

Assessing the Readiness of a School System to Adopt Food Allergy Management Guidelines

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ABSTRACT

Importance: The prevalence of potentially fatal food allergies in school-aged children is rising. It is important for schools to have a food allergy management policy and an emergency action plan for each affected student.

Objective: To examine the current status of food allergy guideline and/or policy implementation and adoption in a large school system in southeastern Wisconsin.

Design: A 24-item anonymous electronic survey was developed and completed by school principals and administrators in the Archdiocese of Milwaukee School System (approximately 125 schools) in southeastern Wisconsin.

Results: One in 4 responding schools reported no guidelines or policy. Schools that reported having students with special needs due to food allergy were more likely to have a local food allergy policy compared to schools that did not report having students with food allergy special needs (OR 6.3, 1.5-26, $P=0.01$). Schools with food allergy guidelines/policies were 3.5 times more likely to require student individual action plans than schools with no guidelines or policies (OR 3.5, 1.00-12.2, $P=0.05$).

Conclusions: Gaps in evidence-based food allergy policy implementation were found in this school system. Schools with food-allergic children with special needs were more likely to have guidelines/policy, however, they were not more likely to require emergency action plans. The majority of schools (66, 90%) reported interest in receiving further information or training on food allergy management.

INTRODUCTION

Food allergies are becoming an increasingly common student health challenge for schools in the United States. A recent national food allergy epidemiologic study reports a food allergy prevalence of 8% and furthermore notes that 38.7% of food-allergic children have a history of a severe reaction.¹ The Centers for Disease

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Control and Prevention (CDC) estimates that 1 in 25 school-aged children have food allergies.^{2,3} For some students with chronic food allergies, exposure to their specific food allergens can result in life-threatening anaphylactic reactions. There is no cure for food allergies and the only known treatment is strict avoidance of the allergen. In the school setting, food-allergic students face multiple challenges, including fear of exposure, inadvertent ingestion, and bullying.⁴⁻⁶

If inadvertent exposure occurs, immediate recognition and treatment with epinephrine (adrenaline) is critical for survival.^{4,7} According to emergency department estimates, there is approximately 1 emergency department visit for an acute food allergy-related reaction in the United States every 3 minutes and an estimated 30,000 food-induced anaphylactic reactions in the United States per year.^{8,9} It is difficult to predict if a food-allergic child will develop anaphylaxis after exposure to

the food allergen; further, a child with a previously mild reaction to a food may have a severe reaction in the future.^{10,11} In a study of an anaphylactic registry performed in the United Kingdom, fewer than one-fourth (22%) of food-allergic fatal reactions were preceded by a previous severe food-allergic reaction.⁷

Incidents associated with fatal and near-fatal anaphylaxis due to food allergies are more likely to occur away from home—eg, in a school or restaurant setting—and they often are associated with delays in epinephrine administration.^{4,5,12} This is likely related to the increased risk of accidental exposure and delay in symptom recognition.¹² Students with food allergies can develop severe symptoms quickly and, therefore, the use of food allergy emergency action plans is recommended to aid school staff in recognizing and promptly treating a reaction in an emergency situation.^{13,14}

Table 1. Descriptive Statistics of Responding Schools

Type of School	Number of Schools Responding (%)
Total responding schools	78
Total schools completed survey	71 (91)
School grade levels	
PK-5th/6th grade	5 (7)
PK/K-8th grade	56 (76)
PK-12th grade	1 (1)
5th/6th-8th grade	2 (3)
9th-12th grade	3 (4)
Schools with a school nurse	6 (8)
Responder Occupation	
Administrator	8 (10)
Principal	70 (90)

Abbreviation: PK, prekindergarten

The unpredictable nature of food allergy reactions, coupled with the need for prompt recognition and treatment with epinephrine, has led to the development of school management guidelines and recommendations for students with food allergies by nationally respected professional organizations such as the American Academy of Allergy, Asthma & Immunology (AAAAI), Food Allergy Research and Education (FARE), and the National Association of School Nurses (NASN).¹⁵⁻¹⁸ Several states also have published school food allergy management guidelines.^{19,20} Additionally, the Food Allergy and Anaphylaxis Management Act (FAAMA), signed into federal law in January 2011, required the CDC to collaborate with stakeholders in the development of national guidelines.²¹ Despite the above-mentioned national food allergy guidelines, school food allergy policies are insufficiently implemented.^{5,11,22-24}

Given these gaps, we set out to examine the current status of food allergy guideline implementation and adoption in a large school system in southeastern Wisconsin. The primary outcomes of interest studied included whether the school had a guideline or policy to address the management of food allergies in students and whether or not the school required that all students with food allergies have individual food allergy action plans. Furthermore, we examined the degree of school nursing support and the school's interest in further food allergy education and training.

