COMPARISON AND ANALYSIS OF THE IMPACT OF CO-INFECTIONS IN PEDIATRIC PATIENTS WITH RESPIRATORY INFECTIONS ADMITTED TO HOSPITAL OR IN PRIMARY CARE HEALTHCARE.

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Introduction

Although the etiology of a majority of lower respiratory tract infection (ARI) is thought to be viral in only 40% of the cases a viral agent can be identified by traditionally methods. The molecular techniques as polymerase chain reaction (PCR) can increase the sensitivity of detecting common and emerging respiratory viruses. These techniques quite often reveal the presence of more than one microorganism in the samples analyzed, but the importance of these co-infections in the pathogenesis, severity or course of respiratory infections is not well established. In addition, the disease can be mild and self-limiting to serious and even fatal disease. Particularly during epidemics, ARIs have a high morbidity that causes a large number of hospitalizations and are the most common reason for outpatient visits. The diagnosis of ARI performed by primary care pediatricians is generally exclusively clinical, without routinely performing diagnostic tests to identify the causative organism.

Objective

The purpose of the current study was to compare the clinical patterns of co-infection in pediatric patients hospitalized with patients attending primary care healthcare (PC) units for acute respiratory infections (ARI) in the same epidemic period.

Methods

Study design and recruitment criteria

A prospective, multicenter study was developed through a network of primary care centers (ReGALIP; www.regalip.org) and the Hospital Clínico Universitario de Santiago (Galicia, Spain) during 2014-2015 in children <14 years old attended and hospitalized respectively due to an ARI.

Laboratory methods

Nasopharyngeal samples were obtained using a sterile nylon swab (FLOQSwabs™ by Copan Diagnostics, Brescia, Italy) with universal transport medium (UTM). A nested reverse transcription polymerase chain reaction (PCR) for viruses and bacteria was carried out in the UK. These tests were in addition to any clinically indicated virological investigations carried out at the time of admission by the admitting team (typically direct immuno-fluorescent assays for influenza A and B, RSV, MPV, HPIV and AdV). Clinical severity parameters of ARI were registered and evaluated, including oxygen need, ventilatory support, PICU admission, hospital length of stay and clinical severity scales.

Hospital Clínico Universitario
Santiago (Galicia, Spain)

REGALIP: network of primary
care centers

Nasopharyngeal samples

Micropathology:

A panel of virus and bacteria was
analyzed by PCR

- Influenza (A, B)
- Metapneumovirus
- RSV
- Parainfluenza (1 - 4)
- Rhinovirus

- Enterovirus
- Adenovirus (A - F)
- Bocavirus
- Coronaviruses (NL63, 229E, OC43, HKU1)

- *Chlamydophila pneumoniae*
- *Legionella pneumophila*
- *Mycoplasma pneumoniae*

Results

A total of 189 samples were collected, namely, $n=109$ PC and $n=80$ hospitalized. At least one pathogen was identified in a similar percentage in both groups (PC: 81.6% vs. hospitalized: 82.5%), although the pattern of microorganisms found was different in both groups. Rhinovirus appeared as the most frequent pathogen in PC ($n=49$, 44.9%), while RSV was the most common pathogen in hospitalized patients ($n=31$, 38.8%). Number of co-infections were similar in PC ($n=31$, 28.4%) and hospitalized ($n=19$, 23.8%) patients.

Characteristics of the cohorts

Patterns of mono-infection / co-infection

Primary care	<div>Characteristics</div>		<div>PC diagnosis</div>		<div>Number (%)</div>		109 analyzed samples by PCR in PC			
	Age (median)	3.07 years	URTI		69 (63.3%)		81.6% positive			18.4% negative
	Sex male	58.7%	Bronchiolitis		15 (13.8%)					
	Asthma	29.3%	Bronchospasm		7 (6.4%)					
			Other (laryngitis, rhinosinusitis,...)		18 (16.5%)		34.8% co-infect		65.2% monoinfected	
Hospital	<div>Characteristics</div>		<div>Hospital diagnosis</div>		<div>Number (%)</div>		80 analyzed samples by PCR in hospitalized			
	Age (median)	0.48 years	Bronchiolitis		40 (50.0%)		82.5% positive			17.5% negative
	Sex male	56.2%	Bronchospasm		11 (13.8%)					
	Asthma	3.75%	Pneumonia		10 (12.5%)					
			Other (URTI...)		9 (11.3%)		30.3% co-infect		69.7% monoinfected	

The most frequent co-infection and the bacteria found in PC and hospital is shown

	Primary care	Hospital
Co-infection	Rhinovirus + Boca/ Corona	RSV + Rhinovirus
Bacteria	Mycoplasma n=2	Mycoplasma n=1

Pathogen frequency (%) in single infected and co-infected nasopharyngeal samples in PC and hospitalized cohorts.

Pathogen prevalence in PC and hospitalized cohorts showed as number in nasopharyngeal samples considering the age of the children. Only the more prevalent viruses are presented.

Rates of co-infection are not related to age in PC or hospitalized children.

Conclusion

The present study shows that molecular techniques in primary care and hospital healthcare are able to detect a pathogen in at least 80% of the patients. Rhinovirus was found to be more prevalent in patients attending PC units and RSV in those hospitalized. The presence of co-infections in both groups of patients is very frequent although the clinical importance of this finding still remains to be elucidated.