

Table S1. Disease Definitions and Corresponding ICD-10 Codes for Baseline Characteristics

Disease	ICD-10	Description	Disease	ICD-10	Description
Diabetes	E10	Type 1 diabetes mellitus	Chronic kidney diseases	N184	Chronic kidney disease, stage 4
	E11	Type 2 diabetes mellitus		N185	Chronic kidney disease, stage 5
	E12	Malnutrition-related diabetes mellitus		N189	Chronic kidney disease, unspecified
	E13	Other specified diabetes mellitus	Transplantation	Z94	Transplanted organ and tissue status
	E14	Unspecified diabetes mellitus	Acquired immunodeficiency syndrome	B20	Human immunodeficiency virus [HIV] disease resulting in infectious and parasitic diseases
Hypertension	I10	Essential(primary) hypertension		B21	Human immunodeficiency virus [HIV] disease resulting in malignant neoplasms
	I11	Hypertensive heart disease		B22	Human immunodeficiency virus [HIV] disease resulting in other specified diseases
	I12	Hypertensive renal disease		B23	Human immunodeficiency virus [HIV] disease resulting in other conditions
	I13	Hypertensive heart and renal disease		B24	Unspecified human immunodeficiency virus [HIV] disease
	I15	Secondary hypertension	Stroke	I63	Cerebral infarction
Dyslipidemia	E78	Disorders of lipoprotein metabolism and other lipidaemias		I64	Stroke, not specified as haemorrhage or infarction
Heart failure	I50	Heart failure	Cancers (not lung)	Cxx	All cancers except lung
Cardiovascular diseases	I20	Angina pectoris	Lung cancer	C33	Malignant neoplasm of trachea
	I21	Acute myocardial infarction		C34	Malignant neoplasm of bronchus and lung
	I22	Subsequent myocardial infarction of anterior wall	Connective tissue diseases	M32	Systemic lupus erythematosus
	I23	Certain current complications following acute myocardial infarction		M33	Dermatopolymyositis
	I24	Other acute ischaemic heart diseases		M34	Systemic sclerosis
	I25	Chronic ischaemic heart disease			
Liver cirrhosis	K746	Other and unspecified cirrhosis of liver			
	K703	Alcoholic cirrhosis of liver			
	K743	Primary biliary cirrhosis			
	K717	Toxic liver disease with fibrosis and cirrhosis of liver			

Table S2. Baseline Characteristics of the Matched Elderly and Very Elderly Pneumonia Patients

Characteristics	Total (n = 444,788)	Elderly (n = 222,394)	Very Elderly (n = 222,394)	P-value	SMD
Age group				-	-
65-70	53,027 (11.9)	53,027 (23.8)			
70-75	72,610 (16.3)	72,610 (32.7)			
75-80	96,757 (21.8)	96,757 (43.5)			
80-85	119,393 (26.8)		119,393 (53.7)		
85-90	70,454 (15.8)		70,454 (31.7)		
90-95	26,034 (5.9)		26,034 (11.7)		
95+	6,513 (1.5)		6,513 (2.9)		
Sex				1.000	<.001
Male	222,062 (49.9)	111,031 (49.9)	111,031 (49.9)		
Female	222,726 (50.1)	111,363 (50.1)	111,363 (50.1)		
BMI group				1.000	<.001
< 25	335,128 (75.3)	167,564 (75.3)	167,564 (75.3)		
≥ 25	109,660 (24.7)	54,830 (24.7)	54,830 (24.7)		
Smoking [†]				1.000	<.001
Non-smoker	279,612 (62.9)	139,806 (62.9)	139,806 (62.9)		
Ex-smoker	88,602 (19.9)	44,301 (19.9)	44,301 (19.9)		
Current smoker	76,574 (17.2)	38,287 (17.2)	38,287 (17.2)		
Comorbidities					
Diabetes	156,160 (35.1)	78,080 (35.1)	78,080 (35.1)	1.000	<.001
Hypertension	306,282 (68.9)	153,141 (68.9)	153,141 (68.9)	1.000	<.001
Dyslipidemia	175,254 (39.4)	87,627 (39.4)	87,627 (39.4)	1.000	<.001
Heart failure	48,624 (10.9)	24,312 (10.9)	24,312 (10.9)	1.000	<.001
CVD	88,968 (20.0)	44,484 (20.0)	44,484 (20.0)	1.000	<.001
Liver cirrhosis	2,511 (0.6)	1,263 (0.6)	1,248 (0.6)	0.764	<.001
CKD	14,566 (3.3)	7,283 (3.3)	7,283 (3.3)	1.000	<.001
Transplantation	63 (0.0)	31 (0.0)	32 (0.0)	0.900	<.001
AIDS	15 (0.0)	7 (0.0)	8 (0.0)	0.796	<.001
Stroke	85,694 (19.3)	42,847 (19.3)	42,847 (19.3)	1.000	<.001
Cancers	40,189 (9.0)	20,105 (9.0)	20,084 (9.0)	0.913	<.001
Lung cancer	9,028 (2.0)	4,512 (2.0)	4,516 (2.0)	0.966	<.001
CTD	416 (0.1)	202 (0.1)	214 (0.1)	0.556	0.002

