Food allergy is a chronic health condition and the leading cause of anaphylaxis (a severe potentially life-threatening allergic reaction) in children. Food allergy prevalence is rising among school-aged children; approximately 1-2 children in each classroom live with a food allergy. Anaphylactic incidents often occur in community settings. In school setting, student caregivers, such as teachers and staff are tasked with managing potential anaphylactic reactions due to food allergy. Caregiver recognition of anaphylactic symptoms along with immediate treatment with an epinephrine auto-injector are critical for child survival. However, many schools do not have an on-site nurse and students have frequent caregiver transitions (e.g. field trips and aftercare), posing challenges in student caregiver training and school emergency health response. See Table 1 below for more challenges.

Therefore, a need exists for health crisis support systems to aid caregivers in acting in the critical minutes before first responders arrive. Furthermore, given the dynamic school environment with frequent transitions in childcare (e.g. multiple child caregivers throughout the day such as bus drivers, substitutes, field trip chaperones and afterschool), a student-centric system design could aid in addressing gaps in caregiver health information exchange.

**Learning objectives:**

- Understand the need for caregiver decision support to help manage children with potentially life-threatening food allergy.
- Identify benefits of community engagement in application/system development.
- Understand the importance of evidence-based medicine in development of decision support tools.

## What is community engagement in Research (CEnR)?

- A research process which requires active community participation and mutual respect between researchers and the community.
- Community is defined as “self-identified by geographic proximity, special interest, or similar situations” and researchers and community members learn together, share knowledge, expertise, and acknowledgments.
- Bi-directional communication between community and researchers.

**How does CEnR help?**

- According to the Institute of Medicine, increases the community’s understanding of the research issues being studied.
- Increases researcher’s and academic institution’s understanding of community health priorities.
- Aids in the development and implementation of culturally sensitive research approaches.

### Table 1. School Food Allergy Challenges

<table>
<thead>
<tr>
<th>Problem</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incompliance health information</td>
<td>Gaps in health provider prescribed food allergy emergency action plans at school</td>
</tr>
<tr>
<td>Food everywhere</td>
<td>Limited school menus to coordinate staff training</td>
</tr>
<tr>
<td>Multiple Caregivers</td>
<td>Act projects</td>
</tr>
<tr>
<td>Common Allergens</td>
<td>Staff training availability</td>
</tr>
</tbody>
</table>

### Methods

**Community Engagement in Research (CEnR) methods** were used to identify a solution for the need for school faculty and staff food allergy emergency preparedness training.

- Education on food allergy and school management challenges provided by clinical team to computer science (IT) researchers who were interested in partnering to design an innovative solution.
- User-centered agile design methods used.
- Trans-disciplinary prototype design: The Archdiocese of Milwaukee Office for Schools, Marquette University’s Computer Laboratory, and the Medical College of Wisconsin (MCW) collaborated in designing a caregiver decision support system for mobile handheld devices to be used by school teachers and staff in the school setting.
- Active engagement of school nurses, administrators, and teachers in the work flow design process.
- An evidence-based medicine approach was used to design the decision tree for the decision support “arm” of the application (see screen shot 3 at upper right)

### Table 2. Community Partners

| Archdiocese of Milwaukee Office for Schools | Aquinas Academy (see picture upper right) |
| Marquette University Ubicomp Computer Lab | Padre Pio Clinic at St. Anthony School |

### Results

- A three “armed” system prototype developed for mobile devices including iPad, iPhone, or Android device. (see screen shots 1-4 at upper right)
- Student health (allergy) information arm: Data entry
- Action plan arm: Easily accessible list of interactive student electronic food allergy action plans (eAAPS) with scrollable search
- Educational arm: Embedding training videos

The use of Community engagement has aided the research team in quickly identifying schools willing to participate in pilot studies.

**Problem**

IRB approved study of school teachers and staff at Aquinas Academy, K-12th grade school, interacting with the system using case scenarios developed in collaboration with an Allergist from the Medical College of Wisconsin is ongoing.

**Initial review by clinical research team and community members** identified the need for several modifications:

- Symptom descriptions too clinical
- Change from embedded videos to picture training in the decision support arm to minimize time required to view
- Use of decision support arm as primarily a training device using drills
- Need for review of new FDA guidelines prior to use in the school environment
- Recommendation for study disclaimer additional to the application

**Future**

In the future, we envision using this mHealth care plan model for school management of other chronic health conditions such as asthma.

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### References


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