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The Belgian nasopharyngeal carriage study of S. pneumoniae in healthy infants attending day-care centres: year 1 results

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Background: In Belgium, the infant pneumococcal conjugate vaccine (PCV) programme has moved since June 2015 in Flanders and June 2016 in Wallonia from PCV13 to PCV10, which excludes serotypes 3, 6A and 19A. We investigate the impact of the PCV programme change on *Streptococcus pneumoniae* colonization in healthy infants aged 6-30 months attending 85 day-care centres (DCC) randomly selected across Belgium (Flanders-Brussels-Wallonia).

Material/methods: During March-June 2016**,** trained nurses collected one nasopharyngeal swab and basic characteristics (demographics, recent use of antibiotics, presence of common cold-cough-rhinitis, etc.) from 746 infants excluding those with antibiotic use in the previous 7 days. Swabs collected in STGG medium were enriched (BHI), and *S. pneumoniae* cultured and serotyped. Pneumococcal DNA was quantified from culture-positive samples by *lytA*-targeting Taqman real-time PCR. Standard curve was set up using serially diluted *lytA* PCR product of *S. pneumoniae* ATCC 49619.

Results: Overall, 60.6% (452/746) of infants carried *S. pneumoniae* with similar prevalence in Wallonia (203/349; 58.2%) and Flanders (199/322; 61.8%). Average pneumococcal DNA

concentration in culture-positive samples was 6.6E+06 DNA copies/µl (95%CI: 3.7E+06 − 9.5E+06 copies/µl). Prevalence of PCV13 serotypes was low (5.3%, 24/452 overall; 5.4%, 11/203 in Wallonia; 5.0%, 10/199 in Flanders), with 19F (2.7%, 12/452) and 14 (0.9%, 4/452) being most frequent. Of the 5 most prevalent non-PCV serotypes, 23B and 15A were more prevalent in Wallonia and Flanders, respectively (Figure 1A). In 10/85 DCC all children carried the same serotype. In 25/85 DCC, >50% children carried the same serotype. Resistance to co-trimoxazole, tetracycline and erythromycin was found in 35.0%, 11.7% and 17.5% pneumococcal isolates. Prevalence of co-trimoxazole-resistant pneumococcal serotypes did not vary significantly between the two regions (Figure 1B). In contrast, proportions of erythromycin-resistant pneumococci were twice as high in Wallonia compared to Flanders. Most prevalent erythromycin-resistant pneumococcal serotypes were 15A and 33F in Wallonia and 35B in Flanders (Figure 1B). Pneumococcal loads were significantly higher in children with signs of common cold (27.2%, 123/452), compared to children lacking these symptoms (Mann-Whitney U test, P<0.0001) (Figure 1C). Antibiotic use in the previous three months resulted in lower pneumococcal loads (Mann-Whitney U test, P=0.080) (Figure 1C).

Conclusions: In 2016, PCV13 serotype carriage was rare in healthy infants throughout Belgium**.** General pneumococcal carriage rate, vaccine type carriage rate and carriage density were similar between the regions. Carriage density was related to antibiotic use and to clinical signs of common cold, but not to vaccine serotype.

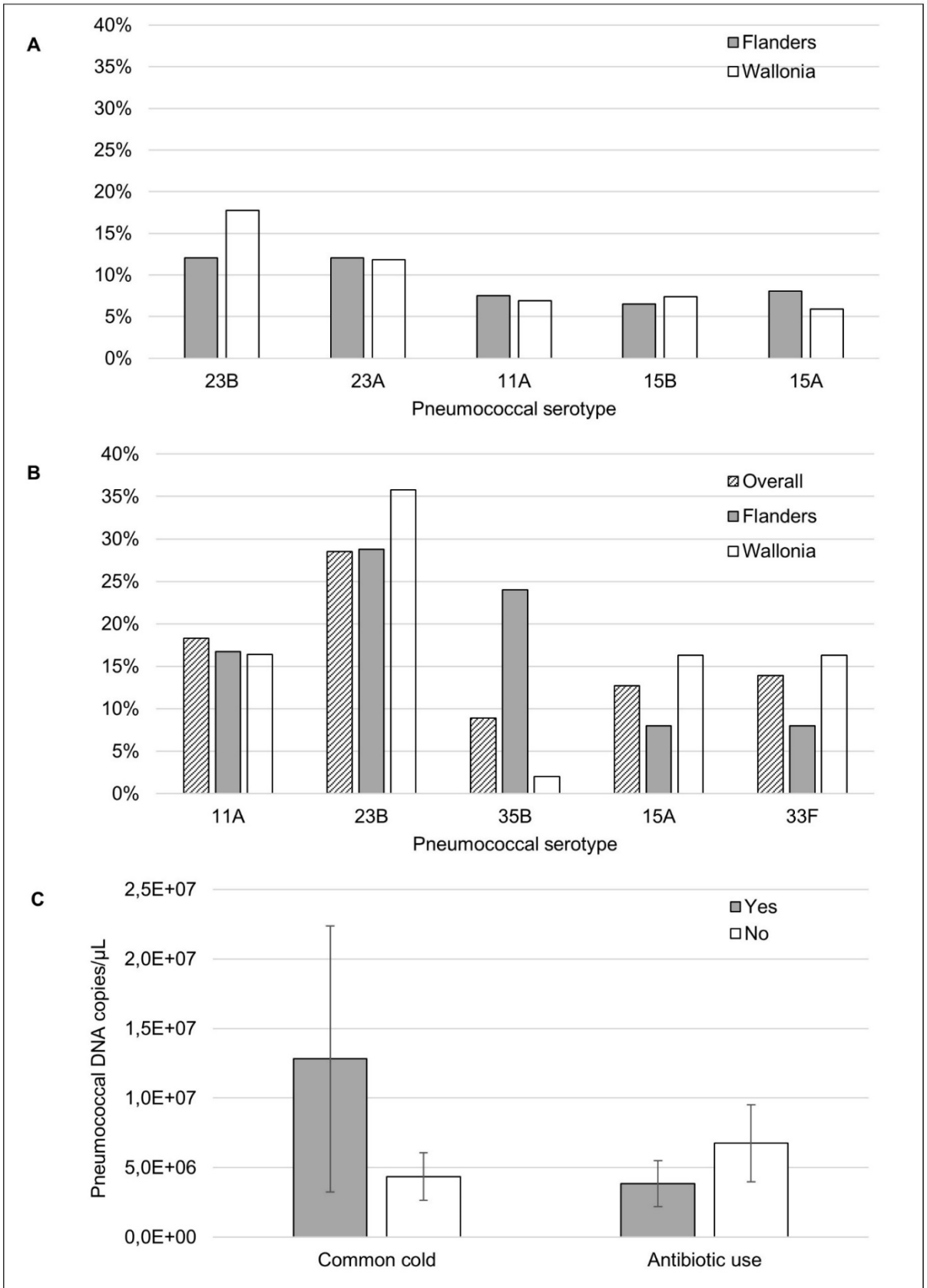

Figure 1: (A) Most prevalent pneumococcal serotypes per region in Belgium, **(B)** Most prevalent co-trimoxazole-resistant (11A and 23B) and erythromycin-resistant (35B, 15A and 33F) pneumococcal serotypes per region in Belgium, **(C)** Average pneumococcal concentrations linked to presence of common cold or antibiotic use in infants (Error bars depict 95% CI).