NORTHERN TERRITORY GOVERNMENT
Centre for Disease Control
DISEASE CONTROL BULLETIN
Vol. 27, No. 3, September 2020 ISSN 1440-883X

An unusual case of salmonellosis following a motorcycle accident

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ABSTRACT
In September 2020, the Northern Territory (NT) Centre for Disease Control was notified of a case of salmonellosis from a wound swab. The person had fallen off a motorcycle on a rural property and was likely infected by Salmonella from the environment. Percutaneous salmonellosis is an unusual condition as most salmonellosis cases present with gastrointestinal symptoms. Wound swabs should be collected for microbial culture and susceptibility testing in the Top End of the NT during the wet season to confirm the aetiology of infections and to guide prescribing appropriate antibiotic therapy.

Keywords: OzFoodNet, salmonellosis, Northern Territory, environmental *Salmonella*.

Case presentation
A 36 year old person presented to a Northern Territory (NT) hospital emergency department on 23 September 2020. The patient complained of ongoing pain in the right hand and right wrist, 3 days after falling from a motorcycle (dirt bike) on a rural property outside of Darwin, NT. On examination in the emergency department, the patient had an infected abrasion of the right wrist ulnar aspect and an infected abrasion to the left extensor surface of the left elbow (Figure 1). An X-ray and computed tomography (CT) scan did not show any obvious fractures. Swabs were taken from the left arm abrasion and sent for microbial culture and sensitivity (MCS) testing. The wounds were cleaned and debrided and a cast was placed. The patient was discharged on amoxicillin/clavulanic acid and trimethoprim/sulphamethoxazole.

Contents

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https://hdl.handle.net/10137/506

Figure 1. Left- Infected left elbow abrasion. Right- Right wrist after cleaning

Diagnosis and outcome

Results from the would swab were culture positive for *Staphylococcus aureus* and *Salmonella* species on 28 September 2020. The antimicrobial susceptibilities reported by the laboratory are found in Table 1.

The patient continued the course of prescribed antibiotics, to which both organisms were susceptible, as directed and the wound healed within approximately 2 weeks without complication. The *Salmonella* isolate was subsequently typed at a reference laboratory as *Salmonella* subspecies I serovar 16:1:v:-.

Discussion

This is an unusual presentation of salmonellosis. Salmonellosis commonly presents as a gastrointestinal illness characterised by diarrhoea, abdominal pain, fever, nausea and sometimes vomiting.[1] Cutaneous salmonellosis is unusual but has been documented in a veterinarian delivering a bovine calf,[2] from person to wound transmission,[3,4,5] and where the mode of transmission was unknown.[6]

In the 5 year period from 2014 to 2018, the mean number of salmonellosis notifications in the NT was 575 cases per year.[7] Typically, approximately half of all salmonellosis notifications in the NT are in children aged 0-4 years and this was observed again in 2019 with 48% of all notifications in this age group.[7]

Salmonella subspecies I serovar 16:1:v:- was the 7th most notified *Salmonella* serovar in the NT in 2019.[7] The median age of cases notified with this serovar over this period was 3 years (range 0 – 75 years) with 54/69 (78%) of notifications in residents in the greater Darwin area.[8]

The young median age of salmonellosis cases notified with this serovar indicates that it is likely a type of *Salmonella* occurring naturally in the Top End (northern half of the NT) environment where a range of animals carry *Salmonella* in their faeces.

The NT consistently reports higher rates of salmonellosis than the rest of Australia, This is felt to be largely due to the high number of children <5 years old who contract salmonellosis that local studies have indicated are usually from environmental rather than food sources.[9] The hot humid environment in the Top End during the 'build-up' and during and immediately following the wet season is ideal for bacterial survival.

The patient reported no gastrointestinal symptoms or contact with anyone with gastrointestinal symptoms, including children, prior to the accident. The patient fell from a motorcycle during rain on a property in the Darwin rural area. It is likely that the *Salmonella* was in the environment where the fall occurred and resulted in percutaneous inoculation.

Alternatively, the wound could have become infected in the days immediately following the accident due to reduced hand hygiene.

Wound swabs should be collected for MCS in the Top End during the wet season to confirm the aetiology of infections for prescribing of appropriate antibiotics, particularly with the increased risk of melioioidosis, caused by the bacterium *Burkholderia pseudomallei*, which is endemic in soil and water in the NT.[10,11] In this case, the bacteria were susceptible to the antibiotics prescribed and the case made a good recovery.

This case study investigation had approval from the Human Research Ethics Committee of the Northern Territory Department of Health and Menzies School of Health Research (TEHREC); reference number HREC 20-3940.

Acknowledgments
Thanks to the staff at the Emergency Department of the Palmerston Regional Hospital, the Royal Darwin Hospital microbiology laboratory and the SA Pathology *Salmonella* reference laboratory.

Table 1. Antimicrobial susceptibilities of organisms isolated from left arm wound swab

Antibiotic	***Staphylococcus aureus***	***Salmonella* species**
Ampicillin	-	Susceptible
Amoxyxillin/clavulanic acid	Susceptible	Susceptible
Clindamycin	Susceptible	-
Cephalothin	Susceptible	-
Cephazolin	-	Resistant
Ciprofloxacin	-	Susceptible
Erythomycin	Susceptible	-
Flucloxacillin	Susceptible	
Gentamicin		Resistant
Penicillin	Resistant	
Trimethoprim/sulphamethoxazole	Susceptible	Susceptible

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ALERT #25

Coronavirus disease 2019 (COVID-19)
Testing, tracing, containing
Maintaining prevention activities
28 July 2020

Dear Clinicians,

There have now been 32 cases of COVID-19 diagnosed in the NT with the last case diagnosed on 10 July 2020. All cases in the NT acquired their disease overseas, interstate or from a known close contact and no NT community transmission has been demonstrated to date. This has been an excellent outcome for the NT with travel restrictions and physical distancing measures serving us very well - from appropriate 14 day quarantine, to the reduction in number and size of gatherings and the maintenance of personal 1.5 metre distancing.

Many other parts of Australia have also achieved low rates of COVID-19 with no community transmission and our borders have now been opened to these areas without the requirement of quarantine.

To maintain an excellent COVID-19 testing, tracing and containing capacity, the NT case definition for *suspect cases* still emphasises people returning from overseas and close contacts of confirmed cases as being high risk but now, rather than *any* interstate travel being high risk, the focus is on geographical areas of risk (GARs) in Australia that the NT declares as 'hotspots'. These declared hotspots are determined on a daily, on-going basis in the NT with this change reflected in (A) *Epidemiological criteria* and removed from (C) as below. The NT case definition still differs slightly from the National Guidelines (SoNG) as the NT *suspect case* definition for the frontline worker group (B) is wider and some high risk settings (C) are also identified. The NT does not use a '*probable case*' definition as all NT *suspect cases* are tested by PCR to diagnose acute COVID-19 disease.

Case Definition in the NT

Confirmed case

A person who:

I. tests positive to validated specific SARS-CoV-2 nucleic acid test
OR
II. has the virus isolated in cell culture, with PCR confirmation using a validated method
OR
III. Undergoes a seroconversion to or has a significant rise in SARS-CoV-2 neutralising or IgG antibody level (e.g. four-fold or greater rise in titre

Suspect case

If the patient satisfies ***Epidemiological*** A, B, C, or D and ***Clinical criteria***, they are classified as a *suspect* case.

Clinical criteria

- Fever (≥37.5°C) or history of fever (e.g. night sweats, chills)

OR

- Acute respiratory infection (e.g. shortness of breath, cough or sore throat) with or without fever

OR

- Loss of smell or loss of taste with or without fever

A. ***Epidemiological criteria*** - highest risk

- Any international travel in the 14 days before the onset of illness

OR

- Close contact in the 14 days before illness onset with a confirmed case of COVID-19

OR

- Living, working, visiting or transiting through an NT declared 'hotspot' in the 14 days before the onset of illness

AND

Clinical criteria as above

B. ***Epidemiological criteria*** - lesser risk

- Any frontline healthcare worker with direct patient contact or other frontline workers (police, emergency workers, correctional officers, educators, childcare workers, aged care and disability workers, phlebotomists, retail pharmacists and pharmacy assistants)

AND

Clinical criteria as above

C. ***Epidemiological criteria*** - lesser risk

- Any person in the following settings
  a. aged care and residential (including disability and psychiatric) care facilities
  b. military - in group residential settings
  c. remote industrial sites with accommodation (e.g. mine sites)
  d. boarding schools
  e. correctional or detention facilities for those newly detained in previous 14 days

AND

Clinical criteria as above

D. ***Epidemiological criteria*** - lesser risk

- Any hospitalised patient

AND

Clinical criteria as above, unless there is fever only and no respiratory symptoms and the fever is explained by another cause (e.g. cellulitis, appendicitis)

Enhanced testing

- Testing beyond the *suspect* case definition should be undertaken on patients with the *clinical criteria*:
  - fever (≥37.5°C) **or** history of fever (e.g. night sweats, chills) where no other clinical focus of infection or alternate explanation of the patient's illness is evident **or** acute respiratory infection (e.g. cough, shortness of breath, sore throat) **or** loss of smell or loss of taste.
- Any symptomatic persons should stay home until their symptoms have resolved.
- Respiratory specimens should be collected in accordance with the appropriate guidelines. Refer to Guidance on use of personal protective equipment (PPE) in non-inpatient healthcare settings, during the COVID-19 outbreak . Good hand washing, surgical mask, gloves and goggles/face shield are recommended for taking a throat and deep nasal swab.
- It is not necessary to contact CDC to report those undergoing *enhanced testing*. The requesting doctor will need to inform the patient of negative results. Patients seen in RDPH ED will have their test results texted to them and are advised to call Darwin CDC on 8922 8044 only if results have not been received 48 hours after being tested. Those seen in ASH ED should call 8951 7540 for their results 48-72 hours after being tested.
- If the test is positive CDC will alert the patient and the requesting doctor. Include the patient's phone number on the laboratory request form to assist.

Key Messages:

- To rapidly identify COVID-19 cases in our community for early management, contact tracing and containment **continued testing of *suspect* cases** and commitment to ***enhanced testing*** are required.
- Call Darwin CDC on 8922 8044, Alice Springs on 8951 7540 or email to cdc.covid@nt.gov.au to report all high risk ***suspect* cases**, providing:
  - Name
  - Patient phone number (or where appropriate, the remote health service contact)
  - Date of birth
  - Reason for test (travel or contact and symptoms)
- **Commitment to *enhanced testing*** means that the daily number of patients you see or have a telehealth encounter with who present with fever, acute respiratory illness (ARI) or loss of smell or taste should equal the daily number of COVID-19 tests you perform or refer safely to a pandemic or respiratory clinic (https://coronavirus.nt.gov.au/stay-safe/symptoms-testing). Are you monitoring your daily COVID-like presentations and your daily number of tests?
- Encourage all of your patients and their family members to get tested early should they develop symptoms of fever, ARI or loss of smell or taste. Advise that they should not go to work or functions outside the home if unwell. How they handle their illness will impact on the community.

Further advice and information for clinicians:

1) Ensure that your practice setting supports physical distancing and provides adequate means of handwashing/hand hygiene.
2) For an upper respiratory tract collection first swab the tonsillar beds and back of the throat and then insert the same swab into the nostril (deep nasal) and rotate several times against the nasal wall. Repeat the process in the other nostril. See pages 43-44 in the National Guidelines (SoNG).
3) **Sputum samples in patients producing sputum are very appropriate specimens for diagnosing COVID-19** and saves on PPE and flocked swabs. The patient should expectorate a deep cough sputum directly into a sterile, leak-proof, screw-top dry sterile container in a safe place (e.g.in a car alone with windows down) away from others.
4) Self-collected throat and deep nasal swabs are an alternative collection method that saves on time and PPE. Call your local CDC for guidance. How to collect a COVID-19 swab.
5) As influenza season approaches, we are fortunate in the NT to have all respiratory specimens collected for COVID-19 also being tested for a respiratory panel of viruses which include influenza. Promote the 2020 influenza vaccine for your patients now.
6) TEHS PHC hosts a teleconference every 2nd Thursday at 3PM with CDC PH physicians. All NT clinicians are welcome. Email jane.thomas@nt.gov.au for details.

