ASSOCIATION BETWEEN FRAILTY INDEX AND REFERRALS TO HOSPITALS IN OUTPATIENTS FOLLOWED IN GERMAN GENERAL PRACTICES

EPH10

IQVIA

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Background

Frailty is a syndrome defined by increased vulnerability to endogenous and exogenous stressors (1). Its prevalence ranges between 12% to 24% in the older population worldwide (2).

In the International Classification of Diseases - 10th revision (ICD-10), there is no code for frailty apart from R54 (i.e., age-related physical debility or senility) and frailty is rarely documented in primary care practices.

Recently, Subramaniam et al. (3) identified 11 surrogates of the modified Frailty Index (mFI) based on 54 diagnoses with corresponding ICD-10 codes. Therefore, the mFI allows for the use of administrative databases and electronic records to investigate frailty. However, to the best of the authors' knowledge, no research has yet shown how frequent the ICD-10 surrogates of the mFI are in primary care settings and if these surrogates might predict future hospitalizations.

Therefore, the goal of this study was to investigate (1) the **prevalence of ICD-10 surrogates of the mFI** and (2) their **association with 12-month referral to the hospital** in older adults followed in general practices in Germany.

Methods

The present study used data from the Disease Analyzer database (IQVIA) that contains demographic, diagnosis, and prescription data collected in general and specialized practices in Germany (4).

Patients followed in a general practice in Germany between 2010 and 2021, aged ≥65 years at their most recent visit (index date), and with at least 12 months follow-up time before the index date were included into the study.

The 11 ICD-10 surrogates of the mFI are displayed in **Table 1**. Following previous research using the original mFI (5), frailty was defined as the presence of more than three ICD-10 surrogates of the mFI. In the primary analysis, the number of ICD-10 surrogates of the mFI was included as a four-category variable (i.e., zero, one, two to three, and more than three surrogates). In the secondary analysis, the number of ICD-10 surrogates of the mFI was included as a three-category (i.e., zero, one to two, and at least three surrogates) and continuous variable.

The association between the number of ICD-10 surrogates of the mFI and incident 12-month referral to the hospital was investigated overall and stratified by age and sex groups using age and sex adjusted Cox regression models.

Results

This study included 1,406,038 patients followed in 1,284 general practices in Germany (15% of eligible patients). The mean (SD) age was 77.0 (7.9) years with slightly more women included (56.2%) (**Table 2**). The prevalence of the ICD-10 surrogates of the mFI ranged between 3.3% (women: 3.2%, men 3.5%) for surrogate 9 "history of TIA or stroke without neurological deficit" and 68.1% (women: 68.0%, men 68.2%) for surrogate 2 "history of hypertension requiring medication".

The **prevalence** of one, two to three, and more than three ICD-10 surrogates of the mFI was 24%, 37%, and 23% in the overall population, respectively. The proportion of individuals with more than three ICD-10 surrogates (i.e., with frailty) increased with age and was higher for men in all age groups (**Figure 1**).

The strength of the **association between the number of ICD-10 surrogates of the mFI and 12-month hospital referral** increased with a higher number of ICD-10 surrogates (**Table 3**). This trend was seen over all age and sex groups (**Table 3**) as well as different categorizations of the number of ICD-10 surrogates of the mFI and whether it was included as a categorical or continuous variable (data not shown).

Conclusion

The prevalence of frailty was relatively high in this older population followed in general practices in Germany.

In addition, there was a positive and significant association between the number of ICD-10 surrogates of the mFI and 12-month referral to the hospital.

These findings highlight the urgent need to document and prevent the occurrence of frailty in general practices. Finally, more research based on ICD-10 data is warranted to investigate further the epidemiology of frailty in primary care settings, e.g. in specialized practices.

References

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Table 1. Surrogates of the modified Frailty Index

Surrogate	
Surrogate 1:	functional status (not independent)
Surrogate 2:	history of hypertension requiring medication
Surrogate 3:	history of chronic obstructive pulmonary disease or pneumonia
Surrogate 4:	history of impaired sensorium
Surrogate 5:	history of diabetes mellitus
Surrogate 6:	history of myocardial infarction
Surrogate 7:	history of congestive heart failure
Surrogate 8:	history of stroke with neurologic deficit
Surrogate 9:	history of TIA or stroke without neurological deficit
Surrogate 10:	history of PCI, angina or stenting
Surrogate 11:	history of peripheral vascular disease or ischemic rest pain

Table 2. Demographic characteristics of included patients

Characteristic	N (%)
Age at index date (in years)	
Mean (standard deviation)	77.0 (7.9)
65 - 69	311,069 (22.1)
70 - 74	281,557 (20.0)
75 - 79	262,588 (18.7)
80 - 84	279,103 (19.9)
85 - 89	177,851 (12.6)
≥90	93,870 (6.7)
Sex	
Women	790,263 (56.2)
Men	615,775 (43.8)

