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## Australian Paediatric Surveillance Unit (APSU) Annual Surveillance Report 2023

Suzy M Teutsch, Carlos A Nunez, Anne Morris, Guy D Eslick, Elizabeth J Elliott,  
on behalf of Chief Investigators of APSU surveillance studies on communicable disease  
and complications of communicable disease

# Communicable Diseases Intelligence

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## Abstract

The Australian Paediatric Surveillance Unit (APSU) has been conducting prospective national surveillance of rare communicable diseases, and complications of communicable diseases, of childhood and infancy for more than three decades. In 2023, there were 15 communicable diseases and complications of communicable diseases under APSU surveillance, which included: acute flaccid paralysis (AFP), congenital cytomegalovirus (cCMV), dengue, severe acute hepatitis (SAH), neonatal and infant herpes simplex virus (HSV) infection, perinatal exposure to human immunodeficiency virus (HIV) and paediatric HIV infection, severe complications of influenza, juvenile-onset recurrent respiratory papillomatosis (JoRRP), Q fever, congenital rubella infection/syndrome, congenital varicella syndrome (CVS) and neonatal varicella infection (NVI), as well as two new communicable diseases, which were paediatric inflammatory multisystem syndrome temporally associated with SARS-CoV-2 (PIMS-TS) and Japanese encephalitis virus (JEV) infection. The results of 2023 APSU surveillance show a marked increase in severe influenza cases for the first time in five years, with more complications associated with influenza type B. Moreover, one child died and only 6% of children received a seasonal influenza vaccine. The APSU also received reports of cases of rare emerging diseases: dengue, Q fever and PIMS-TS. Furthermore, our results show a persistence of vaccine-preventable JoRRP, mother-to-child transmission of HIV, and deaths from neonatal HSV.

Keywords: Australia; child; communicable diseases; emerging infectious diseases; public health surveillance; rare diseases

## Introduction

The APSU has been conducting national active prospective surveillance of rare communicable diseases and rare complications of communicable diseases in children aged < 19 years since 1993, via monthly clinician reporting.<sup>1,2</sup>

In 2023, a total of 15 communicable diseases and complications were under APSU surveillance: acute flaccid paralysis (AFP), congenital cytomegalovirus (cCMV), dengue, severe acute hepatitis (SAH), neonatal and infant herpes simplex virus (HSV) infection, perinatal exposure to human immunodeficiency virus (HIV) and paediatric HIV infection,

severe complications of influenza, juvenile-onset recurrent respiratory papillomatosis (JoRRP), Q fever, congenital rubella infection/syndrome, congenital varicella syndrome (CVS), neonatal varicella infection (NVI), and two new surveillance studies of paediatric inflammatory multisystem syndrome temporally associated with SARS-COV-2 (PIMS-TS) and Japanese encephalitis virus (JEV) infection.

In this report, we describe 2023 surveillance results for each communicable disease and complication, including case numbers, incidence or birth prevalence estimates, demographic and clinical characteristics, risk factors, management and outcomes, as well as clinician reporting rates.

## Surveillance method

In brief, a monthly report card listing up to 19 rare childhood conditions, including the 15 conditions described in this report (case definitions are described in Appendix A, Table A.1), was received by an average of 1,439 paediatricians and other child health specialists who were registered with the APSU and in active clinical practice ('APSU contributors'). Contributors received the report card either electronically via email (96%) or in paper format via post (4%). If contributors had seen a child with one or more of the conditions listed on the card, they were asked to complete a detailed case report form (CRF) for each child. If they had not seen any cases, contributors were asked to return the card with a 'nothing to report' reply so that the response could be recorded for calculation of clinician reporting rates. The CRF for notified cases was completed by contributors either online via REDCap,<sup>i</sup> or in paper format (which was entered into REDCap by APSU staff). Minimal patient identifiers (initials and data of birth) were requested on the CRF to identify duplicate reports. Contributors were subsequently provided with a pdf copy of the CRF data in REDCap format and contacted if any data were missing or unclear. Data were de-identified by APSU staff and downloaded from REDCap into MS-Excel files for analysis. All cases were classified by the investigators/clinical advisory group for each study, with AFP cases classified by the Polio Expert Panel.<sup>5</sup> Ethics approval for APSU surveillance studies was obtained from Human Research Ethics Committees at the Sydney Children's Hospitals Network (approval number 2020/ETH03310) for AFP, cCMV, dengue, SAH, HSV, severe influenza, JEV, PIMS-TS, Q fever, JoRRP, rubella, CVS and NVI studies; and the University of New South Wales (approval number HC210300) for perinatal exposure HIV and paediatric HIV studies.

## Calculation of incidence and birth prevalence estimates

Incidence and birth prevalence estimates per annum, and 95% confidence intervals were calculated for each childhood disease and complication using standard

formulas. Population denominators were obtained from the Australian Bureau of Statistics,<sup>6</sup> which were < 15 years (AFP; JoRRP; severe influenza; Q fever), < 16 years (dengue, paediatric HIV), < 17 years (severe acute hepatitis), < 18 years (JEV infection) and < 19 years (PIMS-TS), and from the Australian Institute for Health and Welfare,<sup>7</sup> which were live births (cCMV; neonatal and infant HSV; perinatal exposure to HIV; congenital rubella; CVS; NVI).

## Results

### Representativeness of clinician reporting and response rates

In 2023, APSU contributors who received the monthly report card were located in every Australian state and territory, and their distribution approximately matched the population of children aged < 15 years residing in the respective states and territories (data not shown). Cases were reported from both inpatient and outpatient settings, as well as in urban, regional, and remote locations.

The annual response rate to the monthly report card by APSU contributors in 2023 (including case notifications and 'nothing to report' responses) was 80%, which was largely unchanged from the 2022 and 2021 response rates of 81%.<sup>8,9</sup>

### Summary of notifications, confirmed cases and annual incidence/birth prevalence estimates

In 2023, a total of 285 notifications was received by the APSU, which included 232 confirmed definite and probable cases (aggregated); 11 historic cases from previous years; 21 duplicate reports; and 21 errors (consisted of reporting errors outside of case definition, cases with insufficient data to classify and cases who did not have a CRF completed). A detailed breakdown of case numbers received for each communicable disease and complication is presented in Appendix A, Table A.2.

A summary of confirmed case numbers, duration of study and annual incidence or birth prevalence estimates for each communicable disease or complication under surveillance for 2023, and for the total study period, is presented in Table 1.

i Study data were collected and managed using REDCap electronic data capture tools hosted at the University of Sydney.<sup>3,4</sup> REDCap (Research Electronic Data Capture) is a secure, web-based software platform designed to support data capture for research studies, providing 1) an intuitive interface for validated data capture; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for data integration and interoperability with external sources.

**Table 1: Confirmed cases identified by APSU surveillance during the period 1 January – 31 December 2023 and for the total study period, and estimated incidence or birth prevalence per 10<sup>5</sup> children of the relevant population/age per annum, by communicable disease or complication**

Communicable disease or disease complication	Surveillance study date of commencement	Confirmed cases for 2023 (1 January – 31 December)	Incidence or birth prevalence estimate per 10 <sup>5</sup> per annum and 95% CI for 2023 <sup>a,b</sup>	Confirmed cases for the whole study period to 31 December 2023	Incidence or birth prevalence estimate per 10 <sup>5</sup> per annum for the whole study period to 31 December 2023 <sup>a,b</sup>
Acute flaccid paralysis	March 1995	82 <sup>c</sup>	1.71 [1.38–2.13] <sup>d</sup>	1,409	1.14 [1.08–1.20] <sup>d</sup>
Congenital cytomegalovirus	January 1999	35 <sup>e</sup>	11.17 [8.02–15.55] <sup>f</sup>	564 <sup>e</sup>	7.78 [7.17–8.45] <sup>f</sup>
Dengue	February 2022	2 <sup>e</sup>	—	4	—
Severe acute hepatitis	September 2022	6	—	14	0.13 [0.08–0.22] <sup>g</sup>
Neonatal and infant herpes simplex virus	January 1997	17	5.42 [3.37–8.72] <sup>f</sup>	257	3.31 [2.93–3.75] <sup>f</sup>
Perinatal exposure to HIV	May 1993	18	5.74 [3.62–9.12] <sup>f</sup>	1,017	11.50 [10.81–12.23] <sup>f</sup>
Paediatric HIV infection	May 1993	0	—	102	0.07 [0.06–0.09] <sup>h</sup>
Severe complications of influenza <sup>a</sup>	2008 (flu season only)	65	1.36 [1.07–1.73] <sup>d</sup>	788	1.09 [1.02–1.17] <sup>d</sup>
Q fever	February 2022	1 <sup>e</sup>	—	2 <sup>e</sup>	—
Juvenile-onset recurrent respiratory papillomatosis	September 2011	1 <sup>e</sup>	—	22 <sup>e</sup>	0.04 [0.02–0.06] <sup>d</sup>
Congenital rubella infection/syndrome	May 1993	0	—	54 <sup>d</sup>	0.61 [0.47–0.80] <sup>f</sup>
Congenital varicella syndrome	May 2006	0	—	4 <sup>d</sup>	—
Neonatal varicella	May 2006	0	—	32	0.59 [0.42–0.83] <sup>f</sup>
PIMS-TS <sup>k</sup>	February 2023	5 <sup>e</sup>	—	5 <sup>e</sup>	—
Japanese encephalitis virus infection <sup>k</sup>	May 2023	0	—	0	—