For more information:

- These CDC Alerts are online at www.health.nt.gov.au
- Visit the NT Government website https://coronavirus.nt.gov.au for local level information and testing locations.
- Visit the Australian Government Department of Health webpage at https://www.health.gov.au.
- The general public who want more information or are concerned about their health can call the national COVID-19 Health Direct line on 1800 020 080 or visit https://www.healthdirect.gov.au/coronavirus.

Yours sincerely

Dr Vicki Krause

Director, Centre for Disease Control-Environmental Health, Public Health Unit, TEHS, Darwin

Centre for Disease Control	**Darwin**	**Nhulunbuy**	**Katherine**	**Alice Springs**	**Tennant Creek**
Phone	08 89228044	08 89870357	08 89739049	08 89517540	08 89624259
Fax	08 89228310	08 89870500	08 89739048	08 89517900	08 89624420

NT COVID-19 Surveillance Situation Report 31 July 2020

CDC NT COVID-19 Surveillance Sit Rep 31 July 2020

COVID-19 Cases

There are currently a total of 32 cases of COVID-19 that have been diagnosed in the NT with the most recent case diagnosed on 10 July. Of the 32 cases, 28 were acquired overseas, 2 were acquired interstate and 2 were acquired from household transmission in the NT. There has been no community transmission in the NT.

	NT residents	Overseas residents	Interstate residents	Total	Indigenous	Non-Indigenous
Diagnosed in NT	28	2	2	**32**	0	32
	Note: National reporting was amended on 18/5. Cases are now assigned to the jurisdiction which does the public health response, rather than the jurisdiction of residence.					

Contacts undergoing active daily monitoring

One close contact is under daily monitoring

District	Darwin Urban	Darwin Rural	East Arnhem	Katherine	Barkly	Alice Springs Urban	Alice Springs Rural	Other	All
Current	1	0	0	0	0	0	0	0	**1**
Total	**391**	**24**	**5**	**20**	**3**	**68**	**2**	**81**	**594**

Note: Other includes Interstate n=55, Overseas n=1 and Not Stated n=25

Exposure setting	Household	Cruises	Flights	Healthcare	Other	All
Current	0	0	0	0	1	**1**
Total	**55**	**61**	**435**	**4**	**39**	**594**

Testing counts and rates by district

Region	30/07/2020	Last 7 days	Previous 7 days	Total	Rate per 100,000
Darwin	321	1,783	1,622	15,663	9,416
*Supervised quarantine**	*71*	*285*	*181*	*466*	
East Arnhem	12	70	45	655	4,262
Katherine	12	86	63	874	4,395
Barkly	15	26	27	397	6,444
Alice Springs	86	562	398	4,833	12,219
Unknown	0	0	0	20	
Total	**446**	**2,527**	**2,155**	**22,442**	**9,074**

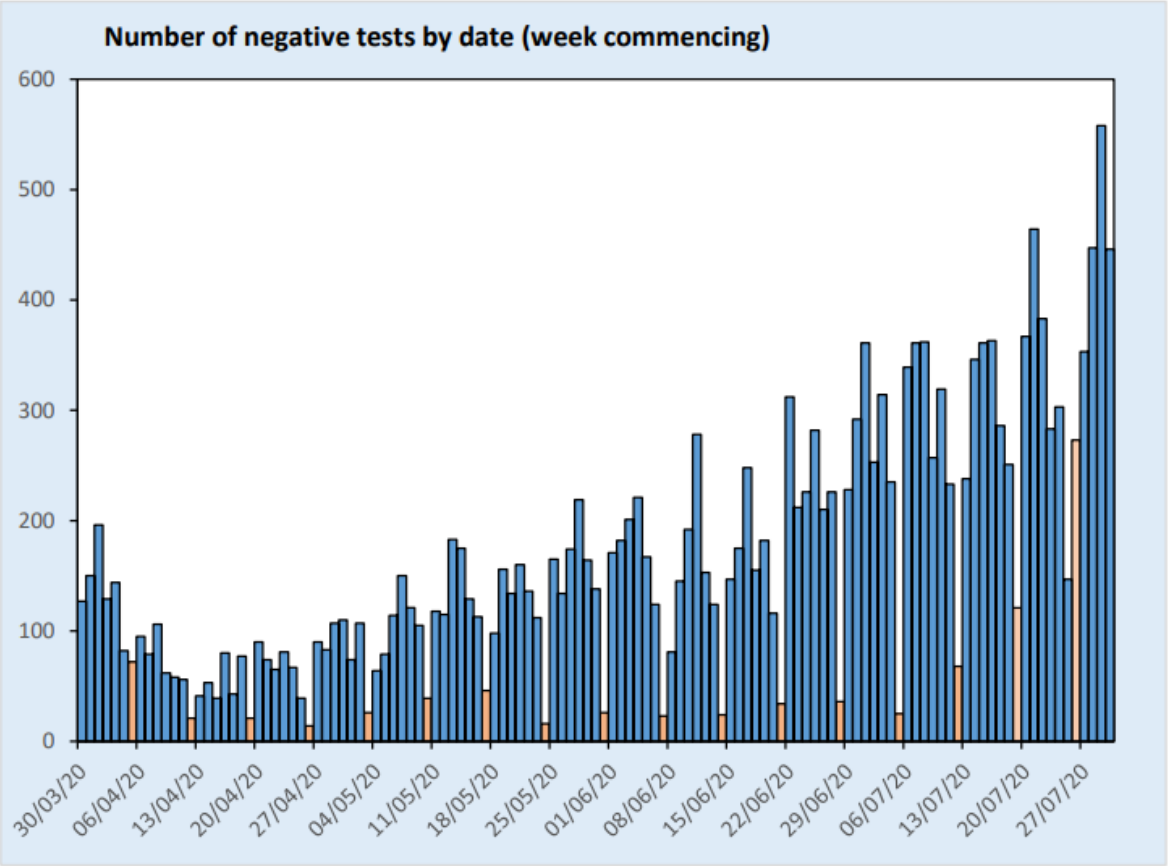
Notes:

1. NT total includes 247 point of care (POC) results for clients tested in remote communities from 12/06/20
2. NT total does not include 1,869 test results for US marines tested between 03/06/20 and 26/07/20

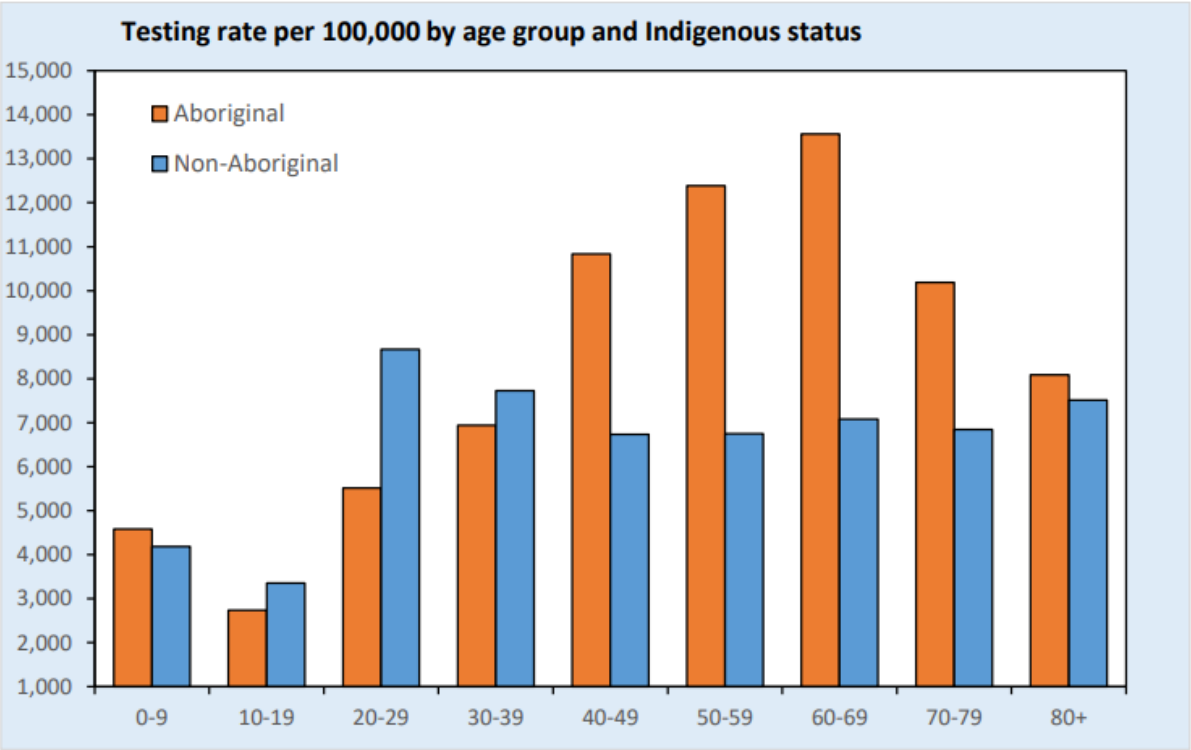
* Darwin includes 466 tests completed for clients in supervised quarantine at the Howard Springs facility from 20/07/2020

Testing trends

Testing trends are shown on the graph below. There were 446 negative tests completed on 30 July 2020

