

## IN FOCUS

# COVID-19 IN HEALTHCARE WORKERS IN NSW

Reporting period: 1 February to 28 July 2020

### Summary

The safety of healthcare workers (HCWs) and their protection from injury and illness at work is a core responsibility of health systems around the world. An enhanced system of surveillance for COVID-19 infections in HCWs was developed by NSW Health early in the pandemic and has allowed a detailed analysis of these infections to understand the setting and context for this transmission. An Expert Panel, chaired by the Chief Executive of the Clinical Excellence Commission, and consisting of subject-matter experts in infectious diseases, infection control, public health, epidemiology, laboratory medicine, and quality and safety systems was established to provide rapid review of HCW workplace acquired COVID-19, to provide support and expert advice to the investigating LHD, and to ensure key statewide learnings are identified and shared. The Panel has to date initiated new and enhanced policy advice to the system about matters such as personal protective equipment (PPE), environmental cleaning and, in recent months, use of shared workspaces such as Emergency Department “flight decks”.

This report is an analysis of HCW COVID-19 infections acquired during the period from the start of the pandemic until 28 July. This was a distinctive “first phase” of the pandemic. A subsequent second phase began in August following the second wave of COVID-19 infections in Victoria. HCW workplace acquired infections for this phase are being reported on an ongoing basis through the COVID-19 Surveillance Report issued by NSW Health each week.

There were 3,584 cases of COVID-19 reported in NSW from 1 February to 28 July 2020. Most of these cases were identified during the first epidemic wave of COVID-19, with most cases identified in March and April and around 60% of all confirmed cases acquired overseas.

During this period, 206 (5.7%) cases were identified as HCWs who had worked in a health facility in the 14 days prior to symptom onset or date of testing. Of these, more than half (120; 58%) were acquired overseas or interstate or following contact with a known COVID-19 household or community case or as part of a community cluster. Of the remaining 86, fewer than half (39; 45%) were likely to have acquired their infection in a health facility setting. Among these 39, two-thirds (26; 67%) were the result of exposure to an infected patient and one-quarter (10; 25%) to an infected colleague. About one-third (28; 32.6%) of cases were unlikely to have acquired their infection in the workplace, with the remainder (19; 22.1%) possible workplace acquisition.

About half of HCW infections acquired in the workplace were associated with known health facility clusters, which occurred early in the pandemic with unrecognised exposure to source patients (not suspected or known to have COVID-19). In the first months of the epidemic in Australia, criteria for testing was limited to those experiencing symptoms and/or contact with a known COVID-19 case. This likely contributed to unrecognised and unprotected exposures to patients with COVID-19 early in the epidemic as demonstrated by health facility clusters in Northern Sydney LHD and Central Coast LHD.

Cases reviewed by the NSW Expert Panel identified the need for ongoing training in infection prevention and control measures including donning and doffing of PPE, and the need for appropriately skilled staff to care for patients with suspected or known COVID-19 as key issues. Where likely transmission between HCW staff was identified, key issues related to shared workspaces including adequacy of environmental cleaning, maintenance of physical distancing and hand hygiene, and appropriate PPE use in these settings.

Categorisation of potential health facility acquisition

Acquisition category	NSW Health health facility	Private health facility	All health facilities	Percent
Likely health facility acquired	33	6	39	45.3
<i>(Direction of acquisition) HCW to HCW</i>	6	4	10	
<i>Patient to HCW</i>	24	2	26	
<i>Unknown</i>	3	0	3	
Possible health facility acquired	10	9	19	22.1
Unlikely health facility acquired	15	13	28	32.6
<b>Total</b>	<b>58</b>	<b>28</b>	<b>86</b>	<b>100</b>

HCW = healthcare worker

**Background**

The novel coronavirus (SARS-CoV-2) is responsible for the disease named COVID-19 and is known to be transmitted from person-to-person by respiratory droplets. Spread from contact with contaminated surfaces or objects is probable, and airborne transmission possible, in some circumstances.<sup>1</sup> The NSW Clinical Excellence Commission states that the virus does not appear to be readily transmissible via small, airborne particles under non-aerosolising conditions.<sup>2</sup>

