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Short report

The first 2 months of COVID-19 contact tracing in the Northern Territory of Australia, March–April 2020

Anthony DK Draper, Karen E Dempsey, Rowena H Boyd, Emma M Childs, Hayley M Black, Laura A Francis, Peter G Markey, Vicki L Krause

Abstract

The Northern Territory (NT) Centre for Disease Control (CDC) undertook contact tracing of all notified cases of coronavirus disease 2019 (COVID-19) within the NT. There were 28 cases of COVID-19 notified in the NT between 1 March and 30 April 2020. In total 527 people were identified as close contacts over the same period; 493 were successfully contacted; 445 were located in the NT and were subsequently quarantined and monitored for disease symptoms daily for 14 days after contact with a confirmed COVID-19 case. Of these 445 close contacts, 4 tested positive for COVID-19 after developing symptoms; 2/46 contacts who were cruise ship passengers (4.3%, 95% CI 0.5–14.8%) and 2/51 household contacts (3.9%, 95% CI 0.5–13.5%). None of the 326 aircraft passengers or 4 healthcare workers who were being monitored in the NT as close contacts became cases.

Key words: Coronavirus disease 2019; COVID-19; contact tracing; Northern Territory; Australia.

Background

On 31 December 2019, the World Health Organization (WHO) China Country Office was alerted to a cluster of pneumonia cases of unknown aetiology in Wuhan, Hubei Province, Peoples' Republic of China.¹ On 7 January 2020, a novel coronavirus was identified as the cause of the outbreak.² This novel coronavirus has since been named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2); the disease it causes is named coronavirus disease 2019 (COVID-19).³ The disease has rapidly spread to countries around the world. On 30 January the WHO declared the outbreak a Public Health Emergency of International Concern,⁴ and on 11 March 2020 it was declared a global pandemic.⁵

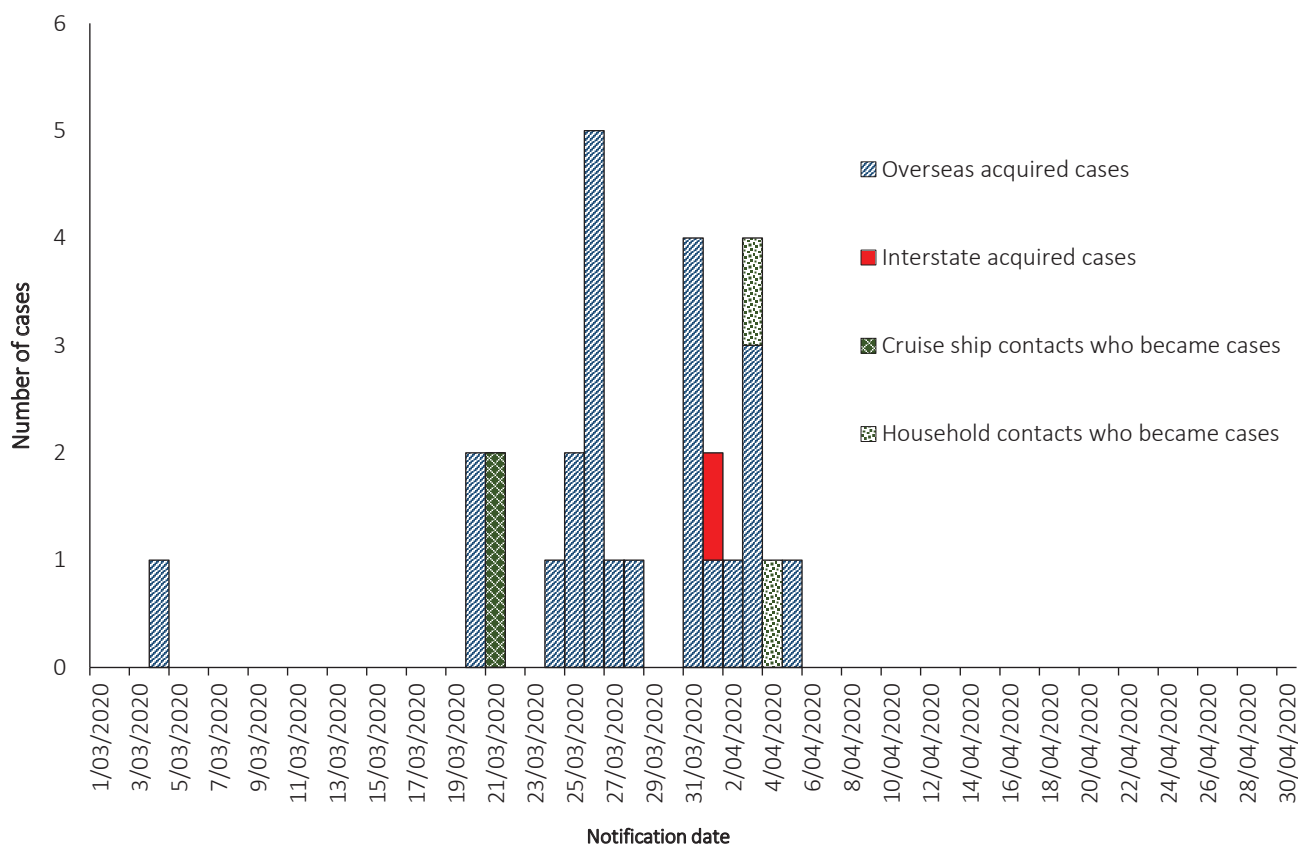
In Australia, the most commonly reported symptoms of COVID-19 have been cough (69%), fever (47%), sore throat (40%) and headache (36%). Pneumonia or acute respiratory disease has been reported in less than 3% of cases.⁶