a Incidence estimate or birth prevalence were not calculated for case numbers < 10, as they were deemed to be inaccurate.

b 95% CI: 95% confidence interval.

c Includes all cases of acute flaccid paralysis (AFP) reported via the APSU/National Enterovirus Reference Laboratory (NERL) and PAEDS surveillance systems. All cases have been classified by the Polio Expert Panel (PEP) as 'non-polio AFP' according to World Health Organization criteria.<sup>10, 11</sup>

d Based on population of children aged < 15 years.<sup>6</sup>

e Includes both confirmed and probable cases.

f Based on number of live births.<sup>7</sup>

g Based on population of children aged < 17 years.<sup>6</sup>

h Based on population of children aged < 16 years.<sup>6</sup>

i Influenza surveillance was conducted each year during the influenza season, from July to September (inclusive) for 2008 and 2010–2015; June to October (inclusive) in the 2009 H1N1 influenza pandemic year; June to September (inclusive) 2016–2019 and 2022; and May to September (inclusive) in the 2020–2021 SARS-CoV-2 coronavirus pandemic years, and in 2023.

j PIMS-TS: paediatric inflammatory multisystem syndrome temporally associated with SARS-Cov-2.

k New surveillance study commenced in 2023.

**Table 2: Demographic, clinical, management characteristics, risk factors and outcomes of confirmed cases reported to the APSU during the period 1 January – 31 December 2023, by communicable disease and complication of communicable disease**

Communicable disease or complication	Case definition (in brief)	Demographics, clinical features, management, risk factors and outcomes <sup>a</sup>
<p><b>Acute flaccid paralysis<sup>b</sup></b></p>	<p>Any child aged &lt; 15 years with acute flaccid paralysis in one or more limbs or acute onset of bulbar paralysis</p>	<ul style="list-style-type: none"> <li>• Of 94 notifications, 82 were confirmed as non-polio AFP cases<sup>b</sup> that were reported from: NSW (19), Vic. (40), Qld (8), SA (3), WA (6), Tas. (2), NT (3) and ACT (1). Four cases were indigenous and the status of one child was not available.</li> <li>• The most common diagnoses assigned by the PEP<sup>b</sup> for the non-polio AFP cases were Guillain-Barré syndrome in 26 children, transverse myelitis in 15, acute disseminated encephalomyelitis in 13, and myasthenia gravis in three children.</li> <li>• 'Adequate' stool samples which the World Health Organization (WHO) defines as two stool samples collected at least 24 hours apart and within 14 days of onset of paralysis in ≥ 80% of cases<sup>10,11</sup> were collected from 52/82 children with confirmed AFP (63%).</li> </ul>
<p><b>Congenital cytomegalovirus</b></p>	<p>Any child from whom CMV is isolated in the first three (3) weeks of life (confirmed case) or up to 12 months of age (probable case)</p>	<ul style="list-style-type: none"> <li>• Of 52 notifications, 35 were confirmed as cases (33 definite and two probable). Three notifications were prevalent cases diagnosed in 2022. Cases were reported from: NSW (9), Vic. (1), Qld (16), WA (6), NT (1) and ACT (2), and two were indigenous.</li> <li>• CMV was most frequently diagnosed by urine polymerase chain reaction (PCR). Of the cases, 22 (62%) were symptomatic, with the most common clinical conditions being small for gestational age (n = 8); microcephaly (n = 7); hepatitis (n = 6); and jaundice (n = 3). Hearing impairment was diagnosed in 15/30 children (50%) and was sensorineural in nine of them.</li> <li>• All infants (n = 10) who had moderate to severe cCMV symptoms, including neurological symptoms or multiple symptoms, received antiviral treatment with valganciclovir or ganciclovir according to current recommendations,<sup>12-14</sup> and no infants died.</li> <li>• A symptomatic illness suggestive of maternal CMV infection was reported during pregnancy in 12 of 17 mothers for whom these data were available (71%). A positive immunoglobulin G (IgG) and/or IgM for CMV infection was reported in eleven mothers.</li> </ul>
<p><b>Dengue</b></p>	<p>Any child aged &lt; 16 years with laboratory definitive (confirmed case), or suggestive (probable case) evidence of dengue, and clinical evidence of dengue</p>	<ul style="list-style-type: none"> <li>• Two notifications were received, and both confirmed as definite cases. Cases were reported from NSW (1) and WA (1) and were not Indigenous.</li> <li>• Both children presented with fever, vomiting and rash, and one child also had abnormal bruising/bleeding. One child was admitted to hospital. One child had dengue serotype DENV-1 and the serotype was not documented for the other child.</li> <li>• One child received supportive therapies (intravenous fluids, pain relief) and ceftriaxone.</li> <li>• One child had no previous history of dengue, and this was not recorded for the other child. Both children had recently travelled to countries outside of Australia where dengue is endemic.</li> <li>• One child still had ongoing problems at discharge, including petechial rash.</li> </ul>

Communicable disease or complication	Case definition (in brief)	Demographics, clinical features, management, risk factors and outcomes <sup>a</sup>
<b>Severe acute hepatitis</b>	Any newly diagnosed case of severe acute hepatitis of any aetiology in any child aged < 17 years	<ul style="list-style-type: none"> <li>• Of eight notifications, six were confirmed as cases. Cases were reported from NSW (3), Vic. (2) and Qld (1) and none were Indigenous.</li> <li>• All children were hospitalised, and clinical symptoms at presentation included fever, abdominal pain, fatigue, jaundice and joint/muscle pain. Only one child had travelled overseas during the previous six months.</li> <li>• Five children were given a final diagnosis of viral hepatitis; one of whom also had <i>Salmonella</i> Typhi bacteraemia (enteric fever) and <i>Shigella</i> gastroenteritis. Another child was given a final diagnosis of drug (minocycline)-induced autoimmune hepatitis.</li> <li>• At the time of reporting, one child was still hospitalised with ongoing hepatitis (ALT &gt; 500 U/L), four children had recovered, and one child had been discharged with no details provided.</li> </ul>
<b>Neonatal and infant herpes simplex virus</b>	Any neonate or infant aged < 3 months of age (regardless of gestation) with laboratory confirmation of HSV infection <i>and</i> with either clinical evidence of HSV infection or laboratory confirmation of maternal perinatal HSV infection in an asymptomatic infant	<ul style="list-style-type: none"> <li>• Of 19 notifications, 17 were confirmed as cases, and all were neonates (aged &lt; 28 days).</li> <li>• Cases were reported from NSW (2), Vic. (3), Qld (8), SA (1), and WA (3), and one child was Indigenous.</li> <li>• Ten cases were classified with HSV skin, eye, mouth (SEM) disease, four with central nervous system (CNS) disease (one also had SEM disease), two with disseminated disease (one with CNS involvement), and one with asymptomatic infection. Eight cases tested positive for HSV-1 infection and nine with HSV-2.</li> <li>• All cases received aciclovir antiviral treatment.</li> <li>• One case with disseminated disease (with CNS involvement) died, and one surviving case with CNS disease had short-term sequelae, which were seizures, focal neurology and a requirement for home oxygen. This case also had both abnormal brain imaging and electroencephalogram test results.</li> <li>• Of 16 survivors, only nine were prescribed antiviral therapy to prevent recurrences of HSV infection.</li> </ul>
<b>Perinatal exposure to HIV</b>	Any infant born to a woman with diagnosed HIV infection, including by in utero exposure or through breastfeeding	<ul style="list-style-type: none"> <li>• Of 26 notifications, 18 were confirmed as cases and seven were prevalent cases born in 2022 and not previously reported. Cases were reported from NSW (10), Qld (5), WA (1) and ACT (2) and one was Indigenous.</li> <li>• Only 16/18 infants confirmed in 2023 with perinatal HIV exposure had data available. All 16 children were born in Australia. Twelve infants had a HIV negative test result at their most recent test and four did not have a result recorded at the time of reporting. Follow-up of these infants at 18 months will be conducted to obtain further HIV test results, in accordance with clinical recommendations.<sup>15</sup></li> <li>• Six of the 16 infants received antiretroviral therapy and 12 with prophylactic antiviral treatment after birth.</li> <li>• A separate CRF was completed for only nine mothers of the 18 infants confirmed as cases. Eight mothers were born outside of Australia. All nine mothers were diagnosed with HIV antenatally and received antiretroviral therapy during pregnancy. Most infants (8/9) were delivered vaginally, with only one infant delivered by elective caesarean section. Breastfeeding was avoided for all nine infants.</li> </ul>

