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**Nationales Referenzzentrum  
für Meningokokken und *H. influenzae***



## Data from the NRZMHi for *H. influenzae* in 2021

### 1. Introduction

The tasks of the National Reference Laboratory for Meningococci and *Haemophilus influenzae* (NRZMHi) assigned by the Robert Koch Institute for the surveillance of **invasive *Haemophilus influenzae* disease** include serotyping of clinical isolates from blood or cerebrospinal fluid (CSF) and the detection of antibiotic resistance against  $\beta$ -lactam antibiotics. In 2021, all in all 366 submissions were analyzed including submissions from 302 patients with invasive infections. The NRZMHi could confirm the diagnosis *Haemophilus influenzae* in 290 cases where disease isolates were available. In one case, *H. influenzae* was detected and serotyped by PCR from submitted DNA. In five cases *H. parainfluenzae* from blood was detected, in other cases no bacteria were cultivated. Furthermore, three *H. influenzae* isolates derived from primarily sterile sites other than blood or CSF. These cases do not meet the criteria of the reference definition for a notifiable invasive infection.

In 274 invasive cases, *H. influenzae* was detected from blood, in 16 invasive cases from cerebrospinal fluid (CSF) only. Additionally there was one invasive case where *H. influenzae* was isolated from both, blood and cerebrospinal fluid (CSF). Detection of *H. influenzae* from these materials must be notified according to the German Infection Protection Act (IfSG).

As in previous years, the majority of blood or CSF isolates were non-typeable *H. influenzae* (NTHi, 176 isolates, 61 %), followed by Hif as the most frequent capsular serotype (62 cases; 21 %). Hie showed the third highest frequency among the serotypes (24 cases; 8 %), followed by Hib (16 cases, 6%). Hia was found in 13 cases (5%). Neither Hic, nor Hid were isolated.

Among the analyzed cases, the age group most affected was > 40 years (230 cases; 79 % of all cases). In addition, a significant percentage of cases (44 cases; 15 %) was found in children aged <5 years.

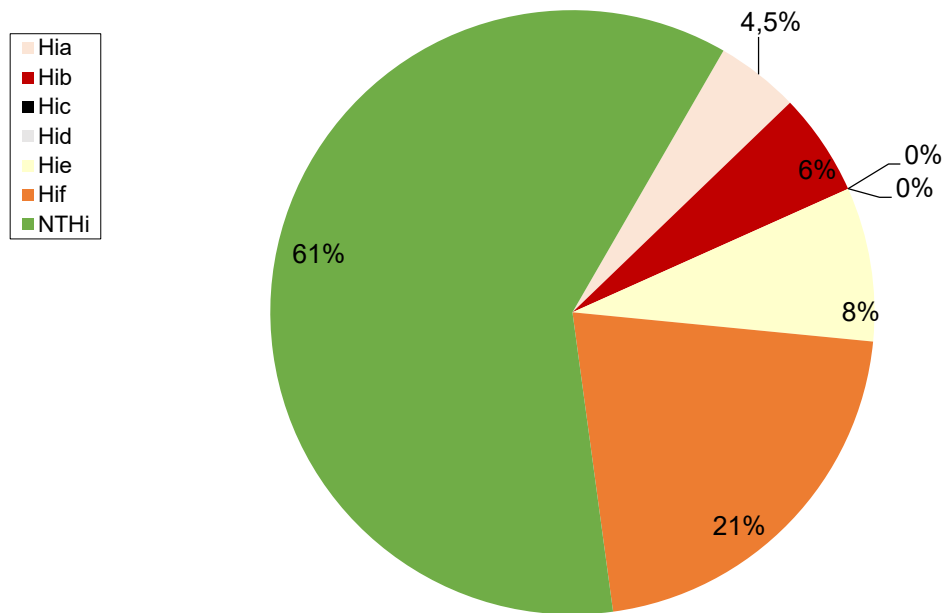
The NRZMHi analyzed the frequency of ampicillin resistance using gradient agar diffusion tests. In two of the total of 291 cases, no viable isolate was available for testing. Thirty nine (13 %) were ampicillin resistant (MIC > 1  $\mu$ g/ml), of which 23 (8 % of all tested isolates) showed  $\beta$ -lactamase production. The NRZMHi has tested all isolates for cefotaxime susceptibility. Resistance to cefotaxime was found in five isolates (2%).