The proportion of COVID-19 cases requiring intensive care unit (ICU) admission was 2.4% (124/5,074) and the mortality rate was 1.4% (98/6,971) as at 10 May 2020.⁶

The Northern Territory made COVID-19 a notifiable condition on 6 February 2020.⁷ The first cases of COVID-19 notified in the NT were 8 passengers from the *Diamond Princess* cruise ship who were repatriated to Australia from Japan and cared for by members of an Australian Medical Assistance Team and by staff at the Royal Darwin Hospital in a dedicated quarantine facility. None of these cases were NT residents.

On 4 March 2020, the first case of COVID-19 was notified in the NT community: a traveller who had come to Darwin from Indonesia, via Sydney. In response to the growing COVID-19 threat, a Public Health Emergency was declared in the NT on 18 March 2020.⁸ From 14 March 2020, all arrivals to the NT were required to

Figure 1. Epidemic curve of COVID-19 cases notified in the Northern Territory between 1 March and 30 April 2020,^a by notification date and by case type



a Source: Northern Territory Notifiable Disease Surveillance System.

undertake quarantine for 14 days at a location of their choice. On 28 March 2020, all overseas arrivals were required to undertake their quarantine in a hotel. Ultimately, from 3 April 2020, all arrivals to the NT, including residents, were required to undertake quarantine in hotels.

Aim

This paper aims to briefly describe (i) the contact tracing methods undertaken in response to cases of COVID-19 notified in the NT during the period 1 March to 30 April 2020 and (ii) the outcomes of those activities.

Methods

We undertook public health follow-up of cases according to Australian Government Department of Health guidelines.⁹ A confirmed case required detection of SARS-CoV-2 by a validated polymerase chain reaction assay from

a nasal and/or oropharyngeal swab or sputum sample. Confirmed cases in the NT were isolated in a hospital facility at diagnosis. The strategy of Australian public health units to contain COVID-19 has been to rapidly detect and test suspected cases and isolate them to reduce the potential for community transmission.⁹ Rapid and thorough contact tracing of close contacts occurred to ensure quick entry into quarantine for 14 days and active daily monitoring for symptoms.⁹ A close contact was defined as anyone who had face-to-face contact with a confirmed COVID-19 case for more than 15 minutes cumulatively or continuously (e.g. household setting or healthcare setting without appropriate use of personal protective equipment) or who was in the same room with an infectious case for more than 2 hours (e.g. school room, workplace) while a case was symptomatic or during the 24 hours preceding symptom onset. Aircraft close contacts included passengers seated in the same row as, or in the two rows in front of or behind,

