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### INTRODUCTION

- Respiratory tract infections are a key driving force of antibiotic consumption and *S. pneumoniae* is the most important bacterial respiratory pathogen in humans.
- Early data showed a reduction of serotypes covered by conjugated polysaccharide vaccines PCV7 and PCV13 (cf. eP738) which may reduce prevalence of resistant isolates (1).
- The majority of presumed bacterial respiratory infections are treated empirically without microbiological diagnostics. It is therefore unclear how well surveillance systems which use routine microbiological data represent antibiotic resistance in non-invasive infections.
- In Switzerland, in addition to surveillance using routine diagnostics (ANRESIS), we have at our disposition an active sentinel surveillance system for outpatient respiratory infections (Sentinel Network).

### PURPOSE

- To compare and thus validate the two existing surveillance systems in Switzerland available for non-invasive isolates of *S. pneumoniae*: the ANRESIS database and the Sentinel surveillance system.
- To assess if the observed reduction in vaccine serotypes leads to decrease antibiotic resistance prevalence.

### TERMS USED IN ASSOCIATION WITH SURVEILLANCE

**Comprehensive:** Data on all cases of a specified disease (or pathogen) in the population at risk are collected.

**Sentinel:** Data from a limited catchment area or population have to serve as indicator data for the rest of the population. The sentinel population should be representative of the total population at risk.

**Passive:** Reports are awaited and no attempt is made to seek reports actively from the primary data collector.

**Active:** Reports are sought from the primary data collector in the surveillance system on a regular basis.

### METHODS

#### The Sentinel Network ("Sentinel") 2004 - 2011 (2,3)

Nationwide, prospective active sentinel surveillance study based on nasopharyngeal swabs from outpatients with acute otitis media or pneumonia. *S. pneumoniae* is cultured from swabs and serotyped (Quellung reaction, Statens Serum Institute, Denmark) and tested for antibiotic resistance (according to CLSI standards (5)) at the Institute for Infectious Diseases, University of Bern. Participating practitioners are representative of all of Swiss practitioners (~2% of general practitioners, 10% of pediatricians).

#### "ANRESIS" 2004 - 2011 (4)

ANRESIS collects routine microbiology data from 22 representative Swiss microbiology labs. The data cover 70-80% of hospitalization days and at least 30% of practitioners in Switzerland. The analysis was restricted to non-invasive isolates of *S. pneumoniae*.

#### Statistics

Confidence intervals were calculated using the Wald Method. Descriptive analysis and analysis of variance were performed using StatView (version 5.0; SAS Institute). Proportions were compared with the chi-square, student's t-test or Fisher's exact test as appropriate.

#### Pneumococcal conjugated polysaccharide vaccination (PCV) era:

Since PCV7 is reimbursed since 08/2006 in Switzerland and taking into account a lag in vaccine uptake the study years 2004-2007 were defined as "pre PCV7" and the years 2008-2011 as "post PCV7".