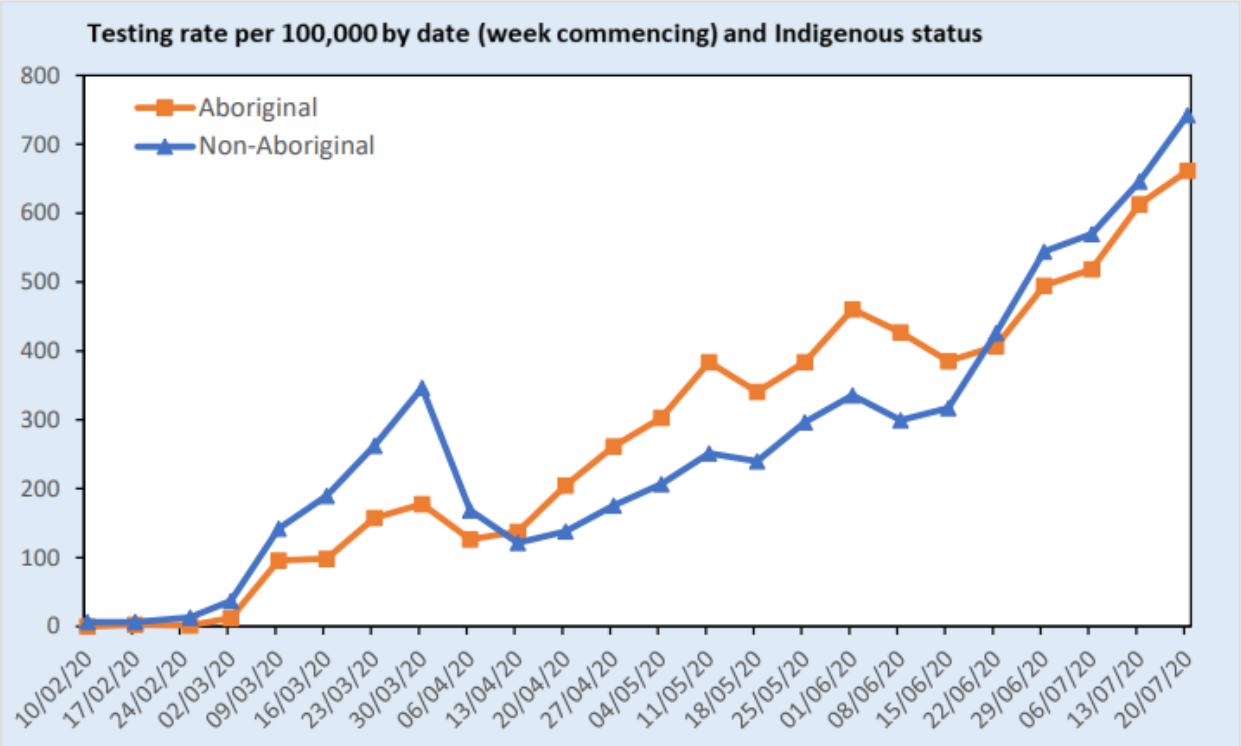


Testing rates by age-group and Indigenous status*



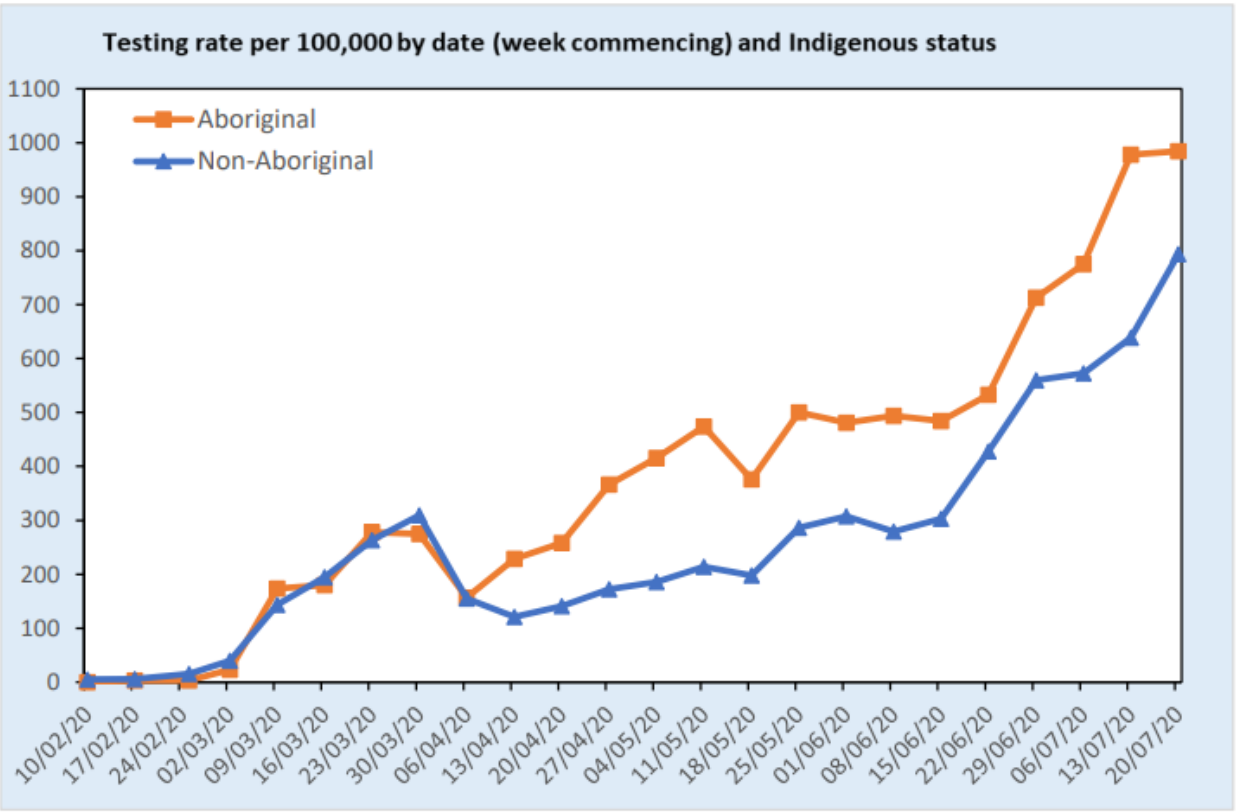
Note: * Indigenous status not stated in 21% of those tested

NT testing rates by date and Indigenous status*



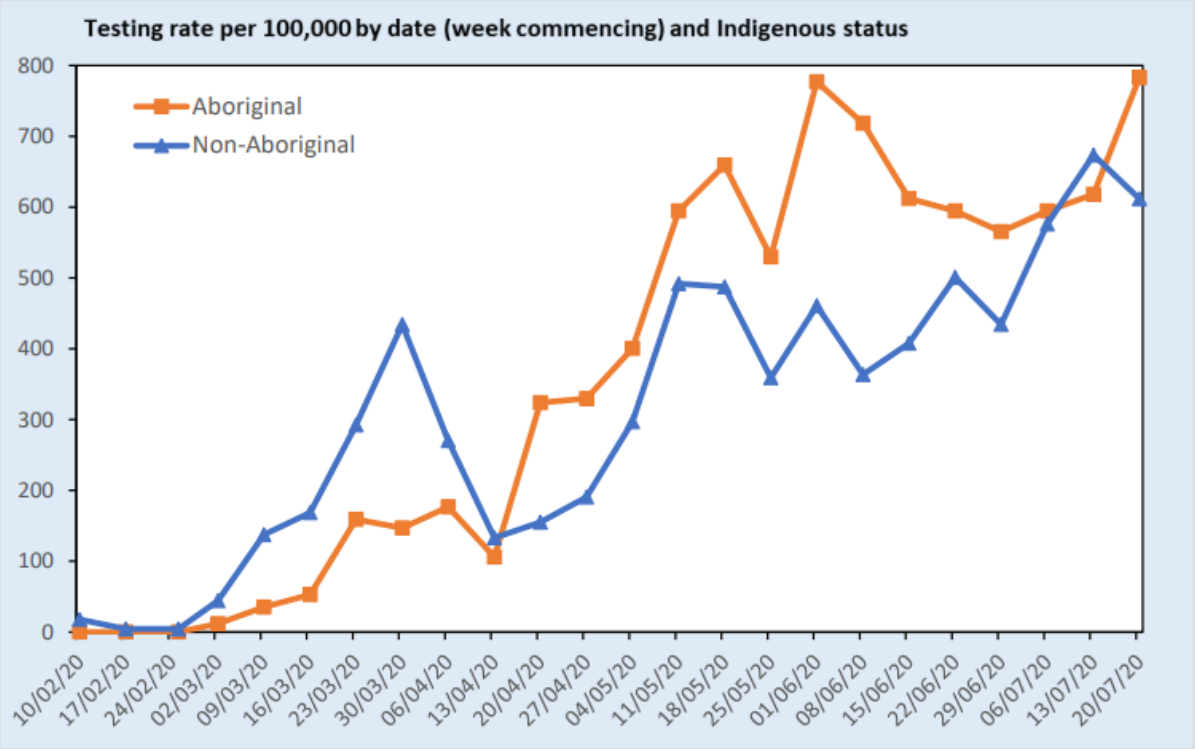
Note: * Indigenous status not stated in 21% of those tested

Darwin region testing rates by date and Indigenous status*



Note: * Indigenous status not stated in 21% of those tested

Alice Springs region testing rates by date and Indigenous status*



Note: * Indigenous status not stated in 28% of those tested

NT COVID-19 Surveillance Situation Report 1 September 2020

CDC NT COVID-19 Surveillance SitRep 01 September 2020

COVID-19 Cases

There are currently a total of 34 cases of COVID-19 that have been diagnosed in the NT with the most recent case diagnosed on 01 August. Of the 34 cases, 28 were acquired overseas, 3 were acquired interstate and 3 were acquired from household transmission in the NT. There has been no community transmission in the NT.

	NT residents	Overseas residents	Interstate residents	Total	Indigenous	Non-Indigenous
Diagnosed in NT	28	2	4	**34**	2	32
Discharged from isolation	28	2	4	**34**	2	32

Note: National reporting was amended on 18/5. Cases are now assigned to the jurisdiction which does the public health response, rather than the jurisdiction of residence.

Contacts undergoing active daily monitoring

There is currently 1 close contact in the NT undergoing monitoring

District	Darwin Urban	Darwin Rural	East Arnhem	Katherine	Barkly	Alice Springs Urban	Alice Springs Rural	Other	All
Current	1	0	0	0	0	0	0	0	**1**
Total	**402**	**24**	**5**	**20**	**3**	**68**	**2**	**82**	**606**

Note: Other includes Interstate n=55, Overseas n=2 and Not Stated n=25

Table 1. Testing counts and rates by district

Region	31/08/2020	Last 7 days	Previous 7 days	Total	Rate per 100,000
Darwin total*	226	1,854	1,629	24,016	14,437.3
RDH Pandemic Clinic	*52*	*336*	*256*	*6,575*	
Howards Springs Drive Through	*8*	*43*	*36*	*1,529*	
Howards Springs Supervised Quarantine	*57*	*430*	*486*	*2,639*	
East Arnhem	18	98	89	994	6,468.4
Katherine	15	107	68	1,278	6,427.0
Barkly	9	50	55	667	10,826.2
Alice Springs	120	432	388	6,892	17,425.2
Unknown	1	1	1	68	
NT total	**389**	**2,542**	**2,230**	**33,915**	**13,686.0**

* Darwin total includes Royal Darwin Hospital pandemic clinic and outreach, Howard Springs drive through, Howard Springs supervised quarantine plus other inpatient, outpatient and primary health care services

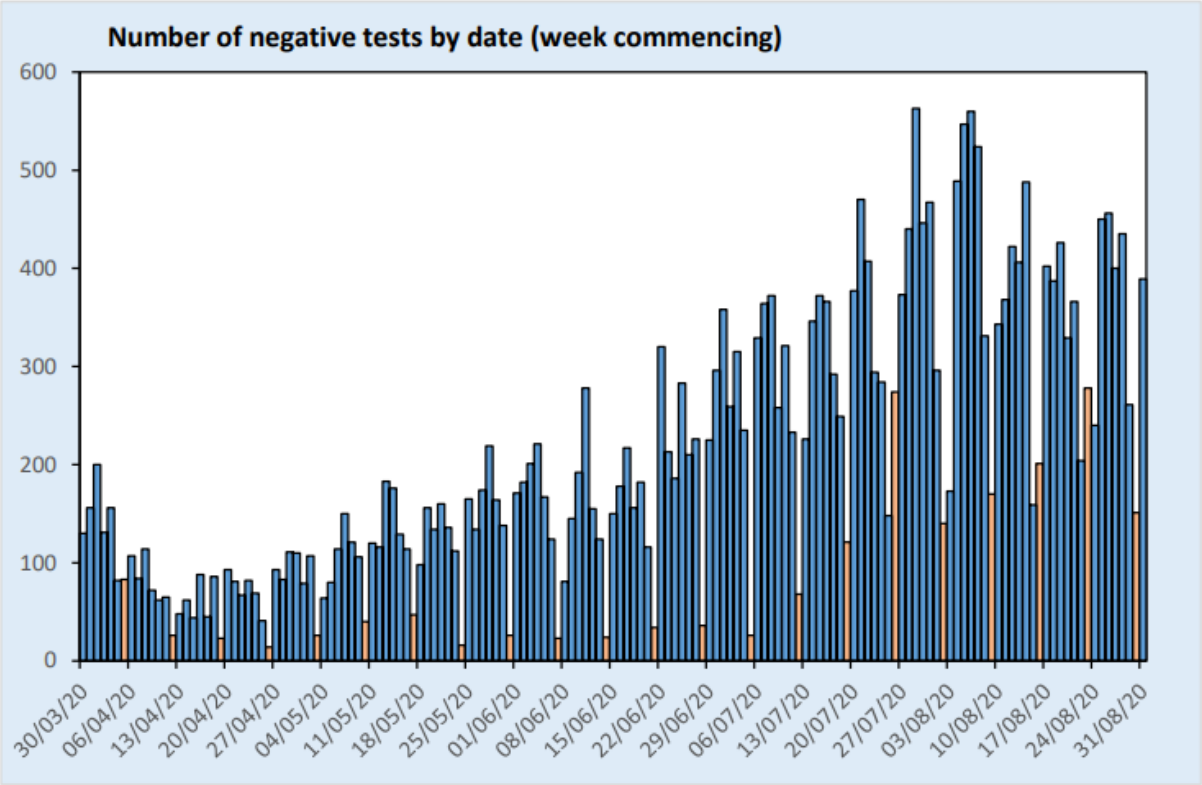
Table 1:
1. Includes rapid tests performed by Territory Pathology and their total will be reported monthly
2. Includes point of care (POC) results for clients tested in remote communities from 23/05/20 (Table 2 provides district breakdown for POC)
3. Does not include 2,052 test results for US marines tested between 03/06/20 and 07/08/20