Values are presented as number (percentage).

Abbreviations: BMI, body mass index; CVD, cardiovascular diseases; CKD, chronic kidney diseases; AIDS, acquired immunodeficiency syndrome; CTD, connective tissue diseases SMD, standardized mean difference.

[†]Smoking was carefully considered from the index year and all preceding years, thereby minimizing the impact of patients' discrepant reporting. For example, patients whose smoking records were sandwiched between non-smoking records, were categorized as an ex-smoker if only past smoking was documented, or as a current smoker if any current smoking was recorded.

Table S3. Hospitalizations and Person-years of the Elderly and Very Elderly Pneumonia Patients according to Year of Diagnosis

Patients with diagnosis: 2009 (N = 60,045)																	
Hospitalizations	Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
	Elderly	41,699	4,759	3,126	2,871	2,373	2,276	2,103	1,884	1,716	1,644	1,478	894	715	732	825	69,095
	Very Elderly	29,161	3,417	1,930	1,596	1,201	949	816	573	519	443	329	168	113	124	106	41,445
Person-years	Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
	Elderly	16,433	26,502	23,848	21,906	20,210	18,718	17,279	15,987	14,779	13,565	12,480	11,432	10,444	9,429	8,386	241,397
	Very Elderly	9,098	12,515	9,920	8,019	6,524	5,401	4,386	3,554	2,873	2,240	1,769	1,358	1,070	772	529	70,027
Patients with diagnosis: 2010 (N = 61,307)																	
Hospitalizations	Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023		Total
	Elderly	41,654	4,766	3,609	2,786	2,437	2,206	2,046	1,846	1,750	1,495	922	724	720	841		67,802
	Very Elderly	30,979	3,635	2,296	1,615	1,230	1,041	811	689	535	408	239	153	177	110		43,918
Person-years	Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023		Total
	Elderly	14,780	25,830	23,184	21,264	19,657	18,194	16,805	15,533	14,266	13,133	12,108	11,123	10,054	9,016		224,948
	Very Elderly	8,608	12,840	10,055	8,216	6,731	5,481	4,453	3,618	2,887	2,313	1,831	1,416	1,054	777		70,281
Patients with diagnosis: 2011 (N = 68,088)																	
Hospitalizations	Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023			Total
	Elderly	46,182	5,938	3,775	3,131	2,763	2,489	2,292	2,148	1,803	1,131	922	898	1,117			74,589
	Very Elderly	34,839	4,613	2,643	1,907	1,535	1,238	970	864	649	362	241	259	230			50,350
Person-years	Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023			Total
	Elderly	17,440	29,237	26,393	24,415	22,646	21,025	19,523	18,058	16,756	15,524	14,380	13,147	11,894			250,440
	Very Elderly	10,547	14,904	11,857	9,740	8,046	6,663	5,471	4,414	3,549	2,835	2,307	1,781	1,319			83,433
Patients with diagnosis: 2012 (N = 82,264)																	
Hospitalizations	Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023				Total
	Elderly	54,202	6,186	4,217	3,564	3,270	2,913	2,883	2,334	1,395	1,235	1,271	1,331				84,801
	Very Elderly	43,945	5,388	3,175	2,530	2,150	1,627	1,432	1,174	626	367	425	341				63,180
Person-years	Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023				Total
	Elderly	23,517	35,236	32,127	29,787	27,712	25,807	23,992	22,397	20,897	19,476	17,808	16,186				294,942
	Very Elderly	14,878	19,265	15,636	13,001	10,820	8,928	7,291	5,981	4,901	3,967	3,084	2,334				110,087

