

Background and Design

Background

A major challenge in effective management of febrile children is the clinical difficulty of distinguishing bacterial from viral infections. This uncertainty drives antibiotic misuse, hampering patient care and contributing to emergence of antibiotic resistance. ImmunoXpert™ is a novel assay that distinguishes bacterial from viral infections based on the serum levels of three host-proteins (TRAIL, IP-10, and CRP).¹⁻³ Here we evaluated the assay's ability to assign correct infection classification (viral or bacterial) in children infected with ten different types of viral strains as well as in bacterially infected children.

A new IVD assay for distinguishing between bacterial and viral infections

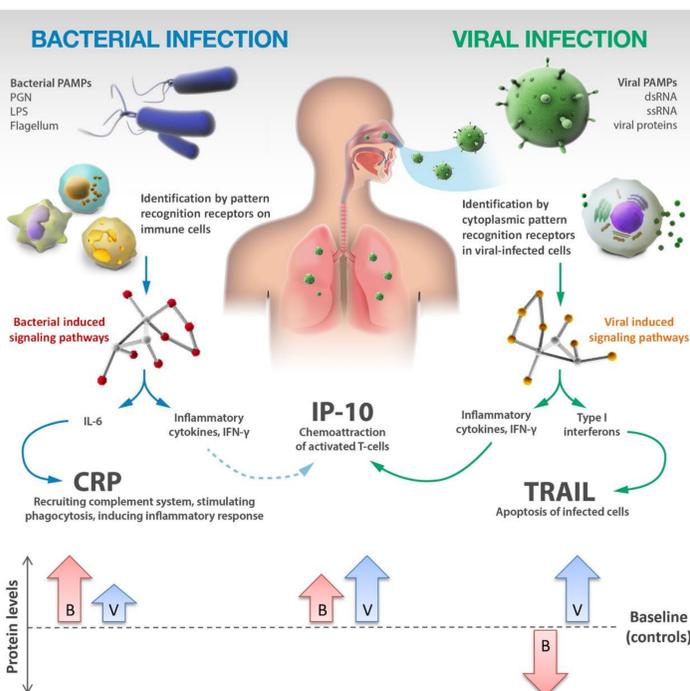


ImmunoXpert™ assay has 2 hours analytical time; is cleared for clinical use in the EU (CE-IVD certified), Switzerland and Israel; is currently in pilot distribution in these territories; and has already been used to assist in the management of over 10,000 febrile children in real-world clinical settings.

Methods

We studied 233 febrile children aged 3 months to 18 years presenting at the emergency department. Infection etiology (78 bacterial, 155 viral) was determined by clinical adjudication of three physicians and microbiological confirmation of pathogenic viral strains using multiplex-PCR applied to nasal swabs (Seeplex-RV15). Based on the manufacturer's pre-determined cut-offs, ImmunoXpert™ generated one of three results: viral (score 0-35), equivocal (score 35- 65) or bacterial (score 65-100).