Communicable disease or complication	Case definition (in brief)	Demographics, clinical features, management, risk factors and outcomes <sup>a</sup>
<b>Paediatric HIV infection</b>	Any child aged < 16 years at diagnosis of HIV infection in Australia	<ul style="list-style-type: none"> <li>• There was one notification, which was confirmed as a prevalent 2022 case not previously reported. The case was a newborn infant born in Australia and diagnosed at the end of 2022 to a woman with previously unknown HIV infection. The case was reported in Vic. and was Indigenous.</li> <li>• The child tested positive for HIV type 1 and was asymptomatic.</li> <li>• The child was treated with antiretroviral therapy before their HIV infection status was known and survived.</li> <li>• The mother had a seroconversion illness during the last trimester of pregnancy but could not be located following diagnosis of primary HIV infection to advise initiation of antiretroviral therapy and Caesarean section delivery prior to the birth of the child.</li> </ul>
<b>Severe complications of influenza</b>	Any child aged < 15 years with laboratory confirmed influenza admitted to hospital with severe complications	<ul style="list-style-type: none"> <li>• During seasonal influenza surveillance (1 May to 30 September 2023), there were 75 notifications, of which 65 were confirmed as cases. Cases were reported from: NSW (24), Vic. (16), Qld (6), SA (3), WA (11), Tas. (1), NT (2), ACT (2) and eight children were Indigenous.</li> <li>• Twenty-two children (34%) were aged 5–9 years and 16 children (25%) were aged &lt; 5 years. Eighteen (28%) children were admitted to intensive care units (ICU).</li> <li>• Influenza A was laboratory-confirmed in 25 children (39%) and influenza B in 39 children (61%). Influenza A H1(09) subtype was recorded for three children and influenza B (Victoria/VIA/3A-2) lineage was recorded for one child.</li> <li>• The most common presenting symptoms were fever, cough, malaise/lethargy and shortness of breath. Fourteen different severe complications were recorded; the most common were pneumonia in 34 (52%) children, bacterial co-infection in 15 (23%), acute renal failure in 11 (17%), encephalitis/encephalopathy, rhabdomyolysis and viral co-infection, respectively in nine (14%) children each. The most common bacterial co-infections were <i>Staphylococcus aureus</i> and group A <i>Streptococcus</i> in 4/15 children each, and the most common viral co-infection was respiratory syncytial virus in 5/9 children. One child had co-infection with SARS-CoV-2.</li> <li>• Of the children, 37/64 (58%) received oseltamivir antiviral treatment and 50/63 (79%) received antibiotics.</li> <li>• Only four children (6%) received a seasonal influenza vaccine, 26 (40%) had not been vaccinated, and vaccination status was unavailable for a further 35 children.</li> <li>• Only 17 (26%) children had an underlying medical condition that likely predisposed them to severe influenza complications; the most common conditions were asthma in four children, genetic disorders and neurodevelopmental delay in three and congenital heart disease, and prematurity, respectively, in two children each. Forty-six children (71%) were previously healthy and the medical history for two children was unavailable.</li> <li>• Three children had previously contracted COVID-19 and none were hospitalised. Two children each had received two and three doses, respectively of a COVID-19 vaccine and eight children did not receive a vaccine. COVID-19 vaccination status was not available for 51 children.</li> <li>• One child died, and 19 children were still in hospital at the time of reporting, including three children in ICU.</li> </ul>



Communicable disease or complication		Demographics, clinical features, management, risk factors and outcomes <sup>a</sup>
<b>Q fever</b>	<p>Any child aged &lt; 15 years who has either:</p> <ul style="list-style-type: none"> <li>Confirmed acute Q fever (by laboratory confirmation)</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>Probable acute Q fever (laboratory evidence, plus clinical presentation compatible with acute Q fever)</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>Chronic Q fever (laboratory confirmation, plus clinical presentation consistent with chronic Q fever)</li> </ul>	<ul style="list-style-type: none"> <li>There was one notification, which was laboratory confirmed as a definite case of acute Q fever. The case was reported from NSW and was not Indigenous.</li> <li>Clinical symptoms at presentation included: fever, vomiting, chills/rigors, fatigue/lethargy, joint/muscle pain, weight loss, abdominal pain, and loss of appetite.</li> <li>The child was hospitalised and treated with doxycycline antibiotic.</li> <li>The child had no underlying medical conditions, resided on a rural property and had been exposed to cattle.</li> <li>The child survived and had recovered at the time of reporting.</li> </ul>
<b>JoRRP</b>	<ul style="list-style-type: none"> <li>Any infant or child aged &lt; 15 years diagnosed JoRRP confirmed by endoscopy of the larynx and by histology.</li> <li>Probable case: as above but without histological confirmation.</li> </ul>	<ul style="list-style-type: none"> <li>There was one notification, which was confirmed as a definite case. The case was reported from WA and was not Indigenous. The child was born outside of Australia.</li> <li>The child presented with hoarseness. Diagnosis of JoRRP was made by histology and human papilloma virus (HPV) type-6 was detected, which is strongly implicated in disease development<sup>16</sup> and is targeted by HPV vaccines.<sup>17</sup></li> <li>The child was treated with debulking surgery.</li> <li>The child's mother received one dose of a HPV vaccine, however it was unknown as to whether this occurred before or after gestation.</li> </ul>
<b>Congenital rubella infection/syndrome</b>	<ul style="list-style-type: none"> <li>Confirmed case: any infant with laboratory definitive evidence (fetal or infant) AND clinical evidence (live or stillborn infant) with or without compatible defects.</li> <li>Probable case: epidemiological evidence of infection in pregnancy AND laboratory suggestive evidence (in an infant).</li> </ul>	<p>There were no notifications of congenital rubella infection or syndrome during the reporting period.</p>
<b>Congenital varicella</b>	<p>Any stillbirth, newborn infant, or child up to the age of 2 years who, has definite or suspected congenital varicella infection, with or without defects</p>	<p>There were no notifications of congenital varicella during the reporting period.</p>
<b>Neonatal varicella</b>	<p>Any infant who has neonatal varicella based on history, clinical and/or laboratory findings in the first month of life (without features of congenital varicella syndrome).</p>	<p>There were no notifications of neonatal varicella during the reporting period.</p>

