

Trends in U.S. Emergency Department Visits for acute allergic reactions and anaphylaxis among older adults: 2006-2014

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Rationale

- Nearly 46 million older adults (≥ 65 years) live in the U.S., which is projected to double by 2060¹
- Fatal anaphylaxis has been associated with older age.²
- Little is known about the prevalence of acute allergic reactions (AAR) and anaphylaxis among older adults living in the United States

Objective

- To examine trends in U.S. emergency department (ED) visits for AAR and anaphylaxis among older adults (≥65 years)

Methods

- Data from the Nationwide Emergency Department Sample (NEDS) 2006-2014 was used.
- We excluded visits occurring in 2015 given change to ICD-10 (late-2015) and seasonal variation
- ICD-9-CM codes were used to identify visits for AAR and anaphylaxis listed as an ED discharge diagnosis
- We calculated the trend over time in the rate of ED visits (number of visits per 100,000 population for respective age groups) using Census population data
- We used survey-weighted multivariable logistic regression modeling to identify factors associated with hospitalization

Figure 1. Rate of ED visits for anaphylaxis among adults (≥18 years) and older adults (≥65 years) in the U.S.

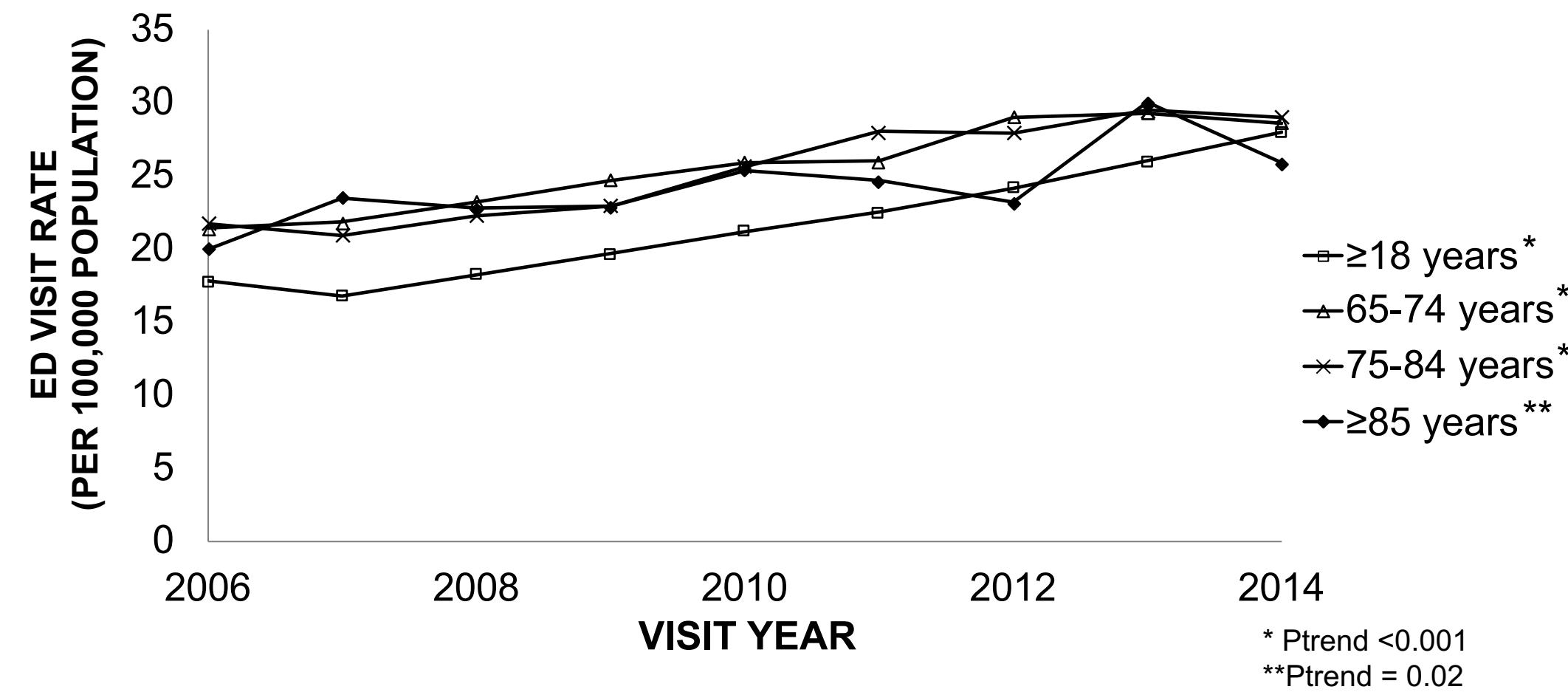


Figure 2. Rate of ED visits for anaphylaxis by trigger among older adults (≥65 years) in the U.S.

