

Economic Impact of Herpes Zoster and Postherpetic Neuralgia on Healthcare Resource Use in Sweden

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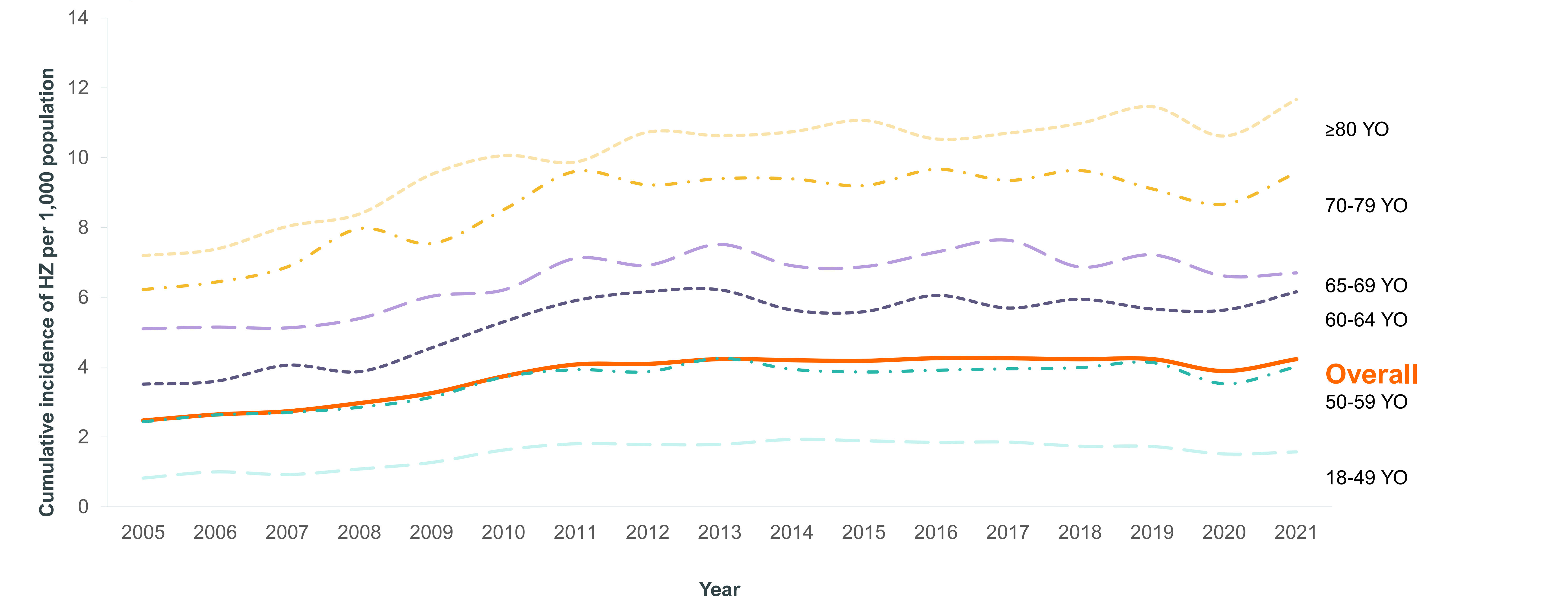
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Supplemental information