Communicable disease or complication	Demographics, clinical features, management, risk factors and outcomes <sup>a</sup>
<p><b>Case definition (in brief)</b></p> <p>Any child aged &lt; 19 years with fever <math>\geq</math> 3 days AND two of the following:</p> <ul style="list-style-type: none"> <li>Rash or bilateral non-purulent conjunctivitis or muco-cutaneous inflammation signs.</li> <li>Age specific hypotension or 'shock' within first 24 hours of presentation.</li> <li>Features of myocardial dysfunction, pericarditis, valvulitis, or coronary abnormalities.</li> <li>Evidence of coagulopathy.</li> </ul> <p>AND</p> <p>Elevated markers of inflammation.</p> <p>AND</p> <p>Exclusion of other infectious causes of inflammation.</p> <p>AND</p> <p>Evidence of SARS-CoV-2 infection OR contact with a confirmed COVID-19 case.</p>	<p>Of six notifications received between 1 February and 31 December 2023, five were confirmed as cases (four definite and one probable). Cases were reported from NSW (1), Vic. (2) and SA (2) and none were Indigenous.</p> <ul style="list-style-type: none"> <li>Clinical symptoms included: fever (<math>\geq</math> 38 °C), rash, breathing difficulty, vomiting, abdominal pain, diarrhoea, oedema, joint/muscle pain, headache, conjunctival injection, age specific hypotension, mucosal changes (strawberry tongue, red lips, pharyngeal erythema), peripheral cutaneous inflammation signs (hands &amp; feet), lymphadenopathy, shock, encephalopathy, hyponatremia, myocardial dysfunction, and coronary artery abnormality.</li> <li>All children were hospitalised, and three children were admitted to ICU. Four children had laboratory evidence of recent or previous infection with SARS-CoV-2. Two children had underlying medical conditions, and only two children received a COVID-19 vaccine.</li> <li>All children received treatment with antibiotics, corticosteroids and aspirin. In addition, four children received intravenous immunoglobulin, two received antiviral treatment, and one child each received anticonvulsant, asthma and analgesic treatments. Three children also received supportive therapy with Inotropes/vasopressors and oxygen.</li> <li>All children survived and were discharged at the time of reporting.</li> </ul>
<p><b>Japanese encephalitis virus infection<sup>e</sup></b></p> <p>Any child aged &lt; 18 years with:</p> <ul style="list-style-type: none"> <li>acute onset of symptoms consistent with Japanese encephalitis</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>later stage symptoms/signs</li> </ul> <p>AND</p> <ul style="list-style-type: none"> <li>Laboratory confirmation of JEV infection.</li> </ul>	<p>Between 1 May and 31 December 2023, there were no notifications of Japanese encephalitis virus infection.</p>

a ACT: Australian Capital Territory; NSW: New South Wales; NT: Northern Territory; Qld: Queensland; SA: South Australia; Tas.: Tasmania; Vic.: Victoria; WA: Western Australia.

b Includes all cases of acute flaccid paralysis (AFP) reported via the APSU/National Enterovirus Reference Laboratory (NERL) and PAEDS surveillance systems. All cases have been classified by the Polio Expert Panel (PEP) as 'non-polio AFP' according to World Health Organization criteria.<sup>10,11</sup>

c PIMS-TS: paediatric inflammatory multisystem syndrome temporally associated with SARS-Cov-2.

d New surveillance study commenced in 2023.

## Demographic, clinical, management, risk and outcome data

A summary of data received by the APSU in 2023 on demographics, clinical features, treatment/management, risk factors, and outcomes of confirmed cases for each communicable disease and complication is presented in Table 2. Trends in disease incidence for each disease and complication, including comparisons to historical trends, and APSU outputs are presented in the following text.

### Acute flaccid paralysis

At the request of the Australian government, APSU surveillance of AFP has been conducted since 1995 (and since 2007 in conjunction with the Paediatric Active Enhanced Disease Surveillance [PAEDS] network), in order to maintain Australia's 'polio-free' status, which was first achieved in 2000.<sup>18</sup>

The 2023 annual incidence of 1.71 non-polio AFP cases per 100,000 children aged < 15 years met the minimum surveillance target set by the World Health Organization (WHO) of one AFP case per 100,000 children in this age group.<sup>10</sup> Of the 2023 AFP cases, 15 were notified using the APSU case report form, and five of these cases were confirmed. These confirmed cases were reported from hospitals outside of the eight hospitals where the PAEDS network operated and therefore would have been missed by using PAEDS surveillance alone. Eight cases were duplicated by PAEDS surveillance. The receipt of duplicate reports is indicative of the effectiveness of AFP case ascertainment by both surveillance systems.

Since AFP surveillance commenced, a total of 1,409 confirmed non-polio AFP cases have been reported, with the WHO target annual incidence of  $\geq 1$  non-polio AFP case per 100,000 children consistently achieved each year since 2008.<sup>11</sup>

AFP data collected by the APSU were also published in the Australian National Enterovirus Reference Laboratory annual report, 2022,<sup>11</sup> and in the WHO Western Pacific polio fortnightly bulletins.<sup>19</sup> AFP data collected by the APSU also contribute to Australia's annual polio-free certification by the WHO in the Western Pacific region.<sup>20</sup>

### Congenital cytomegalovirus infection

Since APSU surveillance of cCMV commenced in 1999, a total of 564 cases has been reported, and overall annual incidence estimates have remained unchanged for the last decade.<sup>21</sup> This is now the

longest running prospective surveillance study of cCMV internationally.

In 2023, APSU cCMV data collected from 1999–2022 were presented by cCMV study principal investigator Professor William Rawlinson at the *Third Congress on Congenital Cytomegalovirus* in Naples, Italy on 23–24 November 2023.

### Dengue

Since APSU surveillance of dengue commenced in February 2022, a total of four confirmed cases have been reported, with two each reported in 2023 and 2022,<sup>8</sup> respectively. It is notable that all affected children had travelled outside of Australia to countries known to be endemic for dengue prior to their infection.<sup>22</sup>

### Severe acute hepatitis

APSU commenced surveillance for SAH in February 2022, in response to the global outbreak of severe hepatitis of unknown aetiology in children in early 2022;<sup>23,24</sup> a total of 14 confirmed cases of severe hepatitis of any cause have been reported since surveillance started, six in 2023 and eight in 2022.<sup>8</sup> The majority of cases were given a final diagnosis of viral hepatitis; however, the cause of hepatitis in two cases reported in 2022 was not determined.<sup>8</sup>

In 2023, the APSU conducted a systematic review and meta-analysis of all global published data on 3,636 cases of children with severe acute hepatitis of unknown aetiology (SAHUA), which found adeno-associated virus 2 was significantly associated with the condition, and that co-infection with other common viral respiratory and enteric pathogens of childhood was also frequent. The study concluded that SAHUA may have been the result of an abnormal immune response to these pathogens due to a lack of exposure during COVID-19 lockdown periods in 2020 and 2021, especially in young children aged < 5 years. These findings were published in the *Journal of Infection*,<sup>25</sup> and were promoted in a media release by the University of Sydney news and in a radio interview by co-author, Guy Eslick.

## Neonatal and infant herpes simplex virus infection

Since APSU surveillance of neonatal and infant HSV commenced in January 1997, a total of 257 confirmed cases has been reported to the APSU, with the overall incidence estimate remaining unchanged in the last decade.<sup>21</sup> This is now the longest running study of prospective neonatal HSV surveillance internationally.

In 2023, APSU HSV study data collected over a 24-year period were analysed and published in the *Journal of Clinical Virology*.<sup>26</sup> The characteristics of 95 neonatal HSV cases aged < 28 days with neurological disease, who were reported between 1997 and 2021, were compared with cases without neurological disease. HSV cases with neurological disease were more likely to be male, born at term, and have higher rates of adverse outcomes (mortality and morbidity) than cases without neurological disease. Moreover, deaths and neurological sequelae in HSV neonates with neurological disease persisted over the time period analysed, despite increases in aciclovir antiviral treatment dose and duration.<sup>26</sup>

Also, clinical characteristics of neonatal HSV cases reported to the APSU from the Australian states of Queensland and Western Australia were compared with cases captured by laboratory and clinical records in those states.<sup>27</sup> In 2023, these data were presented at the following conferences:

- Berkhout A, Yeoh DK, Teutsch SM, Morris A, Nourse C, Clark JE, Blyth C, Jones CA. Herpes simplex virus disease in neonates and infancy: comparison between national surveillance data and statewide evaluation of laboratory and clinical records. Poster. *Australasian Society for Infectious Diseases Annual Scientific Meeting*, Adelaide, South Australia, 3–5 April 2023.
- Berkhout A, Yeoh DK, Teutsch SM, Morris A, Nourse C, Clark JE, Blyth C, Jones CA. Herpes simplex virus disease in neonates and infancy: comparison between national surveillance data and statewide evaluation of laboratory and clinical records. Poster. *Forty-First Annual Meeting of the European Society for Paediatric Infectious Diseases (ESPID)*, Lisbon, Portugal, 8–12 May 2023.