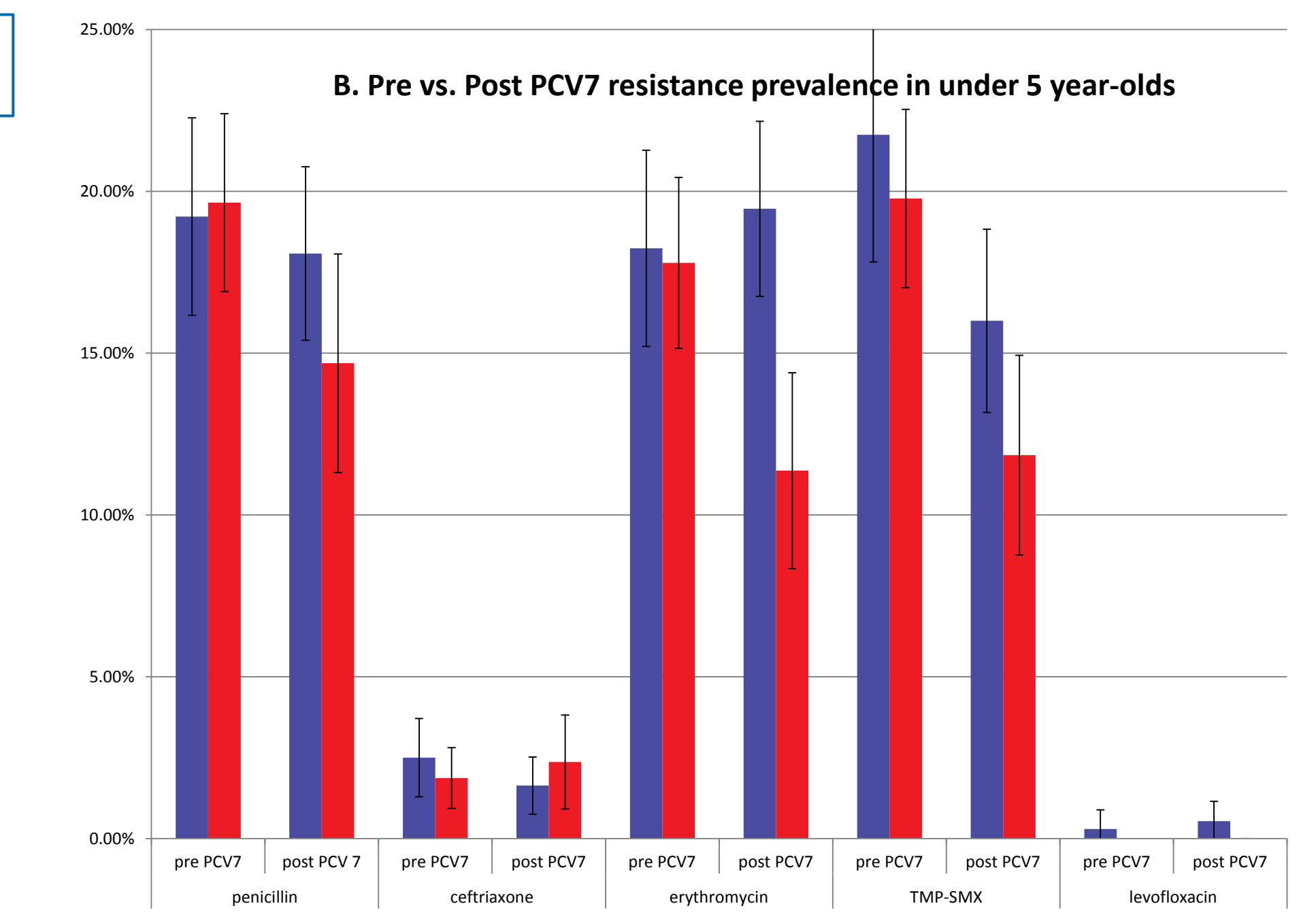