HZ incidence is higher for most high-risk groups

		Average incidence of HZ episodes per 1,000 person-years in study IR (95% CI) in 2014-2019			
Age group (YO)		18-49	50-64	≥65	All ≥18
All HZ episodes		1.8 (1.8 - 1.9)	4.5 (4.4 - 4.6)	9.1 (9.0 - 9.3)	4.2 (4.2 – 4.3)
Diabetes	type 1	2.6 (2.0 – 3.2)	9.8 (8.1 – 11.4)	34.6 (30.9 – 38.3)	10.5 (9.6 - 11.4)
	type 2	3.1 (2.5 - 3.7)	5.2 (4.7 - 5.6)	8.8 (8.4 - 9.1)	7.4 (7.2 - 7.7)
Asthma		1.1 (1.1 – 1.2)	3.3 (3.0 – 3.6)	9.7 (9.2 - 10.2)	3.1 (3.0 - 3.2)
COPD		1.0 (0.6 – 1.4)	6.2 (5.4 – 6.9)	20.4 (19.2 – 21.5)	12.3 (11.7 - 12.9)
Solid organ tumor		4.9 (3.6 - 6.3)	8.2 (7.1 - 9.2)	12.7 (12.0 - 13.5)	11.1 (10.5 - 11.7)
Systemic lupus erythematosus (M32)		16.9 (11.1 - 22.8)	17.6 (9.5 - 25.8)	20 (10.8 - 29.3)	17.8 (13.6 - 22.1)
Other inflammatory system diseases (M33-M35)		20.7 (14.7 - 26.7)	46.1 (37.9 - 54.4)	173.9 (162.3 - 185.4)	105.4 (99.0 - 111.8)
Rheumatoid arthritis		10.9 (8.8 - 13)	17.3 (15 - 19.6)	27.0 (24.8 - 29.1)	20.7 (19.3 – 22.0)
Inflammatory bowel disease		9.4 (8.2 - 10.7)	21.7 (18.9 - 24.4)	43.5 (39.5 - 47.5)	20.7 (19.3 – 22.0)
Psoriasis		11.1 (9.1 - 13.1)	20.5 (17.8 - 23.3)	54.2 (49.3 - 59.1)	27.0 (25.1 - 28.9)
Hematological malignancies		16.3 (12.1 - 20.6)	22.2 (18.4 - 26.1)	24.2 (21.9 - 26.4)	22.8 (21.0 - 24.5)
Multiple sclerosis		9.2 (7.0 - 11.5)	11.0 (7.8 - 14.2)	30.8 (22.5 – 39.0)	12.7 (10.8 - 14.7)
Solid organ transplant		8.8 (5.5 - 12.1)	14.2 (10.3 – 18.0)	13.9 (10.3 - 17.5)	12.5 (10.4 - 14.6)

The overall incidence of HZ increased by 68% from 2005 to 2021, but dropped temporarily in 2020, which may be attributed to the COVID-19 pandemic



HZ incidence (95% CI) per age group and period

Age (years - registered at index event)	2012-2020	2014-2019
18-24	1.5 (1.4-1.6)	1.5 (1.5-1.6)
25-29	1.7 (1.7-1.8)	1.8 (1.7-1.9)
30-34	1.8 (1.7-1.9)	1.9 (1.8-2)
35-39	1.8 (1.7-1.9)	1.8 (1.7-1.9)
40-44	1.8 (1.7-1.9)	1.9 (1.8-2)
45-49	2.3 (2.2-2.4)	2.4 (2.3-2.6)
50-54	3.3 (3.2-3.5)	3.4 (3.2-3.5)
55-59	4.6 (4.4-4.7)	4.6 (4.4-4.8)
60-64	5.8 (5.7-6)	5.8 (5.6-6)
65-69	7.1 (6.9-7.3)	7.1 (6.9-7.4)
70-74	8.9 (8.6-9.1)	9 (8.7-9.2)
75-79	9.9 (9.6-10.2)	10 (9.6-10.3)
80-84	10.9 (10.6-11.2)	10.9 (10.5-11.3)
85-89	11.1 (10.7-11.5)	11.3 (10.8-11.8)
90-94	10.3 (9.7-10.9)	10.6 (9.9-11.4)
95+	9.5 (8.4-10.5)	9.3 (8-10.6)

Abbreviations

CI confidence intervals, COPD chronic obstructive pulmonary disease, YO years old

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Supplemental information

About 30% of the population have belong to a risk group, with a higher number of care visits and thus a higher cost per episode