In 2021, the statutory notification system registered 366 invasive *H. influenzae* infections. Since the NRZMHi transmits all laboratory results to the local health authorities in charge, the coverage of the laboratory surveillance can be estimated based on these data. Thus, a coverage of 79.5% can be assumed for 2021.

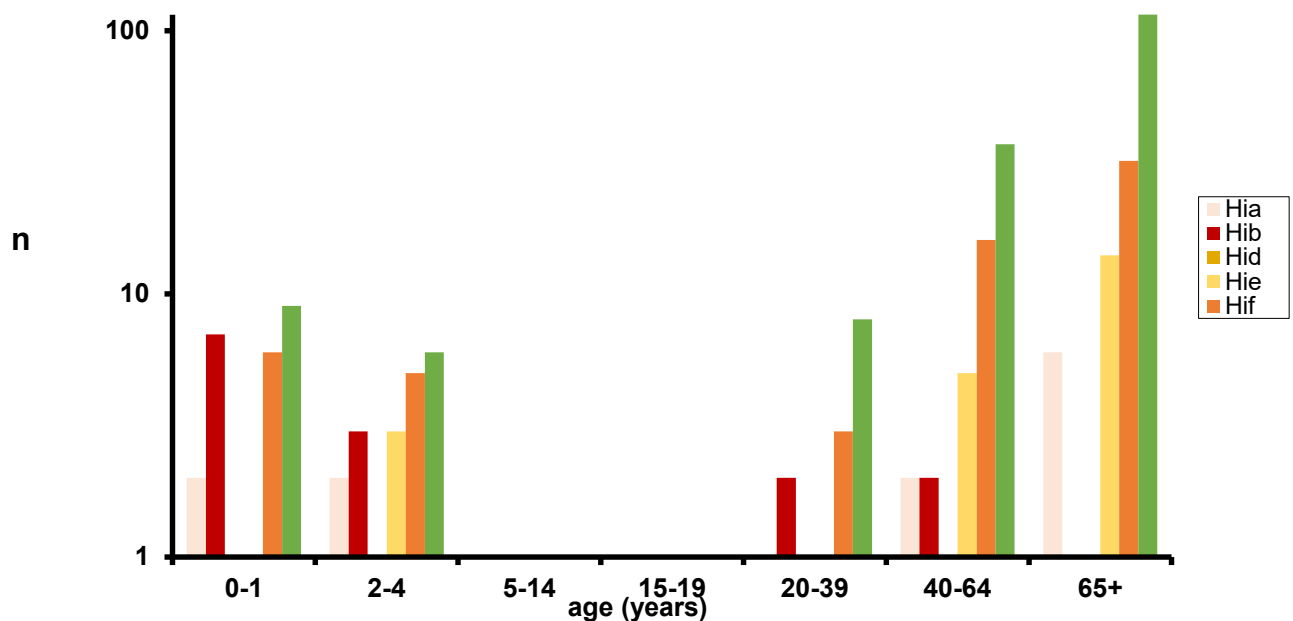
The Covid-19 pandemic had a remarkable impact on invasive *H. influenzae* disease: submissions to the NRZMHi and registered invasive cases, which both had been constantly increasing in previous years, dropped significantly in 2020. The observation has been analysed in an international study, where the NRZMHi participated, as well as by the Robert Koch Institute. The reduced rate of invasive *H. influenzae* infections could mainly be explained by effects of COVID-19 containment measures leading to decreased droplet transmission [1, 2]. In 2021, invasive cases of *H. influenzae* infections was increased compared to the

pandemic months in 2020, but had not reached pre-pandemic levels. The percentage of capsulated strains has augmented compared to previous years due to increased cases in children. In contrast, ampicillin-resistance rate has diminished.