Table 2. Point of care testing counts by district since 23/05/2020

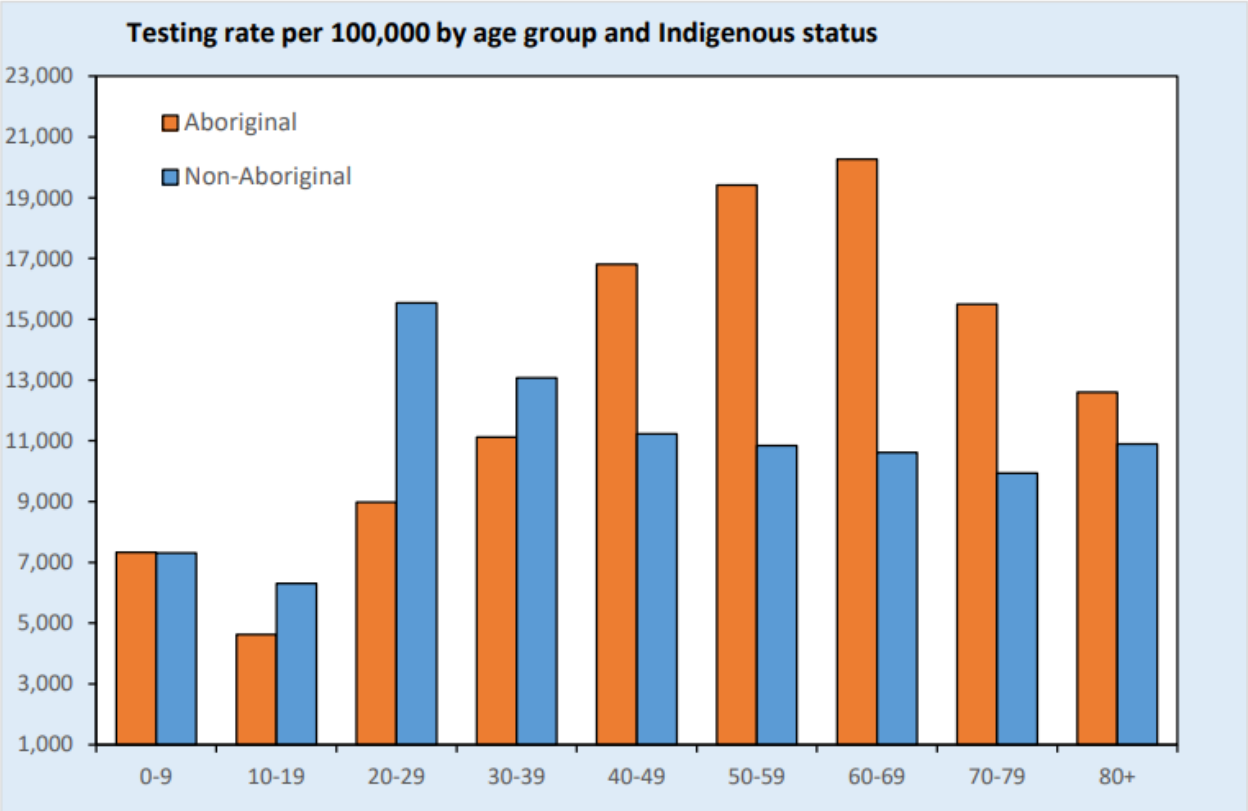
Region	31/08/2020	Last 7 days	Previous 7 days	Total	Rate per 100,000
Darwin	14	46	25	174	104.6
East Arnhem	15	45	38	228	1,483.7
Katherine	3	28	4	78	392.3
Barkly	0	20	19	124	2,012.7
Alice Springs	7	48	24	250	632.1
NT total	**39**	**187**	**110**	**854**	**345.3**

Testing trends

Testing trends are shown on the graph below. There were 389 negative tests completed on 31 August 2020

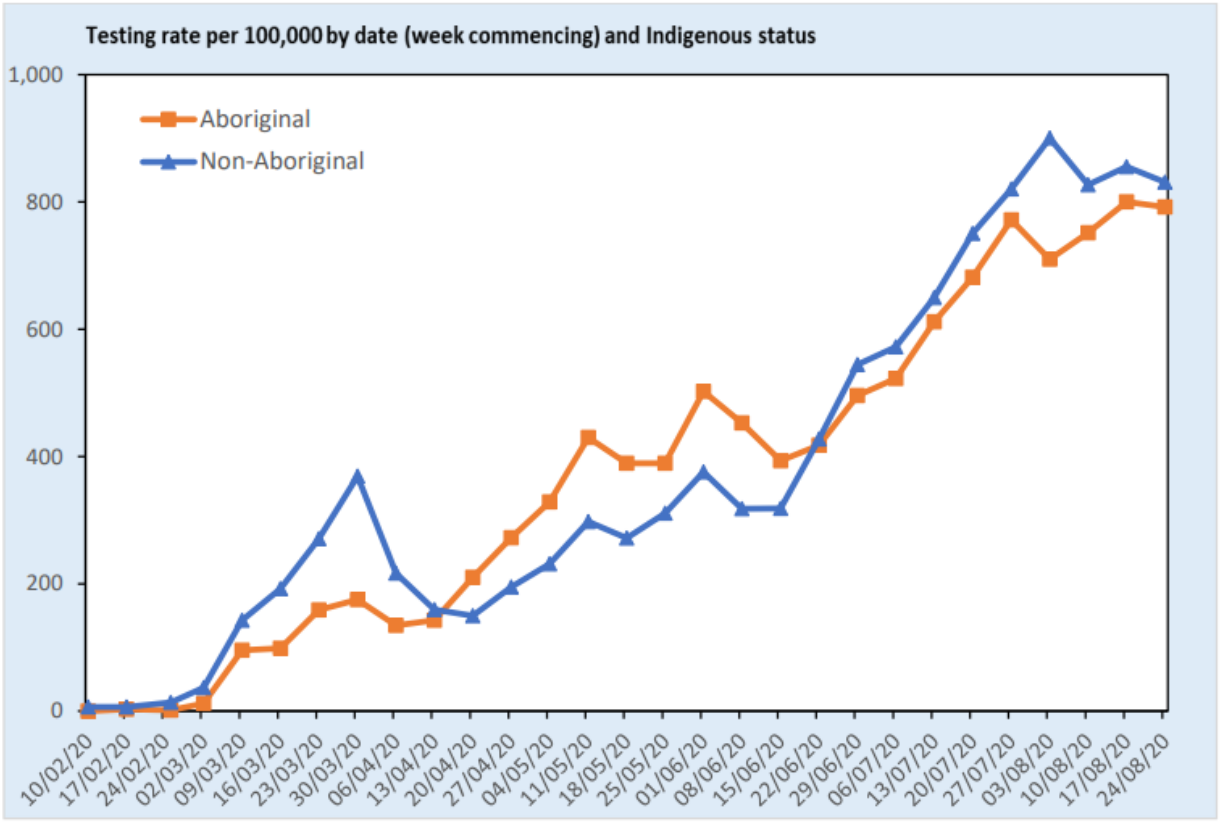


Testing rates by age-group and Indigenous status*



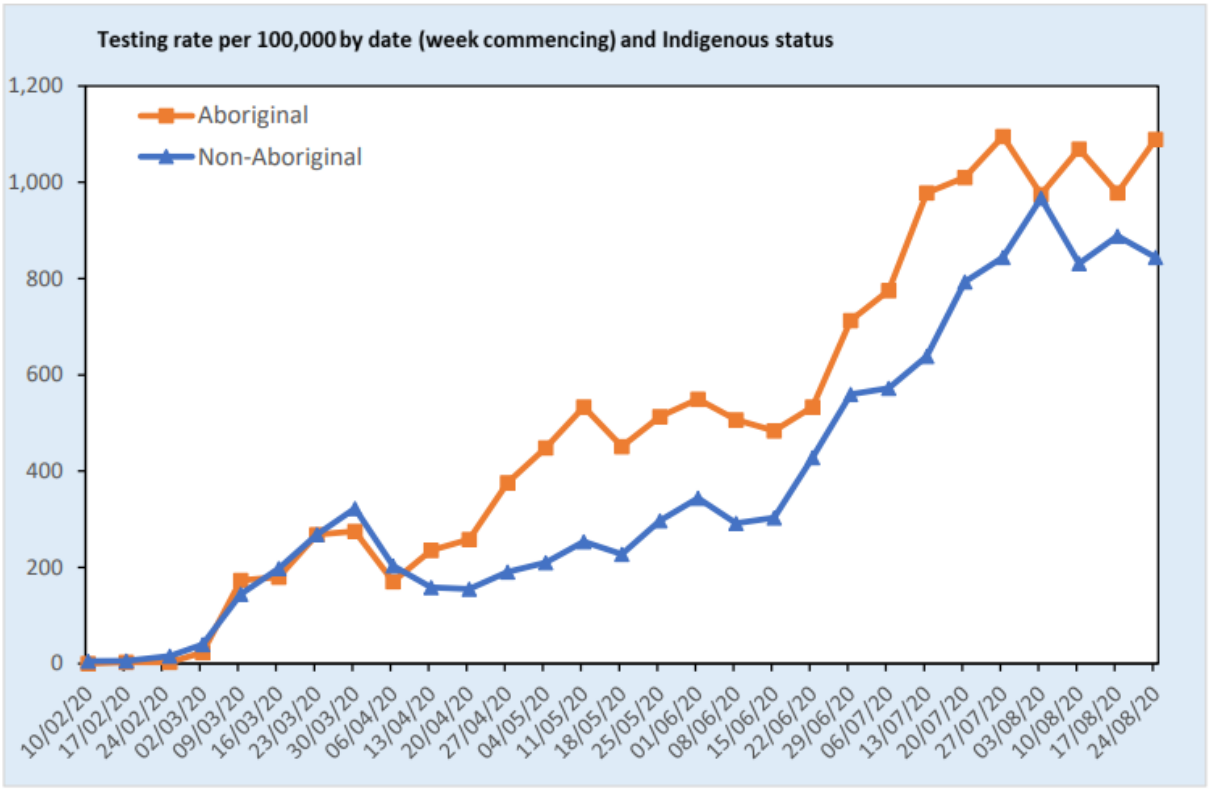
Note: * Indigenous status not stated in 19% of those tested