		Primary care visits		Specialized	Inpatient care			Total HZ related	Average cost	
		Episodes	GP	Other HCP	outpatient care visits	Hospitalizations per episode	Inpatient days per episode	Days per hospitalization	visits per episode	per episode (age ≥18 YO)
No high-risk diagnosis		35,095	1.3	0.3	0.2	0.01	0.06	6.1	2	€ 363
Diabetes	Type 1	760	1.2	0.3	0.21	0.021	0.1	4.6	1.8	€ 396
	Type 2	4,400	1.5	0.44	0.21	0.025	0.15	6	2.2	€ 506
Asthma		3,482	1.4	0.43	0.17	0.013	0.08	6.6	2	€ 430
COPD		2,154	1.7	0.48	0.22	0.028	0.19	6.7	2.4	€ 576
Solid organ tumor		2,009	1.4	0.4	0.27	0.026	0.17	6.6	2.1	€ 539
Systemic lupus erythematosus		1,530	1.7	0.5	0.27	0.037	0.25	6.9	2.5	€ 670
Rheumatoid arthritis		1,249	1.4	0.45	0.22	0.028	0.18	6.3	2.1	€ 540
Inflammatory bowel disease		1,245	1.5	0.4	0.19	0.018	0.12	6.5	2.1	€ 478
Psoriasis		1,112	1.4	0.36	0.25	0.01	0.05	5.4	2	€ 416
Hematological malignancies		884	1.5	0.47	0.58	0.067	0.52	7.8	2.6	€ 991
Multiple sclerosis		229	1.3	0.26	0.31	0.017	0.04	2.3	1.9	€ 415
Solid organ transplant		185	1.3	0.48	0.83	0.049	0.41	8.4	2.6	€ 1,209
HIV		47	0.6	0.09	0.98	0.021	0.02	1	1.6	€ 679

Definitions of high-risk groups : ICD-10 codes

Category	Condition	Definition
IC conditions	Solid organ tumors	C00-C26, C30-C34, C37-C41, C45, C47-C49, C4A, C50-C58, C60-C79, C7A, C7B
	Haematological malignancies	C81-C86, C88, C90-C96
	HIV	B21-B24
	Solid organ transplant	T86.1-4, T86.81, T86.85, Z94.0-Z94.4, Z94.82, Z94.83, Z94.89, Z94.9
Comorbid conditions	Haematological stem cell transplant	Z48.290, Z94.81, Z94.84
	COPD	(J41), J42-J44
	Asthma	J45, J46, (J82.83)
	Diabetes	E10, E11, E13
Auto-immune conditions	Rheumatoid arthritis	M05, M06, M45
	Multiple sclerosis	G35
	Systemic lupus erythematosus	M32-M35 (unless specified as only M32)
	Other inflammatory systemic diseases	M33-M35
	Inflammatory bowel disease	K50, K51, (K52)
	Psoriasis	L40.0, L40.1, L40.2 L40.4, L40.5, L40.8, L40.9, M07.0, M07.1, M07.2, M07.3

