

Monitoring of *Haemophilus influenzae* strains isolated from both carriage and lower respiratory tract infections: preliminary results.

Sema Unal, Delphine Martiny, Charlotte Michel, Nicolas Yin, Benoit Prevost



LABORATOIRE HOSPITALIER UNIVERSITAIRE DE BRUXELLES
LHUB-ULB
UNIVERSITAIR LABORATORIUM BRUSSEL

Belgian National Reference Centre for *Haemophilus influenzae*
Laboratoire des Hôpitaux Universitaires de Bruxelles- Universitair Laboratorium Brussel (LHUB-ULB)

Introduction

The resistance patterns for *Haemophilus influenzae* (HI) is changing and HI strains with reduced susceptibilities to beta-lactams are emerging in Belgium.

Given that non-invasive isolates are referred to our National Reference Centre on a voluntary basis, the epidemiologic features of such isolates in Belgium are currently unknown.

In this context, a national survey is currently running that aims to assess and characterize resistance mechanisms to antimicrobials among Belgian HI isolates collected from both carriage and lower respiratory tract infections.

Material and methods

Ninety-three Belgian clinical laboratories were invited to take part to the survey, 42 of which registered.

Monthly, from November 2021 to April 2022, each participating lab is asked to send one HI "infection" isolate (isolated in pure culture from a deep respiratory sample and showing a high white blood cells /epithelial cells ratio) and one HI "carriage" isolate (isolated from a mixed salivary flora from a upper respiratory tract sample).

Identification by MALDI-TOF Mass Spectrometry, biotype and serotype are determined for all isolates as well as the susceptibility to penicillin 1U (screen), ciprofloxacin, cotrimoxazole, tetracycline and the presence of a beta-lactamase. For all penicillin 1U resistant isolates, the susceptibility to ampicillin, amoxicillin-clavulanic acid, cefuroxime, cefotaxime and meropenem are also determined using e-test.

Results

A total of 364 isolates from 38 clinical laboratories has been collected.

Among them, 145 have been fully analyzed to date. 88 were classified as "infection" isolates and 57 as "carriage" isolates.

All but two isolates (f, carriage) were non-typeable HI.

Only 1 "infection" isolate was resistant to ciprofloxacin and 1 "carriage" isolate was resistant to tetracyclin. A statistical difference was observed between "infection" and "carriage" isolates in terms of cotrimoxazol resistance (23,9% vs 8,8%).

In both groups, the same proportion of strains showed a negative screening test for beta-lactam resistance (infection 70,5% ; carriage 75,5%) and beta-lactamase production (infection 9,1%; carriage 10,5%).

Because of decreased susceptibility to ampicillin and/or amoxicillin-clavulanic acid, mutations of the *ftsI* gene are suspected in 20,5% and 21,1% of "infection" and "carriage" isolates, respectively. One cefotaxime-resistant isolate was observed in each group and all isolates were susceptible to meropenem.