METHODS

Subjects

Jointly the Archdiocese of Milwaukee Office for Schools and the Medical College of Wisconsin asked the principals and school administrators of the Archdiocese of Milwaukee System of Schools to participate in our study. This school system is the second-largest system of schools in the state of Wisconsin and relies mostly on nonmedically trained staff and volunteers to staff school health rooms. Located in southeastern Wisconsin, the school system is a parochial system of 125 3-year-old kinder-

garten (K3) through 12th-grade schools with 2,699 school staff serving approximately 32,000 students at the time of the study. The system spans 10 counties, including the inner city and urban area of Milwaukee County, rural counties (eg, Dodge, Walworth, Ozaukee) and suburban communities. The school system is ethnically and economically diverse with 20% of students coming from underrepresented minority groups and 30% of students receiving free/reduced lunch services. In this decentralized system, each school is independently run by its sponsoring parish or a governing board, and each school determines its own local guidelines or policies addressing the management of student food allergies. The school health rooms are usually run by administrative staff or volunteers.

The study was approved by the Institutional Review Board at the Medical College of Wisconsin.

Instrument

Our community-academic partnership developed a 24-item questionnaire (Appendix). The questions were based on current guidelines from the literature and recommendations for school management of student food allergies from nationally known organizations such as FAAN (now FARE) and AAAAI.^{5,15,16} Prior to administration, a school principal and the associate superintendent pretested the questionnaire for clarity.

Procedure

We sent the questionnaire to all school principals and school administrators in their weekly electronic Office for Schools information packet (InfoPak). The questionnaire was anonymous, voluntary, and administered electronically from December 2010 through February 2011. It took approximately 10 minutes to complete. To ensure anonymity, we did not record respondent Internet Protocol (IP) addresses or administer paper copies of the questionnaire.

Statistical Analysis

The primary outcomes of interest analyzed were whether the school had a guideline or policy to address the management of food allergies in students and whether or not the school required that all students with food allergies have individual food allergy action plans. The potential factors for predicting these outcomes of interest included school enrollment, the presence or absence of a school nurse, the demographic setting of the school (rural, inner city, or suburban), and the presence or absence of food-allergic students at the school. Additionally, we tested whether or not a school had a food allergy policy or guidelines as a possible predictor of whether the school required individual food allergy action plans. Three schools responded "not sure" as to whether they had food allergy guidelines or policies and 3 did not respond. Additionally, 4 schools responded "not sure" as to whether they required food allergy action plans and 5 schools did not respond. Since these were the primary outcomes of interest,

these responses were removed from the bivariate and multivariate analysis. Fisher's exact test was used to analyze the differences in the predictors between schools with student food allergy management guidelines or policies and schools that did not have them. We also used Fisher's exact test to analyze these predictors and the presence of food allergy guidelines/policies between schools that require food allergy emergency action plans and schools that did not require food allergy action plans. We used multivariate logistic regression analyses to model dependence of the 2 primary outcomes of interest, schools having food allergy policies/guidelines and schools requiring student food allergy action plans, on the above-described factors. A backward elimination model selection procedure was used to identify statistically significant covariates to be added into the final model. A statistical significance (alpha) level of 0.05 was used throughout the analysis. SAS OnDemand Enterprise Guide 4.2 (SAS Institute, Cary, North Carolina) was used to perform all statistical analysis.

RESULTS

One hundred twenty-five schools were surveyed and 78 responded for a response rate of 62%. Seventy-one (91%) of the responding schools completed the questionnaire. The majority of the questionnaires were completed by the school's principal and the remainder were completed by another school administrator (Table 1). The mean school enrollment was 251 students (standard deviation 189) with a range of 55 to 1,365 students. The majority of participating schools served students in prekindergarten through 8th grade. Table 1 displays the breakdown of schools by grade levels. Seventy-two (92%) schools indicated that they had no school nurse. For those schools that indicated they had a school nurse, 80% reported the nurse being present at the school for less than 10 hours per week.