- Berkhout A, Yeoh DK, Teutsch SM, Morris A, Nourse C, Clark JE, Blyth C, Jones CA. Herpes simplex virus disease in neonates and infancy: comparison between national surveillance data and statewide evaluation of laboratory and clinical records. Poster. *Thirteenth World Congress of the World Society for Pediatric Infectious Diseases (WSPID)*, Durban, South Africa, 14–17 November 2023.

## Perinatal exposure to HIV and paediatric HIV infection

Since APSU surveillance commenced in 1993, a total of 1,017 confirmed cases of perinatal exposure to HIV and 102 confirmed cases of paediatric HIV have been reported.

Case numbers of perinatal exposure to HIV cases reported in 2023 were similar to those in 2022.<sup>8</sup> Case numbers have fluctuated during the 31 years of surveillance and were at their highest in 2019 when 59 cases were reported.<sup>28</sup> The majority of children have been born to women from countries where HIV is endemic. In 2023, while data was only available for half of the 18 mothers, who had all been diagnosed with HIV antenatally, there was a high uptake of interventions that have been shown to reduce the risk of mother-to-child (MTCT) transmission of HIV, such as avoidance of breast feeding and administration of antiretroviral therapy in exposed newborn infants;<sup>29</sup> however, only one of the nine mothers gave birth via elective caesarean section, which has also been shown to reduce risk of MTCT.<sup>29</sup>

Cases of paediatric HIV during 30 years of surveillance have significantly decreased, with most new cases imported from countries where HIV is endemic.<sup>8</sup> However, at the end of 2022, a local case of MTCT was reported where the mother's HIV status had been unknown prior to the child's delivery.

APSU surveillance data of perinatal exposure to HIV and paediatric HIV are also routinely reported in the Australian Annual Surveillance Report on HIV, viral hepatitis and sexually transmissible infections.<sup>30</sup>

## Severe complications of influenza

In 2023, APSU surveillance of seasonal influenza was conducted one month earlier than in the pre-COVID-19 pandemic years, as a higher number of cases were reported in May 2022, which were outside of the previous reporting period of June to September.<sup>8</sup> This prompted an extension of the 2023 reporting period to include cases seen by APSU contributors prior to the start of winter.

There were 65 severe influenza cases reported in 2023; this is a substantially larger number of cases than reported in any year since 2019, when 62 cases were reported.<sup>28</sup> In contrast, 27 cases were reported in 2022,<sup>8</sup> and no cases were reported during the 2021 and 2020 COVID-19 pandemic years.<sup>9,31</sup> In 2023, influenza B was more frequent than influenza A in children with severe influenza complications (see Table 2). Since APSU surveillance of severe influenza commenced in 2008, we have previously observed a higher frequency of influenza B than influenza A only in the years 2008 and 2015.<sup>32,33</sup> We previously showed in an analysis of ten years of APSU data that influenza B is more likely to be associated with renal and cardiac severe complications.<sup>34</sup> In the 2023 surveillance, influenza-B-associated complications such as acute renal failure and rhabdomyolysis were present. Of most concern, however, is that one child died and only four children (6%) received a seasonal influenza vaccine (see Table 2). Moreover, the majority of children (> 70%) had been previously healthy.

Since APSU surveillance of severe influenza commenced in 2008, a total of 788 confirmed cases have been reported. It is notable that 615 of these cases (78%) were reported from hospitals where PAEDS surveillance does not or did not operate at the time of APSU reporting.

## Q fever

Since APSU surveillance of Q fever commenced in February 2022, a total of two confirmed cases have been reported to the APSU. Both children resided in rural areas and had contact with large domestic animals.<sup>8</sup>

## Juvenile-onset recurrent respiratory papillomatosis

Since APSU surveillance of JoRRP commenced in 2011, a total of 22 cases have been reported. JoRRP cases had previously been reported each year until 2017, with case numbers declining from a maximum of seven cases in 2012, which has been attributed to increased uptake of universal human papillomavirus vaccination in Australia since 2007.<sup>35</sup> However, since 2021, five new cases of JoRRP have been reported to the APSU, including one in 2023 (see Table 2), suggesting persistent gaps in HPV vaccination coverage in women of childbearing age.

In 2023, a summary of APSU JoRRP data from 2011–2022 was presented by study investigator Dr Hannah Burns entitled: “RRP – where have all the cases gone – an Australian perspective” in a keynote speaker presentation at the *Sixteenth European Society of Paediatric Otolaryngology Congress*, Liverpool, United Kingdom, 20–23 May 2023.

## Congenital rubella infection and syndrome

In 2023, there were no notifications of congenital rubella infection or syndrome.

Since surveillance commenced in 1993, a total of 54 cases has been reported, with no cases reported since 2015.<sup>33</sup> The absence of congenital rubella cases can be attributed to the success of universal vaccination programs.<sup>36</sup>

## Congenital varicella syndrome and neonatal varicella infection

Since surveillance commenced in 2006, a total of four cases of CVS have been reported, with the most recent case notified in 2020,<sup>31</sup> and 32 cases of NVI have been reported, with the most recent case reported in 2022.<sup>8</sup> We have previously shown a significant decline in CVS and NVI following the introduction of universal varicella vaccination in 2005;<sup>37</sup> however, continued surveillance is required to identify potential gaps in vaccination coverage, especially in women of childbearing age from countries without similar vaccination programs.<sup>36</sup>

# New communicable disease surveillance studies in 2023

## Paediatric inflammatory multisystem syndrome temporally associated with SARS Cov-2 (PIMS-TS)

APSU surveillance of PIMS-TS commenced in February 2023 in children aged < 19 years, as part of a multicentre collaboration which includes the PAEDS network. PIMS-TS was first described in 2020 when a number of severely ill children and adolescents with COVID-19 developed fever and shock frequently associated with abdominal pain and rash;<sup>38–41</sup> however, the exact link between SARS-CoV-2 and PIMS-TS remains unclear. The epidemiology, particularly the delay in timing between peak SARS-COV-2 infection in the community and PIMS-TS cases, as well as the timing of infection and clinical presentation in individual patients, suggest that this condition may be due to a delayed immune-mediated phenomenon triggered by the virus.<sup>41,42</sup>

As PIMS-TS has not been well characterised in Australia, the aims of the study are to describe the demographic and clinical features of PIMS-TS in children and adolescents; to estimate the incidence and further characterise the aetiology of PIMS-TS in Australia, specifically the association of PIMS-TS with SARS-CoV-2 infection; to determine the overlapping features of PIMS-TS with Kawasaki disease and COVID-19 in Australian children; and to collect internationally comparable data for potential future data sharing to enable higher powered analysis of PIMS-TS in children and adolescents.

The case definition for PIMS-TS used in APSU surveillance is:

Children and adolescents aged < 19 years with fever  $\geq$  3 days AND two of the following:

- a. rash or bilateral non-purulent conjunctivitis or muco-cutaneous inflammation signs (oral, hands or feet);
- b. age specific hypotension or “shock” within first 24 hours of presentation;
- c. features of myocardial dysfunction, pericarditis, valvulitis, or coronary abnormalities (including ECHO findings or elevated troponin/N-terminal pro b-type natriuretic peptide [NT-proBNP]);

- d. evidence of coagulopathy (by prothrombin time [PT] test, partial thromboplastin time [PTT] test, elevated D-dimers);
- e. acute gastrointestinal problems (diarrhoea, vomiting, or abdominal pain);

AND

elevated markers of inflammation such as erythrocyte sedimentation rate (ESR), C-reactive protein, or procalcitonin;

AND

exclusion of other infectious causes of inflammation, including bacterial sepsis, staphylococcal or streptococcal toxic shock syndromes;

AND

evidence of SARS-CoV-2 infection including one or more of: positive reverse transcription polymerase chain reaction (RT-PCR) or antigen test or confirmed positive SARS-CoV-2 serology (noting testing may be delayed, particularly serology; If all other criteria are met, collect data pending results);

OR contact with a confirmed COVID-19 case.

Five cases of PIMS-TS (four definite and one probable) were reported to the APSU in 2023 (see Table 2).

