INVASIVE STREPTOCOCCAL DISEASE IN GERMANY DURING THE SARS-COV-2 PANDEMIC

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BACKGROUND

The GNRCS monitors invasive streptococcal disease in Germany. This includes *Streptococcus pneumoniae*, *Streptococcus pyogenes* (GAS), *Streptococcus agalactiae* (GBS), *Streptococcus dysgalactiae* (SD) and all other validly published streptococcal species. Here, we report on the species-specific reduction of invasive streptococcal disease during the SARS-CoV-2 pandemic in Germany.

METHODS

Species identification was performed using a combination of microbiological, biochemical, immunological and molecular-biological techniques, including hemolysis-assessment, catalase-test, optochine- and bile-susceptibility, pyrrolidonyl-arylamidase-test, leucine-aminopeptidase-test, Lancefield-typing, *emm*-typing, serotyping and multiple PCR-sequence analyses.

RESULTS

SARS-CoV-2 reached Germany beginning of March 2020. A strong reduction in case numbers of invasive pneumococcal disease (IPD), both among children (**Fig. 1**) as well as among adults (**Fig. 2**) was reported shortly after. This effect continued till October 2021, and resulted in a reduction of 75%. With retraction of the non pharmaceutical intervention measures in the autumn of 2021, IPD case numbers increased to pre-pandemic levels. For children case numbers remained on pre-pandemic levels in 2022, For adults IPD case numbers where once again much lower than pre-pandemic levels in the first months of 2022.

A comparable reduction of 67% was observed for invasive GAS infections (**Fig. 3**), accompanied with a disproportional decrease of *emm*1 (-85%) and *emm*12 (-73%). However, no effect was seen for GBS (**Fig. 4**) and SD (**Fig. 6**).

Among viridans streptococci, a 40% reduction was observed for oral-streptococci of the Mitis-, Salivarius- and Mutans-Group (**Fig. 5**), while streptococcal species not commonly associated with the oral microbiome, were not affected (**Fig. 7**).

Cases of invasive disease caused by streptococci belonging to the Angionosus-group (*S. anginosus*, *S. constellatus*, *S. intermedius*) also showed no reduction (**Fig. 8**).

CONCLUSIONS

- The SARS-CoV-2 pandemic had a strong reducing effect on invasive streptococcal disease caused by *S. pneumoniae*, *S. pyogenes* and oral streptococci of the Mitis-, Salivarius- and Mutans-Group
- No comparable effect was observed for invasive GBS and SD disease or for disease caused by Anginosus-group streptococci.
- These reductions in case numbers are obviously limited to respiratorily transmitted streptococci, and therefore seem to be related to non-pharmaceutical interventions (face masks, social distancing, working from home, school closures) during the SARS-CoV-2 pandemic.
- Our results might also be explained by differences in dependence on preceding viral infections of the different streptococcal species.