Healthcare workers (HCWs) play an essential role at the front lines providing care for patients. In the context of caring for patients with COVID-19 and during provision of routine health services, they may be at risk of exposures to COVID-19 in their workplace. Furthermore, once infected, they may spread SARS-CoV-2 to patients, co-workers, and others in the community. Risk of infection can be minimised with the application of infection prevention and control practices including rigorous hand hygiene and use of personal protective equipment (PPE). Cases of infection among HCWs may indicate a breakdown in infection prevention and control practices or may be the result of other unrecognised factors.

Previous reports have suggested that unprotected, prolonged patient contact, as well as certain exposures, including some aerosol-generating procedures, are associated with SARS-CoV-2 infection in HCW. Early recognition and isolation of patients with possible infection and recommended PPE use can help minimise unprotected, high-risk HCW exposures and protect the healthcare workforce.<sup>3</sup> Findings from a recent seroprevalence survey among HCWs in the United States highlight the importance of maintaining PPE supplies at hospitals caring for COVID-19 patients and, assuming adequate supply, adhering to policies that encourage the use of masks for all interactions between HCWs and patients. Universal masking has been associated with a significantly lower rate of infection among HCWs.<sup>4</sup>

COVID-19 was first confirmed in Australia in late January 2020. Australia saw a peak in new coronavirus cases in mid to late-March, followed by a downward trend through June. A resurgence of cases has occurred following an outbreak in Victoria from mid-July. Little information has been available to date in the context of the Australian setting regarding COVID-19 infections among HCWs. Victoria’s Department of Health and Human Services recently reported an analysis of HCWs with COVID-19 indicating 22% of infections prior to July were acquired in the workplace. In contrast more recently, 69% of infections from July onwards were acquired in the workplace.<sup>5</sup>

Since the start of the COVID-19 pandemic in Australia, NSW Health has developed enhanced systems to protect our HCWs from acquisition of COVID-19 in their workplace. This has allowed a detailed analysis of these infections to understand the setting and context for this transmission. Confirming and

understanding the context of infection transmission in HCWs, particularly where there is acquisition and transmission in the workplace, and identifying factors associated with infection, are critical to inform policies and guidelines to minimise further risk to HCWs, patients and communities.

An Expert Panel, chaired by the Chief Executive of the Clinical Excellence Commission, and consisting of subject-matter experts in infectious diseases, infection control, public health, epidemiology, laboratory medicine, and quality and safety systems was established to examine cases of HCW workplace acquired COVID-19. The Panel has subsequently initiated new and enhanced policy advice to the system about matters such as the need for appropriately skilled staff to care for patients with suspected or known COVID-19, training in and use of PPE, environmental cleaning and, in recent months, use of shared workspaces such as Emergency Department “flight decks”.

This report provides a summary and descriptive analysis of cases of COVID-19 in HCWs in NSW from 1 February to 28 July 2020.

## **Methods**

We reviewed all reported cases of COVID-19 in the NSW Health Notifiable Conditions Information Management System (NCIMS) to identify HCWs with confirmed COVID-19 infection. The review included all cases from the first confirmed case through 28 July 2020. NCIMS provides statewide data capture, management and reporting of scheduled medical conditions notifiable under the NSW Public Health Act 2010 from pathology laboratories, medical practitioners and hospitals. All cases reviewed had a confirmed diagnosis of COVID-19 based on a positive SARS-CoV-2 PCR antigen test result.