## Japanese encephalitis virus (JEV) infection

APSU surveillance of JEV commenced in May 2023, in response to a major outbreak of JEV in Australia in 2022, which was the first to affect mainland Australia and the south-east,<sup>43–47</sup> which resulted in 30 confirmed cases and six deaths.<sup>46</sup> Previously, local cases of JEV occurred in Australian islands located off the far northern coastline in 1995 and 1998,<sup>43,44,46,47</sup> however, prior to those occurrences, JEV in Australia was only observed in individuals who had travelled to countries where the virus was endemic, which are mainly in South-East Asia.<sup>44</sup> JEV is a flavivirus transmitted via mosquitos via an intermediary host (e.g. pigs, waterbirds), where it is amplified and then transmitted to humans.<sup>43–48</sup> It has been proposed that the most likely reason for the 2022 outbreak in South-Eastern Australia was related to unusual weather events that resulted in the extended migration of infected waterbirds from Northern Australia and subsequent infection of farmed pigs.<sup>43–47</sup>

While most human infections with JEV are mild or asymptomatic, others can result in severe clinical illness and adverse outcomes such as death and neurologic, psychiatric, and/or cognitive deficits in survivors.<sup>48,49</sup> In countries where JEV is endemic, children are more likely to be infected than adults.<sup>47,48</sup> Vaccines against JEV has been available since the 1960s.<sup>49,50</sup>

As JEV has not been described in Australian children and adolescents,<sup>51</sup> the aim of the study is to determine the incidence, demographics, clinical features, management and short-term outcomes in this population. The case definition used in the APSU surveillance of JEV is as follows:

Any newly diagnosed case of Japanese encephalitis in any child aged < 18 years with:

1. acute onset of symptoms consistent with Japanese encephalitis (e.g., high fever, rigors, headache, weakness, vomiting, diarrhoea, and seizures);

OR

2. later stage symptoms/signs (e.g., altered mental status, hemiplegia, tetraplegia, cranial nerve palsies);

AND

3. laboratory immunoglobulin M (IgM) antibody confirmation of JEV infection.

No cases of JEV were reported to the APSU in 2023 (see Table 2).

In 2023, the APSU published a letter of reply to an article on JEV in *Medical Journal of Australia*, which highlighted the proposed APSU surveillance study of JEV in Australian children.<sup>51</sup>

## Discussion and conclusions

In the 31 years since commencement, the APSU has conducted a total of 30 prospective surveillance studies of rare communicable diseases and complications in children and infants,<sup>2</sup> including the 15 studies described in this report. Collectively, these studies have had considerable impact, in identifying national disease incidence estimates, that often could not have been obtained by other surveillance methods;<sup>2</sup> and in identifying important trends, for example, substantial declines in case reports following the introduction of universal vaccination, e.g., rubella,<sup>52</sup> varicella,<sup>37</sup> and JoRRP.<sup>35</sup> Analysis of APSU communicable disease and complication data have led to considerable research outputs; in 2023, these outputs included publications of severe acute hepatitis,<sup>25</sup> neonatal HSV,<sup>26</sup> and severe microcephaly<sup>53</sup> in high-impact journals. APSU data have also contributed to changes in policy, e.g., food safety guidelines following the outbreak of haemolytic uremic syndrome,<sup>54</sup> and to clinical guidelines for disease management.<sup>12,55</sup>

In 2023, key findings from the 15 communicable diseases and complications under surveillance are summarised in the following paragraphs.

Case numbers of severe complications from seasonal influenza case numbers in children in 2023 were the highest since 2019, following the relaxation of government-mandated restrictions to curb the transmission of SARS-Cov-2 in the 2020–2021 COVID-19 pandemic years.<sup>8</sup> Moreover, it is concerning that only four of the 65 children with severe complications were recorded as having received a seasonal influenza vaccine, despite this vaccine being available fully free under the National Immunisation Program (NIP) for all children aged  $\geq 6$  months to < 5 years, and for all children aged  $\geq 6$  months with an underlying medical condition.<sup>56</sup> Indeed, in 2023, influenza vaccination coverage of children in this age group was only 28%,<sup>57</sup> so more clearly needs to be done to increase vaccination rates.

Perinatal exposure to HIV case numbers continued to be steady; however, the late reporting of HIV infection via MTCT in 2022 in a newborn infant indicates that ongoing surveillance is required if Australia is to meet the WHO target of elimination of MTCT.<sup>58</sup>

While no cases of vaccine-preventable congenital rubella or CVS or neonatal varicella were reported, one case of JoRRP was again reported in 2023, indicating likely gaps in vaccination coverage of women of childbearing age. It is to be noted that in 2023, the provision of free HPV vaccine became available under the NIP as a single catch-up dose for females and males up to age 26 years.<sup>59</sup> Ongoing surveillance of JoRRP will therefore be required to monitor for cases and to assess the effectiveness of vaccination strategies.

Cases of dengue and Q fever were again reported in 2023, indicating that ongoing surveillance of these rare emerging diseases is required, especially when a global increase in dengue cases was recently reported.<sup>60</sup>

The incidences of neonatal and infant HSV and cCMV in 2023 were unchanged from previous years. However, in the absence of suitable vaccines, current management of these diseases is unable to prevent adverse outcomes, as deaths and neurological sequelae persist.

In 2023, the WHO expected incidence of  $\geq 1$  non-polio AFP case per 100,000 children aged  $< 15$  years was exceeded by combined APSU and PAEDS surveillance mechanisms.

Cases of severe acute hepatitis were again reported; however, none had unknown aetiology.

For new surveillance studies of rare communicable diseases that commenced in 2023, cases were reported for PIMS-TS, indicating the importance of ongoing monitoring. No cases of JEV infection reported; however, Australia remains at risk of further outbreaks from this rare emerging infection.

The APSU surveillance system remains an important tool for monitoring the national disease burden and epidemiology of rare communicable diseases and their complications in Australian children. Likewise, this resource can quickly collect data on trends, outbreaks, and emerging infections to enable appropriate public health actions. Indeed, the APSU is the only surveillance unit that is currently conducting prospective national surveillance on cCMV, neonatal HSV, JoRRP, perinatal HIV (in conjunction with the Kirby Institute) and AFP (in conjunction with PAEDS), all of which remain an ongoing concern to the health of Australian children.

## Implications

APSU surveillance data reported in 2023 have the following important implications:

- Increasing the uptake of seasonal influenza vaccination in children in 2024 will be critical to reduce the increasing incidence of severe complications resulting from influenza infection, including deaths, in this population group.
- Ongoing screening of women at risk of HIV infection and encouraging uptake of interventions to reduce MTCT in expectant mothers diagnosed with HIV are required to eliminate paediatric cases of HIV in Australia.
- Deaths persist in infants with HSV, and neurological sequelae from HSV and cCMV (including sensorineural deafness in children with cCMV) continue to occur. These adverse outcomes have not substantially improved over time, and so the long-running APSU studies of these diseases are well-placed to assess the effectiveness of any future vaccines and/or adjuvant treatments.



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# Appendix A

Table A.1: Case definitions of APSU communicable diseases and disease complications under surveillance in 2023