Overall, 53 (71%) schools had some type of guideline or policy to address food allergies in students. However, 1 in 4 schools indicated they had no local policy or guidelines and 3 (4%) schools responded they were unsure. Food allergy emergency action plans (EAP) were required in 41 (56 %) schools. The setting of the study schools are described in Table 2a. Using Fisher's exact test, no association was found between a school's reported geographic area and the adoption of food allergy guidelines/policies or requirement of action plans in this system of schools (Tables 2a and 2b).

Fifty-six (76%) schools reported having students that needed special arrangements due to food allergies. Of these schools, the most frequent accommodation was establishing a peanut-free classroom (44; 79%). Fifteen (27%) schools had specific allergen-free areas and 25 (45%) had special lunchroom tables. Other methods to accommodate students with food allergies included (1) having allergic students move themselves away from the allergen; (2) providing special snacks for affected students or having the parents provide their lunch; (3) increased monitoring of

Table 2a. Selected Characteristics of Responding Schools With Food Allergy Policies in Comparison to Those Without Food Allergy Policies

n (%) Schools			
	With Food Allergy Policies or Guidelines (n = 47)	Without Policies or Guidelines (n = 14)	P-value
Student Enrollment			
Mean	254	209	0.06
Variables (n = 53) (n = 19) P-value			
School Has Students With Food-allergic Special Needs			
Yes	45 (85)	8 (15)	<0.0001
No	5 (36)	9 (64)	
Missing/other	1 (100)	0 (0)	
School Has a Nurse			
Yes	4 (80)	1 (20)	1.00
No	47 (75)	16 (25)	
School Setting			
Inner City	6 (75)	2 (25)	0.23
Rural	13 (65)	7 (35)	
Suburban	30 (83)	6 (17)	
Missing/other	2 (50)	2 (50)	

Table 2b. Selected Characteristics of Responding Schools That Require Food Allergy Action Plans in Comparison to Those Who do Not Require Food Allergy Action Plans

n (%) Schools			
	Require Food Allergy Action Plans (n = 36)	Do Not Require Food Allergy Action Plans (n = 25)	P-value
Student Enrollment			
Mean	251	234	0.18
Variables n = (41) (n = 28) P-value			
School Has Students With Food-allergic Special Needs			
Yes	32 (60)	21 (40)	0.74
No	7 (50)	7 (50)	
Not sure	1 (100)	0 (0)	
School Has a Nurse			
Yes	3 (60)	2 (40)	0.63
No	37 (59)	26 (41)	
School Setting			
Inner City	2 (25)	6 (75)	0.22
Rural	12 (60)	8 (40)	
Suburban	23 (64)	13 (36)	
Missing/Other	3 (75)	1 (25)	
School Has Food-allergic Policy/Guidelines			
Yes	34 (67)	17 (33)	<0.0001
No	6 (35)	11 (65)	

snacks; and (4) 1 school indicated it was moving toward a peanut-free school environment.

However, the study schools used recommended food allergy reaction prevention guidelines inconsistently. Table 3 displays simple prevention guidelines and the number of responding

Table 3. Simple School Prevention Guidelines

Prevention Guideline	Number of Schools With Guideline or Policy	Percentage
Hand washing guidelines or policies	42	56.8 %
No food or eating utensil sharing	22	29.7%
Food substitution guidelines for classroom projects	43	58.1%
Cleaning surfaces in contact with food allergens	33	44.6%

Table 4a. Bivariate Analysis of Factors Associated With a School Having Local Food Allergy Guidelines or Policies

Variable	n (%)	(95% Confidence Interval)	P-value
Proportion of Schools With Food Allergy Policies or Guidelines Crude Odds Ratio			
Schools Has Students With Food Allergy Accommodation Needs			
No	5 (11)	Referent	
Yes	42 (89)	6.3 (1.5, 26)	0.01
School Nurse Present			
No	43 (91)	Referent	
Yes	4 (9)	1.2 (0.12, 11.8)	1.00
School Setting			
Suburban	29 (62)	Referent	
Inner City	6 (13)	0.52 (0.08, 3.32)	0.60
Rural	12 (25)	0.30 (0.08, 1.12)	0.09
Student Enrollment			
Continuous		1.003 (1.00, 1.01)	0.28