## 2. Serotype distribution of *H. influenzae* isolates from blood or CSF in 2021



## 3. Age distribution of patients with *H. influenzae* detected in blood or CSF

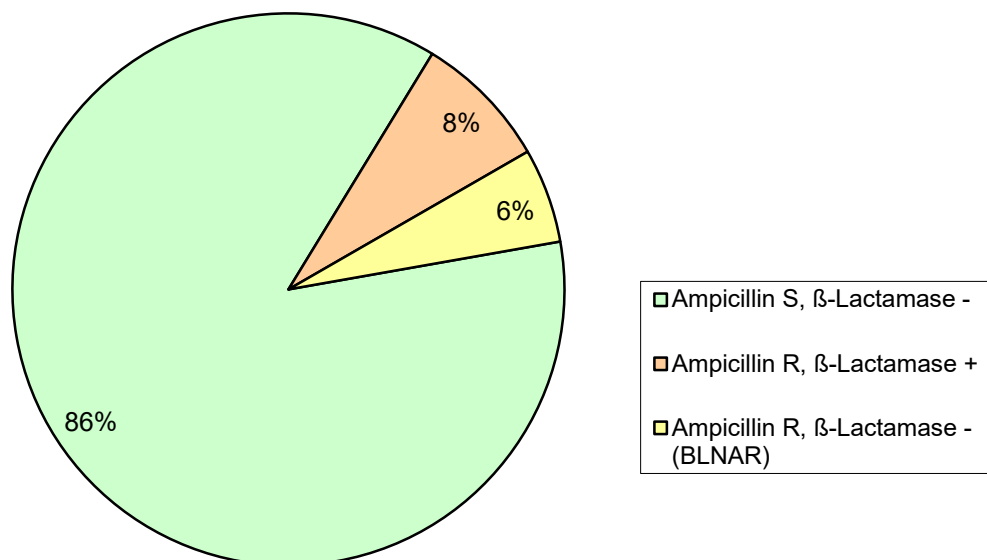


#### 4. Serotype distribution in Federal States

	BW	BY	BE	BB	HB	HH	HE	MV	NI	NW	RP	SL	SN	SA	SH	TH	n.n.	Summe
Hia	2	2	1	0	0	0	2	0	1	2	0	1	2	0	0	0	0	13
Hib	1	3	0	0	0	1	1	0	1	6	1	0	1	0	0	0	1	16
Hic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hid	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hie	3	6	0	0	2	1	1	1	3	2	0	1	1	0	2	0	1	24
Hif	12	9	4	0	0	3	2	1	5	11	0	1	5	2	4	0	3	62
NTHi	26	21	8	3	2	5	6	2	14	49	16	1	9	7	1	1	5	176
Total	44	41	13	3	4	10	12	4	24	70	17	4	18	9	7	1	10	291

BW: Baden-Württemberg, BY: Bavaria, BE: Berlin, BB: Brandenburg, HB: Bremen, HH: Hamburg, HE: Hessen, MV: Mecklenburg-Western Pomerania, NI: Lower Saxony, NW: North Rhine-Westfalia, RP: Rhineland-Palatinate, SL: Saarland, SN: Saxony, ST: Saxony-Anhalt, SH: Schleswig-Holstein, TH: Thuringia

#### 5. Ampicillin resistance in isolates *H. influenzae* from blood or CSF



#### References

1. Robert Koch-Institut (2021). *Die Auswirkungen der COVID-19-Pandemie und assoziierter Public-Health-Maßnahmen auf andere meldepflichtige Infektionskrankheiten in Deutschland*. Epidemiologisches Bulletin. 2021(7): p. 5.
2. Brueggemann, A. B., Jansen van Rensburg, M. J., Shaw, D., McCarthy, N. D., Jolley, K. A., Maiden, M. C. J., van der Linden, M. P. G., Amin-Chowdhury, Z., Bennett, D. E., Borrow, R., *et al.* (2021). Changes in the incidence of invasive disease due to *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Neisseria meningitidis* during the COVID-19 pandemic in 26 countries and territories in the Invasive Respiratory Infection Surveillance Initiative: a prospective analysis of surveillance data. *Lancet Digit Health* 3(6): e360-e370.