Prioritization of Children With Anaphylaxis in Pediatric Emergency Departments: Results of a National Survey From Spain

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Anaphylaxis is a medical emergency that requires early identification and treatment. The overcrowding of emergency departments (EDs) highlights the importance of accurate prioritization. Validated pediatric triage systems include 5 priority levels, ranging from I, which requires immediate medical attention, to IV-V, corresponding to less urgent complaints with longer wait times (WTs) [1]. Anaphylaxis may be prioritized as level I (resuscitation, immediate attention) or II (emergency, WT below 15 minutes) [2]. Acute urticaria/angioedema (U/AE) is classified as priority level III or IV (WT, 30 and 60 minutes, respectively), depending on the extent or location of the edema [2,3].

Prioritization of anaphylaxis is suboptimal, with only 30%-50% of patients being correctly classified [4-7]. Inaccurate triage delays medical assessment and may jeopardize the prognosis of affected patients. Data on the prioritization of anaphylaxis are limited to single hospitals [4-7] and selected triage systems [3-6].

We aimed to describe the prioritization of pediatric anaphylaxis in Spain. Triage systems in Spain differ in terms of procedures and computer support [8]. We created a survey to address these differences by considering common elements for a unified analysis. The cross-sectional survey targeted nurses and pediatricians who perform triage.

We included questions addressing the workplace, triage system, responders' training and experience, prioritization of anaphylaxis and U/AE, and prioritization-related elements such as the Pediatric Assessment Triangle (PAT). The PAT standardizes the initial assessment in pediatric emergencies [9] and is included in pediatric anaphylaxis algorithms in the GALAXIA guideline [10]. Additional questions included prioritizing 5 types of patient through sequenced questions (Supplementary file 1), as follows:

- A child with food-induced anaphylaxis self-treated with epinephrine, asymptomatic upon arrival at the ED.
- A child with food-induced anaphylaxis, treated with epinephrine at a health center, asymptomatic upon arrival at the ED.
- A child with food-induced U/AE, symptomatic upon arrival at the ED.
- A child with gastroenteritis and an epinephrine prescription.
- A child with anaphylactic shock, symptomatic upon arrival.

We designed a survey using Survey Monkey, launching it in December 2023 and continuing until April 2024. The survey was disseminated through the Spanish Allergy and Clinical Immunology Society (SEAIC) mailing list, WhatsApp, social media, and word-of-mouth among pediatricians and nurses, with assistance from the SEAIC Pediatric Allergy Interest Group and Young Allergists Committee (CAJMIR). Data were entered into an anonymized database.

We obtained 137 responses (97.1% from public hospital employees) at 36 hospitals across 12 autonomous regions in Spain (Supplementary file 2). Ninety percent worked in hospitals with dedicated pediatric emergency units. Almost 40% worked in tertiary hospitals. Fifty-three respondents (38.7%) performed triage duties during the study period. Ninety-four (68.6%) reported specific training in triage, mainly through specialized courses (70.8%). They also reported prior experience in pediatrics (47.4%; median [IQR] duration, 13 [15] years) and emergency medicine (52.6%; duration, 11 [14] years). The triage systems used by the respondents included the Manchester Triage System (38.7%), Andorran System (MAT/SET) (24.1%), PaedCTAS system (13.9%), and local adaptations (18.2%). According to our respondents, nurses performed pediatric triage in most cases (97.8%). Additional questions included inquiries about past allergies (77.4% of respondents), drug administration before arrival (74.5%), and drug administration in triage (27.7%).

Seventy-nine percent of respondents used the PAT in triage.

Regarding prioritization of anaphylaxis, 60.6% identified anaphylaxis as priority I. An additional 31.4% chose priority II. WT should be 0 minutes (90.5%) or less than 15 minutes (7.3%). The locations where patients were seen varied, with resuscitation areas (47.4%) and consultation areas (31.4%) being the most frequent.

Prioritization of U/AE was more problematic. The most frequently assigned priority was III (31.4%). However, a third of responders assigned anaphylaxis priority levels with short WTs (I or II).

Simulated cases were presented to determine whether respondents would recognize anaphylaxis. However, frequent mistakes were observed in all steps of prioritization.

Initial prioritization using the PAT was often incorrect. Patients A to D appeared stable, and a stable PAT would normally require a low priority level (V). However, it was an infrequent answer. By contrast, Case E was correctly prioritized according to the PAT. An unstable child is attended to immediately, regardless of the cause. A stable patient follows

Table. Main Findings for Prioritization of Anaphylaxis and Urticaria/Angioedema According to Responders. Prioritization of Simulated Cases.

