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Title: STREP A PHARYNGITIS RATES IN CHILDREN LIVING IN URBAN AUSTRALIA EMERGING AFTER THE COVID-19 PANDEMIC

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Background & Aims: Group A Streptococcus (Strep A) causes a range of acute infections such as pharyngitis, impetigo, invasive disease, and severe autoimmune sequelae including acute rheumatic fever (ARF) and rheumatic heart disease (RHD). The development of safe and effective vaccines against Strep A is a priority and pharyngitis an accepted first target indication. Active surveillance of Strep A infection is vital for vaccine development as it provides information about circulating strains, vaccine efficacy and escape variants to inform second-generation vaccine development. We aimed to collect contemporary Strep A surveillance data from urban-living Australian children to inform future vaccine trials and vaccine introduction.

Methods: 500 participants aged between 3-14-years old were enrolled into the Strep A Melbourne-Perth Surveillance Study (STAMPS). In partnership with primary care practitioners, participants and their parent/guardian, the study offered face-to-face and/or remote data and sample collection. Recruitment strategies included via primary practices and direct to community using social media platforms. Participants provided a baseline throat swab and blood sample at enrolment, and a throat swab and optional blood sample at 2-3 seasonal visits over a 12-month period to determine asymptomatic carriage. Throat swabs were collected upon report of sore throat symptoms, and a convalescent blood sample was taken ~4 weeks after Strep A culture-positive sore throat episodes. Strep A pharyngitis was diagnosed using an approved molecular point-of-care test or gold-standard culture. Because it can be difficult to distinguish Strep A pharyngitis from viral pharyngitis in the presence of Strep A carriage, serology was used to confirm true Strep A infection.

Results: The STAMPS study demonstrated Strep A pharyngitis was prominent across all age groups in the study, and interim analyses revealed incidence rates of sore throats were higher than published literature. This is consistent with the current surge of Strep A infections observed around the world. To date, over 600 throat swabs have been cultured, including over 100+ swabs collected from children experiencing an episode of sore throat. Over 500 blood samples have been bio-banked for serology. We performed interim analyses on throat swabs collected to March 2023 to measure baseline Strep A carriage and incidence, to compare with similar studies. Danchin et al., performed a study in Melbourne in 2001-2002 and reported baseline carriage rates of 8%, 12% and 16% in summer, winter, and spring respectively, which is comparable to the 10.7% carriage observed across the two cities in our study, over the 20 months to date. The rate of carriage observed in a 2006 study by Steer et al., in Fiji was only 6%.

In the current study, sore throat incidence was higher than previously reported in Melbourne, yet lower than in Fiji, but the incidence rate of Strep A+ sore throats was higher in our study (19.4 per 100 child years first episode). Incidence of serologically confirmed Strep A sore throats will also be determined.

Strep A pharyngitis rates, circulating strains, and serological responses in urban-living children form an important comparison to children living in remote and regional Australia where the burden of Strep A diseases is highest.

Conclusions: This study demonstrated the incidence rates of pharyngitis, Strep A pharyngitis and serologically proven Strep A pharyngitis in an urban population emerging from the pandemic in Australia. The data is crucial to future vaccine development, informing vaccine trial designs through better understanding of the burden of Strep A pharyngitis after easing of public health measures implemented during the pandemic, and providing knowledge on immune responses to Strep A during infection and asymptomatic carriage. Another strength of our study was the demonstrated success of remote data and parent-led biospecimen collection, providing increased convenience for families and resulting in greater community participation.