Strategy 3.2:
Develop and maintain research infrastructure

The value of data linkage for evaluating Australia's childhood immunisation program

A national research partnership developed a program of work around evaluating Australia's National Immunisation Program through the linkage of birth, perinatal, death, hospital, emergency department, disease notification, and immunisation records for a cohort of about two million births in NSW and Western Australia (WA). This represents the first time cross-jurisdictional linkages have occurred between datasets from multiple Australian states and a Commonwealth Government dataset under new Commonwealth arrangements for statistical data integration.

The project includes collaborators from the University of NSW School of Public Health, the National Centre for Immunisation Research and Surveillance, the University of Western Australia Telethon Kids Institute, Curtin University, Menzies School of Health Research, Australian National University National Centre for Epidemiology and Population Health, WA Health and NSW Health.

This project involved the established data linkage centres in WA (WADLS: WA Data Linkage System) and NSW (CHeReL: Centre for Health Record Linkage) and the approved Integrating Authority, the Australian Institute of Health and Welfare (AIHW).[1,2] The study cohort was live births in WA and NSW between 1 January 1996 and 31 December 2012, based on registrations from the Register of Births in WA and NSW. The WADLS and CHeReL used existing linkages between the birth registers and the respective state datasets (hospital admissions, perinatal records, emergency department data, infectious disease notifications and routine laboratory data [WA only]) to assign state project-specific linkage keys to each dataset. The AIHW was responsible for linking birth records to immunisation records from the Australian Childhood Immunisation Register (ACIR) and the National Death Index. This three-way linkage resulted in the creation of national project-specific linkage keys that connected individuals from each state to their corresponding immunisation records via the Secure Unified Research Environment (SURE) system.

To date the linked dataset has been used to examine the effectiveness of pneumococcal vaccine in children,[3] the impact of childhood pneumococcal vaccine on non-notifiable pneumococcal disease,[4] on-time vaccination coverage in population sub-groups,[5] and predictors of delayed vaccination.[6] Additional analyses are planned to look at vaccine effectiveness in sub-groups such as children born prematurely and Aboriginal children.

The research collaboration has contributed to *Population Health Research Strategy 3.2 (Build population health research capability: Develop and maintain research infrastructure)* by demonstrating the value of CHeReL and that linkages of cross-jurisdictional population-wide datasets can be achieved and used to successfully answer a wide range of policy relevant questions.

Further reading

1. Moore HC, Guiver T, Woollacott A, De Klerk N, Gidding HF. Establishing a process for conducting cross-jurisdictional record linkage in Australia. *Aust N Z J Public Health* 2016; 40(2): 159-64.

2. Gidding HF, McCallum L, Fathima P, Snelling T, Liu B, de Klerk N, et al. Probabilistic linkage of national immunisation and state-based health records for a cohort of 1.9 million births to evaluate Australia's childhood immunisation program. *International Journal of Population Data Science* 2017; 2(1).

3. Gidding HF, McCallum L, Fathima P, Moore HC, Snelling TL, Blyth CC, et al. Effectiveness of a 3 + 0 pneumococcal conjugate vaccine schedule against invasive pneumococcal disease among a birth cohort of 1.4 million children in Australia. *Vaccine* 2018; 36(19): 2650-6.

4. Gidding HF, Sheridan S, Fathima P, Moore HC, Liu B, McIntyre PB, et al. Impact of childhood pneumococcal conjugate vaccine on nonnotified clinically suspected invasive pneumococcal disease in Australia. *Pediatr Infect Dis J* 2019; 38(8): 860-5.

5. Moore HC, Fathima P, Gidding HF, de Klerk N, Liu B, Sheppeard V, et al. Assessment of on-time vaccination coverage in population subgroups: A record linkage cohort study. *Vaccine* 2018; 36(28): 4062-9.

6. Gidding HF, Flack LK, Sheridan S, Fathima P, Sheppeard V, et al. Infant, maternal and demographic predictors of delayed vaccination: a population-based cohort study. *Vaccine* 2019 Oct 15. pii: S0264-410X(19)31333-7. doi: 10.1016/j.vaccine.2019.09.091. [Epub ahead of print]