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Brief report

An algorithm developed using the Brighton Collaboration case definitions is more efficient for determining diagnostic certainty

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ABSTRACT

The Brighton Collaboration is a global research network focused on vaccine safety. The Collaboration has created case definitions to determine diagnostic certainty for several adverse events. Currently nested within multi-page publications, these definitions can be cumbersome for use. We report the results of a randomized trial in which the case definition for anaphylaxis was converted into a user-friendly algorithm and compared the algorithm with the standard case definition. The primary outcomes were efficiency and accuracy. Forty medical students determined the Brighton Level of diagnostic certainty of a sample case of anaphylaxis using either the algorithm or the original case definition. Most participants in both groups selected the correct Brighton Level. Participants using the algorithm required significantly less time to review the case and determine the level of diagnostic certainty [mean difference = 107 s (95% CI: 13–200; $p = 0.026$)], supporting that the algorithm was more efficient without impacting accuracy.

1. Introduction

Immunizations are powerful public health interventions that have been very effective in reducing global disease burden [1]. Although vaccines are generally safe, there are certain risks associated with their administration. While adverse events following immunization (AEFI), such as anaphylaxis, are rare, efficient systems to monitor AEFIs are essential to systematically assess vaccine safety.

The Brighton Collaboration is a non-profit, international research network that provides standardized, validated, and objective case definitions for monitoring vaccine safety [2]. The definitions provide clinical and diagnostic criteria to allow AEFIs to be assigned to one of three levels of "diagnostic certainty"; a Level 1 indicates the highest level of confidence that an AEFI meets the corresponding diagnosis. The use of these standardized case definitions in research and clinical settings will more precisely characterize events, leading to a better understanding of the true risk of AEFIs [3].

Because the case definition format is generally a footnoted table nested within a 10–20 page journal article, the goal of this study was to convert one Brighton case definition into an algorithm, and evaluate the efficiency and accuracy of the algorithm compared to the original case definition.

2. Materials and methods

2.1. Algorithm development

In July 2012 the Brighton Collaboration case definition of anaphylaxis [4] was reviewed. Key clinical criteria that distinguished the levels of diagnostic certainty were abstracted and using SmartDraw software [5] were transposed into a step-wise algorithm that guided users to the appropriate level (Fig. 1). The algorithm was tested by applying it to cases of anaphylaxis identified through a Pubmed search. The algorithm was reviewed by one pediatrician and one allergist to verify that the criteria matched the original case definition.

2.2. Sample case

The sample case was selected from clinical cases presented to the Clinical Immunization Safety Assessment network (CISA)

Abbreviations: AEFI, adverse events following immunization; LMICs, low to middle income countries; GVSI, Global Vaccine Safety Initiative.

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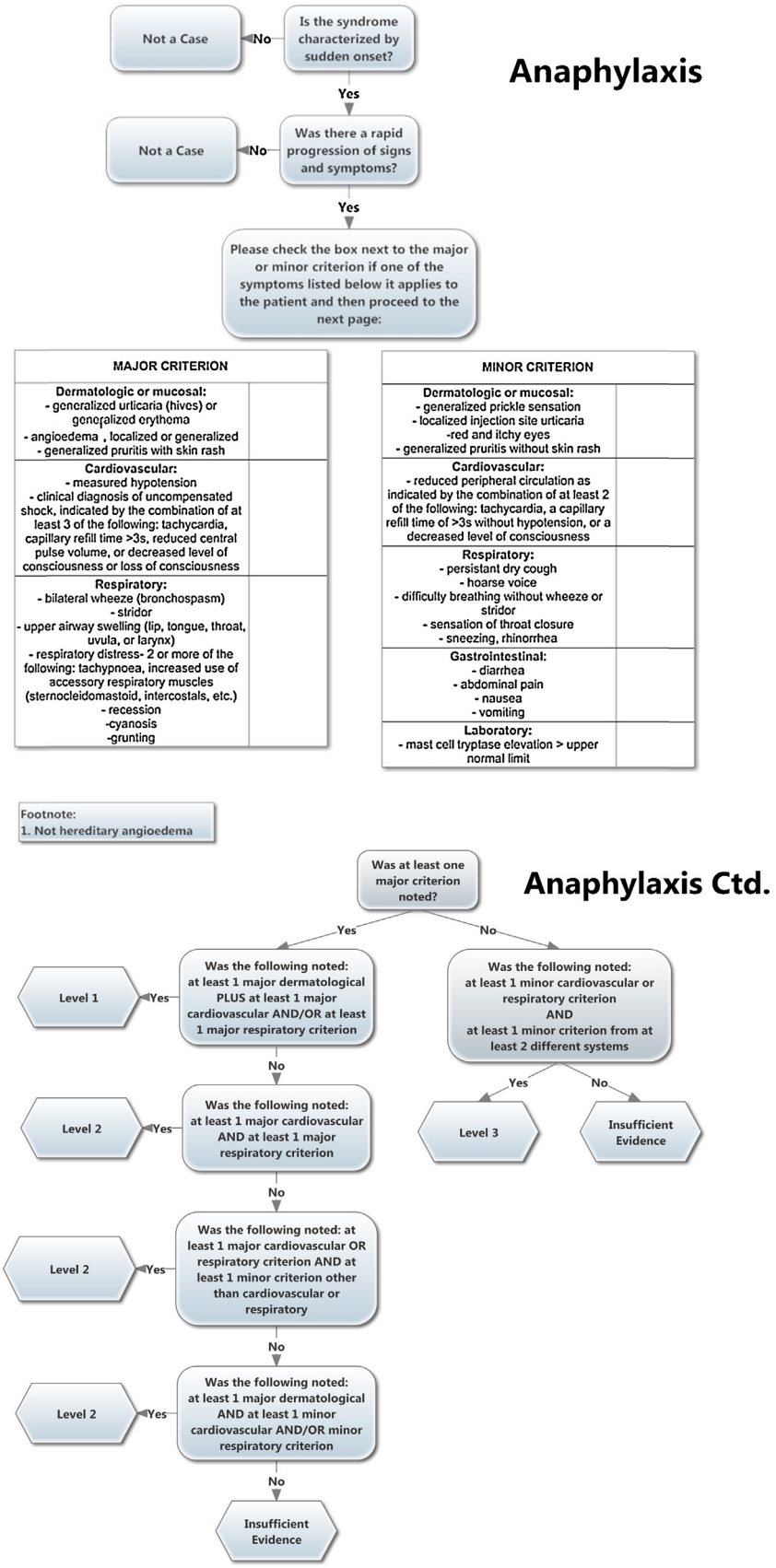

Fig. 1. Algorithm for anaphylaxis developed from the Brighton Collaboration case definition.