NT total testing rates by date and Indigenous status*



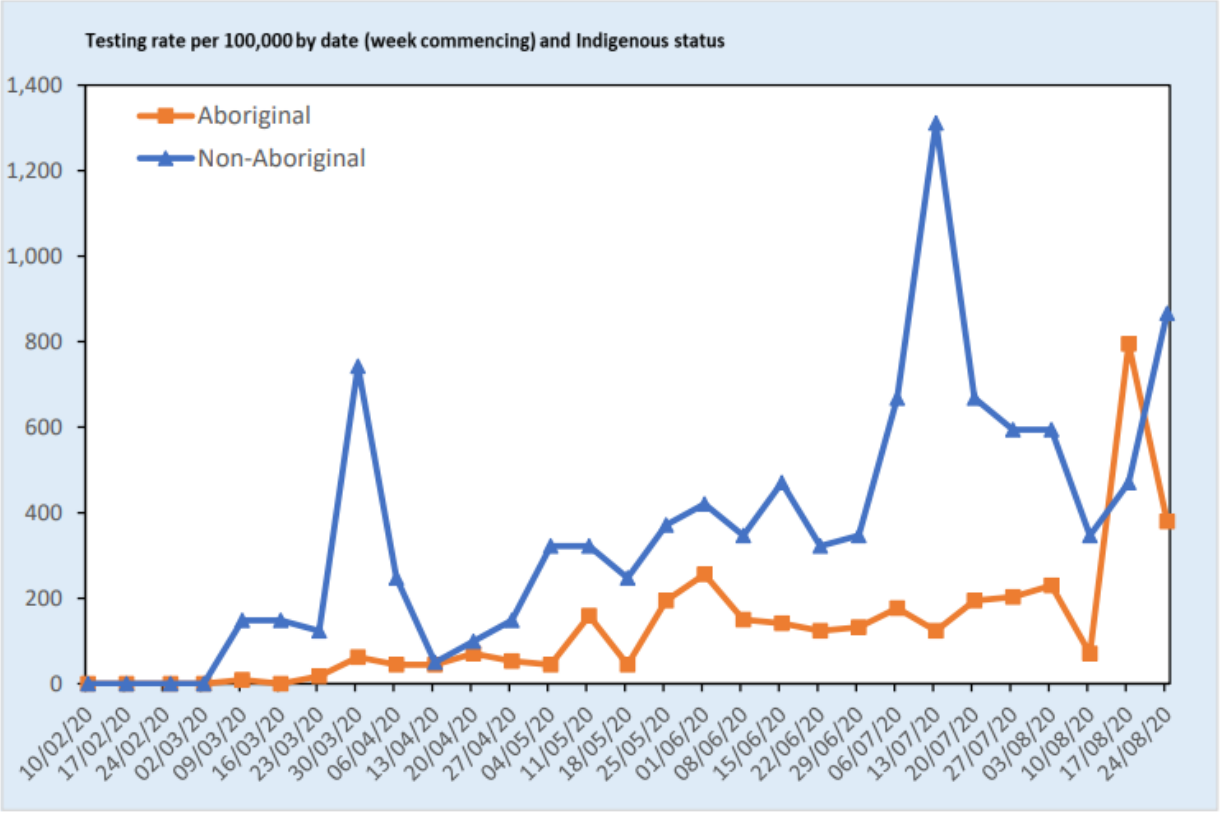
Note: * Indigenous status not stated in 19% of those tested

Darwin region testing rates by date and Indigenous status*



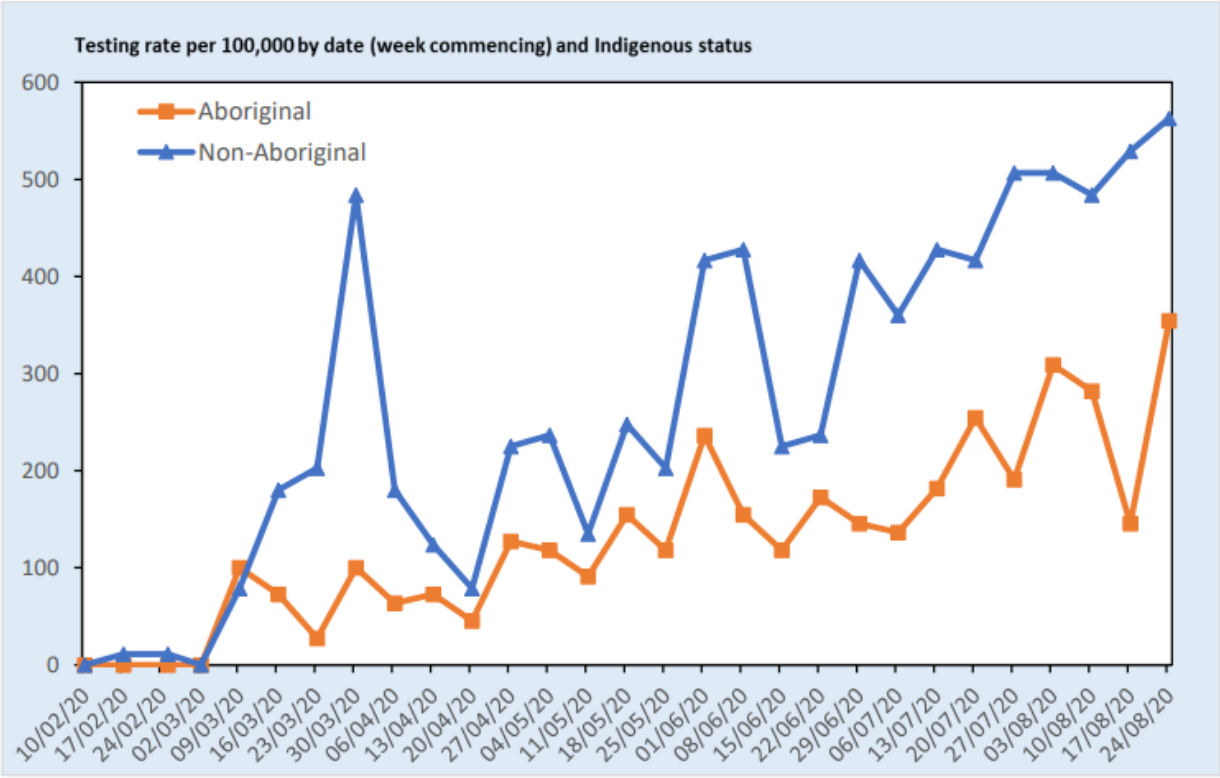
Note: * Indigenous status not stated in 18% of those tested

East Arnhem region testing rates by date and Indigenous status*



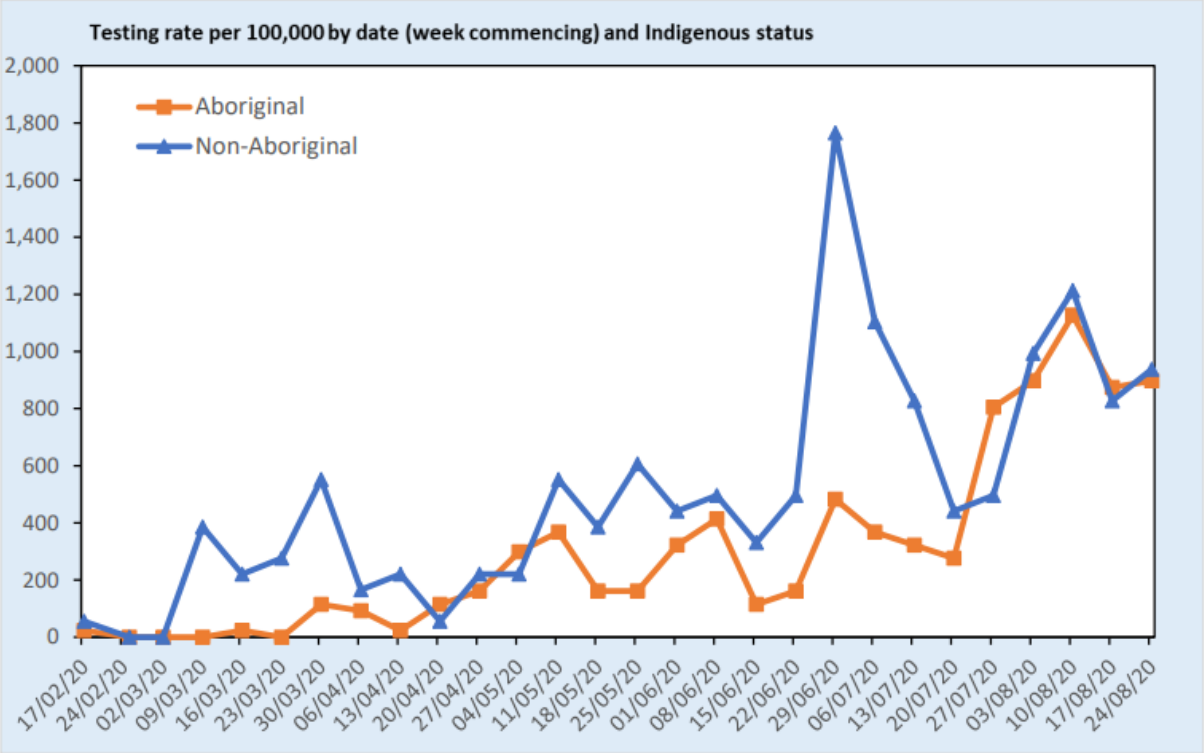
Note: * Indigenous status not stated in 14% of those tested

Katherine region testing rates by date and Indigenous status*



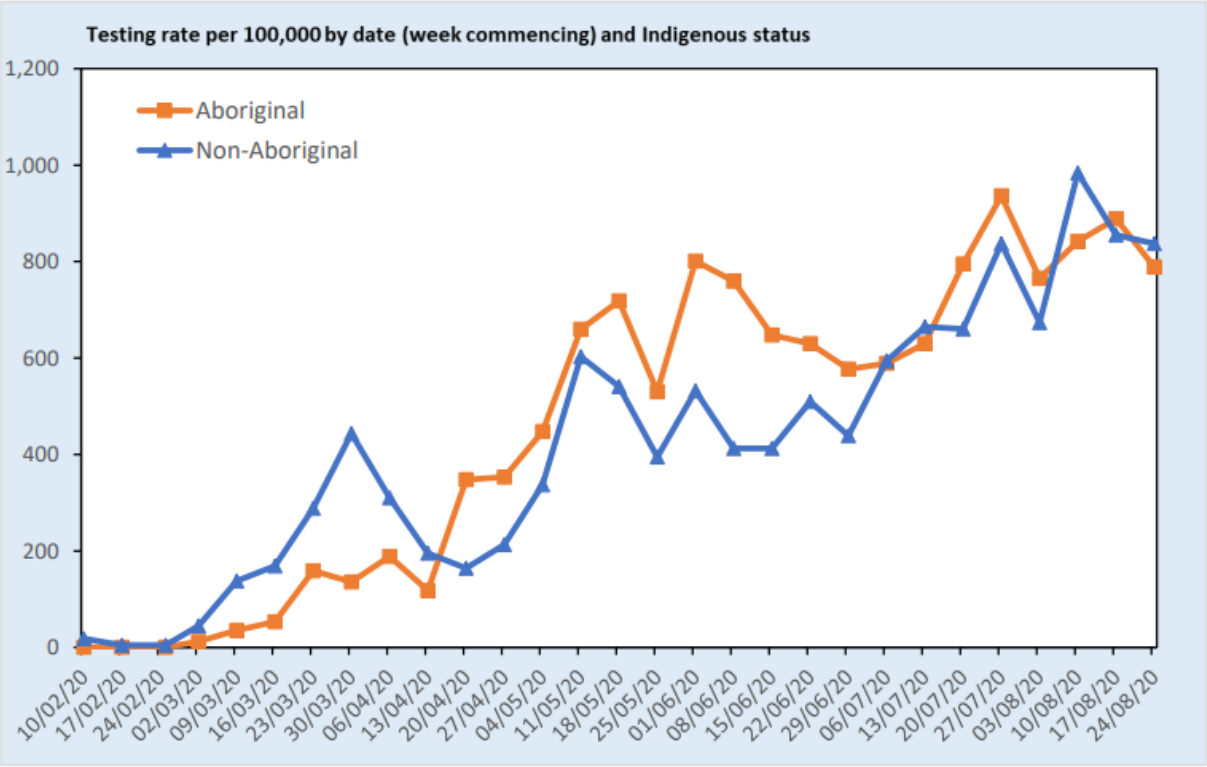
Note: * Indigenous status not stated in 11% of those tested

Barkly region testing rates by date and Indigenous status*



Note: * Indigenous status not stated in 4% of those tested

Alice Springs region testing rates by date and Indigenous status*



Note: * Indigenous status not stated in 25% of those tested

NT COVID-19 Surveillance Situation Report 30 September 2020

CDC NT COVID-19 Surveillance SitRep

Coronavirus (COVID-19)

30 September 2020

COVID-19 Cases

There have been 34 cases of COVID-19 diagnosed in the NT, with the most recent cases notified on 31 July 2020 and released from isolation on 14 August 2020. There has been no community transmission in the NT.

