Anaphylaxis In Elderly Patients Presenting to the Emergency Departments of a Large Health System From January 2016 to December 2017

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Background

- Anaphylaxis is a life threatening systemic and acute allergic reaction that requires immediate recognition and treatment[1]
- The prevalence of this condition is unclear. In the United States the prevalence of anaphylaxis is reported to be least 1.6% or higher[1]
- The elderly may be at risk for poorer outcomes due to both comorbidities and medications
- Anaphylaxis in the elderly is understudied. We hypothesize that anaphylaxis is under-recognized in this vulnerable population
- Our study analyzed the frequency of anaphylaxis and the demographic characteristics of elderly patients presenting to the emergency departments of a large health system.

Methods

- We performed a retrospective analysis of patients aged ≥ 65 years presenting to the emergency department of a large health system in the New York State, Northwell Health.
- Cases were identified using anaphylaxis ICD-9 Codes or an ICD -9 based diagnostic algorithm incorporating the National Institutes of Allergy and Infectious Disease diagnostic Criteria (Harduar-Morano et al (2010)).
- Descriptive Statistics were calculated.

Ascertainment methods

ICD-9 Codes:

Other anaphylactic shock (995.0) OR anaphylactic shock due to serum (999.4) OR anaphylactic shock caused by food (999.5)

Harduar-Morano algorithms correspond to the NIAID definition of anaphylaxis:

1. The acute onset of a reaction with involvement of the skin, mucosal tissue or both and at least one of the following:

a) respiratory compromise

b) reduced blood pressure

c) symptoms of end-organ dysfunction

2. Two or more of the following that occur rapidly after exposure to a likely allergen for that patient:

a) involvement of skin/mucosal tissue

b) respiratory compromise

c) reduced blood pressure or associated symptoms

d) persistent gastrointestinal symptoms

3. Reduced blood pressure after exposure to a known allergen

Harduar-Morano Algorithms

Harduar- Morano Algorithms criteria used to Identify Cases of Anaphylaxis
1. Skin-mucosal tissue involvement (372.73 OR 374.82 OR 478.6 OR 478.25 OR 782.62 OR 708 OR 708.0 OR 708.1-708.5 OR 708.8-708.9 OR 698 OR 698.1 OR 698.8 OR 698.9) AND shock caused by anesthesia (995.4)
2. Respiratory compromise (518.81 OR 518.82 OR 786 OR 786.00-786.09 OR 786.1 OR 493.0 OR 493.9) AND shock caused by anesthesia (995.4)
3. Respiratory compromise (518.81 OR 518.82 OR 786 OR 786.00-786.09 OR 786.1 OR 493.0 OR 493.9) AND angioneurotic edema (995.1)
4. Reduced blood pressure (458 OR 458.0 OR 458.2 OR 458.8 OR 458.9 OR 780.2) AND angioneurotic edema (995.1)
5. Reduced blood pressure (458 OR 458.0 OR 458.2 OR 458.8 AND skin-mucosal involvement (372.73 OR 374.82 OR 478.6
6. Reduced blood pressure (458 OR 458.0 OR 458.2 OR 458.8 OR 458.9 OR 780.2) AND the toxic effect of venom (989.5)
7. Reduced blood pressure (458 OR 458.0 OR 458.2 OR 458.8 OR 458.9 OR 780.2) AND an Ecode indicating the cause of poisoning was a venomous animal/plant (E905 OR E905.3 OR E905.5 OR E905.8 OR E905.9)
8. Reduced blood pressure (458 OR 458.0 OR 458.2 OR 458.8 OR 458.9 OR 780.2) AND gastrointestinal symptoms (558.3 OR 787.0 OR 787.01 AND (an unspecified adverse effect caused by the correct administration of a drug, medicinal, and biologic substance (995.2) OR an unspecified allergic reaction (995.3))
9. Reduced blood pressure (458 OR 458.0 OR 458.2 OR 458.8 OR 458.9 OR 780.2) AND skin-mucosal tissue involvement (372.73 OR 374.82 OR 478.6 OR 478.25 OR 782.62 OR 708 OR 708.0 OR 708.1-708.5 OR 708.8-708.9 OR 698 OR 698.1 OR 698.8 OR 698.9) AND (an unspecified adverse effect caused by the correct administration of a drug, medicinal, and biologic substance (995.2) OR an unspecified allergic reaction (995.3))
10. Respiratory compromise (518.81 OR 518.82 OR 786 OR 786.00-786.09 OR 786.1 OR 493.0 OR 493.9) AND reduced blood pressure (458 OR 458.0 OR 458.2 OR 458.8 OR 458.9 OR 780.2) AND (an unspecified adverse effect caused by the correct administration of a drug, medicinal, and biologic substance (995.2) OR an unspecified allergic reaction (995.3))
11. Respiratory compromise (518.81 OR 518.82 OR 786 OR 786.00-786.09 OR 786.1 OR 493.0 OR 493.9) AND gastrointestinal symptoms (558.3 OR 787.0 OR 787.01 AND (an unspecified adverse effect caused by the correct administration of a drug, medicinal, and biologic substance (995.2) OR an unspecified allergic reaction (995.3))

