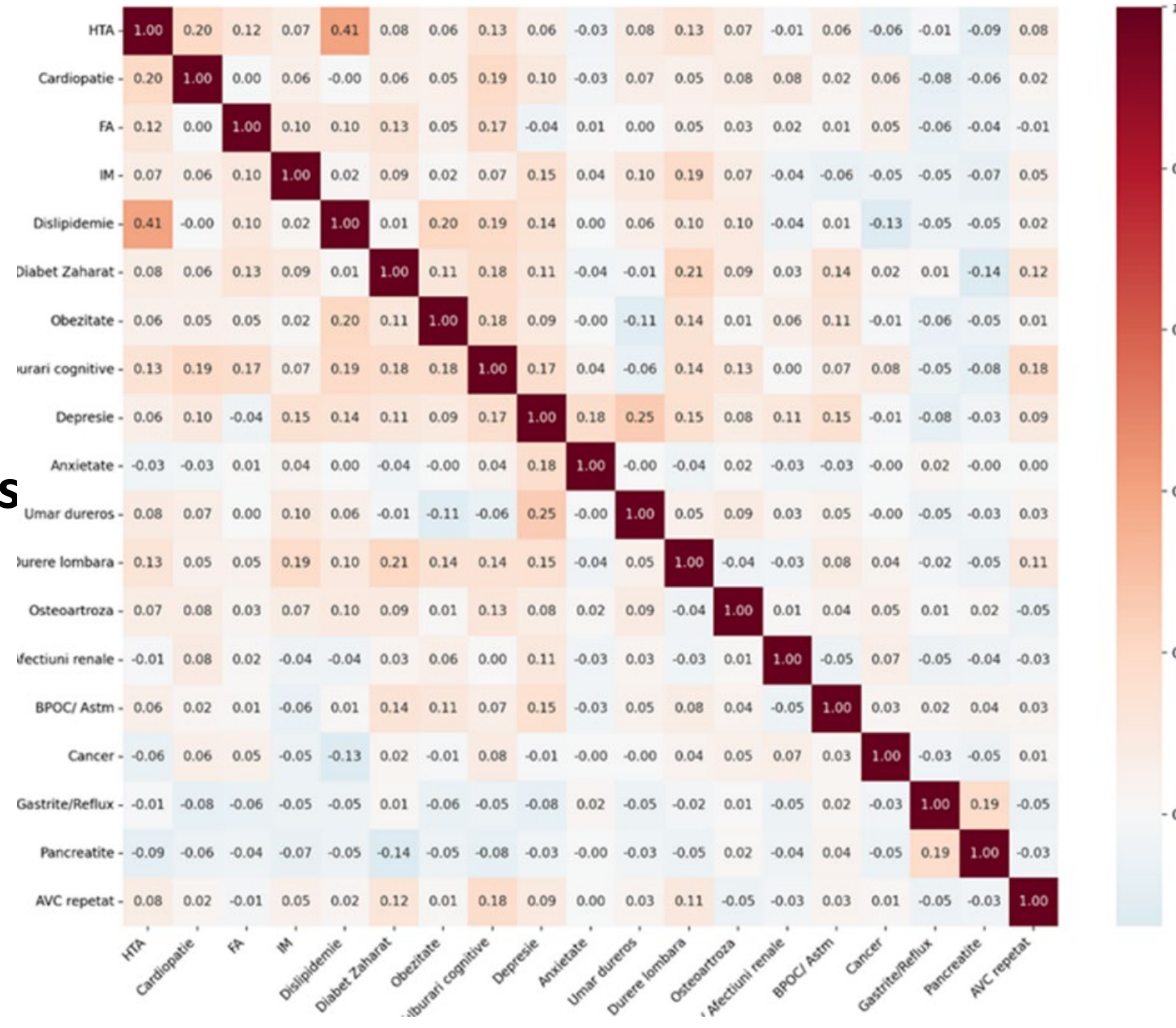
Comorbidity	B	SE	β	t	p
Cancer	-19.018	3.146	-.211	-6.045	< .001
Anxiety	-6.241	1.095	-.199	-5.702	< .001
Recurrent Stroke	-9.887	1.865	-.186	-5.300	< .001
Diabetes	-5.546	1.095	-.183	-5.065	< .001
Depression	-5.292	1.177	-.171	-4.498	< .001
COPD/Asthma	-9.715	2.189	-.158	-4.437	< .001
Cardiopathy	-4.762	1.115	-.153	-4.272	< .001
UTI/Renal Issues	-4.633	1.221	-.131	-3.796	< .001
Cognitive Disorders	-3.646	1.076	-.128	-3.390	.001
Osteoarthritis	-4.630	1.329	-.123	-3.484	.001
Obesity	-5.427	1.621	-.120	-3.349	.001
Low Back Pain	-4.824	1.630	-.106	-2.959	.003
Atrial Fibrillation	-4.922	1.675	-.104	-2.939	.004