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Abbreviations

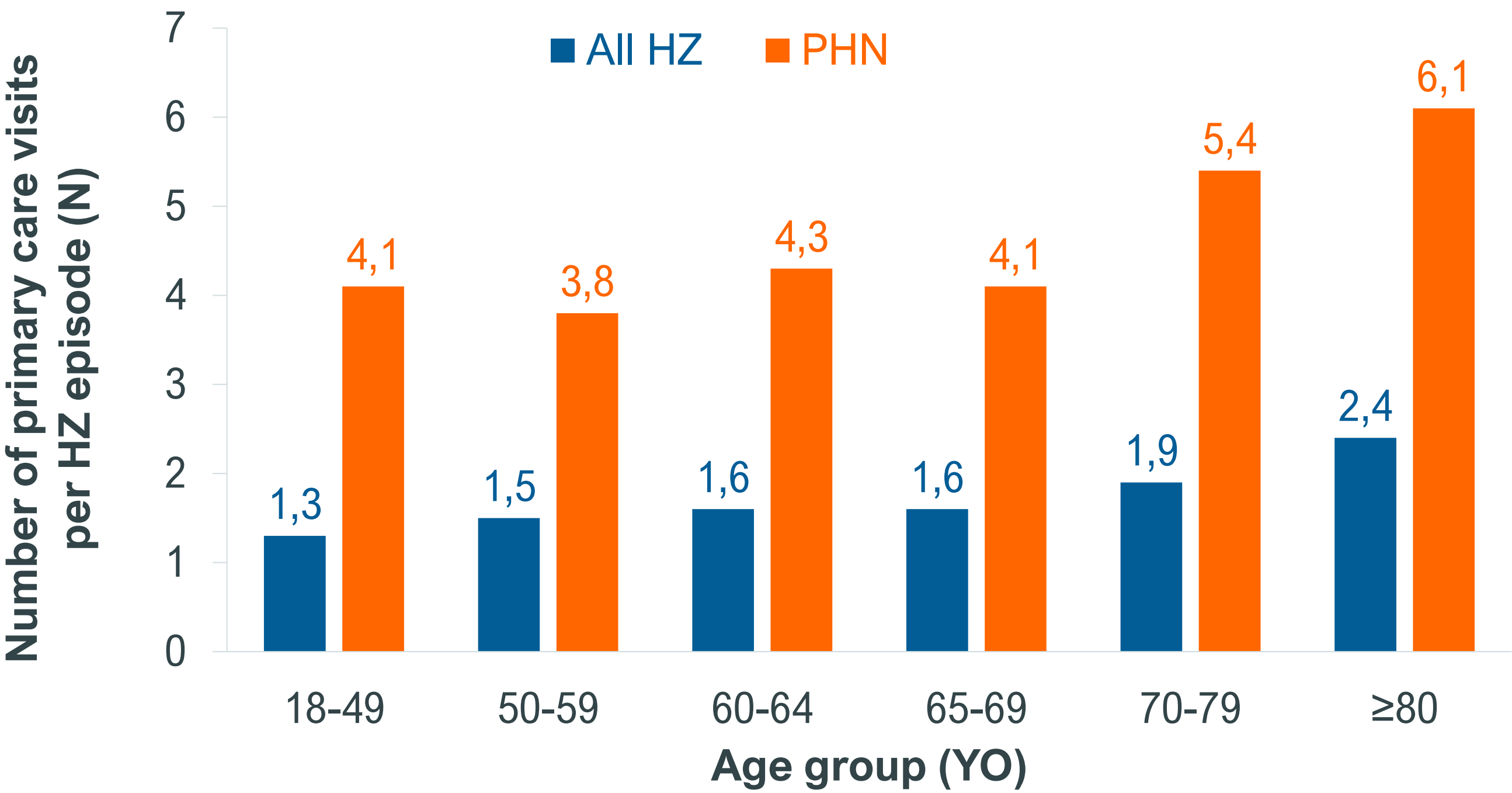
CI confidence intervals, COPD chronic obstructive pulmonary disease, GP general practitioner, HCP healthcare professional, HIV human immunodeficiency virus, HZ herpes zoster, IC immunocompromised, ICD-10 international classification of diseases 10th revision, YO years old