Table 1. Total number of close contacts identified by the NT CDC, 1 March – 30 April 2020

Category	Number of people	Percentage of total
Aircraft passengers	389	74
Cruise ship passengers	59	11
Household contacts	52	10
Healthcare workers	4	<1
Other	23	4
Total	527	

an infectious case. If the case was a crew member, the passengers in the area in which the crew member worked were classified as close contacts. Passengers disembarking from cruise ships with high incidence of COVID-19 were also classified as close contacts for surveillance purposes.⁹

Where a confirmed case travelled on an aircraft or cruise ship, a passenger manifest was obtained directly from the airline or from the Australian Government Department of Health National Incident Room (NIR). A team of contact tracers telephoned identified contacts to confirm the time, place and duration of contact, to determine whether they had any symptoms suggestive of COVID-19, and to inform them of the requirement to undergo quarantine until 14 days after their last contact with any infectious COVID-19 case. Close contacts were required to quarantine at home or in a hotel and to respond daily to a short message service (SMS) so as to declare whether they were well or had developed fever or respiratory symptoms. Compliance officers conducted random visits to those in quarantine to ensure adherence to the NT's legislated quarantine requirements.¹⁰

Close contacts' information was entered into NetEpi[®], an online epidemiological database available to jurisdictional public health units in Australia. Using NetEpi[®] we recorded the close contacts' quarantine addresses and the outcomes of daily monitoring.

Data were extracted daily from NetEpi[®] for contact monitoring, reporting and analysis from 1 March to 30 April 2020. Analysis was performed

using Intercooled Stata 13.1 (StataCorp, USA) and Microsoft Excel 2016 (Microsoft, USA). We calculated the proportion of contacts we monitored who became cases, with 95% confidence intervals. Daily extracts identified close contacts undergoing active monitoring for symptoms, their quarantine address (which was sent to compliance officers) and their mobile phone number. Close contacts were sent an initial SMS using Telstra Integrated Messaging at approximately 8:30 am every morning, a reminder at midday (if they were yet to respond) and a telephone call after 2 pm for those who had still not responded by that time. SMS and phone responses were recorded and testing for COVID-19 was arranged when symptoms consistent with acute respiratory infection or fever were reported.

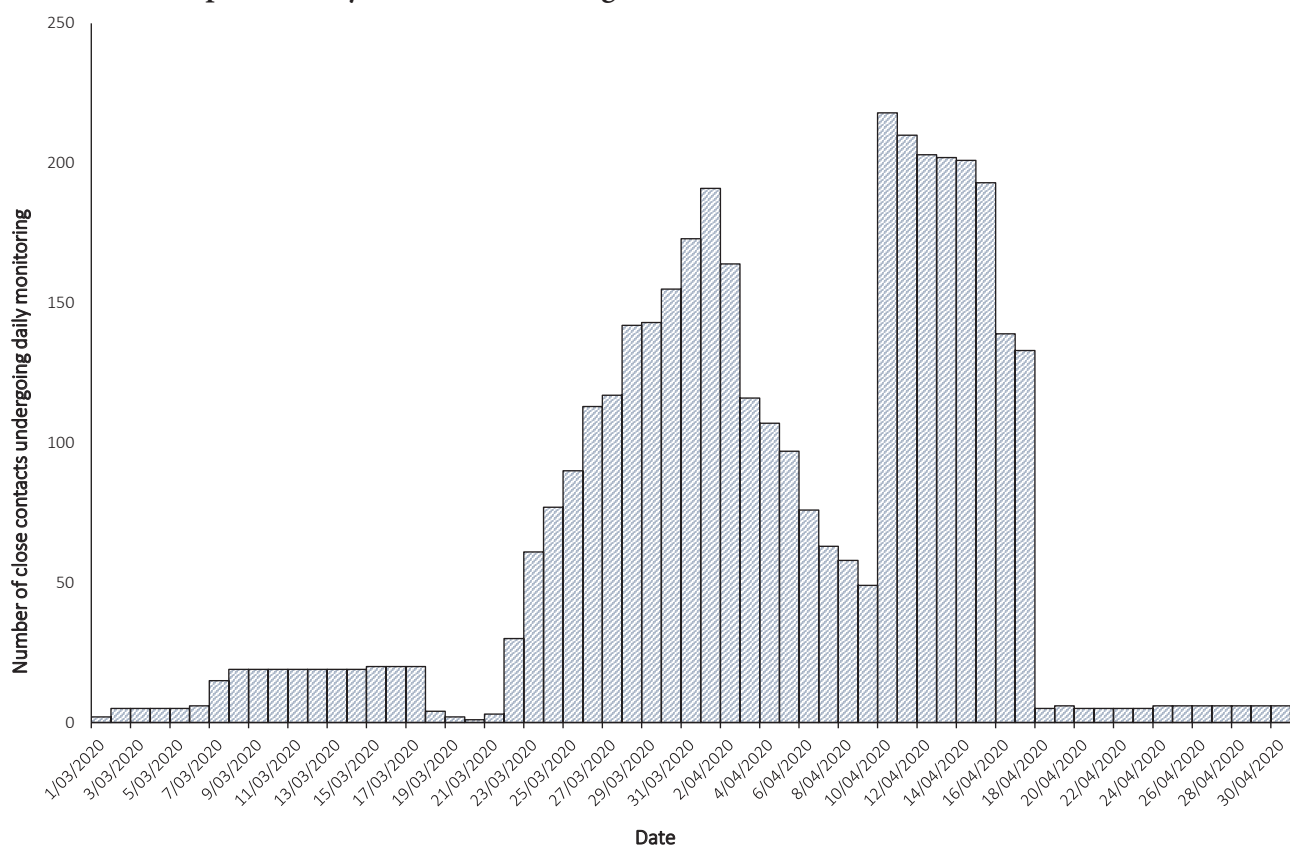
Ethics approval was not sought as our activities were conducted under the auspices of public health legislation.¹⁰