Comorbidities and EQ VAS

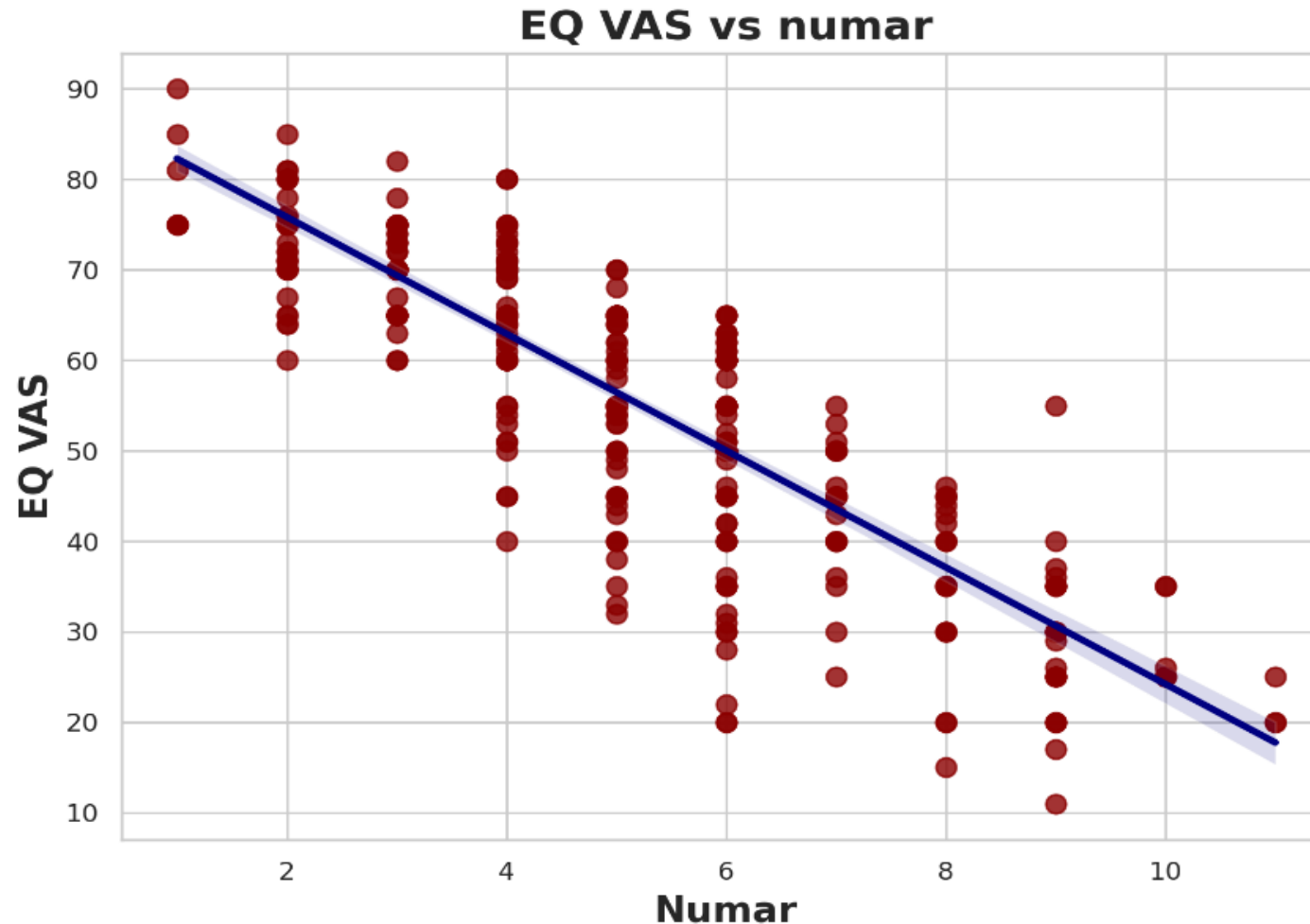
Comorbidity	B	SE	β	t	p
Cancer	-17.118	3.518	-0.175	-4.866	.000
Diabetes	-6.940	1.224	-0.211	-5.668	.000
Depression	-8.245	1.316	-0.245	-6.267	.000
Recurrent Stroke	-8.859	2.086	-0.153	-4.247	.000
COPD/Asthma	-9.151	2.448	-0.138	-3.738	.000
Osteoarthritis	-7.632	1.486	-0.186	-5.135	.000
Obesity	-6.698	1.812	-0.137	-3.696	.000
Cognitive Disorders	-4.051	1.203	-0.131	-3.368	.001
Cardiopathy	-3.186	1.246	-0.095	-2.556	.011
UTI/Renal Issues	-3.477	1.365	-0.091	-2.547	.011
MI	-5.067	2.157	-0.086	-2.350	.019
Pancreatitis	-4.629	2.230	-0.074	-2.076	.039
Low Back Pain	-4.793	1.823	-0.097	-2.629	.009
Anxiety	-5.235	1.224	-0.154	-4.277	.000