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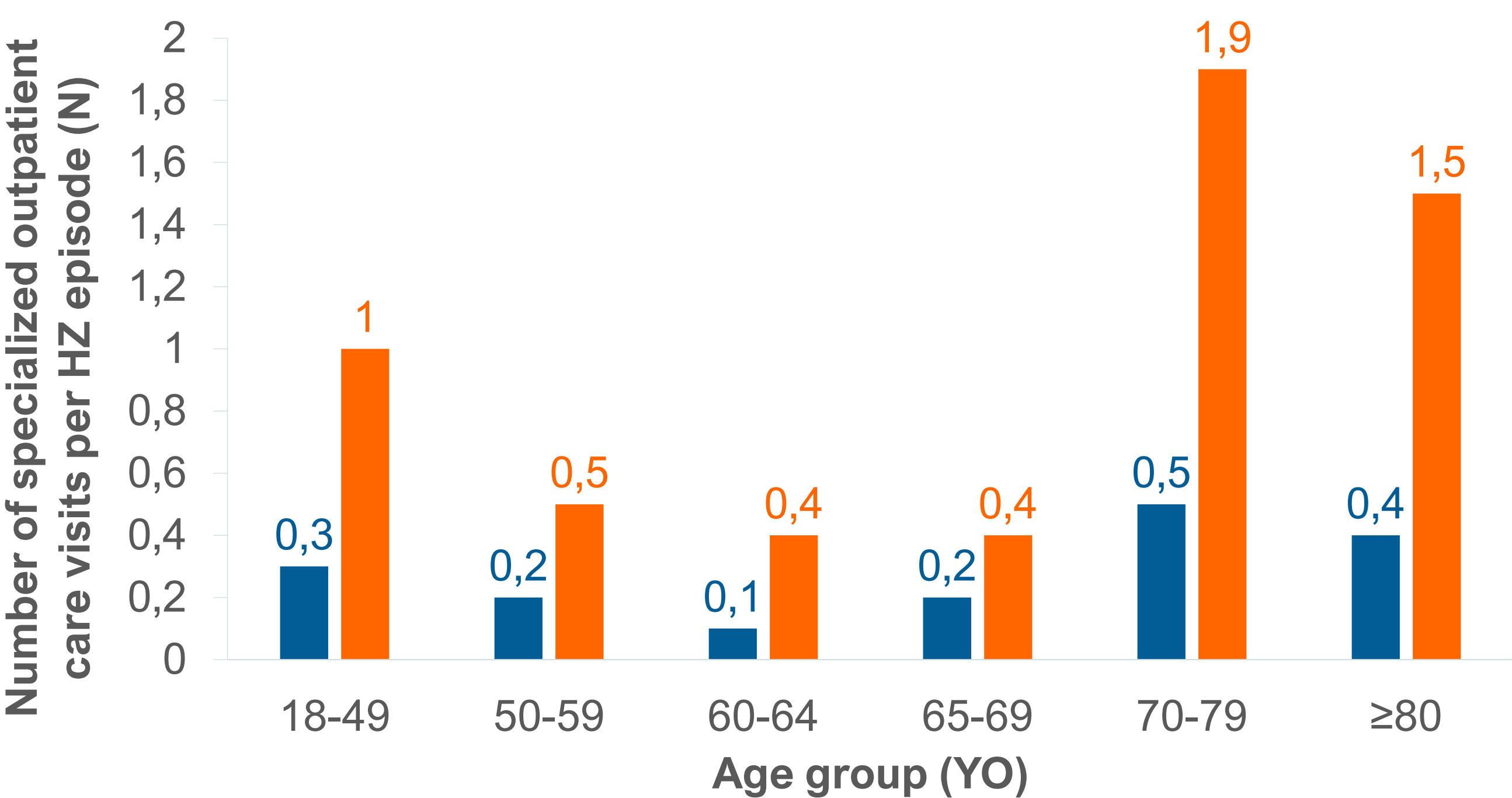
The number of primary care visits per episode is higher in ≥70 YO patients



The average number of inpatient stays per episode was higher for HZ episodes with PHN

Numbers of hospitalizations per HZ episode			
Year	All HZ	HZ without PHN	HZ with PHN
2012	0.02	0.01	0.10
2013	0.02	0.01	0.08
2014	0.01	0.01	0.07
2015	0.01	0.01	0.06
2016	0.01	0.01	0.07
2017	0.01	0.01	0.05
2018	0.01	0.01	0.06
2019	0.01	0.01	0.04
2020	0.01	0.01	0.04
Average	0.01	0.01	0.06