Figure 1 Confirmed COVID-19 cases by source and date of symptom onset

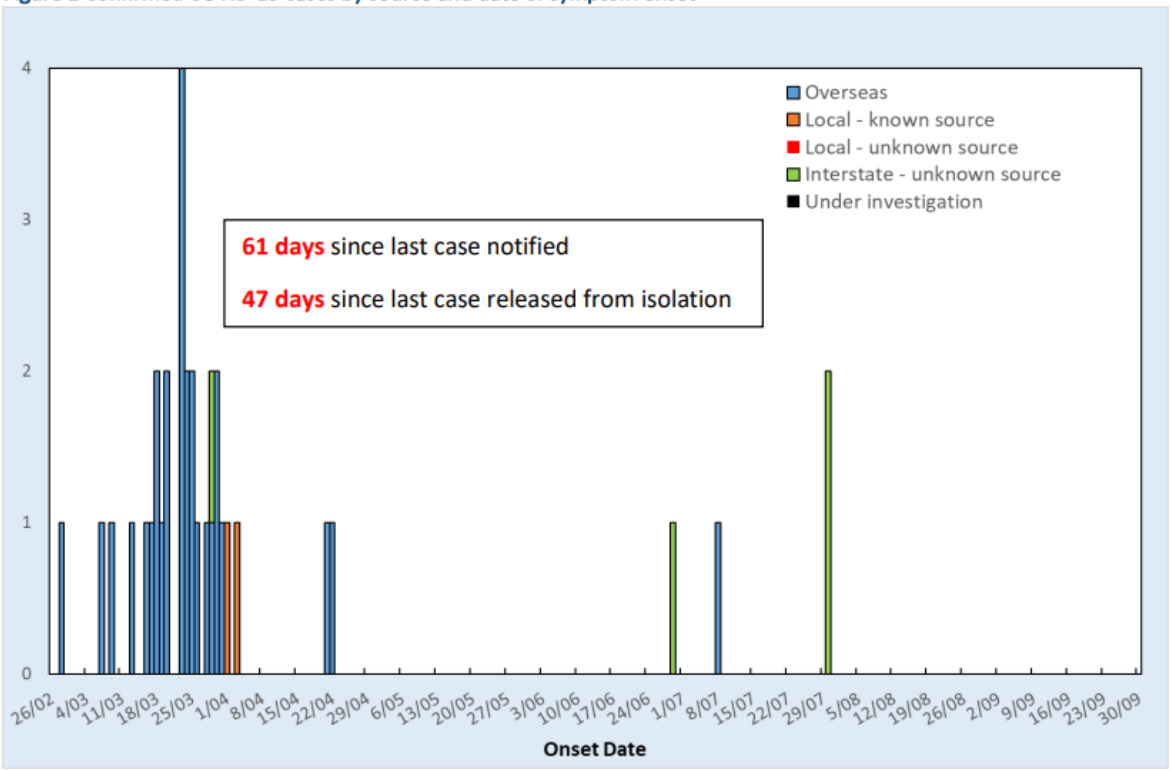


Table 1 COVID-19 cases by source of acquisition and Indigenous status

Source of acquisition	Indigenous	Non-Indigenous	Total
Overseas	0	28	28
Interstate	2	2	4
NT - known source			
NT healthcare setting	0	0	0
NT aged care setting	0	0	0
NT household setting	0	2	2
NT other setting	0	0	0
NT - unknown source	0	0	0
Total	**2**	**32**	**34**

Note: In national counts, 33 cases are reported in the NT due to a change in reporting definition on 18/05/2020

Close contacts

There are currently no close contacts undergoing monitoring in the NT. A total of 606 close contacts have undergone monitoring in the NT, the last of whom was released from quarantine on 11 September 2020.

Testing trends

Table 2 Testing counts & rates by region

Region	29/09/2020	Last 7 days	Previous 7 days	Total	Rate per 100,000
Darwin total*	247	2,007	2,309	32,981	19,827
RDH Pandemic Clinic	*44*	*268*	*264*	*7,814*	
Howards Springs Drive Through	*-*	*2*	*-*	*1,640*	
Howards Springs Supervised Quarantine	*94*	*907*	*1,137*	*6,227*	
East Arnhem	4	49	51	1,264	8,225
Katherine	8	53	82	1,603	8,061
Barkly	2	33	39	828	13,439
Alice Springs	53	341	381	8,440	21,339
Todd Facility Drive Through	*10*	*74*	*79*	*344*	
Todd Facility Supervised Quarantine	*9*	*38*	*43*	*171*	
Unknown		0	1	71	
Total [1,2,3]	**314**	**2,483**	**2,863**	**45,187**	**18,243**

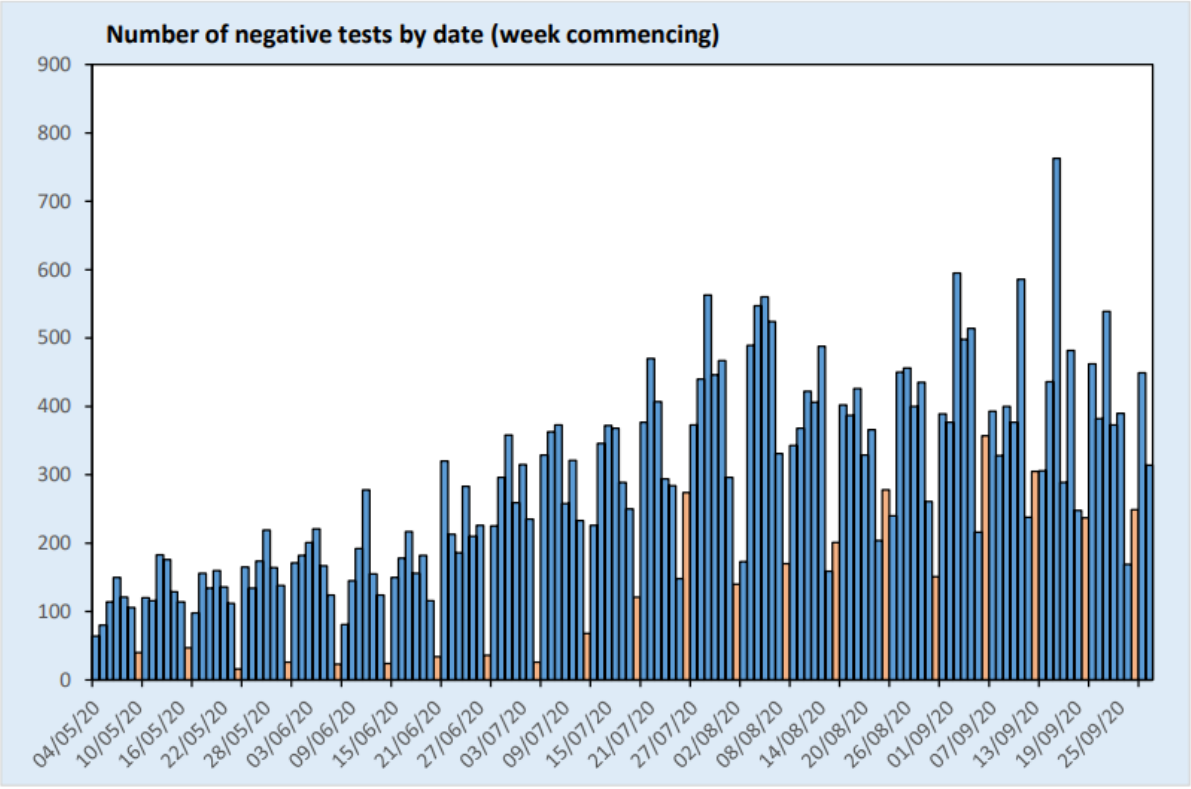
* Darwin total includes Royal Darwin Hospital pandemic clinic & outreach, Howard Springs drive through, Howard Springs supervised quarantine plus other inpatient, outpatient and primary health care services

1. Includes rapid tests performed by Territory Pathology. Total will be reported monthly
2. Includes point of care test (POCT) results for clients tested in remote communities from 23/05/20 (Table 3 provides district breakdown for POCT)
3. Does not include 2,328 results for International defence force members

Table 3 Point of care testing counts performed in primary health care by region since 23/05/2020

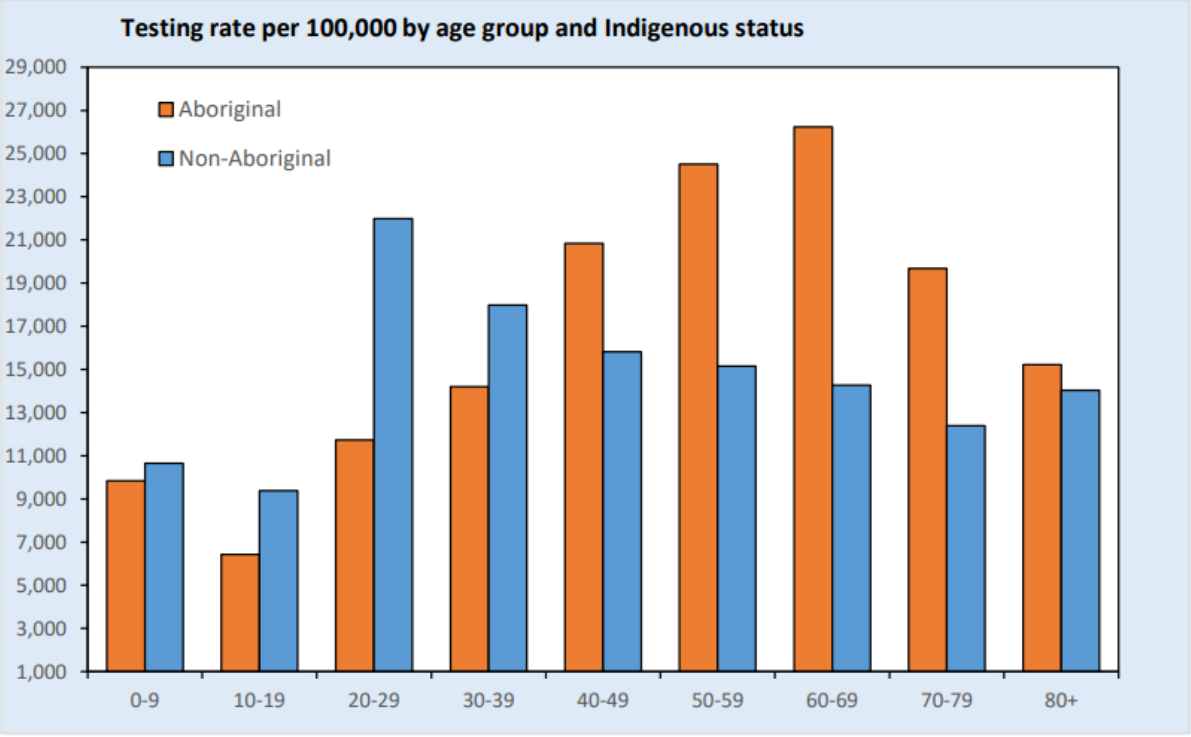
Region	29/09/2020	Last 7 days	Previous 7 days	Total	Rate per 100,000
Darwin	12	61	43	372	224
East Arnhem	4	19	20	330	2,147
Katherine	1	5	8	122	614
Barkly	2	9	12	186	3,019
Alice Springs	10	43	32	422	1,067
Total	**29**	**137**	**115**	**1,432**	**579**