Harduar- Morano Algorithms criteria (continued)
12 Respiratory compromise (518.81 OR 518.82 OR 786 OR 786.00-786.09 OR 786.1 OR 493.0 OR 493.9) AND gastrointestinal symptoms (558.3 OR 787.0 OR 787.01 OR 787.03 or 789.0) AND skin-mucosal involvement (372.73 OR 374.82 OR 478.6 OR 478.25 OR 782.62 OR 708 OR 708.0 OR 708.1-708.5 OR 708.8-708.9 OR 698 OR 698.1 OR 698.8 OR 698.9)
13. Respiratory compromise (518.81 OR 518.82 OR 786 OR 786.00-786.09 OR 786.1 OR 493.0 OR 493.9) AND gastrointestinal symptoms (558.3 OR 787.0 OR 787.01 OR 787.03 or 789.0) AND the toxic effect of venom (989.5)
14. Respiratory compromise (518.81 OR 518.82 OR 786 OR 786.00-786.09 OR 786.1 OR 493.0 OR 493.9) AND gastrointestinal symptoms (558.3 OR 787.0 OR 787.01 OR 787.03 or 789.0) AND an Ecode indicating the cause of poisoning was a venomous animal/plant (E905 OR E905.3 OR E905.5 OR E905.8 OR E905.9)
15. Respiratory compromise (518.81 OR 518.82 OR 786 OR 786.00-786.09 OR 786.1 OR 493.0 OR 493.9) AND skin-mucosal tissue involvement (372.73 OR 374.82 OR 478.6 OR 478.25 OR 782.62 OR 708 OR 708.0 OR 708.1-708.5 OR 708.8-708.9 OR 698 OR 698.1 OR 698.8 OR 698.9) AND (an unspecified adverse effect caused by the correct administration of a drug, medicinal, and biologic substance (995.2) OR an unspecified allergic reaction (995.3))
16. Respiratory compromise (518.81 OR 518.82 OR 786 OR 786.00-786.09 OR 786.1 OR 493.0 OR 493.9) AND skin-mucosal tissue involvement (372.73 OR 374.82 OR 478.6 OR 478.25 OR 782.62 OR 708 OR 708.0 OR 708.1-708.5 OR 708.8-708.9 OR 698 OR 698.1 OR 698.8 OR 698.9) AND the toxic effect of venom (989.5)
17. Respiratory compromise (518.81 OR 518.82 OR 786 OR 786.00-786.09 OR 786.1 OR 493.0 OR 493.9) AND skin-mucosal tissue involvement (372.73 OR 374.82 OR 478.6 OR 478.25 OR 782.62 OR 708 OR 708.0 OR 708.1-708.5 OR 708.8-708.9 OR 698 OR 698.1 OR 698.8 OR 698.9) AND an Ecode indicating the cause of poisoning was a venomous animal/plant (E905 OR E905.3 OR E905.5 OR E905.8 OR E905.9)
18. Gastrointestinal symptoms (558.3 OR 787.0 OR 787.01 OR 787.03 or 789.0) AND skin-mucosal tissue involvement (372.73 OR 374.82 OR 478.6 OR 478.25 OR 782.62 OR 708 OR 708.0 OR 708.1-708.5 OR 708.8-708.9 OR 698 OR 698.1 OR 698.8 OR 698.9) AND (an unspecified adverse effect caused by the correct administration of a drug, medicinal, and biologic substance (995.2) OR an unspecified allergic reaction (995.3))
19. Gastrointestinal symptoms (558.3 OR 787.0 OR 787.01 OR 787.03 or 789.0) AND skin-mucosal tissue involvement (372.73 OR 374.82 AND the toxic effect of venom (989.5)
20. Gastrointestinal symptoms (558.3 OR 787.0 OR 787.01 OR 787.03 or 789.0) AND skin-mucosal tissue involvement (372.73 OR 374.82 OR 478.6 OR 478.25 OR 782.62 OR 708 OR 708.0 OR 708.1-708.5 OR 708.8-708.9 OR 698 OR 698.1 OR 698.8 OR 698.9) AND an Ecode indicating the cause of poisoning was a venomous animal/plant (E905 OR E905.3 OR E905.5 OR E905.8 OR E905.9)