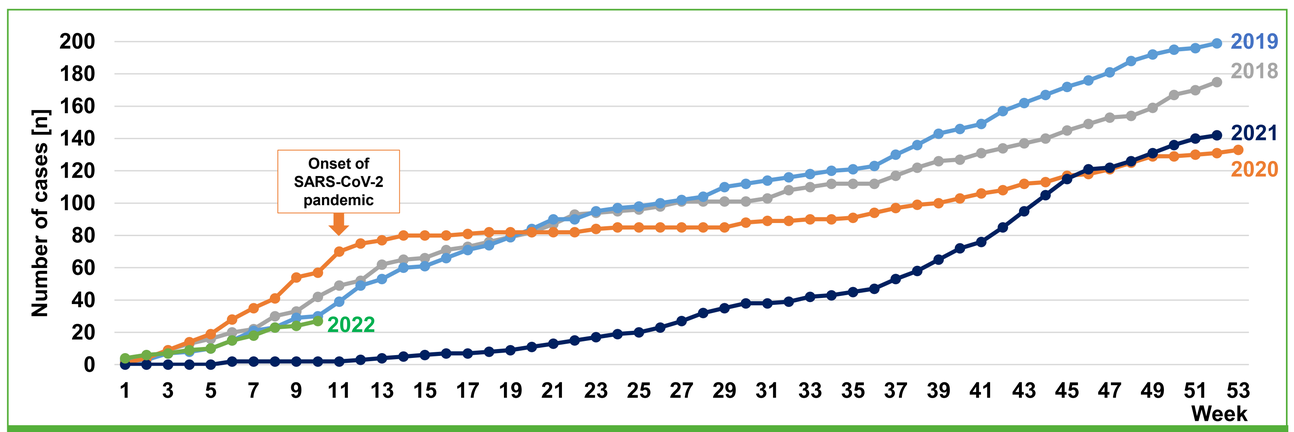

Fig. 1: Cumulative number of reported IPD cases from children <18 years of age in Germany

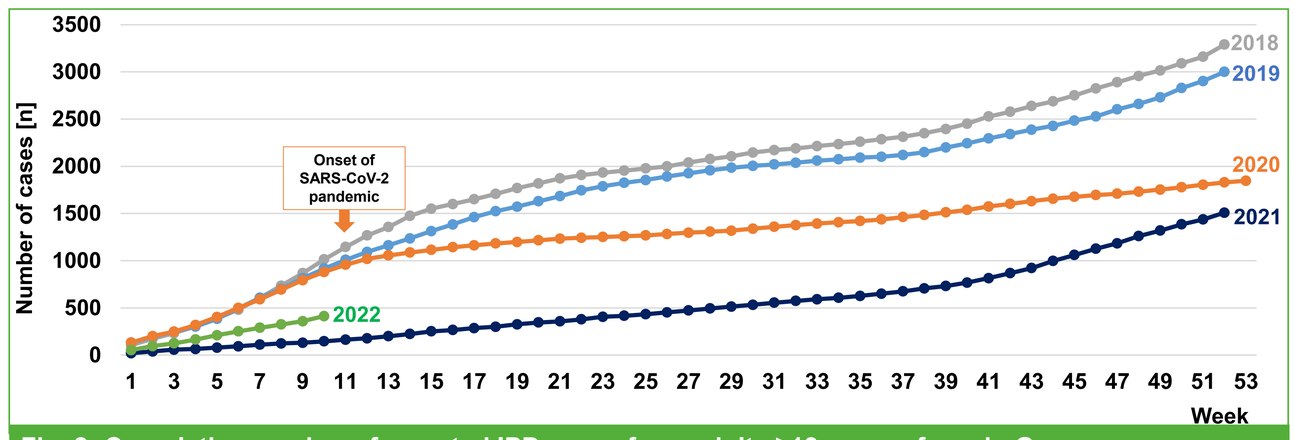

Fig. 2: Cumulative number of reported IPD cases from adults ≥18 years of age in Germany