Figure 2 Daily count of negative tests



Note: Daily counts of COVID-19 tests prior to 04/05/2020 are available on request

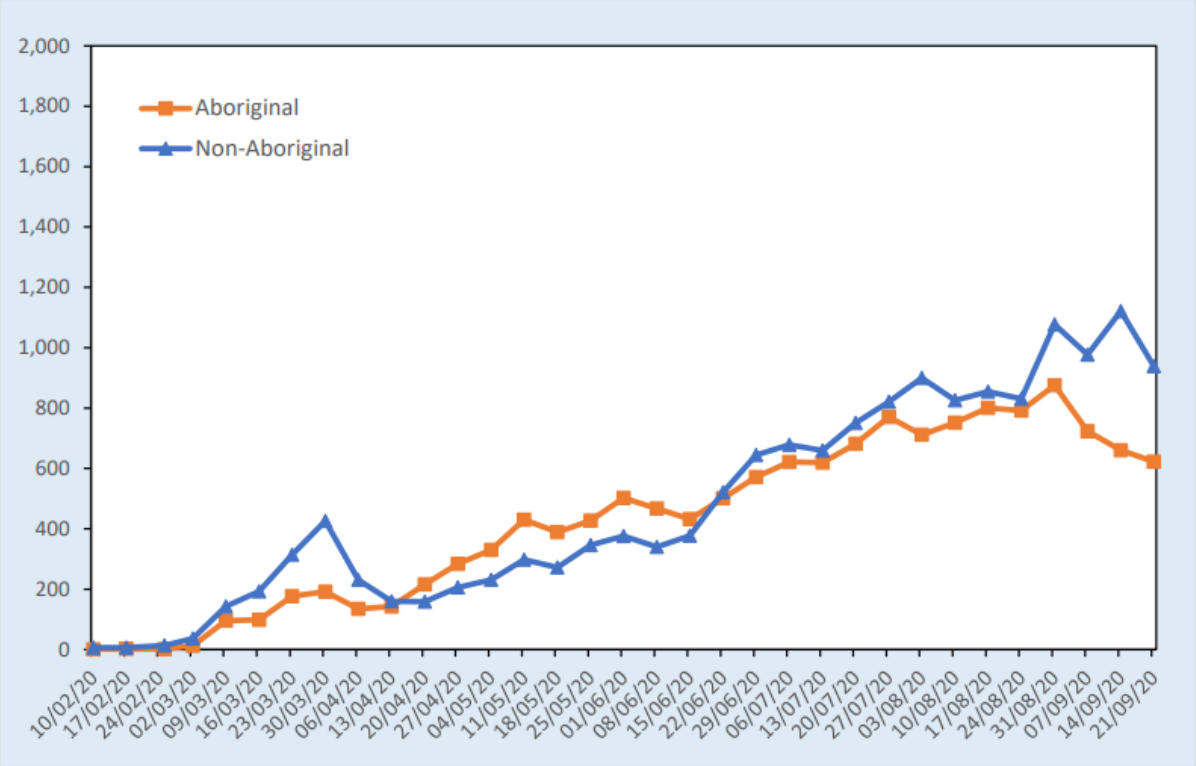
Figure 3 Testing rates by age-group and Indigenous status*



Note: * Indigenous status not stated in 15% of those tested

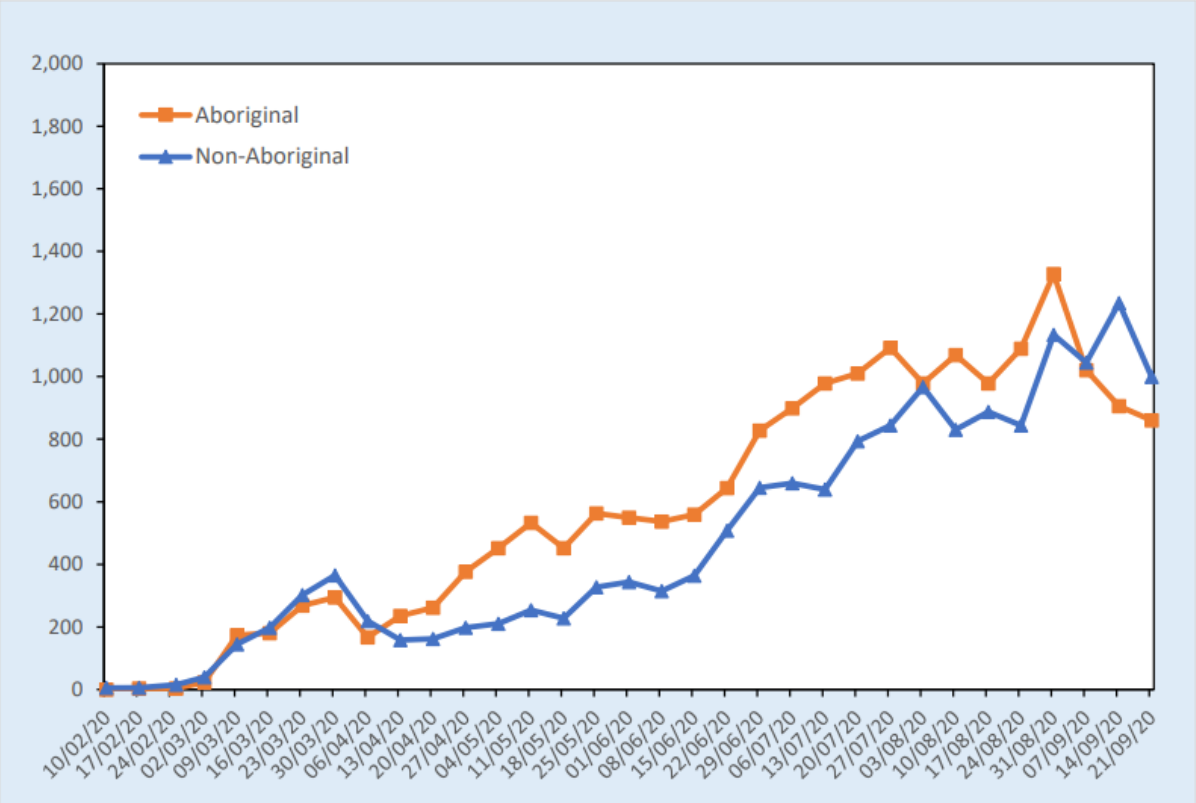
CDC NT COVID-19 Surveillance SitRep

Figure 4 NT total testing rates (per 100,000) by date and Indigenous status*



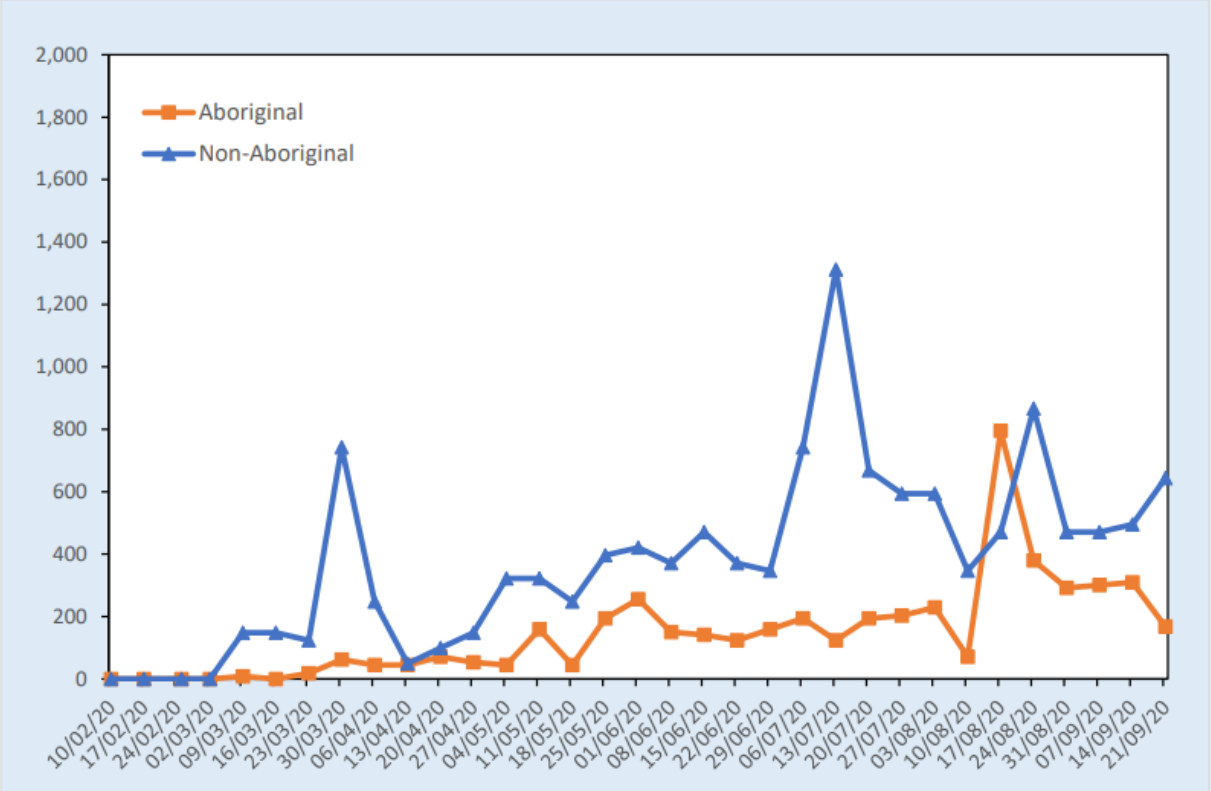
Note: * Indigenous status not stated in 15% of those tested

Figure 5 Darwin region testing rates (per 100,000) by date and Indigenous status*



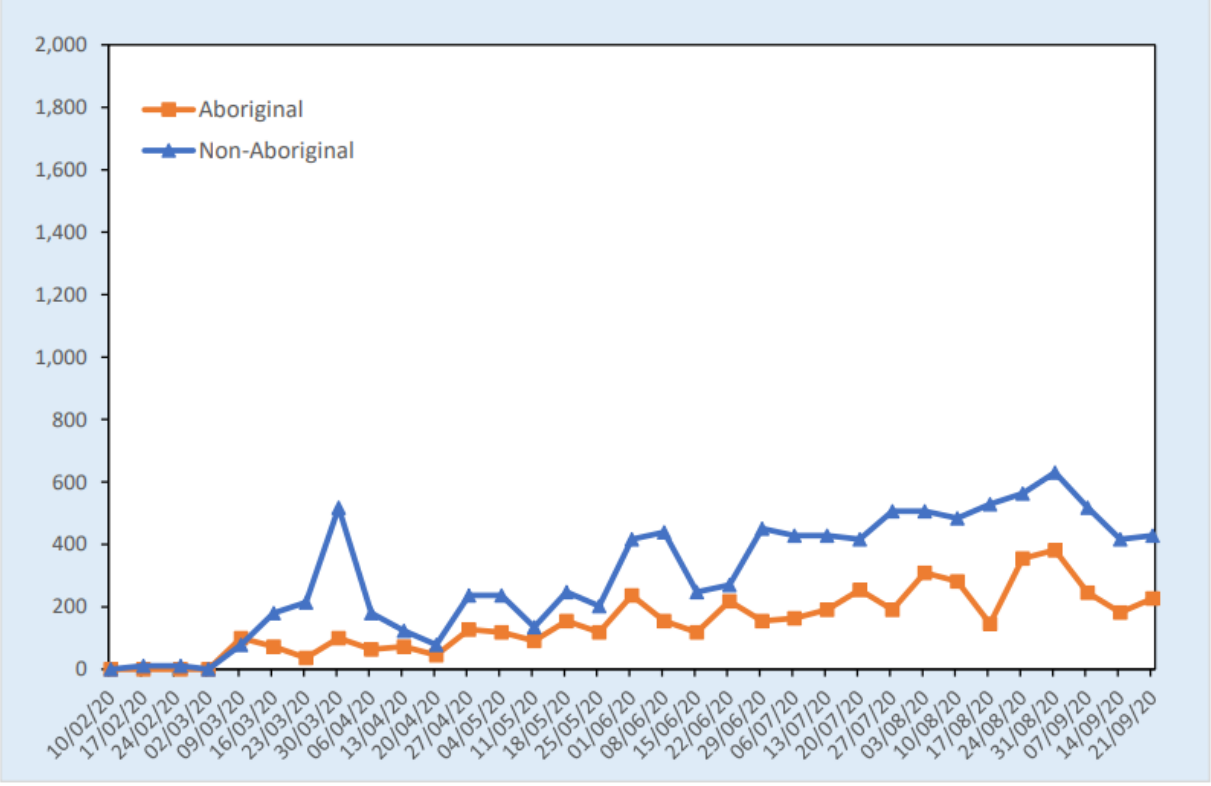
Note: * Indigenous status not stated in 15% of those tested