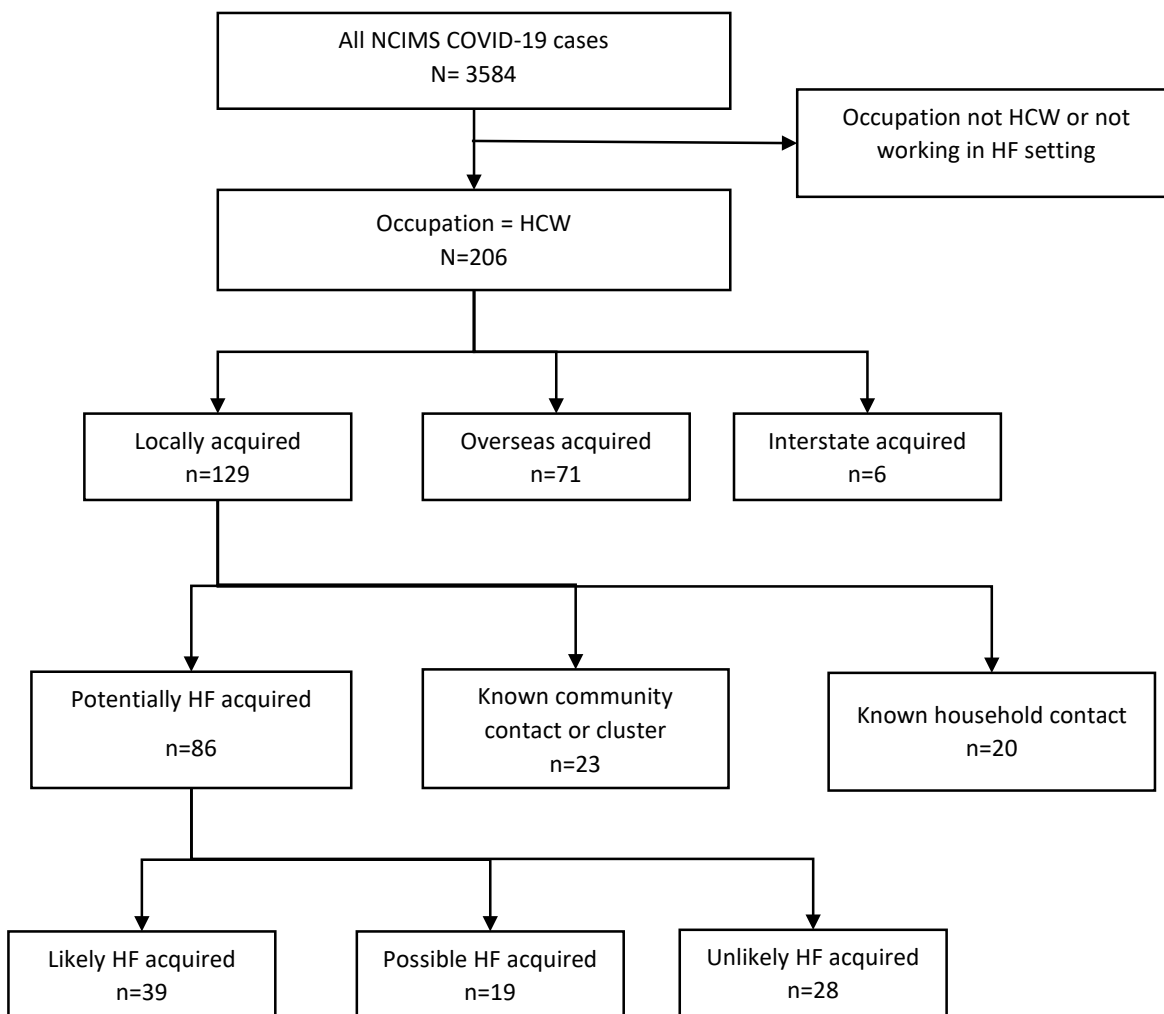
We included any individual case with an occupation listed in NCIMS as a HCW who also had attended work in a health facility during the 14 days prior to onset of symptoms or date of COVID-19 test (asymptomatic cases). This included Visiting Medical Officers, employees, contractors and volunteers within a public or private health facility (hospital and community settings) working in either clinical or non-clinical roles. NSW Health managed Aged Care facilities were included, however private aged care and disability care facilities were not included. Residential aged care facilities, by definition, are not healthcare facilities. However, NSW Health managed Aged Care facilities were included because staff are employees of NSW Health. Cases were also identified through checks with NSW employee Stafflink ID numbers, from discussion at briefings, and from other communications with public health colleagues where occupation may not have been indicated in NCIMS.