Hot spots

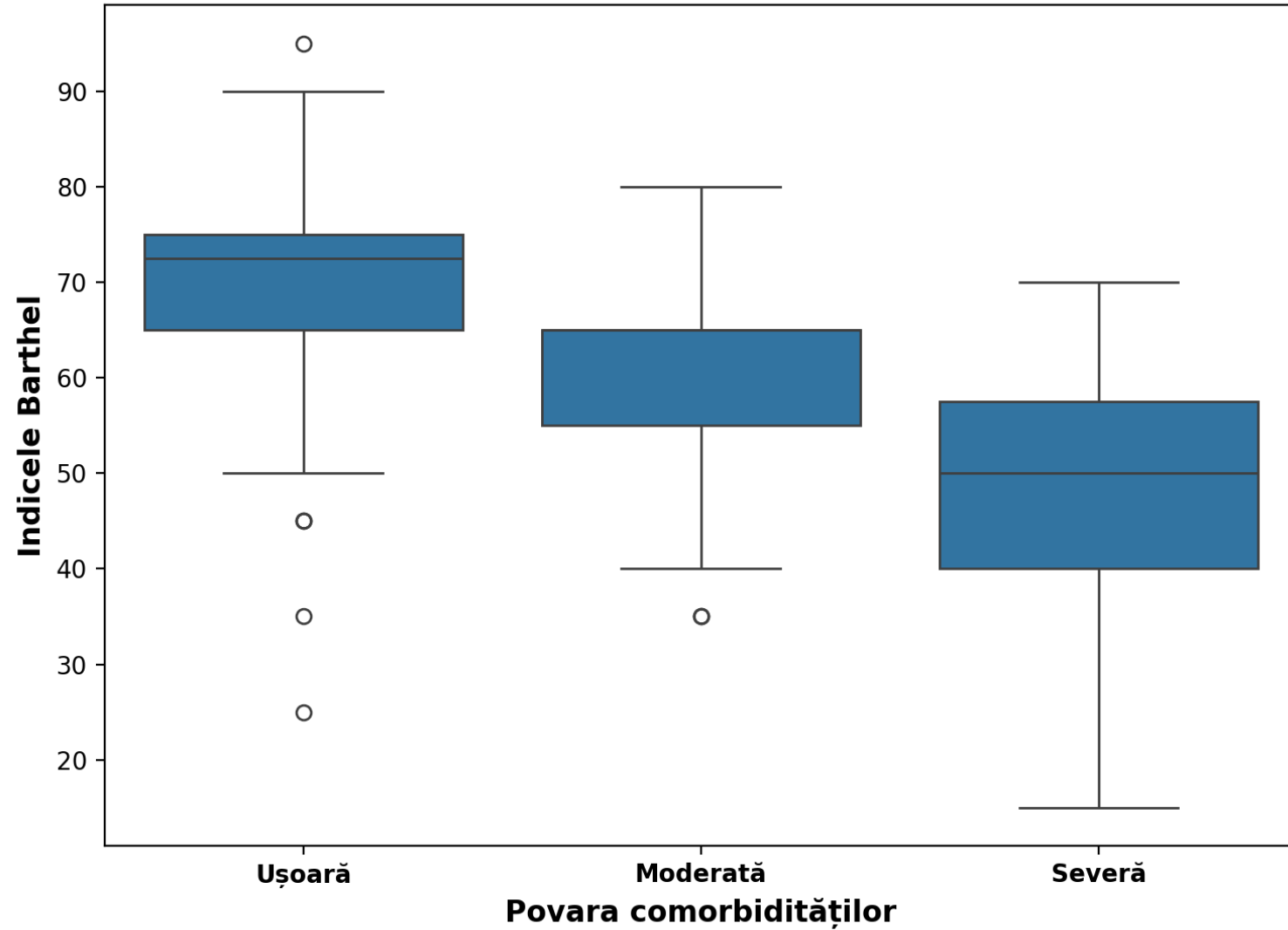
- HTA – Dyslipidemia
- Depression – Anxiety
- Depression – Shoulder pain
- Diabetes – Obesity
- Low back pain – Osteoarthritis
- Diabetes – Low back pain



