Project Title
Utility of peak flow in interpreting subjective chest tightness during food challenge.

Name, Country
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Type, duration and location of Fellowship
EAACI Research Short Term Fellowship, 4 months, London, UK.

Host Institution and Supervisor name
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What questions were addressed and why?
The research aimed to answer the following primary question: "Is a fall in peak expiratory flow (PEF) useful as an indicator of anaphylaxis during food challenge?"
This question is crucial as food challenges (FC) are fundamental in diagnosing food allergies but can result in anaphylaxis in 20-50% of cases, causing significant anxiety for patients and caregivers. Specifically, the study sought to determine if a fall in PEF, particularly in the context of subjective chest tightness (a common yet ambiguous symptom), could serve as a reliable marker for respiratory compromise indicative of anaphylaxis.

What was the nature of the research?
The research involved a post hoc analysis of data from a previously conducted food challenge study involving an adult cohort: TRACE Peanut Study.
The data encompassed a total of 138 double-blind, placebo-controlled food challenges (DBPCFC) and 125 open food challenges, with PEF measurements recorded at various points during the challenges (at baseline, prior to each challenge dose and as clinically indicated.).
The analysis focused on changes in PEF from baseline, the occurrence of anaphylaxis, and the sensitivity/specificity of different PEF drop thresholds (≥10% and ≥20%).

What was the result?
The research proposed several key outcomes of interest:

- Occurrence of anaphylaxis according to NIAID criteria and WAO criteria
- Sensitivity and specificity of a PEF drop of ≥10% and ≥20%
- Receiver operating characteristic (ROC) curve analysis to determine the optimal cut-off for PEF drop to inform the significance of subjective chest tightness.

The analysis provided several findings:

- **Anaphylaxis Incidence**: Out of 263 food challenges, anaphylaxis occurred in 40 (15%) based on WAO criteria, increasing to 59% when including persistent GI symptoms as per NIAID definition.

When looking the PEF drop:

- **PEFR reduction of ≥10%**:
    - 78 participants (30%) experienced a ≥10% reduction in PEF.
    - Among these, 26 (33%) had no respiratory symptoms at the time of the drop.
    - 67% had respiratory symptoms, of whom 48% developed clinical anaphylaxis (WAO criteria).
    - Sensitivity: 68%, Specificity: 61%, Likelihood Ratio: 1.7.
- **PEFR Reduction of ≥20%**:
    - 14 participants (5.3%) experienced a ≥20% reduction in PEF.
    - Among these, 2 had no respiratory symptoms.
    - 12 (86%) had respiratory symptoms, with 8 developing clinical anaphylaxis (WAO criteria).
    - Of the other 4 patients with respiratory symptoms but not developing anaphylaxis, notably, 2 participants had poor effort during PEFR due to throat or abdominal pain.
    - Sensitivity: 22%, Specificity: 94%, Likelihood Ratio: 3.7.

Regarding the placebo challenges:

- 15 participants (12%) had a drop in PEF of ≥10%, and 1 person had a drop of 20%, none of whom reported subjective chest tightness.

The results indicate that:

- A <20% fall in PEF is not a reliable predictor of respiratory anaphylaxis.
- A ≥20% fall in PEF may be helpful in interpreting the significance of isolated chest tightness without objective signs and should prompt a full assessment of the patient prior to any further doses being administered.

How will the findings impact future research?

The findings from this research are expected to have significant implications for both clinical practice and future research. By providing evidence on the utility of PEF measurements in interpreting subjective chest tightness, the study could lead to more precise and safer criteria for stopping food challenges, thus reducing the risk of severe reactions during these procedures.

Furthermore, members of the PRACTALL Working Group are aware of this analysis, indicating that the results are likely to inform the next revision of the PRACTALL guidelines. This would standardize practices globally, enhancing patient safety and the reliability of food allergy diagnostics.

The study's results are going to be presented in EAACI congress 2024.

We expect the project to result in at least one full paper which will be submitted to Allergy for consideration, contributing to the body of knowledge in allergy diagnostics and management.

Conclusion

Reflecting on this research experience, I have gained significant insights into the field of food allergy research and into the complexities and nuances of diagnosing food allergies, particularly the use of PEF as an objective measure during food challenges. The process has deepened my understanding of how critical it is to have reliable and accurate indicators for anaphylaxis to ensure patient safety.

One of the key learnings from this research is the importance of balancing sensitivity and specificity in diagnostic criteria. While a ≥20% fall in PEF shows high specificity, its low sensitivity means that not all cases of anaphylaxis will be caught using this measure alone. This highlights the need for comprehensive diagnostic approaches that consider multiple indicators and patient symptoms.
Additionally, the experience underscored the importance of meticulous data collection and analysis. The post hoc analysis required careful scrutiny of existing data to draw meaningful conclusions. This process emphasized the value of robust study design and the need for thorough documentation during initial data collection phases.
Areas for Improvement

1. In future research, I would focus on improving the precision of data collection, ensuring that all relevant variables are consistently recorded. This includes more detailed patient symptom tracking and ensuring effort consistency in PEF measurements.
2. Expanding the diversity of study cohorts, including a wider range of ages and allergic conditions, would improve the generalizability of findings. This approach can help tailor guidelines to various patient demographics more effectively.
3. Leveraging technology, such as digital health records and automated data collection tools, could streamline the process and reduce manual errors. This integration can facilitate real-time data analysis and quicker decision-making during food challenges.

This research experience has been invaluable in highlighting both the challenges and opportunities in allergy diagnostics. By focusing on continuous improvement in data collection and diagnostic approaches, I am better equipped to contribute to safer and more effective allergy management practices in the future. The insights gained will guide my approach in future research projects, ensuring they are conducted with greater precision and patient-centered care.

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