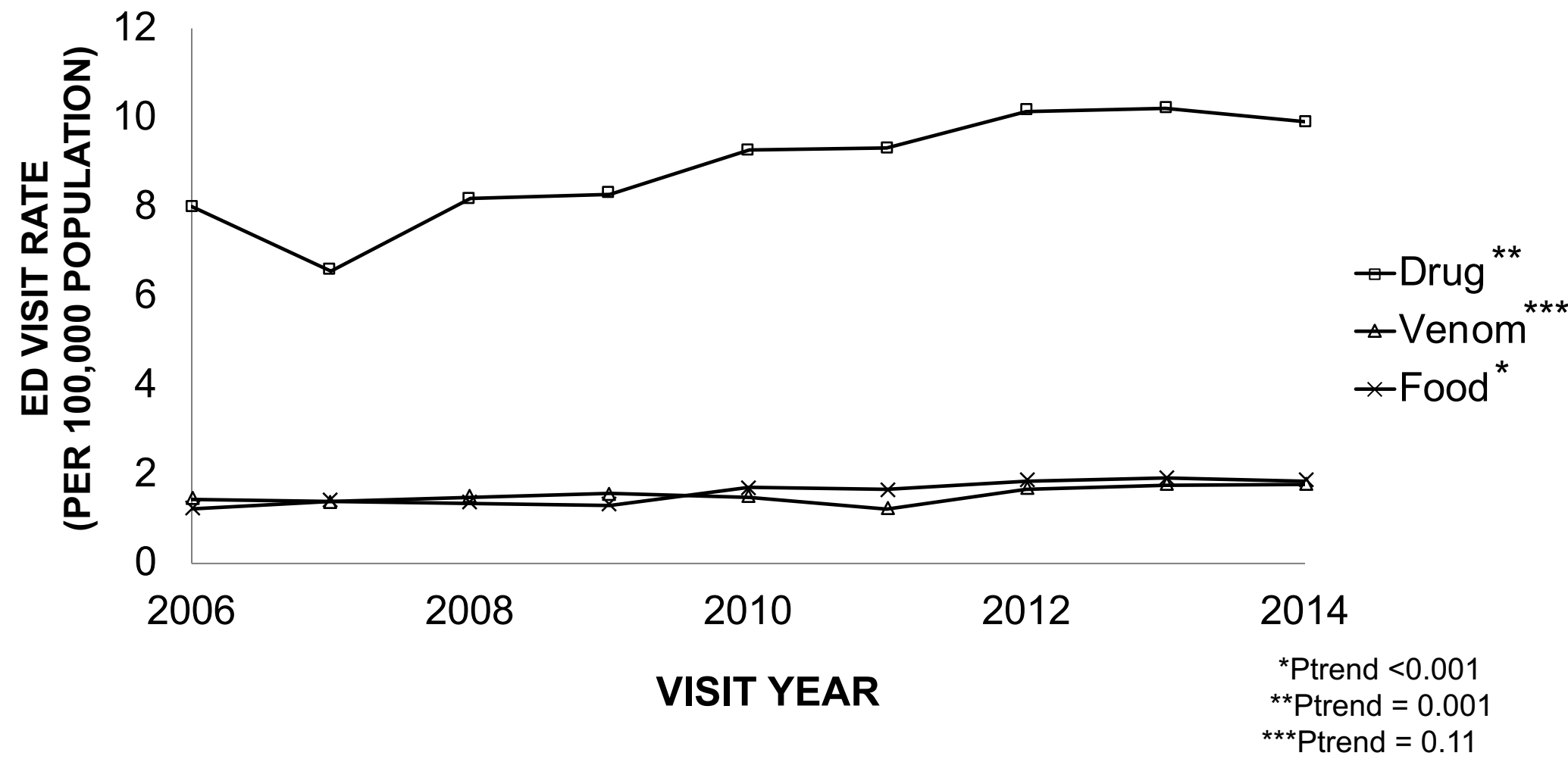