Figure 1. Proportions of individuals with zero, one, two to three, and more than three ICD-10 surrogates of the modified frailty index in the overall sample and by age and sex groups
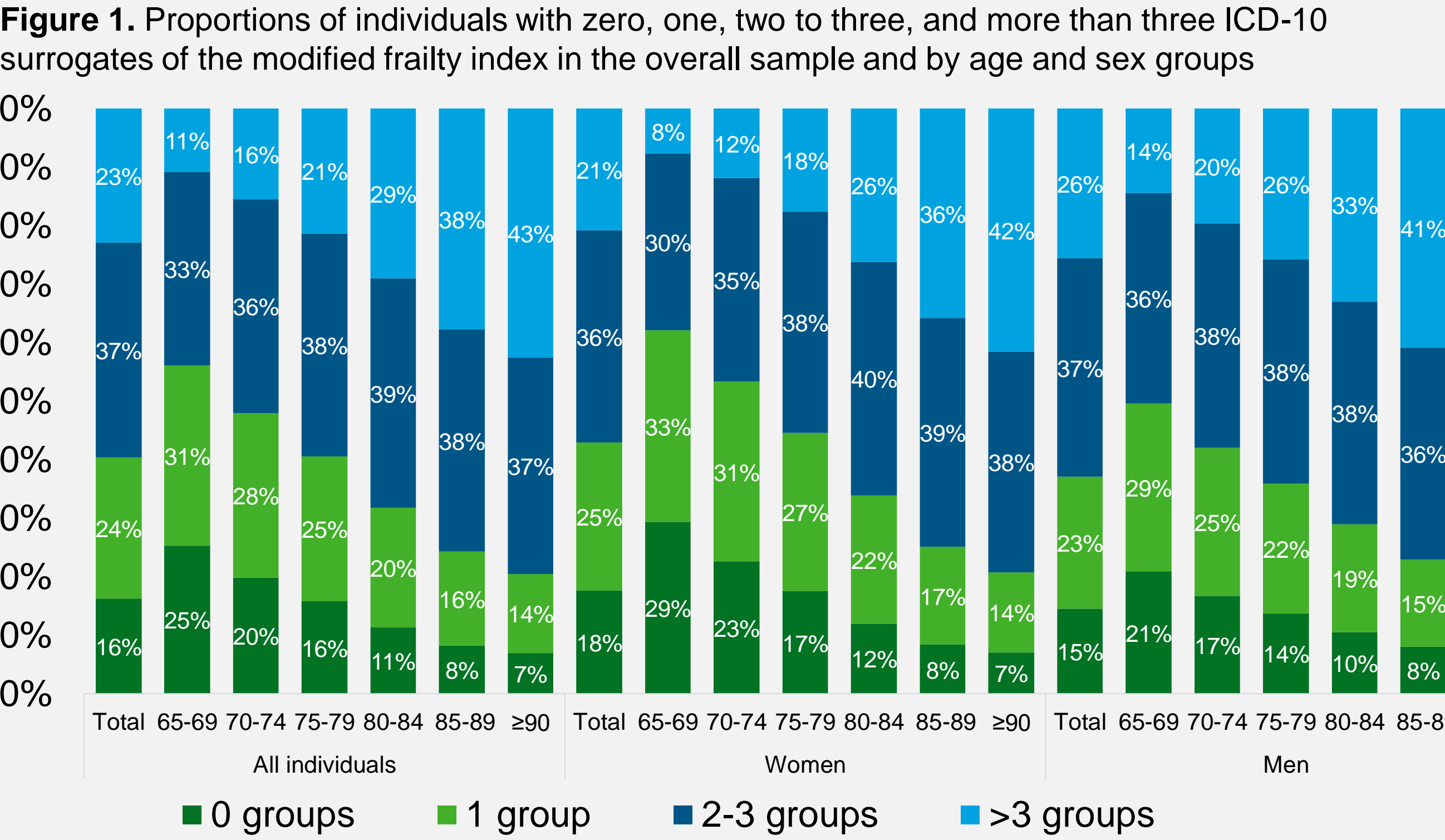

Table 3. Association between the number of ICD-10 surrogates of the modified Frailty Index and 12-month incident hospital referral (primary analysis)

Group	1 ICD-10 surrogate	2-3 ICD-10 surrogates	>3 ICD-10 surrogates
Overall sample[1]	1.37 (1.31-1.42)	2.00 (1.93-2.08)	3.32 (3.19-3.44)
Within age groups (in years)[2]			
65 - 69	1.36 (1.27-1.46)	1.99 (1.87-2.12)	3.48 (3.24-3.73)
70 - 74	1.33 (1.23-1.44)	1.93 (1.79-2.07)	3.45 (3.21-3.72)
75 - 79	1.37 (1.24-1.50)	1.93 (1.77-2.11)	3.39 (3.10-3.70)
80 - 84	1.33 (1.20-1.47)	1.96(1.84-3.42)	3.11 (2.84-3.42)
85 - 89	1.48 (1.24-1.78)	2.20 (1.86-2.59)	3.39 (2.87-3.99)
≥90	1.59 (1.17-2.18)	2.57 (1.93-3.43)	3.51 (2.64-4.66)
Within sex[3]			
Women	1.43 (1.36-1.51)	2.15 (2.05-2.26)	3.42 (3.25-3.60)
Men	1.29 (1.21-1.37)	1.85 (1.75-1.95)	3.18 (3.01-3.37)

This table includes HR [95% CI] against 0 ICD-10 surrogates as the reference group.
[1] adjusted for age and sex. [2] adjusted for sex. [3] adjusted for age.