Results

There were 28 cases of COVID-19 notified in the NT between 1 March and 30 April 2020 (Figure 1).

In total, we identified 527 close contacts of COVID-19 cases over the two-month period, of whom we were able to successfully contact 493 (94%). The majority were airline passengers (Table 1). The median interval between last exposure to a case and entry into quarantine was 7 days (interquartile range 4–8 days). This was skewed by the fact that 195 of the 493 con-

Figure 2. Number of COVID-19 close contacts undergoing daily monitoring, Northern Territory, 1 March - 30 April 2020 by date of monitoring



tacts we were able to contact (40%) were from 2 flights for which there was a delay getting the manifests; for these 2 flights all passengers were deemed to be close contacts of an infectious crew member.

The median number of contacts undergoing daily monitoring for COVID-19 symptoms was 19 per day (range 1–218 per day) (Figure 2).

Of the 34 close contacts we were unable to reach through contact tracing, 28 (82%) were from flights. Of those successfully contacted, 48/493 (10%) were located interstate or in military facilities/vessels overseas. These contacts were transferred to those authorities for daily monitoring during their quarantine period. Of the 445 people identified as residing in the NT for their quarantine period, the majority (334; 75%) were located in the Darwin urban area (Table 2).

There were 389 contacts on aircraft, with flights ranging from 1:25 hours to 4:35 hours in duration. Of these 389 contacts, 326 were monitored

in the NT. There were 131 close contacts who were monitored because they were seated in the same row as, or in the two rows in front or behind, an infectious case (Table 3). The remaining 195 contacts were monitored because they were on two aircraft where flight crew who worked in the entire cabin were subsequently diagnosed as cases. None of the 326 aircraft passengers monitored in the NT became cases after being identified as close contacts (95% CI 0–1.1%).

Of the 445 contacts monitored in the NT, 80 (18%) developed symptoms and had swabs collected for COVID-19 testing. Only 4 were positive. Of the 46 close contacts from cruise ships that were monitored in the NT, 2 (4.3%; 95% CI 0.5–14.8%) became cases. These two cases boarded a flight while infectious after disembarking a cruise ship with known on-board transmission; however, they did not transmit disease to 21 close aircraft contacts or 1 household contact. They were telephoned by the NT CDC 2 days after arriving back to the NT and diagnosed with COVID-19 on the same day.