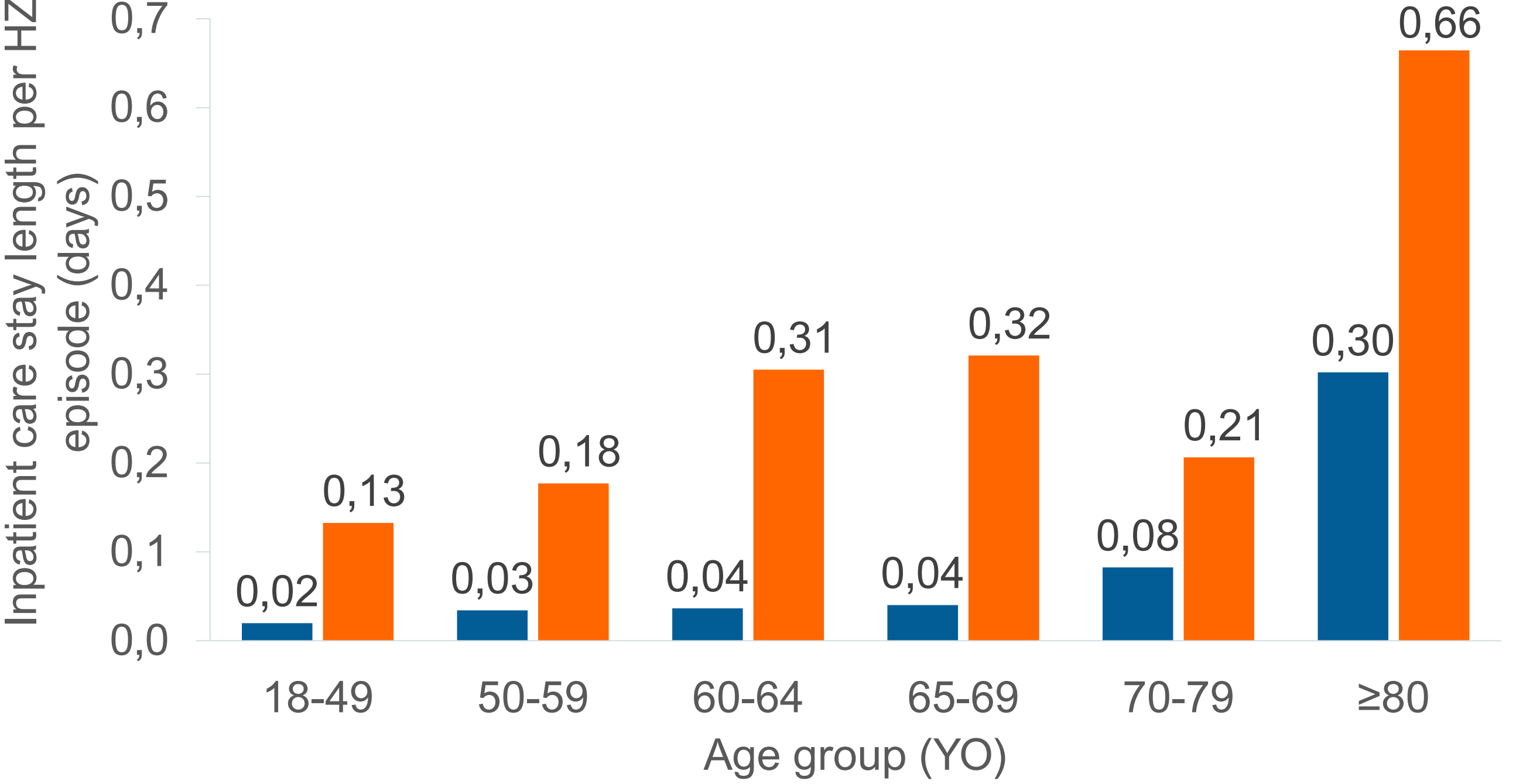
Patients 70-79 YO had the highest number of average specialized outpatient care visits per episode