Surveillance study	Case definition
<p><b>Acute flaccid paralysis (AFP)</b></p>	<ul style="list-style-type: none"> <li>Any child aged &lt; 15 years with acute flaccid paralysis in one or more limbs or acute onset of bulbar paralysis.</li> <li>All cases reported through APSU, NERL and PAEDS are reviewed by the PEP and classified as: confirmed poliomyelitis; non-polio AFP, polio-compatible or non-AFP. The NERL determines whether there is an infectious cause of AFP including enteroviruses.</li> <li>The PEP secretariat reports all Australian cases to the World Health Organization (WHO).</li> </ul>
<p><b>Congenital cytomegalovirus (cCMV) infection</b></p>	<ul style="list-style-type: none"> <li>Congenital CMV: Any child from whom CMV is isolated in the first three (3) weeks of life, from urine, blood, saliva, or any tissue taken at biopsy.</li> <li>Suspected congenital CMV: any child up to 12 months of age, in whom CMV is isolated from urine, blood, saliva or any tissue taken at biopsy and/or a positive serum IgM is found and in whom clinical features exist that may be due to intrauterine CMV infection.</li> <li>Clinical features associated with congenital CMV infection include prematurity, low birth weight, sensorineural deafness, other neurological abnormalities (encephalitis, microcephaly, developmental delay), seizures, microphthalmia, chorioretinitis, cataracts), hepatitis, hepatosplenomegaly, thrombocytopenia, pneumonitis or myocarditis.</li> </ul> <p>Children aged &lt; 16 years who are either a:</p> <ul style="list-style-type: none"> <li>Confirmed case: a confirmed case requires laboratory definitive evidence AND clinical evidence.</li> <li>Laboratory definitive evidence: isolation of dengue virus or detection of dengue virus by nucleic acid testing, detection of dengue non-structural protein 1 (NS1) antigen in blood by EIA, IgG seroconversion or a significant increase in antibody level or a fourfold or greater rise in titre to dengue virus, proven by neutralisation or another specific test or detection of dengue virus-specific IgM in cerebrospinal fluid, in the absence of IgM to Murray Valley encephalitis, West Nile virus/Kunjin or Japanese encephalitis viruses.</li> <li>Clinical evidence: a clinically compatible illness includes fever, headache, arthralgia, myalgia, rash, nausea, and vomiting, with possible progression to severe plasma leakage, severe haemorrhage, or severe organ impairment – CNS, liver, heart or other.</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>Probable case: requires laboratory suggestive evidence AND clinical evidence AND epidemiological evidence OR clinical evidence AND household epidemiological evidence.</li> <li>Laboratory suggestive evidence: Detection of NS1 antigen in blood by a rapid antigen test (unless dengue NS1 antigen by EIA is negative) or detection of dengue virus-specific IgM in blood.</li> <li>Clinical evidence: A clinically compatible illness (e.g., fever, headache, arthralgia, myalgia, rash, nausea/vomiting).</li> </ul>
<p><b>Dengue</b></p>	<p>Any newly diagnosed case of severe acute hepatitis of any aetiology in any child aged &lt; 17 years with:</p> <ul style="list-style-type: none"> <li>Acute onset of symptoms consistent with hepatitis (e.g. fever, jaundice, abdominal pain, fatigue, loss of appetite, rash, itch, joint or muscle ache, dark urine, pale coloured stools, nausea or vomiting); AND</li> <li>Elevated serum alanine aminotransferase (ALT) OR aspartate aminotransferase (AST) levels (&gt;500 IU/L);</li> </ul> <p>AND</p> <ul style="list-style-type: none"> <li>Hepatitis, of known or unknown cause, including infections, drugs, metabolic or auto-immune causes.</li> </ul>
<p><b>Severe acute hepatitis</b></p>	<p>Children aged &lt; 16 years who are either a:</p> <ul style="list-style-type: none"> <li>Confirmed case: a confirmed case requires laboratory definitive evidence AND clinical evidence.</li> <li>Laboratory definitive evidence: isolation of dengue virus or detection of dengue virus by nucleic acid testing, detection of dengue non-structural protein 1 (NS1) antigen in blood by EIA, IgG seroconversion or a significant increase in antibody level or a fourfold or greater rise in titre to dengue virus, proven by neutralisation or another specific test or detection of dengue virus-specific IgM in cerebrospinal fluid, in the absence of IgM to Murray Valley encephalitis, West Nile virus/Kunjin or Japanese encephalitis viruses.</li> <li>Clinical evidence: a clinically compatible illness includes fever, headache, arthralgia, myalgia, rash, nausea, and vomiting, with possible progression to severe plasma leakage, severe haemorrhage, or severe organ impairment – CNS, liver, heart or other.</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>Probable case: requires laboratory suggestive evidence AND clinical evidence AND epidemiological evidence OR clinical evidence AND household epidemiological evidence.</li> <li>Laboratory suggestive evidence: Detection of NS1 antigen in blood by a rapid antigen test (unless dengue NS1 antigen by EIA is negative) or detection of dengue virus-specific IgM in blood.</li> <li>Clinical evidence: A clinically compatible illness (e.g., fever, headache, arthralgia, myalgia, rash, nausea/vomiting).</li> </ul>

<b>Surveillance study</b>	
<b>Neonatal and infant herpes simplex virus (HSV) infection</b>	<p style="text-align: center;"><b>Case definition</b></p> <ul style="list-style-type: none"> <li>• Any neonate or infant aged &lt; 3 months of age (regardless of gestation) seen in the last month with laboratory confirmation of HSV infection and with either clinical evidence of HSV infection or laboratory confirmation of maternal perinatal HSV infection in an asymptomatic infant.</li> <li>• Laboratory confirmation is by detection of HSV by PCR in a surface swab, respiratory specimen and/or sterile site (CSF or blood) (or by virus isolation), or by immunofluorescence.</li> <li>• Clinical evidence of neonatal HSV infection is one or more of: typical herpetic lesions of the skin, eye or mouth; evidence of disseminated infection (bleeding, bruising or coagulopathy, jaundice or elevated serum bilirubin, hepatosplenomegaly or elevated liver transaminases), pneumonitis (respiratory distress or chest radiograph) or encephalitis (lethargy, seizures, apnoea or abnormalities on neuroimaging or EEG).</li> <li>• Laboratory evidence of maternal perinatal HSV infection is provided by detection of HSV in maternal genital swab and/or mother seroconverted to HSV or IgM positive in pregnancy or early postnatal period.</li> </ul>
<b>Perinatal exposure to HIV</b>	<p>Any infant born to a woman with diagnosed HIV infection. Children born to women with HIV infection and who are known to have been exposed to HIV perinatally, by in utero exposure or through breastfeeding, should be notified, even if they are subsequently confirmed as HIV antibody negative.</p>
<b>Paediatric HIV infection</b>	<p>Any child aged &lt; 16 years at diagnosis of HIV infection in Australia.</p> <p>Any child aged &lt; 15 years with laboratory confirmed influenza admitted to hospital with at least one of the following complications:</p> <ul style="list-style-type: none"> <li>• Pneumonia (confirmed radiologically and/or by microbiology);</li> <li>• Acute respiratory distress syndrome (ARDS);</li> <li>• Laboratory proven viral co-infection including COVID-19;</li> <li>• Laboratory proven bacterial co-infection; bacteraemia; septicaemia;</li> <li>• Encephalitis / encephalopathy ;</li> <li>• Seizures (including simple febrile seizure, prolonged or focal seizure or status epilepticus);</li> <li>• Transverse myelitis;</li> <li>• Polyneuritis / mononeuritis;</li> <li>• Guillain-Barré syndrome;</li> <li>• Reye syndrome;</li> <li>• Myocarditis; pericarditis; cardiomyopathy;</li> <li>• Rhabdomyolysis;</li> <li>• Purpura fulminans;</li> <li>• Disseminated intravascular coagulopathy;</li> <li>• Shock (requiring &gt;40 ml/kg fluid resuscitation);</li> <li>• Acute renal failure;</li> <li>• Death, including death at presentation to hospital;</li> <li>• Requirement for supplementary oxygen, non-invasive ventilation, invasive ventilation or Extracorporeal membrane oxygenation (ECMO)</li> </ul>
<b>Severe complications of influenza</b>	