Figure 1 describes the data collection and categorisation pathway for all HCW cases identified in NCIMS. We categorised each HCW case based upon the likely source of infection as indicated within NCIMS: overseas acquired, interstate acquired, locally acquired – community or household contact of known case or community cluster, or locally acquired with unknown source. We considered those locally acquired with an unknown source; that is, where no other sources of infection outside the health facility was identified, as potentially facility acquired infections for the purposes of further investigation. For these cases, we conducted an in-depth review of the NCIMS case records and, in consultation with the responsible investigating Local Health District (LHD) and select review by the NSW Healthcare Worker Expert Review Panel, categorised each case as likely, possibly or unlikely health facility acquired. Determination considered the enhanced epidemiologic, laboratory (including whole genome sequencing), and infection prevention and control evidence available. Among those with likely transmission in the health facility, we also recorded the likely direction of transmission (patient to HCW, HCW to HCW, or unknown). Likelihood of health facility acquisition was determined using the principles outlined in Table 1.

Table 1. Definition of health facility acquisition categories

Health facility acquisition	Principle
Likely health facility acquired	Clear epidemiological and/or laboratory evidence of exposure a patient or healthcare worker colleague with COVID-19
Possible health facility acquired	Suggestive epidemiologic or laboratory evidence of exposure to COVID-19 in the health facility, but no direct exposure identified (e.g. part of an epidemiologic cluster in a health facility but no identified contact with any COVID-19 case or performing clinical duties in a health facility setting with suspect COVID-19 cases, but no identified contact with any known COVID-19 case)
Unlikely health facility acquired	No epidemiologic or laboratory evidence of exposure to known or suspect COVID-19 cases (e.g. healthcare worker role did not include clinical duties).

Figure 1. Flow diagram of identification and categorisation of COVID-19 infection in healthcare workers in NSW



HCW = healthcare worker, HF = health facility

## Results

There were 3,584 cases of COVID-19 reported in NCIMS up to end of July 2020. Two hundred and six (5.7%) were identified as HCWs who had worked in a health facility in the 14 days prior to symptom onset or date of testing.

Among the 206 COVID-19 HCW infections identified, a known community source of infection was identified for more than half the cases (120; 58%). Of these, overseas or interstate acquisition accounted for the majority (71; 34%), with the remaining cases attributed to local acquisition resulting from contact with a known household or community case or community cluster (43; 21%). Six cases (3%) were attributed to acquisition interstate. Among those acquired locally, 86 (42%) had no identified community source and were considered to have potential health facility acquisition requiring further investigation (Table 2).

**Table 2. COVID-19 infections in healthcare workers in NSW, attributed source of acquisition**

Category of acquisition	N	Percent
Overseas acquired	71	34.3
Interstate acquired	6	2.9
Locally acquired – known household/community contact or cluster	43	20.9
Locally acquired – unknown (potentially health facility acquired)	86	41.7
<b>Total</b>	<b>206</b>	<b>100.0</b>

Among the 86 HCW with potentially health facility acquired infection, the mean age was 41.6 years (range: 17–67 years) and the majority of HCWs were female (58; 67%); none identified as Aboriginal or Torres Strait Islander.

Figure 2 shows date of onset for potentially health facility acquired cases, with the first case in mid-February and last case as part of this report from mid-July 2020.