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Patients with diagnosis: 2013 (N = 76,562)													
Hospitalizations	Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
	Elderly	50,212	6,418	4,172	3,445	3,091	2,911	2,437	1,484	1,067	1,115	1,272	77,624
	Very Elderly	42,117	5,445	3,197	2,395	2,022	1,623	1,162	667	464	455	447	59,994
Person-years	Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
	Elderly	20,015	31,498	28,450	26,254	24,363	22,564	20,952	19,435	18,041	16,585	15,163	243,319
	Very Elderly	13,197	18,022	14,396	11,906	9,833	8,026	6,605	5,451	4,474	3,500	2,707	98,116
Patients with diagnosis: 2014 (N = 80,045)													
Hospitalizations	Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023		
	Elderly	50,783	6,509	4,266	3,478	3,060	2,707	1,612	1,174	1,225	1,534		76,348
	Very Elderly	45,288	6,296	3,462	2,640	2,239	1,696	978	662	636	562		64,459
Person-years	Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023		
	Elderly	20,533	32,060	29,094	26,883	24,967	23,294	21,715	20,272	18,647	17,086		234,551
	Very Elderly	14,353	19,633	15,775	12,969	10,629	8,824	7,256	6,021	4,806	3,748		104,014
Patients with diagnosis: 2015 (N = 86,634)													
Hospitalizations	Year	2015	2016	2017	2018	2019	2020	2021	2022	2023			
	Elderly	52,606	6,741	4,596	3,751	2,907	1,839	1,426	1,380	1,713			76,959
	Very Elderly	51,650	7,062	4,249	3,250	2,355	1,361	895	897	867			72,586
Person-years	Year	2015	2016	2017	2018	2019	2020	2021	2022	2023			
	Elderly	21,969	34,012	30,984	28,638	26,716	25,055	23,490	21,768	20,113			232,745
	Very Elderly	17,086	22,819	18,427	15,162	12,698	10,613	8,854	7,054	5,541			118,253
Patients with diagnosis: 2016 (N = 88,936)													
Hospitalizations	Year	2016	2017	2018	2019	2020	2021	2022	2023				
	Elderly	53,468	7,031	4,615	3,596	2,057	1,678	1,632	1,871				75,948
	Very Elderly	54,625	7,979	4,728	3,037	1,738	1,221	1,110	1,024				75,462
Person-years	Year	2016	2017	2018	2019	2020	2021	2022	2023				
	Elderly	20,906	34,188	31,052	28,825	26,986	25,304	23,454	21,627				212,342
	Very Elderly	16,368	23,467	18,658	15,358	12,796	10,638	8,518	6,808				112,612

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Patients with diagnosis: 2017 (N = 91,751)								
Hospitalizations	Year	2017	2018	2019	2020	2021	2022	2023
	Elderly	53,380	7,320	4,628	2,506	1,831	1,660	1,954
	Very Elderly	59,062	8,666	4,683	2,373	1,547	1,447	1,302
Person-years	Year	2017	2018	2019	2020	2021	2022	2023
	Elderly	20,446	33,383	30,254	28,053	26,192	24,206	22,397
	Very Elderly	17,646	24,692	19,684	16,192	13,538	10,930	8,736
Patients with diagnosis: 2018 (N = 98,826)								
Hospitalizations	Year	2018	2019	2020	2021	2022	2023	
	Elderly	55,661	7,685	3,333	2,263	2,287	2,287	73,516
	Very Elderly	66,319	9,623	4,008	2,594	2,160	1,824	86,528
Person-years	Year	2018	2019	2020	2021	2022	2023	
	Elderly	21,947	34,841	31,552	29,304	27,012	24,918	169,575
	Very Elderly	20,622	27,955	22,294	18,416	14,660	11,790	115,737
Patients with diagnosis: 2019 (N = 94,716)								
Hospitalizations	Year	2019	2020	2021	2022	2023		
	Elderly	52,703	5,191	2,767	2,461	2,388		65,510
	Very Elderly	64,824	7,608	3,580	2,863	2,221		81,096
Person-years	Year	2019	2020	2021	2022	2023		
	Elderly	19,093	32,535	29,538	27,042	24,938		133,146
	Very Elderly	18,390	26,645	21,228	16,829	13,380		96,472

Subsequent hospitalizations and person-years from the initial pneumonia diagnosis were presented. If person A was diagnosed with pneumonia in 2009 as an elderly individual, the ratio of person A's cumulative inpatient cases to person-years up to 2023 is attributed to the elderly group in 2009.