Invasive Pneumococcal Disease in Refugee Children Residing in Germany: A Possible Niche for Vaccine-Type and Antibiotic-Resistant Isolates

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BACKGROUND AND AIMS

Refugee children arriving in Germany following political upheaval in the Middle East and Northern Africa were not routinely given a pneumococcal conjugate vaccine.

Infectious disease screening and prevention programs to this point have been haphazard, although various efforts are underway to streamline access to care and improve screening and health care coverage.

The vaccination program for newly-arrived refugees did not include PCVs, as *Streptococcus pneumoniae* was not listed among the high-priority infectious disease agents identified by the European Center for Disease Prevention and Control.

We investigated refugee status as a potential risk factor for the development of childhood vaccine-type (VT) IPD.

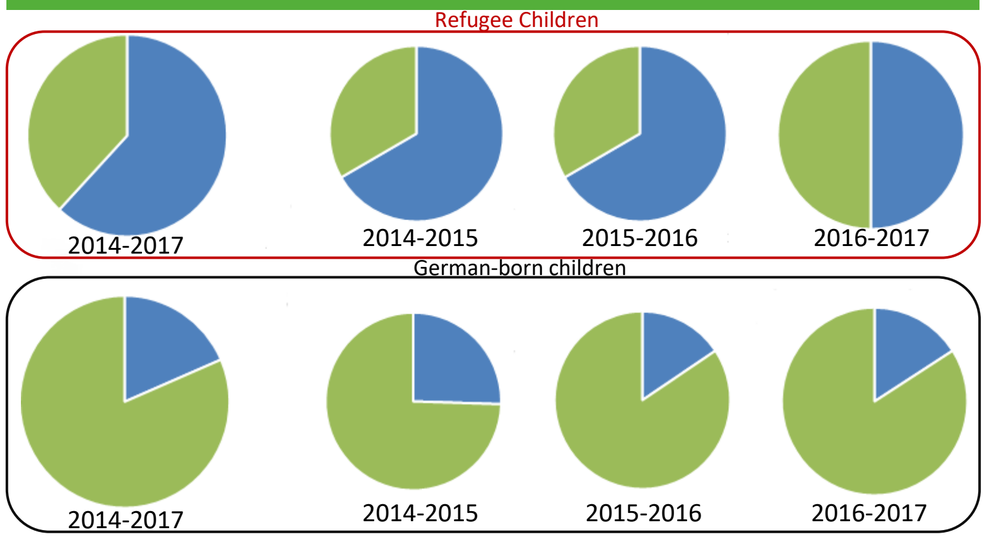
METHODS

Cases of IPD occurring from July 1, 2014 to June 30, 2017 in refugee children were compared to cases of IPD in German-born children over the same time period. The serotype (determined by Neufeld-Quellung reaction) and the presence of resistance to multiple (≥ 3) classes of antibiotics (determined by microdilution testing for penicillin, amoxicillin, cefotaxime, erythromycin, clindamycin, tetracycline, levofloxacin, chloramphenicol, moxifloxacin, trimethoprim-sulfamethoxazole, and vancomycin. Antibiotic resistance was defined by the Clinical and Laboratory Standards Institute 2015 breakpoints.) Odds ratios were calculated using Firth's bias-reduced logistic regression and adjusted for age and season of infection.

RESULTS

Comparing 21 refugee children to 405 German-born children over the study period, refugee children had significantly higher odds of contracting VT IPD (**Fig. 1**) (OR 6·60, 95% CI 2.73 to 16.84) as well as significantly higher odds of contracting multiple-antibiotic-resistant IPD (**Fig. 2**) (OR 23.84, 95%CI 7.98 to 72.72) than German-born children. IPD serotypes in refugee children were different than those in German-born children (**Table 1**).

Figure 1. Percentage of VT IPD isolates in refugee children (top) and German-born children (bottom) over the study period. VT serotypes are shown in blue; non-vaccine serotypes are in green.



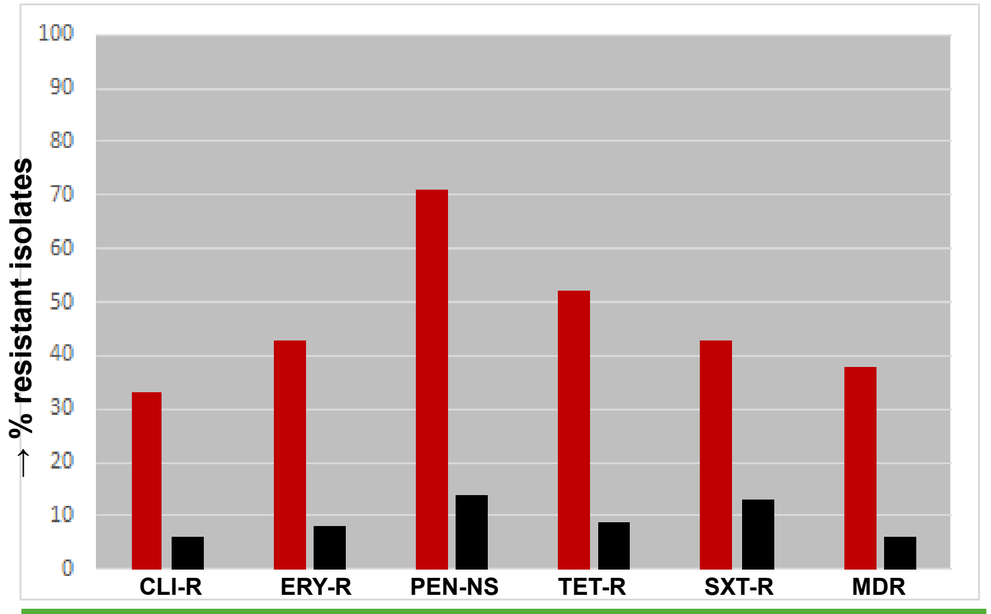


Figure 2. Percentage of antibiotic-resistant isolates in refugee children (red) and German-born children (black). MDR isolates are those resistant to ≥3 classes of antibiotics.

Table 1. Serotype distribution of IPD isolates in refugee children and German-born children, 2014-2017.

Refugee Children		German-born Children	
SEROTYPE	n	SEROTYPE	n
19F	6	10A	48
1	2	24F	43
15C	2	15C	32
3	2	3	30
24F	1	12F	28
16F	1	23B	27
14	1	22F	24
23F	1	38	18
20	1	15B	14
19A	1	19A	13
17F	1	15A	12
35F	1	35F	11
23A	1	33F	10

CONCLUSIONS

- **Refugee children with IPD are significantly more likely to have vaccine-type IPD.**
- **Refugee children with IPD are significantly more likely to have multiple-antibiotic resistant IPD.**
- **Refugee children with IPD show a distinct serotype distribution from German-born children.**
- **To prevent a niche for vaccine-type and antibiotic resistant pneumococcal disease, a catch-up PCV program could be considered for refugee children residing in Germany.**