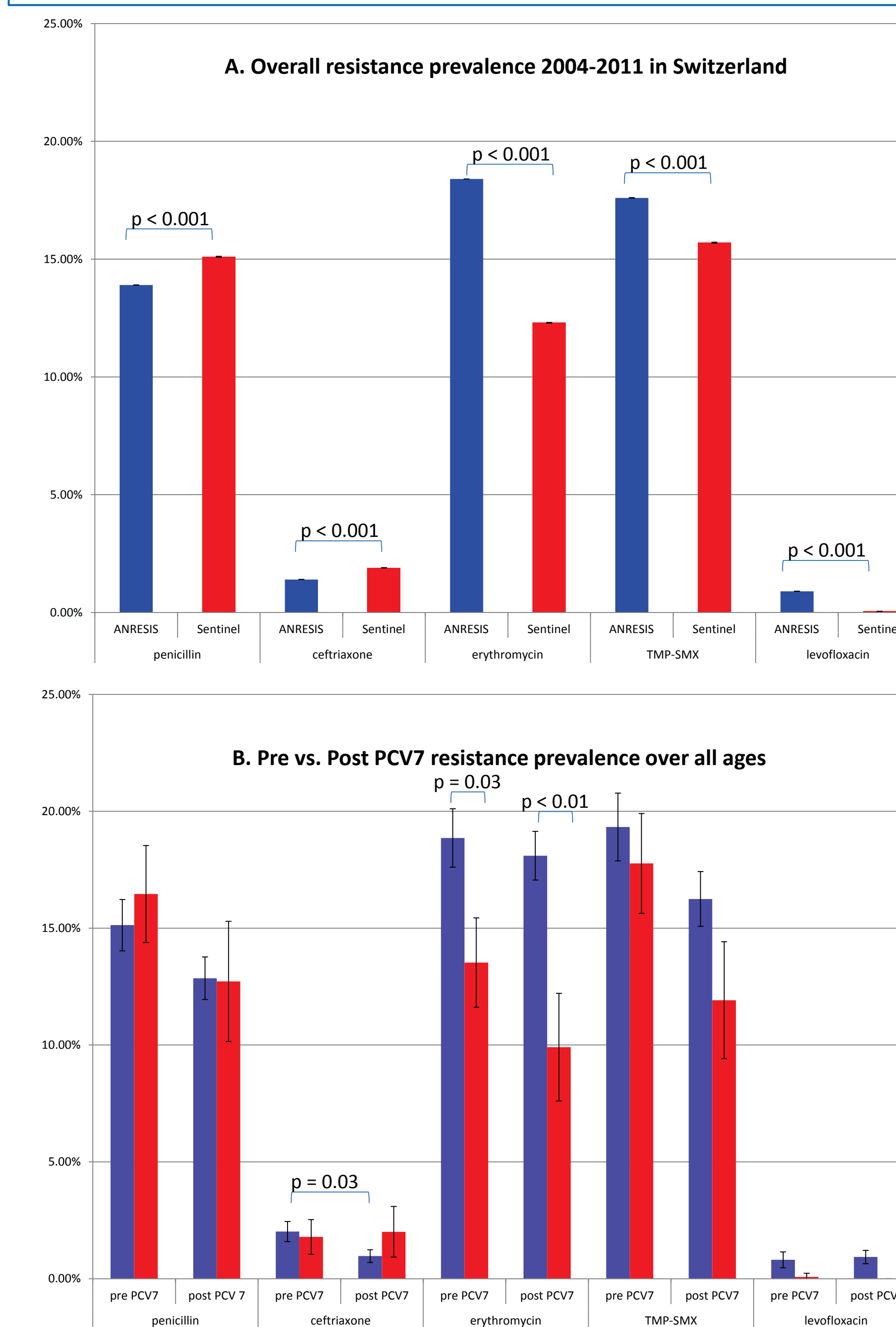
### STUDY POPULATIONS