**Figure 2. Epidemic curve of healthcare worker infections with potential health facility acquisition (n=86)**

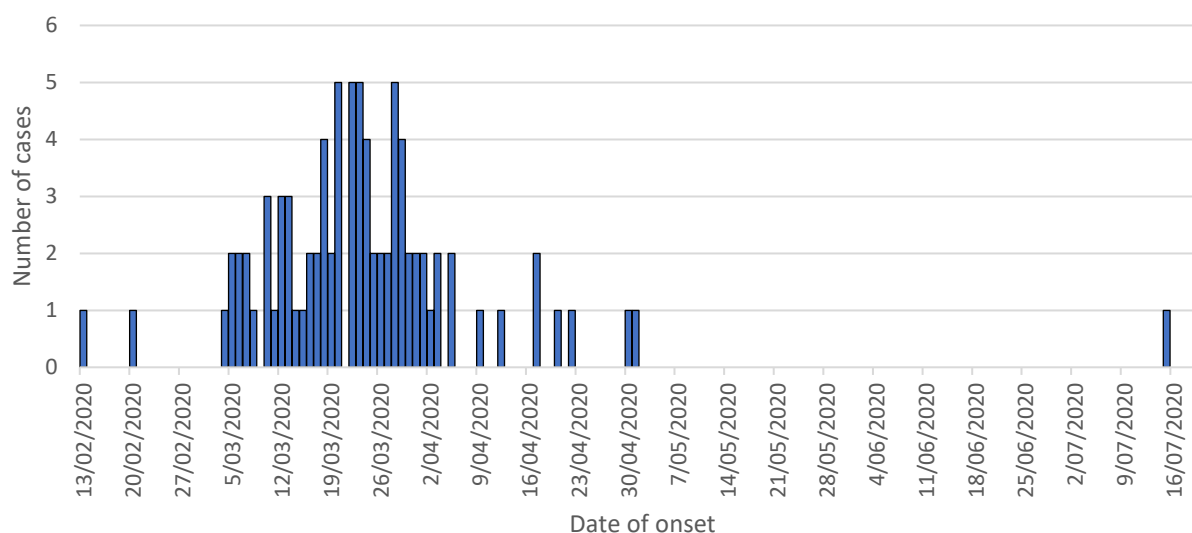


Table 3 describes the final determination of locally acquired HCW infections with no identified community source (i.e. potential health facility acquired) following review of epidemiologic and laboratory evidence in the NCIMS records and in collaboration with local LHDs. Thirty-nine (45.3%) of these HCW infections were determined to have been acquired in a health facility; 19 (22.1%) were considered to have been possibly acquired and 28 (32.6%) unlikely to have been acquired in a health facility setting. Thirty-three (85%) of the health facility acquired infections occurred in NSW Health facility settings.

Among those with a health facility acquired infection, 26 (66.6%) were identified to have occurred as a result of exposure to a patient with COVID-19 while 10 (25.6%) were the result of exposure to another HCW colleague with COVID-19 in the workplace. For three cases (7.7%), the direction of transmission was unable to be determined.

**Table 3. Categorisation of potential health facility acquisition**

Acquisition category	NSW Health health facility	Private health facility	All health facilities	Percent
Likely health facility acquired	33	6	39	45.3
<i>(Direction of acquisition) HCW to HCW</i>	6	4	10	
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HCW = healthcare worker

Most HCW infections where the source was able to be identified were from early in the pandemic. Of note, these source patients were not recognised to have COVID-19 at the time of their admission and at the time when the HCW was initially exposed.

Further evidence supporting health facility transmission is their association with known health facility clusters. A cluster was defined as two or more confirmed cases occurring within the same healthcare facility within one incubation period (14 days) of each other. These confirmed cases may be patients, HCWs, or a combination of both. There were four identified health facility clusters, with approximately a quarter of potential health facility acquired HCW infections (23; 26.7 %) associated with these known clusters.

Whole genome sequencing of SARS-CoV-2 was attempted from 62 available samples from the 86 HCWs with potential health facility acquired infections, with 29 SARS-CoV-2 genomes (47%) successfully recovered. There were seven unique cluster sequences identified (Table 4). Whole genome sequences of 21 cases were associated with four known epidemiologic NSW health facility clusters (i.e. Ryde Hospital NSW 2.0/2.1; Westmead Hospital Pharmacy NSW 9.0/9.1; St George Hospital 17.2; and Gosford Hospital NSW 25.0). One case was associated with a cluster at the Sydney Adventist Hospital (NSW 17.4 - Singleton).