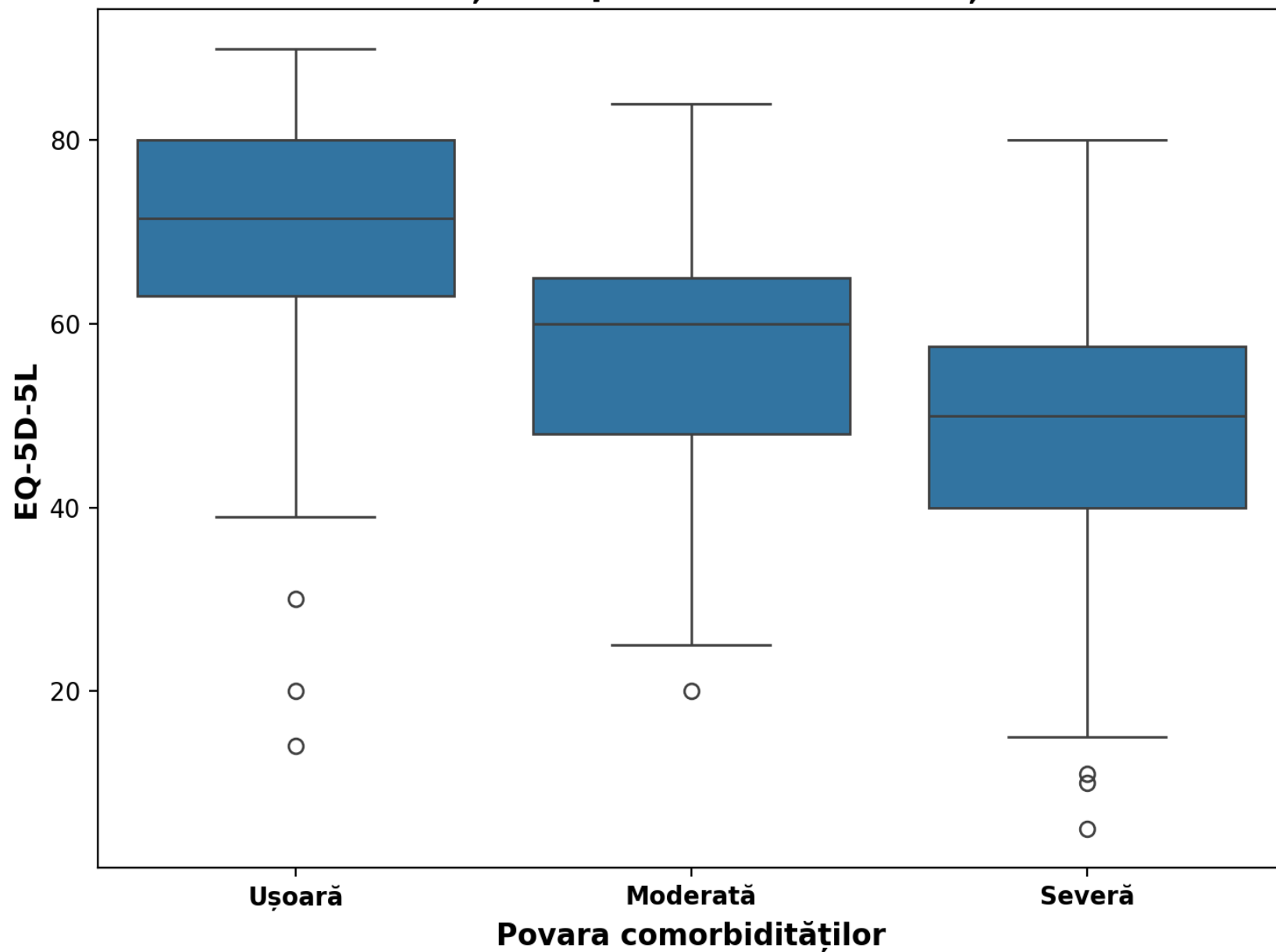
1 comorbidity will determine a slope of -6.4 points in EQ VAS