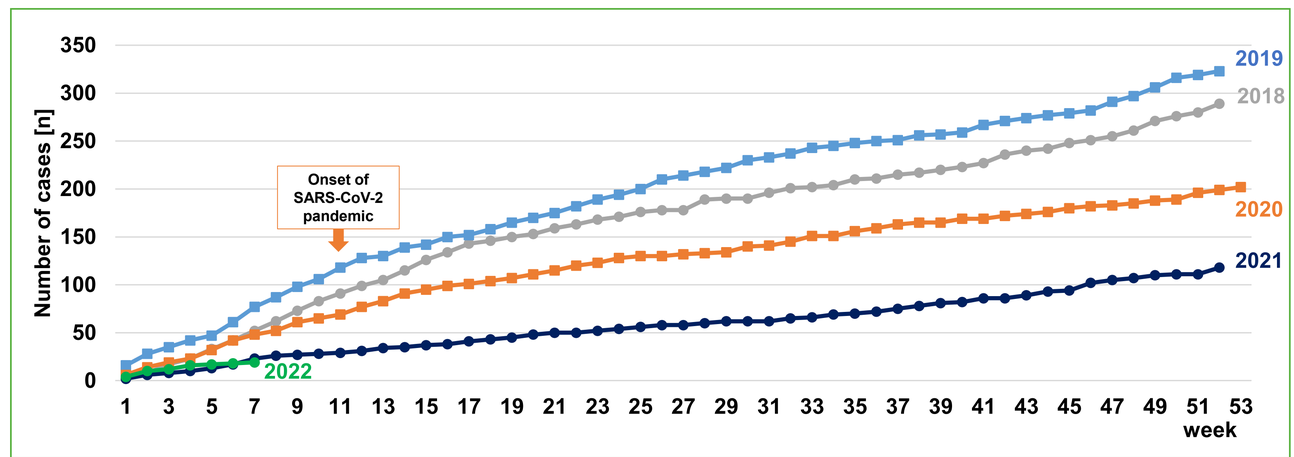

Fig. 3: Cumulative number of reported invasive Group-A streptococcal disease cases among all ages in Germany.

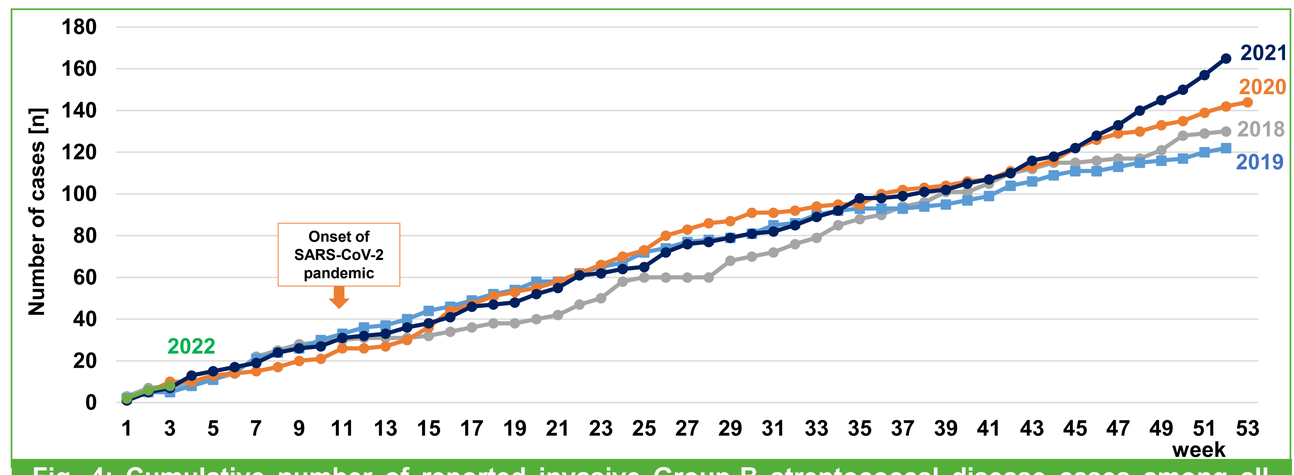

Fig. 4: Cumulative number of reported invasive Group-B streptococcal disease cases among all ages in Germany.