**Table 1. Comparison of Patient Characteristics and Sample Origins in ANRESIS vs. Sentinella**

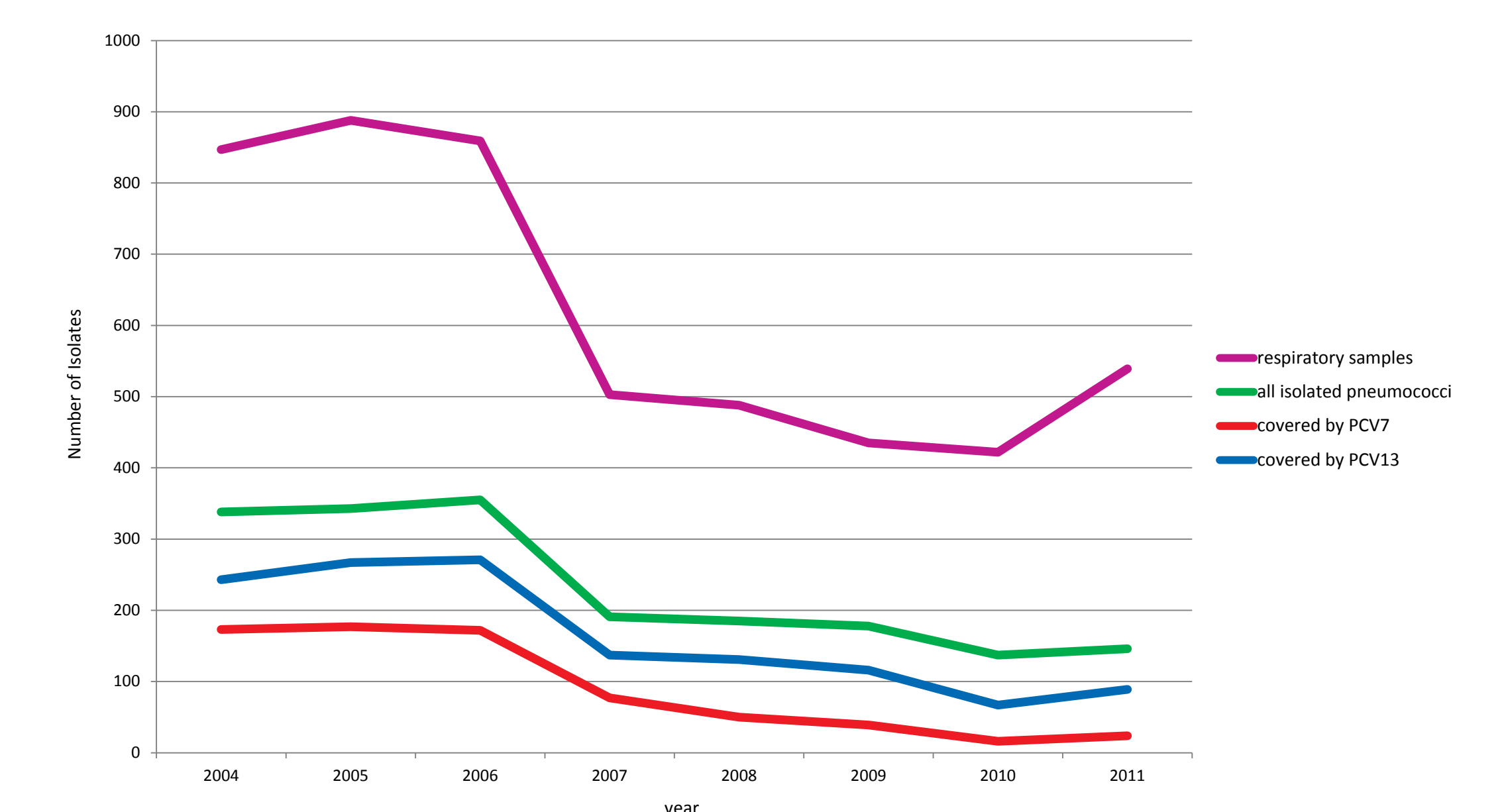
	ANRESIS		Sentinel	
	N	%	N	%
Total isolates	9220	100	1881	100
Age (years)				
<5	1431	15.5	1226	65.1
>64	3096	33.5	47	2.5
West	3843	41.7	791	42.1
Outpatients	4064	44.1	1226	100

### RESULTS

**Figure 1. Resistance prevalence in ANRESIS and Sentinel 2004-2011**



**Figure 2. Serotypes contained in PCV vaccines in Sentinel 2004-2011**



### CONCLUSIONS

- Overall resistance prevalences are in a comparable range but significantly different between the two studies
- With better demographic matching the differences lose significance (as seen in Figure 1.C with better age matching)
- Passive routine surveillance (ANRESIS) may overestimate resistance prevalence (evident for macrolides, Fig 1.A, B, C) since routine culturing is biased towards more high risk patient characteristics (more health-care association, morbidity and antibiotic pre-treatment since low-risk patients are not routinely cultured).
- Active surveillance of non-invasive pneumococcal isolates within the Sentinel network is more resource intensive but is the only unbiased way knowing resistance trends in the general patient population.
- Numbers of the pediatric serotypes covered by PCV7 vaccine are drastically reduced in the post PCV7 era, however, no clear coincidence with reduction in resistance prevalence is observed post PCV7 (except for ceftriaxone in ANRESIS Fig 1.B).

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