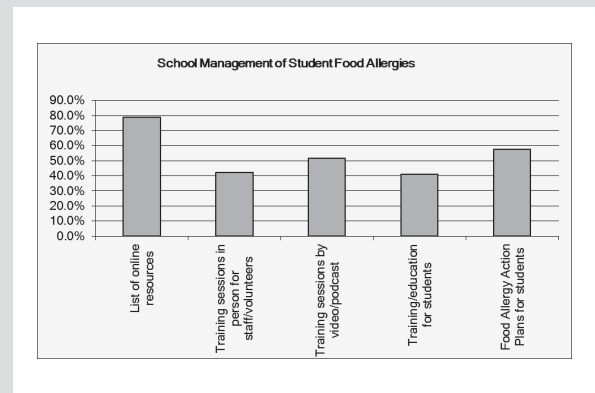
Table 4b. Bivariate Analysis of Factors Associated With a School Requiring Food Allergy Action Plans for Students With Food Allergy

Variable	n (%)	(95% Confidence Interval)	P-value
Proportion of Schools That Require Food Allergy Action Plans Crude odds ratio			
Schools With Students with Food Allergy Accommodations Needs			
No	6 (17)	Referent	
Yes	30 (83)	1.25 (0.4, 4.7)	0.75
School Nurse Present			
No	33 (92)	Referent	
Yes	3 (8)	1.05 (0.2, 6.8)	1.00
School Setting			
Suburban	22 (61)	Referent	
Inner City	2 (6)	0.18 (0.03, 1.0)	0.06
Rural	12 (33)	0.94 (0.3, 3.0)	1.00
School Has Food Allergy Guideline/Policy			
No	5 (14)	Referent	
Yes	31 (86)	3.487 (1.00, 12.16)	0.05
Student Enrollment			
Continuous		1.001 (1.00, 1.01)	0.63

schools that had adopted the guideline.

Study schools with students who had food allergy special needs differed significantly from schools that did not have students with these needs as to whether or not they had local

Figure 1. Preferred Instructional Formats for Educational Information and Training



food allergy policies or guidelines (85% vs 15%, $P < 0.0001$). Additionally, schools with food allergy policies were more likely to require individual student food allergy action plans (67% vs 35%, $P \leq 0.0001$). Further breakdown of these characteristics (variables) in relation to the primary outcomes of interest are shown in Tables 2a and 2b.

Anaphylaxis and epinephrine training of some kind were provided by 49 (66%) schools. Of these 49 schools, all provided training to school staff; however, only 9 (18%) provided training for school volunteers and 1 (2%) provided parent training. Sixty-six schools (90%) reported interest in receiving further information or training on school management of food allergies. Figure 1 displays the preferred format of information and training.

Bivariate Analyses

Results of the bivariate analysis are summarized in Tables 4a and 4b. Schools that reported having students with special needs due to food allergy were 6 times more likely to have a local food allergy policy compared to schools that did not report having students with food allergy special needs (OR 6.3, 1.5-26). However, there was no significant difference between the 2 groups in regard to whether the school required individual food allergy action plans for students with food allergies.

When analyzing whether having a local school food allergy policy is associated with the school requiring individual student action plans, we found marginal significance with a P -value of 0.05. Schools with food allergy guidelines/policies were 3.5 times more likely to require student individual action plans than schools with no guidelines or policies (OR 3.5, 1.00-12.2).

Multivariate Analyses

Multivariate analyses of the potential predictors for the 2 outcomes above did not yield any other significant variables.

DISCUSSION

The results of our study show that adoption of school food

allergy management guidelines remains inconsistent in this large school system. Additionally, many did not employ simple prevention strategies or provide education and training, and did not require student emergency action plans. Our results support current studies in the literature with similar findings in other geographic areas of the United States.^{5,11,22-24}

We had a high response rate for the survey and believe that our community-academic partnership approach and the use of the electronic survey mechanism promoted the completion of the questionnaires. Our high response rate also may be related to the school principals' and administrators' recognition of the importance of implementing better practices for caring for students with food allergies.