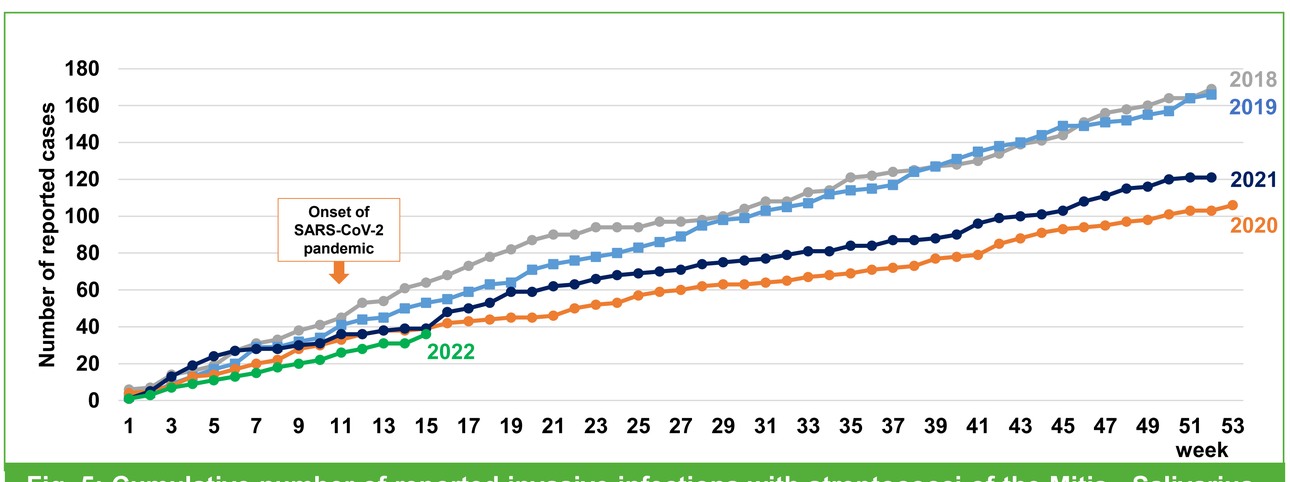

Fig. 5: Cumulative number of reported invasive infections with streptococci of the Mitis-, Salivarius- and Mutans-group among all ages in Germany

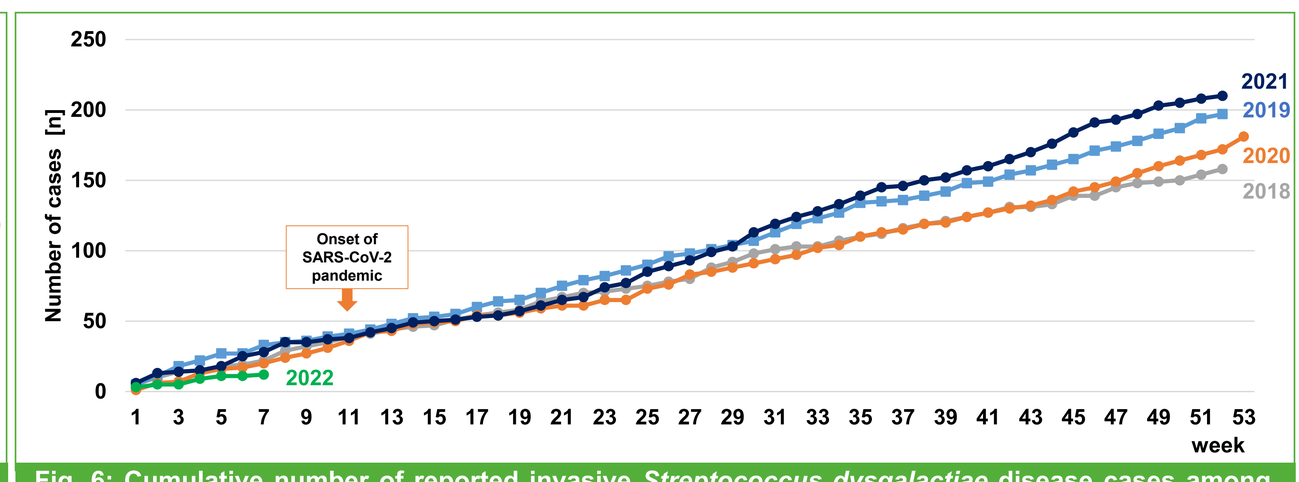

Fig. 6: Cumulative number of reported invasive *Streptococcus dysgalactiae* disease cases among all ages in Germany