**Table 4. Successful whole genome sequencing (WGS) among potential healthcare worker infections**

WGS Cluster name	Number of sequenced cases in cluster	Percent
NSW 2.0/2.1	5	17.2
NSW 3.0	1	3.4
NSW 6.0	4	13.8
NSW 9.0/9.1	6	20.7
NSW 12.0	3	10.3
NSW 17.2/17.4/17.4 -Singleton	5	13.8
NSW 25.0	6	20.7
<b>Total</b>	<b>29</b>	<b>100</b>

More than half the HCWs with COVID-19 infections worked in a NSW Health managed health facility (58; 67%), the majority of which were NSW Health public hospitals. Ten HCW cases worked in private hospitals, and 18 in private community settings including specialist services or primary care (Table 5).

**Table 5. Health facility type among those with potential health facility acquired infection**

Facility type	N	Percent
NSW Health hospital	54	62.8
NSW Health (non-hospital) *	4	5.9
Private hospital	10	11.6
Private specialist or service	10	11.6
Primary care	8	9.3
<b>Total</b>	<b>86</b>	<b>100</b>

\* includes NSW Health Statewide Services and Shared Services

Table 6 summarises the occupational categories of HCWs with potential health facility acquired infections by facility type. The majority were among nurses (31; 36%) and doctors (18; 21%). Specialty type was not available for all clinicians, however there were five doctors identified as emergency department doctors, one intensive care doctor and one anaesthetist. Among nurses, there were four ward nurses, four assistants in nursing, and three emergency department nurses. Most doctors and nurses indicated a NSW Health public hospital as their primary health facility work setting.

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**Table 6. Occupational category of HCW with potential health facility acquired infection, by facility type**

Occupational category	NSW Health public hospital	NSW Health non-hospital	Private hospital	Private specialist services	Primary care services	Total
Allied Health	5	0	1	2	1	9
Dental	0	0	0	1	0	1
Doctor	12	0	0	2	4	18
Midwife	2	0	0	0	0	2
Nurse	25	1	3	2	0	31
Paramedic	0	1	0	0	0	1
Pharmacist	3	0	0	1	0	4
Student	1	0	1	0	0	2
Support staff	6	2	5	2	3	18
<b>Total</b>	<b>54</b>	<b>4</b>	<b>10</b>	<b>10</b>	<b>8</b>	<b>86</b>

**NSW Health public hospital** includes affiliated health organisations and specialist networks (i.e. Sydney Children's Hospitals Network and St Vincent's Health Network). **NSW Health non-hospital** includes NSW Health Statewide Services and Shared Services. **Private specialist services** includes specialist medical, dental, pharmacy, optometry, and radiology services. **Primary care** includes primary care and general practice. **Allied Health** includes occupational therapists, physiotherapists, social workers, dietitians, mental health workers, radiographers, radiation therapists, and optometrists. **Support staff** includes pathology collectors, food service workers, operating theatre assistants, cleaners, administrative staff, ward clerks, receptionists, medical records clerks, switchboard operators, patient services assistants, workplace health and safety officers, and medical researchers.

Table 7 shows further detail relating to the occupational role among HCWs categorised as support staff.

**Table 7. Occupational role of support staff with potential health facility acquired infection, by facility type**

Occupational role of support staff	NSW Health public hospital	NSW Health non-hospitals	Private hospital	Private specialist services	Primary care services	Total
Administrative staff	1	1	1	0	3	6
Cleaner	1	0	0	1	0	2
Patient transport	0	1	0	0	0	1
Food service worker	1	0	0	0	0	1
Pathology services	2	0	0	0	0	2
Patient services	1	0	0	0	0	1
Researcher	0	0	0	1	0	1
Theatre assistant	0	0	3	0	0	3
Ward clerk	0	0	1	0	0	1
<b>Total</b>	<b>6</b>	<b>2</b>	<b>5</b>	<b>2</b>	<b>3</b>	<b>18</b>

The administrative staff included two medical receptionists, one switchboard operator, and three other administrative staff. Pathology services included one managing logistics and another who collected patient specimens.