Additionally, we found significantly limited school staff access to school nurses. The lack of schools with access to nurses limited our power to test associations between the presence of school nurses and the adoption of food allergy guidelines. Therefore, it is possible that with a high number of schools with access to a school nurse in our sample we may have found this to be a significant predictor of the school adopting food allergy guidelines. The literature posits that implementing food allergy guidelines and policies without access to qualified health professionals (such as a school nurse) to help with the interpretation, implementation, and adherence to food allergy guidelines may be difficult.²⁵ Without the aid of a school nurse, school leaders and staff are tasked to provide health services for students—this includes compliance with state statutes regarding school health services. Anecdotally, we discovered that schools often rely on teachers, administrators, and volunteers to provide school health services and to implement appropriate local health safety measures to ensure student well-being. The additional responsibilities of providing health care to students often extends beyond the comfort level of school personnel.²⁵ Furthermore, the presence of a school nurse alone is not sufficient to care for students with food allergies. Indeed, the US Peanut and Tree Nut Allergy Registry found that the school nurse responded to food allergy reactions in only 10% of food allergy incidents. Teachers were noted to be the first responder in 59% of cases; therefore, teacher training and communication with health care providers are particularly important.²⁶

In addition, it is likely that to some extent schools learn from or are motivated by the parents of affected students to implement policy, as our results show that having a student who has a food allergy was significantly associated with having adopted school guidelines or policies. Unfortunately, relying on concerned parents to drive food allergy policy and practices in schools is not enough, as many first reactions occur in the school setting.²⁶ Schools need to be prepared for the unexpected and adopt evidence-based policies to prevent poor outcomes.

Our study also indicates that staff, volunteer, and parent training on epinephrine use was inconsistent in the schools. This

is concerning given the unpredictable nature of food allergies in which prompt recognition and epinephrine administration are the primary methods of treatment. Given that health rooms, field trips, sports, and after-school activities often are staffed, or run, by parents and volunteers, training and education targeted at these groups would be beneficial. However, as we previously noted, few schools have the access to skilled health professionals to help provide training.

Our results also indicate that recommended preventive management strategies for students with food allergies were not consistently used such as simple hand washing, cleaning guidelines, and no-sharing policies. Once again, this finding underscores the need for education and training of staff and volunteers on simple food allergy management strategies. Furthermore, many of the schools that had children with food allergy special needs did not mandate that all students have a food allergy emergency action plan. Without individualized physician-prescribed emergency care plans for each affected student, the school administrative staff, teachers, and volunteers do not have the vital information (ie, a written plan to manage a student with a food allergy) needed in the event of an emergency when swift appropriate action is needed and an experienced school nurse may not be available.¹⁷

On a positive note, many respondents noted a desire to improve their knowledge and skills by requesting further information or training on food allergy management. Most schools preferred online resources or video podcasts to learn more about school management of food allergies. These formats may provide an efficient strategy to address food allergy management training, as they can be merged easily into the current school workflow (ie, reduced need for attendance and participation at workshops and seminars). In addition, the school system's administration is supportive of continued health education and training and our partnership currently is working to develop online and mobile health food allergy education and training resources for school staff and volunteers in addition to regional educational workshops. Further study will be required to identify the most effective and efficient strategies to provide food allergy education and training to schools with minimal to no nursing support.

LIMITATIONS

We acknowledge limitations in applying these results to other settings. First, all survey responses were drawn from a single geographic area in Southeastern Wisconsin; it is not clear the results would be similar outside this region. Similarly, while our focus on private (parochial) schools avoids confounding by different types of school systems, allowing us to examine specific characteristics, it does limit the generalizability to other types of school systems. Also, the nature of our survey design may have created recall bias. To minimize the effect of this, the questions were kept simple and most allowed for a "not sure" response. Finally, we

Appendix. Complete Survey Questions

1. What is the role of the person filling out this survey?

- a. Principal
- b. Teacher
- c. School nurse
- d. Administrator

2. Does your school have a school nurse?

- a. Yes
- b. No

3. If yes, how many hours is the nurse in your school per week?

- a. Less than 10 hours
- b. 11-20 hours
- c. 21-30 hours
- d. 40 or more hours

4. Does your school have any policy or guidelines specifically addressing food allergies in students?

- a. Yes
- b. No
- c. Not sure

5. Does your school require that all students with food allergies have a Food Allergy Action Plan or similar form filled out by the student's doctor or primary care provider?