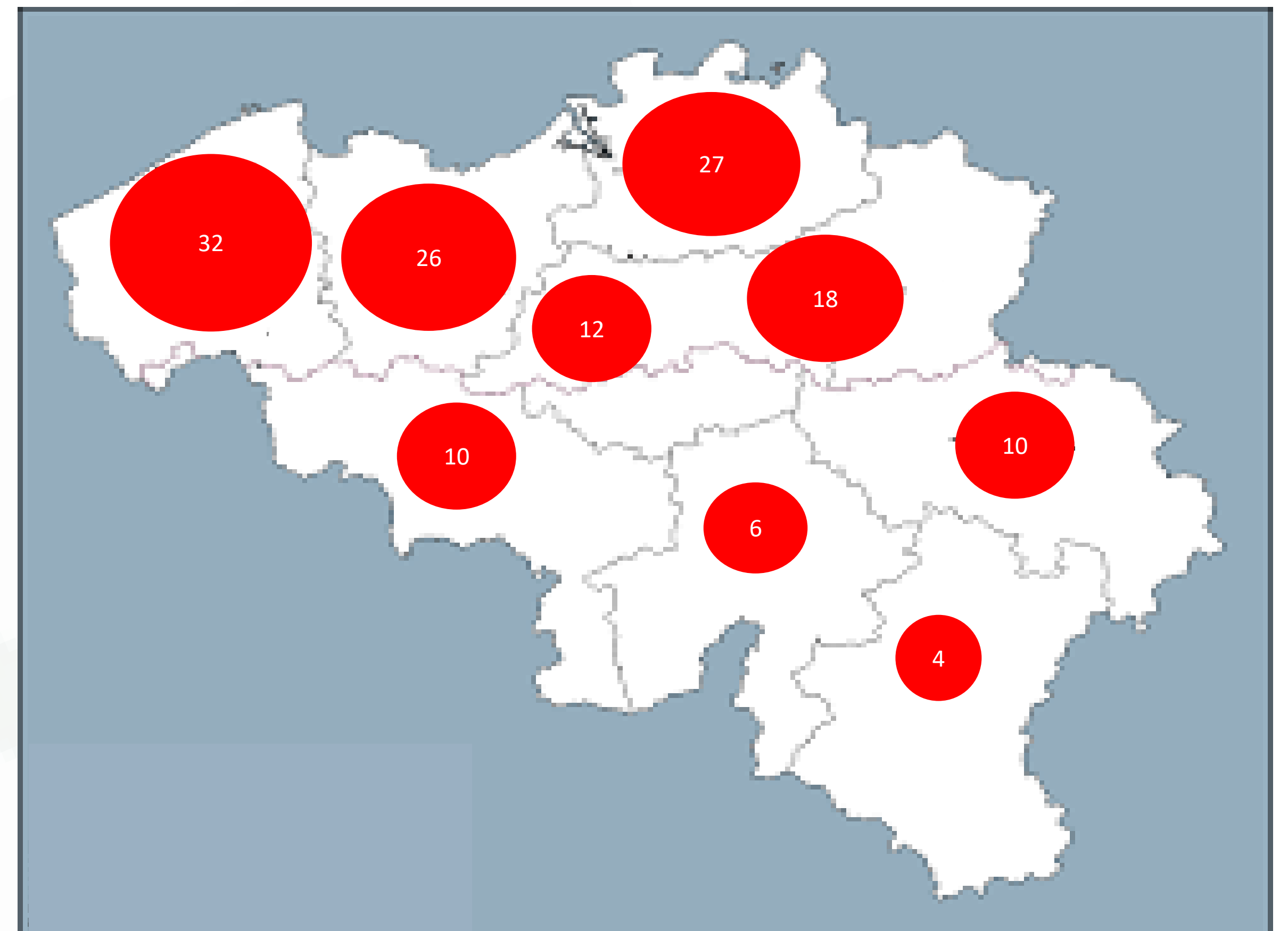


Fig 1. Numbers and geographical distribution of strains studied

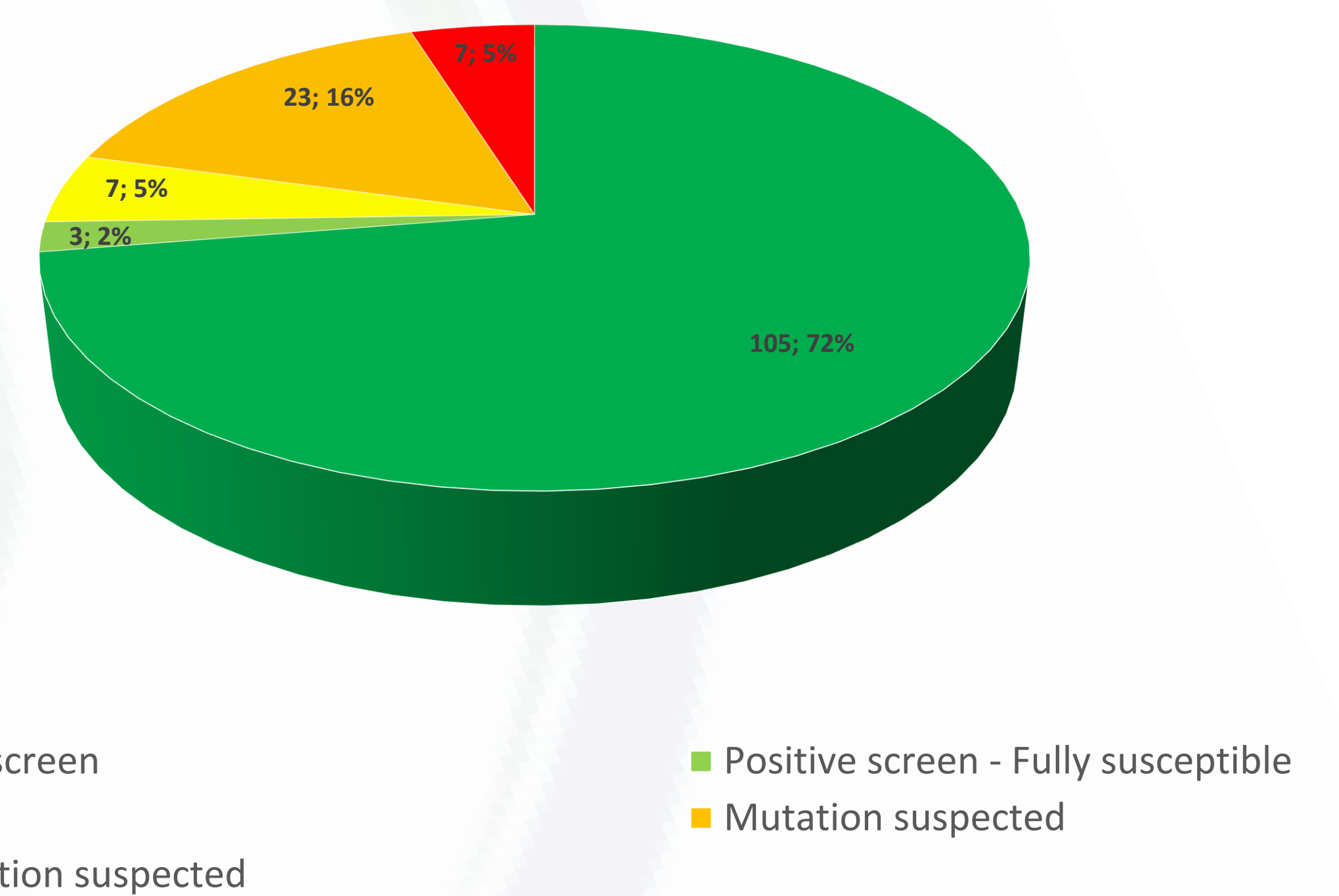


Fig 2. Resistance mechanisms to beta-lactams among studied strains

Susceptibility to:	Infection (n=88)		Carriage (n=57)	
	n	%	n	%
Ciprofloxacin	87	98,9	57	100,0
Cotrimoxazol	67	76,1	52	91,2
Tetracyclin	88	100,0	56	98,2
Ampicilline	72	81,8	49	86,0
Amoxicillin-clav. acid	78	88,6	52	91,2
Cefuroxime (IV)	70	79,5	47	82,5
Cefotaxime	87	98,9	56	98,2
Meropenem (non meningitidis)	88	100,0	57	100,0

Table 1. Antimicrobial susceptibility profiles of "infection" and "carriage" strains

Discussion

HI is a major pathogen causing community-acquired respiratory tract infections worldwide.

Apart from beta-lactamase production, other resistance mechanisms occur that affect the susceptibility of HI strains to beta-lactams. The clinical impact of such mechanisms needs to be further explored.

Today, C3-resistant isolates are circulating in Belgium that emphasizes the need for additional studies and a continued epidemiological monitoring of circulating strains.