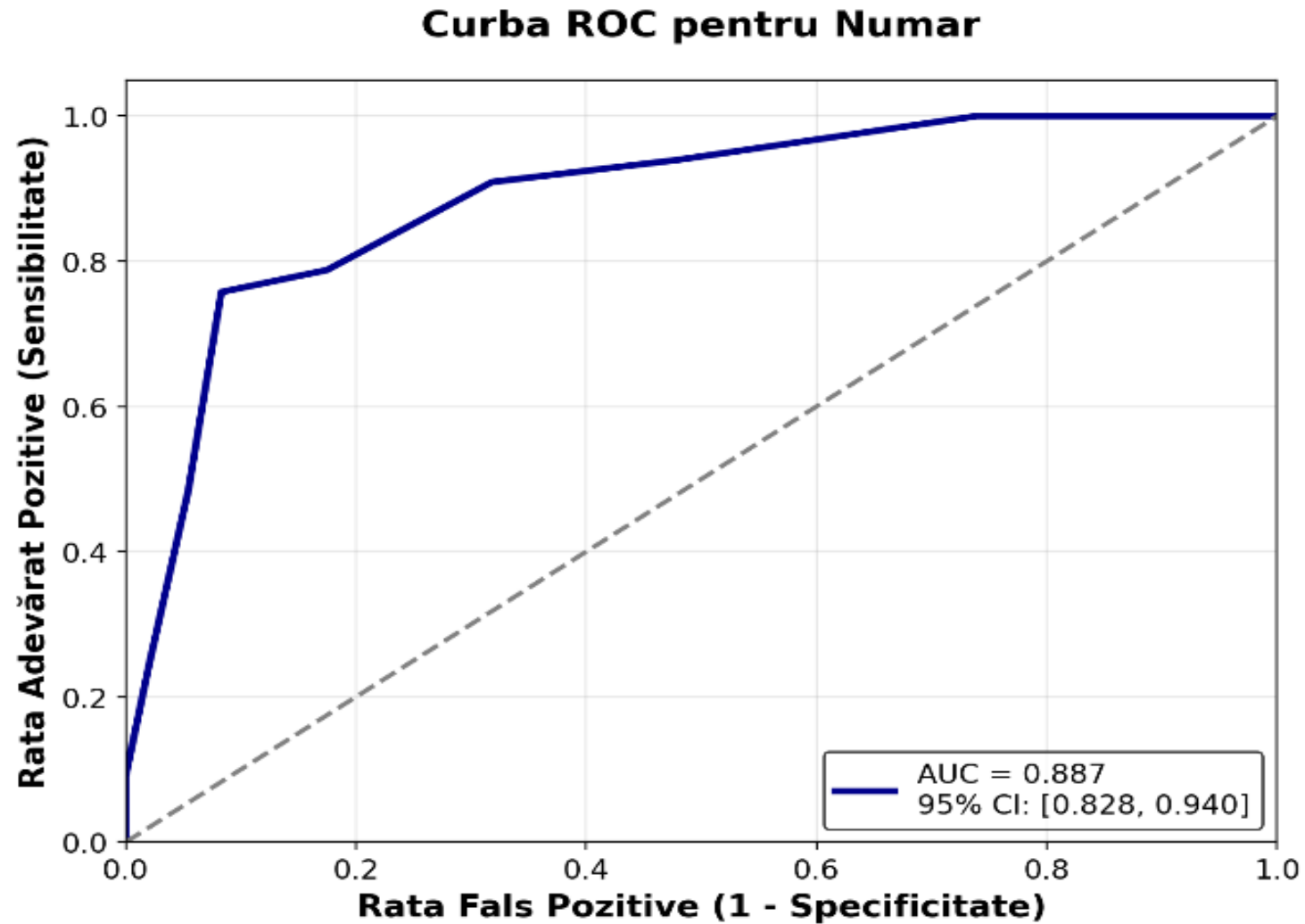
Distribuția Indicelui Barthel în funcție de povara comorbidităților



Distribuția EQ-5D-5L în funcție de povara comorbidităților



ROC CURVE FOR PREDICTION



Which comorbidities seem most relevant?

- Cardiometabolic: diabetes, coronary disease, atrial fibrillation, heart failure, chronic kidney disease.
- Neuropsychiatric/cognitive: depression, anxiety, cognitive impairment, dementia, delirium.
- Frailty-related and systemic factors: malnutrition, sarcopenia, anemia, recurrent infections.
- Musculoskeletal pain and osteoarthritis may further reduce mobility, endurance, and participation.

Clinical implications for rehabilitation

- Screen comorbidity burden at admission using an explicit diagnosis list and a structured index.
- Identify high-impact conditions early: severe diabetes, AF, CHF, CKD, depression, cognitive vulnerability, frailty.
- Optimize medication, complication prevention, nutrition, mood, sleep, continence, and cardiometabolic control.
- Comorbidity should personalize rehabilitation, not become a reason to deny it.

Take-home messages

- Multimorbidity is common after stroke and clinically meaningful.
- Comorbidity burden predicts disability, but mostly as an adjunct to neurological severity.
- Cardiometabolic and neuropsychiatric clusters are especially relevant for functional recovery.
- The best models are integrated models: stroke severity + baseline function + comorbidity + frailty + context.
- Rehabilitation planning should be individualized, proactive, and multidisciplinary.

Selected references

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