- a. Yes
- b. No
- c. Not sure

6. Does your school have any children who currently need special arrangements due to food allergies?

- a. Yes
- b. No
- c. Not sure

7. If yes, please check all that apply

- a. Allergen free areas
- b. Special lunchroom table
- c. Special classroom accommodations (eg, peanut-free)
- d. Other (please specify)

8. Does your school have guidelines or a policy regarding hand washing after food handling by staff, students, or volunteers?

- a. Yes
- b. No
- c. Not sure

9. If yes, which group do these handwashing guidelines or policy apply (may select one or more groups)?

- a. Staff
- b. Students
- c. Volunteers

10. Does your school have a "no food or eating-utensil trading" guideline or policy?

- a. Yes
- b. No
- c. No sure

11. Some classroom projects involve food (such as math, science projects, art projects, cooking demonstrations etc.) Does your school use food substitution guidelines for classrooms with food allergic students who may have an allergy to the food used (eg, peanut butter)?

- a. Yes
- b. No
- c. Not sure

12. Does your school have guidelines or a policy for cleaning surfaces (eg, tables, desks) which have been in contact with common food allergens (such as peanut, peanut butter, egg, tree nuts etc)?

- a. Yes
- b. No
- c. Not sure

13. Does your school provide any training on anaphylaxis* and epinephrine (adrenaline) treatment? *According to the Food Allergy and Anaphylaxis Network (FAAN), anaphylaxis is a "serious allergic reaction that is rapid in onset and may cause death." Symptoms can include difficulty breathing, hives, facial swelling, vomiting, diarrhea, cramping, shock and loss of consciousness. ²⁷

- a. Yes
- b. No
- c. Not sure

14. If yes, please select which group receives training in your school on anaphylaxis and epinephrine (adrenaline) use. (May select more than one).

- a. Staff training
- b. Volunteer training
- c. Parent training

15. When a classroom has a student with a food allergy, does the school provide information to the parents of the classmates?

- a. Yes
- b. No
- c. Not sure

16. If yes, please select the type of information provided (May select more than one).

- a. Letter from the teacher
- b. Letter from the student's parents
- c. Safe snack list
- d. Educational information on food allergies
- e. Other (please specify)

17. Is educational information on food allergies provided or available to staff, parents, and volunteers? (May select more than one)

- a. Yes, staff
- b. Yes, parents
- c. Yes, volunteers
- d. No
- e. Not sure

18. If yes, please check the type of information:

- a. Websites
- b. Pamphlets
- c. Training sessions
- d. Video
- e. Other (please specify)

19. Would your school like training and/or information on school management of food allergies? Please select all that apply:

- a. List of online resources
- b. Training sessions in person for staff/volunteers
- c. Training sessions by video/podcast
- d. Training/education for students
- e. Food Allergy Action Plans for students
- f. Other (please describe)

20. Please share any other comments you have:

21. Please select which applies to you:

- a. Public school
- b. Private school

22. How would you describe the setting your school is in?

- a. Rural
- b. Suburban
- c. Inner City
- d. Other (please specify)

23. What was your school's enrollment last year? _____

24. Please enter your school's lowest grade and your school's highest grade:

- a. Lowest grade _____
- b. Highest grade _____

did not achieve a 100% response rate and the study's results may not fully represent the entire school system. However, we feel that the geographical diversity of the schools that did participate can serve as a strong representation of the school system, as many neighboring schools likely will adopt similar policies.

Fellowship: Funded in part by an Institutional National Research Service Award from the Health Resources and Services Administration, Grant # T32-HP10030 and the Department of Family and Community Medicine at the Medical College of Wisconsin.

Funding/Support: None declared.

Financial Disclosures: None declared.

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WMJ (ISSN 1098-1861) is published through a collaboration between The Medical College of Wisconsin and The University of Wisconsin School of Medicine and Public Health. The mission of *WMJ* is to provide an opportunity to publish original research, case reports, review articles, and essays about current medical and public health issues.

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