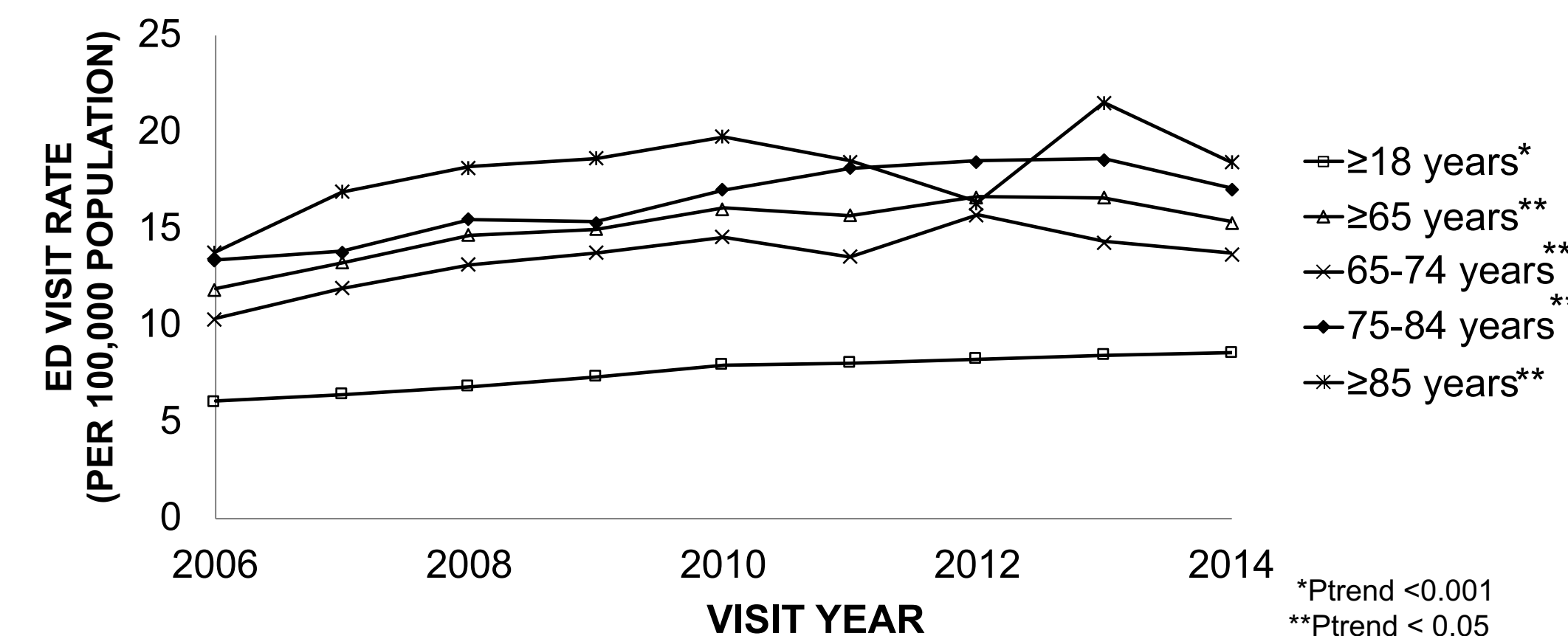