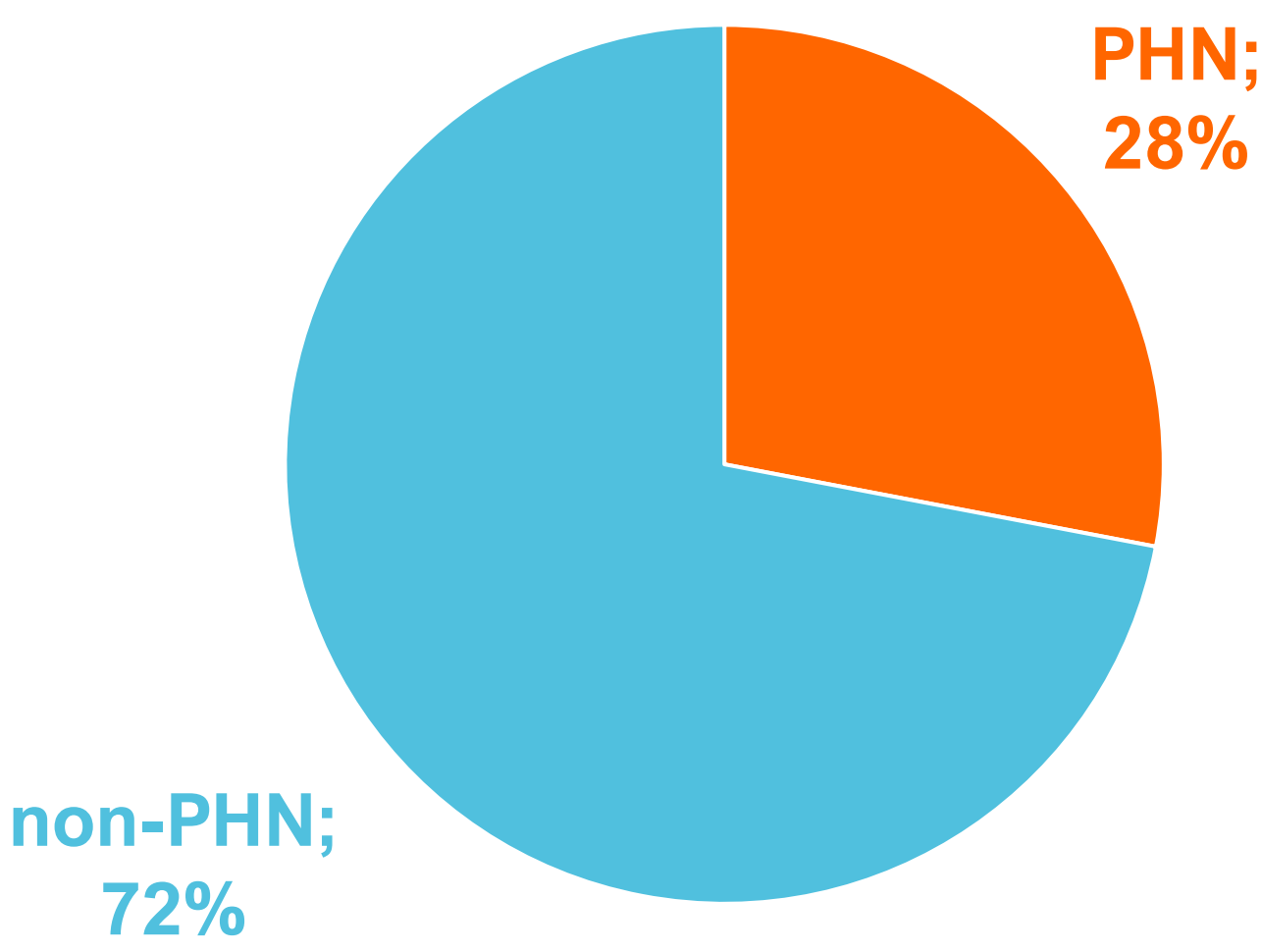
The number of specialized outpatient care visits per episode was higher for HZ episodes with PHN

Numbers of specialized outpatient care visits per HZ episode			
Year	All HZ	HZ without PHN	HZ with PHN
2012	0.16	0.15	0.43
2013	0.19	0.16	0.66
2014	0.18	0.14	0.71
2015	0.18	0.15	0.55
2016	0.19	0.15	0.78
2017	0.21	0.17	0.64
2018	0.20	0.17	0.52
2019	0.20	0.16	0.55
2020	0.22	0.19	0.60
Average	0.19	0.16	0.61

Average length of hospitalization for PHN was lower in 70-79 YO compared to neighboring age groups



Share of A&E visits per episode type in 2012-2021



- No sex differences were identified in number of visits per episode during the study period.
- Generally, the number of care visits per episode has increased steadily for all HZ episodes.
- In general, healthcare use increased with age, but further analyses are needed to understand why 70-79-year-olds have lower number of hospitalization days for PHN compared to neighboring age groups.

Author information and disclosures

Conflict of interest: KM, MN and EZ are employed by GSK. MN was previously an Aixial Sprl consultant on behalf of GSK. ES and PS are employed by Lumell Associates. Lumell Associates received consulting fees from GSK to complete the work disclosed in this publication. TB declares he received writing support from Business and Decision Life Science on behalf of GSK and support for data collection from Lumell for the present manuscript. TB also declares consulting fees from GSK and Lumell paid to Viridoc Limited Company (Sweden) and payment for lectures or presentations paid to Viridoc Limited Company. All authors declare no other financial and non-financial relationships and activities.

Abbreviations

A&E accidents and emergencies, HZ herpes zoster, PHN postherpetic neuralgia, YO years old