	Priority level (N = 132)		WT (N=134)		WL (N=136)	
Anaphylaxis	I	83 (60.6%)[a]	Immediate	124 (90.5%)[a]	R	65 (47.4%)
	II	43 (31.4%)[a]	< 15 min	10 (7.3%)[a]	T	30 (21.9%)
	III	5 (3.6%)	< 30 min	-	C	43 (31.4%)
	IV	-	< 60 min	-	WR	13 (9.5%)
	V	1 (0.7%)	< 120 min	-		
	Priority level		**WT**			
Urticaria/Angioedema (N=97)	I	17 (12.4%)[a]	Immediate			
	II	25 (18.2%)[a]	< 15 min	59.9%[a]		
	III	43 (31.4%)	< 30 min	30.7%		
	IV	12 (8.8%)	< 60 min	4.4%		
	V	-	< 120 min			

Prioritization: Simulated cases	Initial prioritization by PAT					Final Priority					Location			
	I	II	III	IV	V	I	II	III	IV	V	R	T	O	WR
CASE A (N=127)	5.1%	24.8%	29.2%	22.6%	10.9%[b]	12.4%[b]	39.4%[b]	40.1%	2.2%	1.5%	46%[b]	25.5%	14. 6%	12.4%
CASE B (N=129)	8.8%	34.3%	21.2%	18.2%	11.7%[b]	19.7%[b]	49.6%[b]	23.4%	1.5%	1.5%	59.9%[b]	23.4%	11. 5%	5.8%
CASE C (N=131)	8.8%	25.5%	32.8%	19.7%	8.8%[b]	15.3%	43.1%	31.4%	8%[b]	0.7%	43.8%	22.6%	5.8%	26.3%[b]
CASE D (N=131)	2.9%	9.5%	29.9%	40.1%	14.6%[b]	2.2%	12.4%	35.8%	47.4%[b]	0.7%	-	7.3%	-	76.6%[b]
CASE E (N=135)	67.2%[b]	26.3%	2.2%	0.7%	2.2%	73.7%[b]	23.4%[b]	-	-	1.5%	94.2%	2.2%	-	-

Abbreviations: C, consultation area; O, other location; PAT, Pediatric Assessment Triangle; R, resuscitation box-critical box; WL, waiting location; WR, waiting room; WT, estimated waiting until medical care is provided.
[a]Most frequent answer.
[b]Correct answer.

all triage steps, leading to a final priority level [1-3]. Patients A and B had received epinephrine before arrival. The most frequent priority level for case A was III (40.1%). For case B, the most frequent level was II (49.6%). In contrast, the most frequently assigned priority level for case C was II (43.1%). The resuscitation area was the most common location for cases A, B, C, and E. The survey content aimed to imitate information given by parents or health care providers at triage and was not a complete medical history. Use of a self-injectable epinephrine device reported at triage should indicate anaphylaxis and prioritization, irrespective of the patient's appearance. The presence of symptoms upon arrival facilitates identification [7]. However, apparently stable children with anaphylaxis are often symptomatic during examination [4,5]. By contrast, the presence of hives upon arrival led to a higher and inaccurate priority level in the third case. Anaphylactic shock (case E) was the most easily identified scenario.

The respondents were aware of the appropriate priority level for anaphylaxis. Mistakes were frequent when prioritizing simulated cases. Overtriage was common when prioritizing U/AE. The implications of overtriage for subsequent medical attention remain unclear. U/AE is common in EDs [11], potentially affecting patient distribution and flow during crowding. Low acuity levels delay identification and medical care and have been associated with lower rates of epinephrine administration [4-7,12].

This study is the first attempt to analyze prioritization of anaphylaxis beyond a single center and triage system. Our results suggest that children with anaphylaxis are frequently misprioritized in Spain. Our dissemination channels (allergists) may have biased our results [13], leading us to potentially overestimate the accuracy of prioritization of anaphylaxis.

Anaphylaxis must be identified in triage to ensure prompt treatment [10,14]. Allergists can improve triage based on their knowledge of the peculiarities of anaphylaxis and differences in clinical presentation, complementing the perspectives of emergency specialists.

Possible improvement measures include the following:

- Addition of triage variables in anaphylaxis epidemiology research.
- Inclusion of prioritization advice in anaphylaxis guidelines [15].
- Inclusion of the peculiarities of anaphylaxis in prioritization training [5].

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Conflicts of Interest

The authors declare that they have no conflict of interest.

Previous Presentation

We submitted our preliminary results to the International Symposium on Life-Threatening Allergic Diseases (Simposium Internacional de Enfermedades Alérgicas de Riesgo Vital organized by the Spanish Society of Allergology and Clinical Immunology (SEAIC) held in Bilbao, Spain, November 2024 and to the EAACI Food Allergy and Anaphylaxis Meeting (FAAM) held in Athens, November 2024.

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