Surveillance study	Case definition
<b>Japanese encephalitis</b>	<p>Please report any newly diagnosed case of Japanese encephalitis in any child aged less than 18 years with:</p> <ul style="list-style-type: none"> <li>• acute onset of symptoms consistent with Japanese encephalitis (e.g. high fever, rigors, headache, weakness, vomiting, diarrhoea, and seizures);</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• later stage symptoms/signs (e.g., altered mental status, hemiplegia, tetraplegia, cranial nerve palsies);</li> </ul> <p>AND</p> <ul style="list-style-type: none"> <li>• Laboratory IgM antibody confirmation of JEV infection.</li> </ul> <p>Children and adolescents (up to 18 years of age) with fever <math>\geq</math> 3 days AND two of the following:</p> <ul style="list-style-type: none"> <li>• Rash or bilateral non-purulent conjunctivitis or muco-cutaneous inflammation signs (oral, hands or feet);</li> <li>• Age specific hypotension or "shock" within first 24 hours of presentation;</li> <li>• Features of myocardial dysfunction, pericarditis, valvulitis, or coronary abnormalities (including ECHO findings or elevated Troponin/NT-proBNP);</li> <li>• Evidence of coagulopathy (by PT, PTT, elevated D-dimers);</li> <li>• Acute gastrointestinal problems (diarrhoea, vomiting, or abdominal pain); AND</li> <li>• Elevated markers of inflammation such as ESR, C-reactive protein, or procalcitonin; AND</li> <li>• Exclusion of other infectious causes of inflammation, including bacterial sepsis, staphylococcal or streptococcal toxic shock syndromes; AND</li> <li>• Evidence of SARS-CoV-2 infection including one or more of: positive RT-PCR or antigen test or confirmed positive SARS-CoV-2 serology (noting testing may be delayed, particularly serology. If all other criteria are met, collect data pending results);</li> <li>• OR contact with a confirmed COVID-19 case.</li> </ul>
<b>PIMS-TS</b>	<p>Children aged &lt; 15 years who have either:</p> <ul style="list-style-type: none"> <li>• Confirmed acute Q fever as determined by:</li> <li>• Laboratory detection of <i>Coxiella burnetii</i> by PCR testing of unclotted blood or serum; OR</li> <li>• Laboratory detection of a <math>\geq</math> four-fold increase in IgG antibody titres to phase II <i>C. burnetii</i> antigen by indirect immunofluorescence antibody (IFA) in a serum sample collected 2–3 weeks after onset (convalescent), when compared with a serum sample collected at onset, in the absence of recent vaccination; OR</li> </ul> <p>Probable acute Q fever as determined by:</p> <ul style="list-style-type: none"> <li>• Laboratory detection of IgM antibody to phase II <i>C. burnetii</i> antigen in serum in the absence of recent vaccination; AND</li> <li>• Clinical presentation compatible with acute Q fever disease (fatigue, cough, headache and fever); OR</li> </ul> <p>Chronic Q fever as determined by:</p> <ul style="list-style-type: none"> <li>• Clinical presentation consistent with chronic Q fever disease (e.g., endocarditis, osteomyelitis, hepatitis, encephalitis or other); AND</li> <li>• Laboratory detection by IFA of elevated IgG antibody titres to phase I <i>C. burnetii</i> antigen, with or without detection of IgA in serum; OR</li> <li>• Laboratory detection of <i>C. burnetii</i> by PCR in blood or tissue at infection site (e.g., bone, joint).</li> </ul>
<b>Q fever</b>	

## Surveillance study

### Case definition

#### Juvenile onset recurrent respiratory papillomatosis (JoRRP)

- Any infant or child aged < 15 years diagnosed with juvenile onset recurrent respiratory papillomatosis (JoRRP) confirmed by endoscopy of the larynx and by histology.
- Probable case: as above but without histological confirmation.
- Confirmed case: a confirmed case requires laboratory definitive evidence (fetal) OR laboratory definitive evidence (infant) AND epidemiological evidence.
- Laboratory definitive evidence:
  - Fetal: isolation or detection of rubella virus from an appropriate clinical sample (i.e. fetal blood or tissue, amniotic fluid, chorionic villus sample) by culture or nucleic acid testing.
  - Infant: Isolation or detection of rubella virus from an appropriate clinical sample in an infant, by culture or nucleic acid testing OR detection of rubella-specific IgM antibody in the serum of the infant.
- Epidemiological evidence: the mother has confirmed rubella infection during pregnancy.
- Probable case: epidemiological evidence (first trimester infection) OR epidemiological evidence (second and third trimester infection) AND laboratory suggestive evidence (infant).
- Laboratory suggestive evidence:
  - Infant: High / rising rubella-specific IgG level in first year of life.
- Congenital rubella syndrome: a confirmed case requires laboratory definitive evidence (fetal or infant), as described above AND clinical evidence.
- Clinical evidence: A live or still born infant with ANY of the following compatible defects:

#### Congenital rubella infection/syndrome

- Cataracts;
- Congenital glaucoma;
- Congenital heart disease;
- Hearing defects;
- Microcephaly;
- Pigmentary retinopathy;
- Development delay;
- Purpura;
- Hepatosplenomegaly;
- Meningoencephalitis;
- Radiolucent bone disease; or
- Other defect not better explained by an alternative diagnosis.

Any stillbirth, newborn infant, or child up to the age of 2 years who, has definite or suspected congenital varicella infection, with or without defects and meets at least one of the following criteria:

- Cicatricial skin lesions in a dermatomal distribution and/or pox-like skin scars and/ or limb hypoplasia.
  - Development of herpes zoster in the first year of life.
  - Spontaneous abortion, termination, stillbirth or early death following varicella infection during pregnancy.
- Confirm varicella infection by one or more of the following:
- Detection of varicella-specific IgM antibodies in cord blood or in serum specimen taken in the first 3 months of life (only 25% of cases are positive).
  - Persistence of varicella specific IgG antibody in a child aged beyond 6 months of age.
  - Identification of varicella virus in skin lesions or autopsy tissue.
  - History of maternal varicella during pregnancy or maternal contact with varicella in pregnancy in the mother of an infant with congenital abnormalities.

### **Congenital varicella syndrome (CVS)**

The following clinical signs may also be present in cases CVS:

- Microcephaly, hydrocephalus, cerebellar hypoplasia, motor or sensory deficits, sphincter dysfunction and peripheral nervous system defects.
- Microphthalmia, cataracts, Horner's syndrome, chorioretinitis, nystagmus, retinal scars, optic atrophy.
- Gastrointestinal abnormalities including colonic atresia, hepatitis, liver failure.
- Genito-urinary abnormalities.
- Cardiovascular abnormalities.
- Intrauterine growth retardation.

- Any infant who has neonatal varicella based on history, clinical and/or laboratory findings in the first month of life without features of CVS).

Features of neonatal varicella infection include pox-like rash which may be papulovesicular, vesiculopustular or haemorrhagic, and fever.

Other systemic symptoms may be present. Complications of neonatal varicella include bacterial superinfection, neurological and haematological problems and general visceral involvement.

### **Neonatal varicella infection (NVI)**

- The diagnosis of neonatal varicella can be made when an infant in the first month of life presents with clinical features of varicella infection. There may be a history of maternal varicella infection in the last 1–4 weeks of pregnancy or contact with a varicella infected person after birth.
- The diagnosis can be confirmed by laboratory tests to detect:
  - Viral antigen/viral isolate from scrapings of the skin lesions or viral DNA from lesion fluid.
  - Varicella specific IgM in a serum sample from the infant (or from the contact).

**Table A.2: Notifications received in 2023 of communicable diseases and complications of communicable diseases under surveillance by the APSU, and their categorisation**

Disease or complication under surveillance	Total notifications	Confirmed cases	Duplicates	Errors <sup>a</sup>	Other <sup>b</sup>
Acute flaccid paralysis <sup>c</sup>	94	82	8	4	0
Congenital cytomegalovirus	52	35 <sup>d</sup>	6	8	3
Dengue	2	2 <sup>d</sup>	0	0	0
Severe acute hepatitis	8	6	1	1	0
Neonatal and infant herpes simplex virus infection	19	17	2	0	0
Perinatal exposure to HIV	26	18	0	1	7
Paediatric HIV infection	1	0	0	0	1
Severe complications of influenza	75	65	3	7	0
Q fever	1	1 <sup>d</sup>	0	0	0
Juvenile-onset recurrent respiratory papillomatosis	1	1 <sup>d</sup>	0	0	0
Congenital rubella syndrome	0	0 <sup>d</sup>	0	0	0
Congenital varicella syndrome	0	0 <sup>d</sup>	0	0	0
Neonatal varicella infection	0	0	0	0	0
Japanese encephalitis virus infection	0	0	0	0	0
PIMS-TS <sup>e</sup>	6	5 <sup>d</sup>	1	0	0
<b>Total (all surveilled conditions)</b>	<b>285</b>	<b>232</b>	<b>21</b>	<b>21</b>	<b>11</b>

a Includes administrative errors, cases outside of study definition, missing case report forms or insufficient data provided to confirm.

b Historical (prevalent) cases not previously reported.

c Includes all cases of acute flaccid paralysis (AFP) reported via the APSU/National Enterovirus Reference Laboratory (NERL) and PAEDS surveillance systems. All confirmed cases have been classified by the Polio Expert Panel (PEP) as 'non-polio AFP' according to World Health Organization criteria.<sup>8</sup> Fifteen cases were reported using the APSU case report form, with five of these cases confirmed and eight cases duplicated by PAEDS.

d Includes both confirmed and probable cases.

e Paediatric inflammatory multisystem syndrome temporally associated with SARS-CoV-2.