A novel host-immune signature

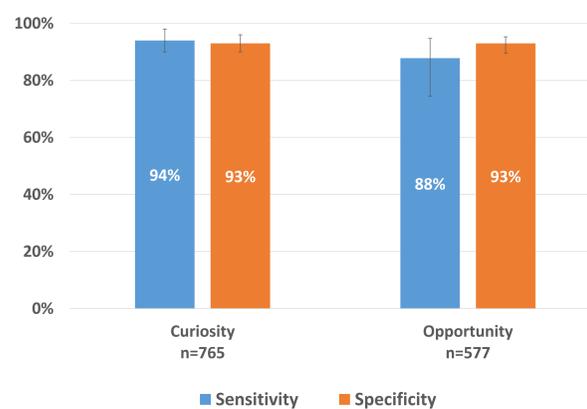


Oved et al. PLOS ONE 2015

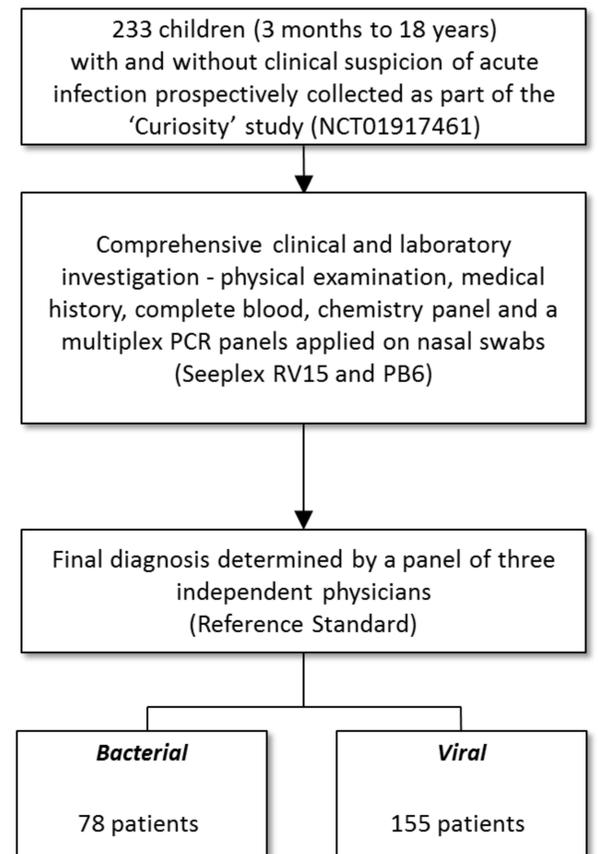
Host-assay outcomes



Assay validated in several clinical studies



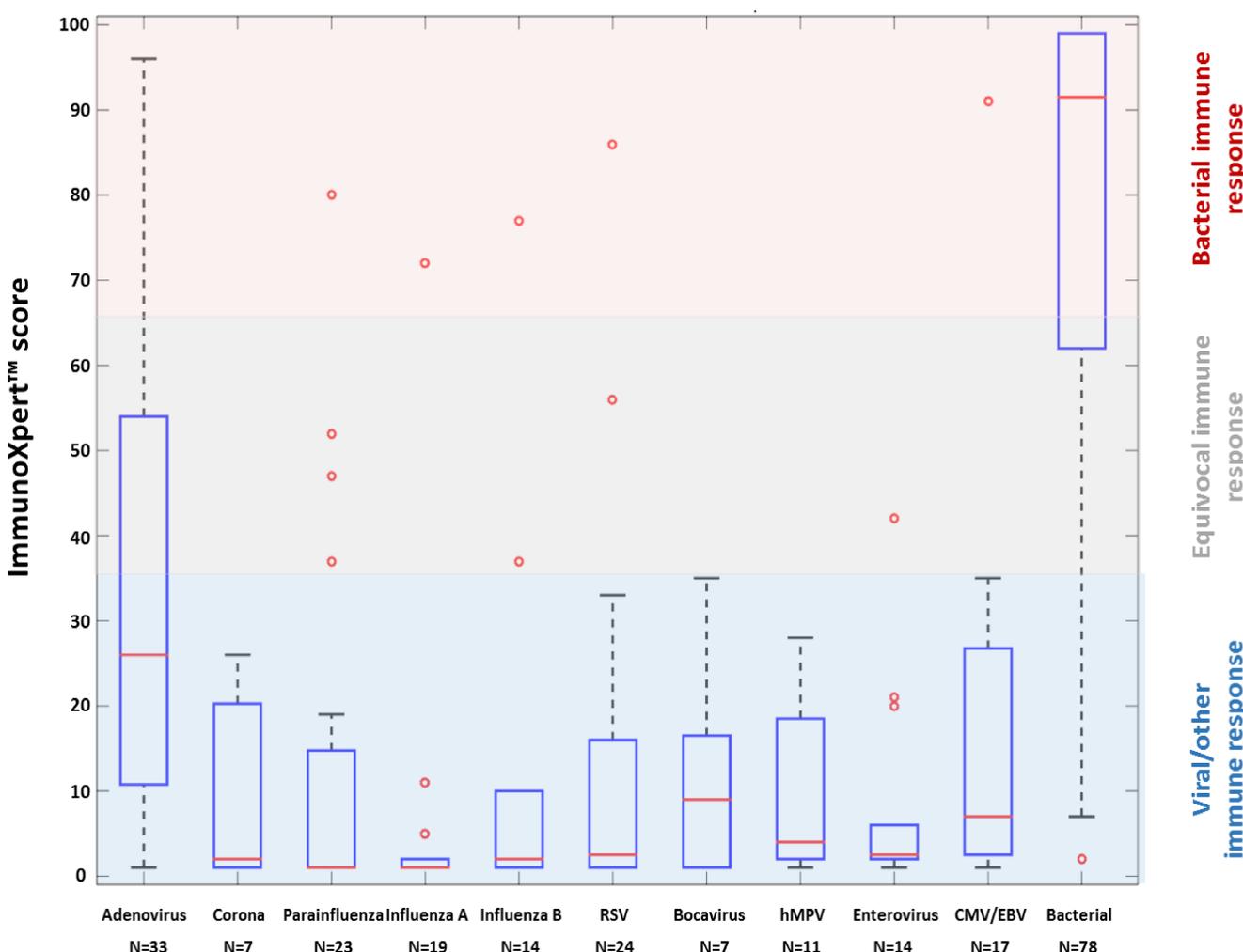
- Oved et al. PLOS ONE 2015
- Eden et al. Journal of Infection 2016
- van-Houten et al Lancet Infectious Diseases 2016



Results and discussion

ImmunoXpert™ scores of patients presenting with different infection types

Blue boxes present first to third quartiles. Red line corresponds to group median. RSV - Respiratory syncytial virus; hMPV – human Metapneumovirus. Some patients presented with more than one viral strain



- ImmunoXpert™ correctly classified 90% of bacterial cases and 91% of viral cases, when compared to the expert panel diagnoses (13% of patients had an equivocal response).
- Assay correctly classified all coronavirus, bocavirus, human metapneumovirus, and enterovirus cases.
- In the case of adenovirus, which is known to trigger a bacterial-like inflammatory host response, the assay correctly classified 83% of the patients. In comparison, CRP (cut-off: 40 mg/l) correctly classified only 42% of adenovirus infections.
- The assay may aid clinicians in determining infection etiology in febrile children. Importantly, it may assist in distinguishing between adenovirus and bacterial infections, which can be associated with similar clinical presentation.
- The assay evaluated in the study has a two-hour analytical time and requires a trained laboratory technician, which precludes its wide use in the outpatient setting where much antibiotic overuse occurs. Development of more rapid (within minutes) and easy to use formats of the assay for the ED and point-of-care would be valuable, and is underway.