Table 8 summarises the organisational category in which HCW infections occurred. Among those under the jurisdiction of NSW Health, four Local Health Districts (LHDs) accounted for 40 of the 59 cases identified in NSW Health managed facilities. These same four LHDs (Northern Sydney, Central Coast,



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Western Sydney and South Eastern Sydney) were those with known health facility clusters described earlier.

**Table 8. HCW with COVID-19 infection potentially acquired at work, by organisation**

Organisation	N	%
Private hospitals	10	11.6
Private specialist services	10	11.6
Primary care	8	9.3
<b>LHDs and Specialty Networks</b>		
Central Coast LHD	9	10.5
Far West LHD	0	0
Hunter New England LHD	3	3.5
Illawarra Shoalhaven LHD	0	0
Mid North Coast LHD	0	0
Murrumbidgee LHD	0	0
Nepean Blue Mountains LHD	2	2.3
Northern NSW LHD	0	0
Northern Sydney LHD	17	19.8
South Eastern Sydney LHD	5	5.8
South Western Sydney LHD	3	3.5
Southern NSW LHD	0	0
Sydney LHD	7	8.1
Western NSW LHD	1	1.2
Western Sydney LHD	7	8.1
Justice Health and Forensic Mental Health Network	0	0
Sydney Children's Hospitals Network	1	1.2
St Vincent's Health Network	1	1.2
<b>Statewide Health Services</b>		
NSW Ambulance	1	1.2
NSW Health Pathology	0	0
Health Protection NSW	0	0
<b>Shared Services</b>		
HealthShare NSW	1	1.2
eHealth NSW	0	0
Health Infrastructure	0	0
<b>Pillars</b>		
Agency for Clinical Innovation	0	0
Bureau of Health Information	0	0
Cancer Institute NSW	0	0
Clinical Excellence Commission	0	0
Health Education and Training Institute	0	0
<b>Total</b>	<b>86</b>	<b>100</b>

## Findings and interpretation

This report summarises cases of COVID-19 in HCWs in NSW during the first period of the Australian epidemic from February to July 2020.

Of the 206 cases of COVID-19 in HCWs identified in NSW, more than half (120; 58%) were acquired overseas or interstate or following contact with a known COVID-19 household or community case or as part of a community cluster. Of the remaining 86, fewer than half (39; 45%) were subsequently confirmed to have acquired their infection in a health facility setting. Among these 39, two-thirds (26; 67%) were the result of exposure to an infected patient and one-quarter (10; 25%) to an infected colleague. About one-third (28; 32.6%) of cases were unlikely to have acquired their infection in the workplace, suggesting these infections could have been acquired in the community. The epidemic curve of healthcare infections mimics that seen among community acquired cases.

About half of HCW infections acquired in the workplace were associated with known health facility clusters, which occurred early in the pandemic with unrecognised exposure to source patients (not suspected or known to have COVID-19). In the first months of the epidemic in Australia, criteria for testing were limited to those experiencing symptoms and/or contact with a known COVID-19 case. This likely contributed to unrecognised and unprotected exposures to patients with COVID-19 early in the epidemic as demonstrated by health facility clusters in Northern Sydney LHD and Central Coast LHD.

This report highlights the importance of investigating and understanding the specific context of acquisition of infection in HCWs and transmission in the workplace. Whether acquired in the community or as a result of contact with a patient in the health facility setting, this analysis also identified transmission pathways between HCW colleagues.

Adherence to infection prevention and control (IPC) guidelines was not able to be assessed systematically for each case as part of this analysis. Where more detailed information was available relating to adherence to IPC guidelines for cases reviewed by the NSW Expert Panel, case reviews did highlight the need for frequent training in IPC measures including donning and doffing of PPE and appropriately skilled staff to care for patients with suspected or known COVID-19. Furthermore, where transmission between HCW staff was identified, issues related to environmental cleaning of common spaces and lack of adherence by HCWs to physical distancing and use of PPE with these colleagues were identified. The Panel has subsequently initiated new and enhanced policy advice to the system about matters such as personal protective equipment, environmental cleaning and, in recent months, use of shared workspaces such as Emergency Department “flight decks”.

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