Table 2. Total number of close contacts monitored daily in the Northern Territory, by region, within the period 1 March – 30 April 2020

Region	Number of people	Percentage of total
Darwin urban area	334	75
Alice Springs urban area	68	15
Darwin rural area	21	5
Katherine region	13	3
East Arnhem region	4	< 1
Barkly region	3	< 1
Alice Springs rural area	2	< 1
Total	445	

Figure 3. Diagram showing transmission of COVID-19 within one household of 12 persons in the Northern Territory, March–April 2020

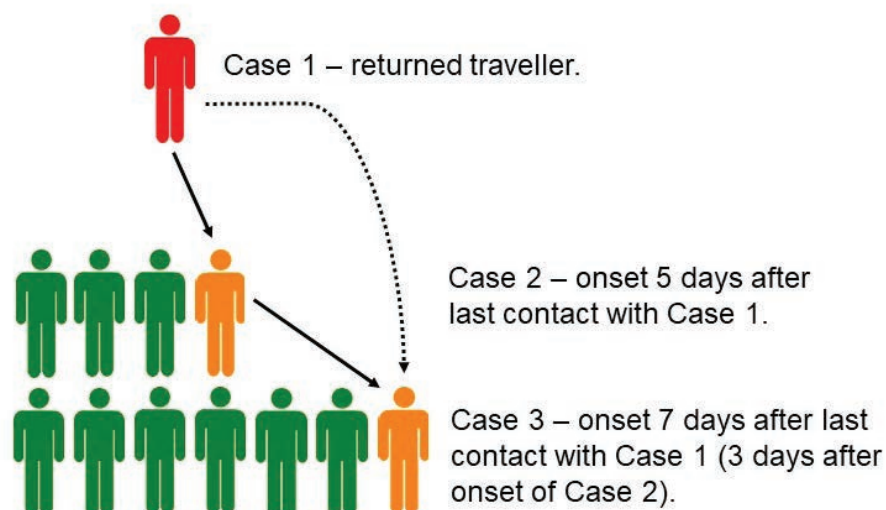


Table 3. Summary of NT monitored contacts on flights where the case was a passenger, 1 March – 30 April 2020 (n = 131)

Flight	Duration (hh:mm)	Case's symptom onset in relation to flight	Number of close contacts	Number of contacts in same row as case	Number of contacts seated next to case
A	04:00	4 days before flight	19	4	2
B	03:35	2 days before flight	11	1	0
C	02:32	10 days before flight	12	0	0
D	04:35	1 day before flight	21	2	2
E	04:00	13 days before flight	10	1	0
F	04:30	7 days before flight	2	0	0
G	04:34	2 days before flight	2	0	0
H	02:00	1 day after flight	2	0	0
I	02:49	1 day after flight	15	2	0
J	01:25	1 day after flight	2	0	0
K	04:00	1 day after flight	18	3	2
L	04:35	9 days before flight	7	1	0
M	04:00	1 day after flight	5	1	0
N	04:00	1 day after flight	5	1	1
			131	16	7

There were 2/51 household close contacts monitored in the NT who became cases (3.9%; 95% CI 0.5–13.5%). Both were household contacts of the same case who returned from overseas. It cannot be determined whether both were co-exposed to the initial case in the household or whether 2 separate transmission events occurred in the household of 12 persons (Figure 3).

Discussion

We describe our experience in contact tracing in the early phase of the COVID-19 pandemic. We detected transmission of COVID-19 to household contacts and close contacts from a cruise ship with known on-board transmission. However, we did not observe in-flight transmission of COVID-19 to 326 close contacts on flights.

With commercial aviation now beginning to resume regular flights, the issue of in-flight trans-

mission is pertinent. Some reports have suggested in-flight transmission of SARS-CoV-2;^{11,12} for SARS-CoV, some studies have reported in-flight transmission and others not.^{13,14,15}

With our contact tracing, the number of contacts undergoing daily monitoring fluctuated greatly; at one point all passengers from 2 flights needed to be rapidly placed into quarantine. It is important, particularly in smaller jurisdictions, to have surge capacity in the workforce to prevent delays in this process, in order to reduce the risk of community transmission of COVID-19.

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