Figure 3. Rate of hospitalizations per 100,000 population after ED visit for anaphylaxis among adults (≥18 years) and elderly (≥65 years) in the U.S.



Demographic characteristics of ED visits for anaphylaxis and risk factors for severe anaphylaxis (hospitalization or death) among older adults ≥65 years, 2006-2014

	Weighted Frequency n	%	95% CI	Hospitalization* OR	[95% CI]	Death* OR	[95% CI]
Overall Number	93795	100					
Age							
65-74 years	51385	55	[54,56]	(ref)		(ref)	
75-84 years	30282	32	[32,33]	1.43	[1.33, 1.54]	1.55	[1.27, 1.91]
≥85 years	12095	13	[12,13]	2.19	[1.96, 2.45]	2.96	[2.34, 3.75]
Sex							
Male	36801	39	[39,40]	(ref)		(ref)	
Female	56793	61	[60,61]	0.83	[0.78, 0.89]	0.92	[0.77, 1.11]
Insurance Status							
Private	25118	10	[9,11]	(ref)		(ref)	
Public	24608	88	[87,89]	1.31	[1.16, 1.48]	1.12	[0.74, 1.70]
Self-pay	22070	0.9	[0.7,1]	1.18	[0.79, 1.78]	0.77	[0.17, 3.54]
Other	20029	1.0	[0.8,1]	0.94	[0.63, 1.40]	0.78	[0.22, 2.70]
Median Household income quartile							
Highest Quartile	20029	22	[20, 23]	(ref)		(ref)	
3 rd Quartile	22070	24	[23, 25]	0.98	[0.87, 1.10]	1.04	[0.77, 1.40]
2 nd Quartile	25118	27	[26, 28]	1.09	[0.97, 1.22]	1.28	[0.97, 1.70]
Lowest Quartile	24608	27	[26, 28]	1.23	[1.09, 1.39]	1.35	[1.00, 1.81]
Hospital Region							
Northeast	1565	17	[15,18]	(ref)		(ref)	
Midwest	2229	24	[22,26]	0.67	[0.58, 0.79]	0.59	[0.43, 0.80]
South	4035	43	[41,45]	0.54	[0.47, 0.63]	0.64	[0.48, 0.86]
West	1551	17	[15,18]	0.76	[0.64, 0.89]	0.75	[0.54, 1.05]
Type of Trigger							
Food	5920	6	[6.0, 6.7]	(ref)		(ref)	
Drug	33013	35	[34, 36]	2.75	[2.35, 3.21]	5.64	[2.60, 12.25]
Venom	5711	6	[5.7, 6.5]	0.47	[0.38, 0.59]	0.23	[0.03, 1.86]
Other/Multiple	49152	52	[52, 53]	1.48	[1.28, 1.71]	3.66	[1.68, 7.97]
ED Epinephrine use							
No	91828	98	[98,98]	(ref)		(ref)	
Yes	1933	2	[1.8, 2.3]	0.10	[0.07, 0.15]	0.45	[0.11, 1.85]
Any chronic condition							
No	12544	13	13-14	(ref)		(ref)	
Yes	81230	87	[86, 87]	15.61	[13.37, 18.21]	14.68	[5.29, 40.72]
Severe Anaphylaxis							
Hospitalization	55761	59	58-61	NA		NA	
Cardiac arrest	1724	1.8	1.6-2.1				
Intubation/Ventilation	15974	17	16-18				
Death	2420	3	2-3				

*Adjusted also for weekend presentation, season of discharge, hospital type, and year

Conclusions

- The rates of ED visits and hospitalizations for older adults with anaphylaxis have increased over time
- We encourage further research on underlying contributing factors and ensuring appropriate care for this population

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1. Mark Mather, Linda A. Jacobsen, and Kelvin M. Pollard. "Aging in the United States." *Population Bulletin* no. 2 (2015).
2. Jerschow, E., et al., *Fatal anaphylaxis in the United States, 1999-2010: temporal patterns and demographic associations.* *Journal of allergy and clinical immunology*, 2014, 134(6): p. 1318-1328. e7.
3. Harduar-Morano, L., et al., *A population-based epidemiologic study of emergency department visits for anaphylaxis in Florida.* *Journal of allergy and clinical immunology*, 2011, 128(3): p. 594-600. e1.

ICD-9-CM codes	
Acute Allergic Reactions	
Drug	693.0, 995.2, 995.1, 995.4
Venom	989.5
Food	693.1, 995.60-995.7
Other/Multiple	995.0, 995.3, 708.0, 999.4
Anaphylaxis based on Harduar-Morano algorithm³ and following:	
Drug	693.0, 995.2, 995.4, E930-E930.9, E931-E931.9
Venom	989.5, E905.3, E905.5
Food	995.60-995.7