	ICD-9	Harduar- Morano Algorithms	Both
Gender			
Male	26 (36.6%)	35 (38.9%)	2 (66.7%)
Female	45 (63.4%)	55 (61.1%)	1 (33.3%)
Race			
White	42 (59.2%)	49 (54.5%)	3 (100.0%)
African American	8 (11.3%)	26 (28.9%)	0
Other/ Multiracial	11 (15.5%)	12 (13.3%)	0
Asian	8 (11.3%)	1 (1.1%)	0
Unknown/Unspecified	2 (2.8%)	1 (1.1%)	0
Declined	0	1 (1.1%)	0
Age			
Early-Old (Age 65-74)	30 (42.3%)	27 (30.0%)	0
Middle-Old (Age 75-84)	33 (46.5%)	46 (51.1%)	3 (100.0 %)
Late-Old (Age ≥85)	8 (11.2%)	17(18.9%)	0
Total	71	90	3

Table 1: Demographics by ascertainment methods

Results

- Out of 47,793 ED visits during this study period, 167 visits met inclusion criteria.
- Anaphylaxis ICD-9 codes identified 71 (42.5%) distinct visit cases, the algorithm identified 90 (53.9%), and 3 (1.8%) were identified by both.
- Females predominated in the ICD-9 and algorithm cohorts.
- Whites comprised more than half of the subjects, regardless of ascertainment method.
- Median age did not differ by ascertainment method 75.0 (ICD-9) vs. 74.0 (Algorithm) vs. 80.0 (Both) years (P=0.9170).
- There were relatively few subjects age ≥ 85 years regardless of ascertainment method.

Conclusions

- Anaphylaxis occurred among the elderly presenting to the Emergency departments of a large health system.
- Relying on anaphylaxis ICD-9 codes alone missed more than half of possible cases.
- The identification and possibly, impact of anaphylaxis among the elderly may differ depending on gender, race, and age.
- Improving anaphylaxis recognition and diagnosis by ED providers is needed.
- Accurate analysis of this vulnerable population will help address key deficiencies in our understanding of anaphylaxis epidemiology . Identifying these risk factors may help further enhance awareness amongst clinicians and the general public as well as assist in prevention of the deadly occurrence of anaphylaxis in the elderly.
- Incorporating multiple algorithms, will enrich our data set and understanding of this risk and will aid in building a foundation for future studies.

References

1. Harduar-Morano L, Simon MR, Watkins S, Blackmore C. Algorithm for the Diagnosis of Anaphylaxis and its Validation Using Population Based Data on Emergency Department Visits for Anaphylaxis in Florida. Journal of Allergy and Clinical Immunology 2010; 126(1): 98- 104.
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