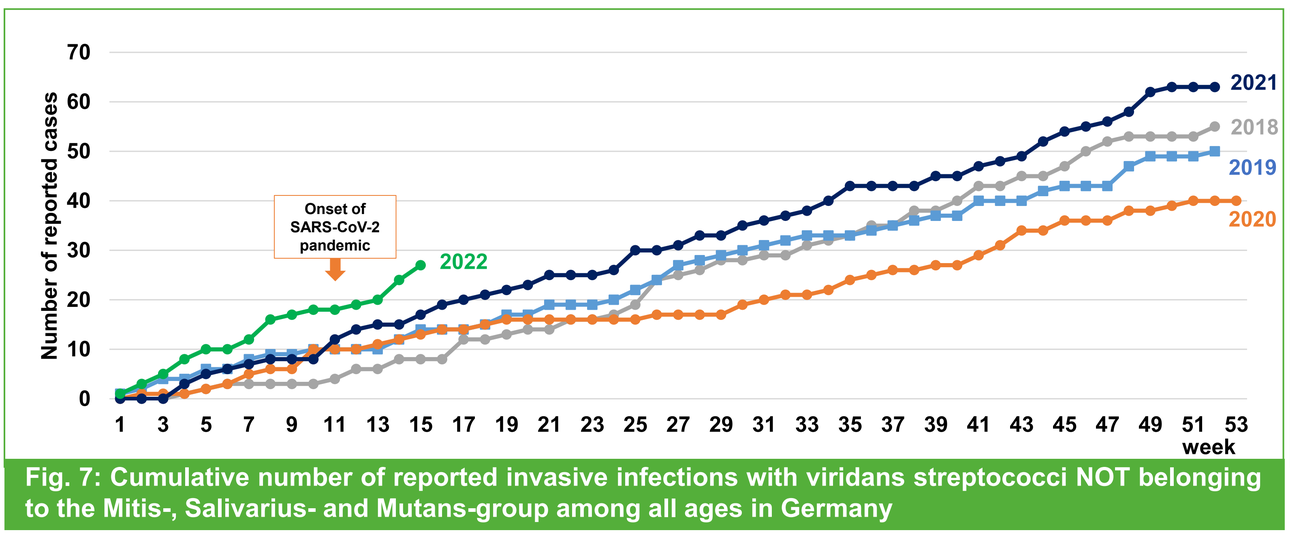

Fig. 7: Cumulative number of reported invasive infections with viridans streptococci NOT belonging to the Mitis-, Salivarius- and Mutans-group among all ages in Germany

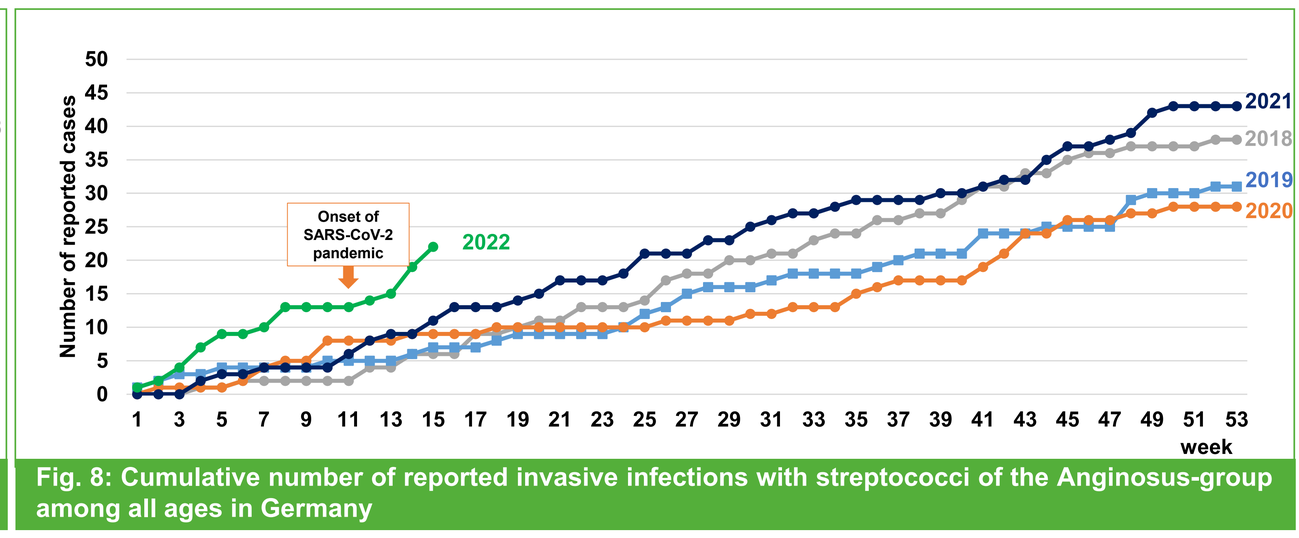

Fig. 8: Cumulative number of reported invasive infections with streptococci of the Anginosus-group among all ages in Germany