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Impact of rapid influenza diagnostic test on physician estimation of viral infection probability in paediatric emergency department during epidemic period

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ABSTRACT

Background: The clinical diagnosis of influenza is difficult in the younger children.
Objectives: Evaluate the impact of rapid influenza diagnostic test (RIDT) on clinicians' estimation of the clinical probability of influenza in children.
Study design: This prospective study included children aged from 1 month to 5 years who were admitted in a university paediatric emergency department during an influenza epidemic period and presented with fever without source. The RIDT Quickvue® was performed on nasopharyngeal aspiration and results were confirmed with immunofluorescence and/or PCR. The clinical probability of influenza and serious bacterial infection (SBI) was evaluated for each child before and after the physician(s) was informed of the RIDT results.
Results: 170 children were included from January 15th through March 18th, 2013. After the only clinical examination, the overall clinical probability of influenza was 66.0% [CI 95%: 63.04–68.4], and was significantly increased at 92.4% [CI 95%: 89.5–95.3] in case of positive RIDT and significantly decreased at 30.8% [CI 95%: 29.0–32.5] in case of negative RIDT without knowing the results of laboratory tests. Whereas the initial clinical probability of influenza were appropriate regarding the prevalence (66.0% vs. 57.0%), the probability of SBI was overestimated (30.2% vs. 8.8%). The RIDT result positive enabled a significant decrease in orders for chest X-rays (64,4% vs. 45.8%, $p < 0,05$) and laboratory tests (71,1% vs. 41.1%, $p < 0,05$).
Conclusions: The RIDT seems to be a useful diagnostic tool for ED clinicians in epidemic conditions. Improving clinician estimation of flu probability would reduce orders for imaging and testing.

1. Background

Flu-like syndrome, seen mainly during an epidemic period, is the most common reason for paediatric emergency department (PED) consultations [1]. In case of fever without source, clinicians must consider the possibility of a serious bacterial infection (SBI), which is involved in fever in 6–12% of febrile children [2]. Influenza is a common infection, which affects 20–40% of children during epidemics [3,4]. Moreover, children are the virus' main vector [5]. In cont rast to adults, clinical diagnosis of SBI or influenza is difficult in young children because of non-specific symptoms [6,7]. During the winter 2000–2001, in Finland, Peltola et al. showed that the clinical positive predictive value (PPV) for children younger than 3 is only 16.0% [5]. Moreover influenza presents clinically as a SBI with fever in 50% of children under 6 months of age [6]. The antibiotic prescriptions increase by 10–30% during an epidemic period [8]. In this period, the rapid influenza diagnostic test (RIDT) would enable faster sure diagnosis and in turn help to reduce antibiotic prescriptions.

The performance of RIDT has already been evaluated in paediatrics [9–10]. During a 2002 epidemic in USA, Rodriguez et al. found that the sensitivities of 4 different tests ranged from 72 to 95%, and their specificities from 76 to 84% [9]. Several studies in paediatric

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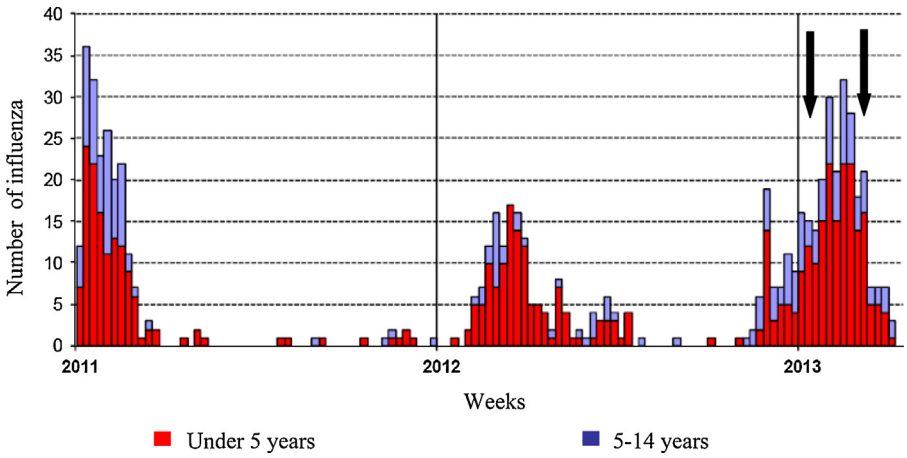

Fig. 1. Inclusion period.

emergency departments have shown that RIDT would decrease prescriptions [11–16]. However some of these studies were limited by the retrospective design [11–14] or did not evaluate how the clinical reasoning was modified by the test results.

2. Objectives

The main objective of this study was to evaluate the impact of the RIDT in the clinical estimation of influenza probability in paediatric emergency department during the epidemic period, in comparison to the estimation resulting from physical exam alone. A secondary aim was to evaluate the impact on laboratory tests and radiographs ordered and on the frequency of antibiotic prescriptions.

3. Study design

3.1. Study period

This prospective study was conducted in the paediatric emergency department of CHU (Centre Hospitalier Universitaire) in Nantes, France, during the 2012–13 influenza epidemic period. The epidemic's peak was identified using data from a national influenza monitoring network, GROG (Groupe Régional d'Observation de la Grippe).

3.2. Population

The eligible population was children admitted to the PED with fever. Children were included if they were aged from 1 months to 5 years, had fever without source and appeared ill (presented with temperature higher than 40 °C, tachypnea, bulging fontanels, grunting, significant colour change or based on the appraisal appears of a healthcare professional). Children with clinically evident severe bacterial infection (purpura fulminans, meningitis, urine tract infection, penumopathie or otitis) were not included. Children with incomplete data collection forms were excluded.

3.3. Rapid influenza diagnostic test

The RIDT used was Quikvue influenza® test (Quidel Corporation, San Diego, California). The test is based on an immunochromatography technique and can be easily performed at the bedside, with results available within 10 min. All the nasopharyngeal swabs were tested with RIDT and with laboratory test: viral culture-direct fluorescent antigen and RT-PCR (gold standard). The laboratory test was considered positive if one laboratory test indicated influenza. Rodriguez et al. reported in 2002 the performance characterisitics of Quickvue influenza® test in pediatrics. His sensitivity was 73% and his specificity was 95–99%.

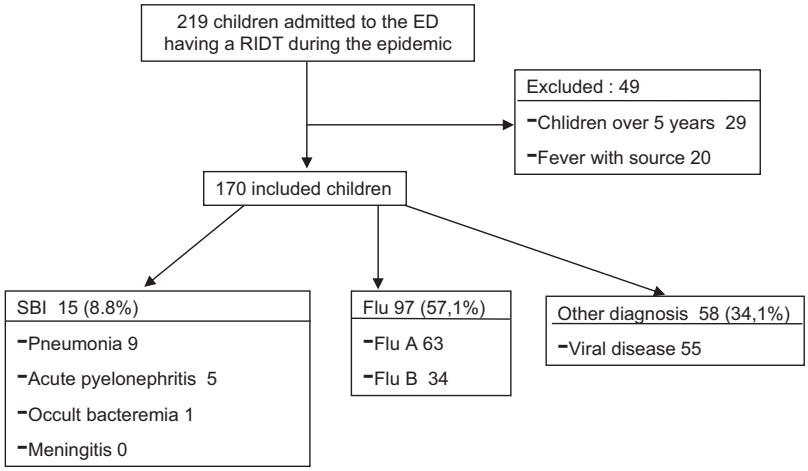

Fig. 2. Flow chart.