Figure 6 East Arnhem region testing rates (per 100,000) by date and Indigenous status*



Note: * Indigenous status not stated in 16% of those tested

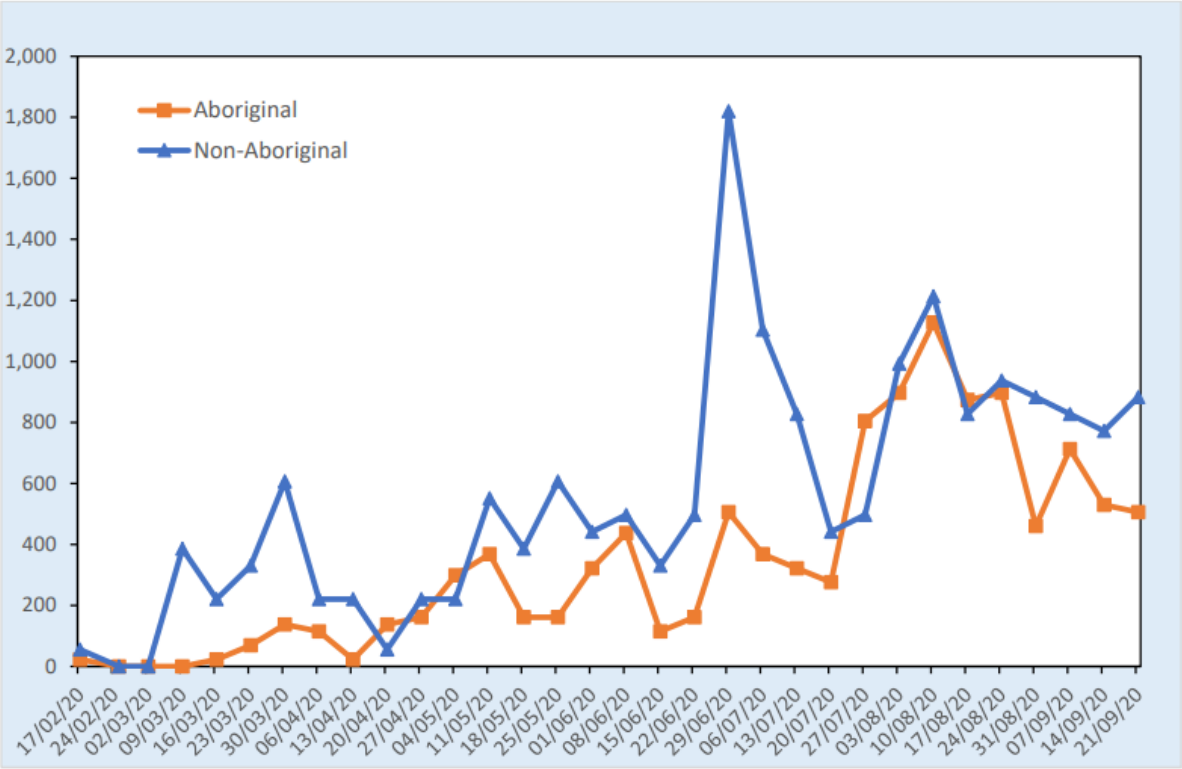
Figure 7 Katherine region testing rates (per 100,000) by date and Indigenous status*



Note: * Indigenous status not stated in 9% of those tested

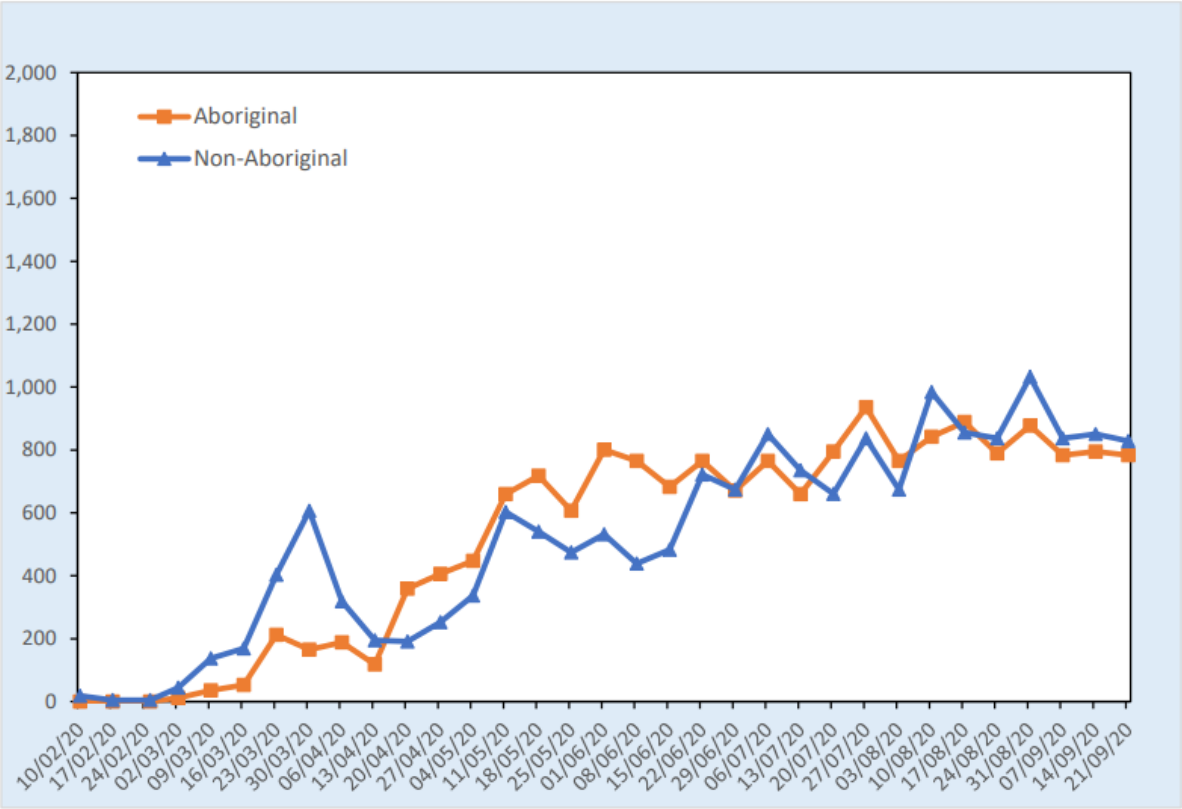
CDC NT COVID-19 Surveillance SitRep

Figure 8 Barkly region testing rates (per 100,000) by date and Indigenous status*



Note: * Indigenous status not stated in 2% of those tested

Figure 9 Alice Springs region testing rates (per 100,000) by date and Indigenous status*



Note: * Indigenous status not stated in 18% of those tested

Abstracts from peer reviewed published articles related to the Northern Territory

Case ascertainment on Australian registers for Acute Rheumatic Fever and Rheumatic Heart Disease

Agenson T, Katzellenbogen JM, Seth R, Dempsey K, Anderson M, Wade V, Bond-Smith D

Int. J. Environ. Res. Public Health. 2020;17 (15):5505
https://doi.org/10.3390/ijerph17155505

In Australia, disease registers for acute rheumatic fever (ARF) and rheumatic heart disease (RHD) were previously established to facilitate disease surveillance and control, yet little is known about the extent of case-ascertainment. We compared ARF/RHD register records with administrative hospital data from the Northern Territory (NT), South Australia (SA), Queensland (QLD) and Western Australia (WA) for cases 3-59 years of age. Agreement across data sources was compared for persons with an ARF episode or first ever RHD diagnosis. ARF/RHD registers from the different jurisdictions were missing 26% of Indigenous hospitalised ARF/RHD cases overall (ranging 17-40% by jurisdiction) and 10% of non-Indigenous hospitalised ARF/RHD cases (3-28%). The proportion of hospitalised RHD cases (36%) was half the proportion of hospitalised ARF cases (70%) notified to the ARF/RHD registers. The registers were found to capture few RHD cases in metropolitan areas (SA Metro: 13%, QLD Metro: 35%, WA Metro: 14%). Indigenous status, older age, comorbidities, drug/alcohol abuse and disease severity were predictors of cases appearing in the hospital data only ($p<0.05$); sex was not a determinant. This analysis confirms that there are biases associated with the epidemiological analysis of single sources of case ascertainment for ARF/RHD using Australian data.

Community leadership and empowerment are essential for eliminating rheumatic heart disease

Carapetis JR, Brown A

Med J Aust. 2020;213(3):116-117
10.5694/mja2.50695

No abstract - Editorial

COVID-19 associated pneumonia and pleural effusion masquerading as heart failure in Rheumatic Heart Disease

Malik J, Javed N, Naeem H, Sattar Rana A, Ikram U

European Journal of Case Reports in Internal Medicine. 2020;7(8)
https://doi.org/10.12890/2020_001842

The ongoing outbreak of coronavirus disease 2019 (COVID-19) that began in Wuhan, China, became an international emergency when thousands of people were infected around the world. COVID-19 emerged in Pakistan in April 2020, precipitating a nationwide lockdown. While some countries are now recovering from the pandemic, its peak is not estimated to occur in Pakistan until August 2020. We present a case of rheumatic heart disease with fever, myalgia and an unusual radiological finding of the virus.

Learning points:

- Unusual radiological findings seen in COVID-19 patients.
- Pleural effusion in a mildly symptomatic patient is a rare presentation of the disease.
- Early aggressive treatment can produce dramatic improvement in COVID-19 pneumonia

Utilising a novel surveillance system to investigate species of *Forcipomyia* (*Lasiohelea*) (Diptera: Ceratopogonidae) as the suspected vectors of *Leishmania macropodum* (Kinetoplastida: Trypanosomatidae) in the Darwin region of Australia

Panahi E, Shivas M, Hall-Mendelin S, Kurucz N, Rudd PA, De Araujo R, Skinner EB, Melville L, Herrero LJ

International Journal for Parasitology: Parasites and Wildlife. 2020;12:192-198
https://doi.org/10.1016/j.ijppaw.2020.06.004

Up until recently, Australia was considered free of *Leishmania* due to the absence of phlebotomine sandfly species (Diptera: Phlebotominae) known to transmit *Leishmania* parasites in other parts of the world. The discovery of *Leishmania (Mundinia) macropodum* (Kinetoplastida: Tryanosomatidae) in Northern Australia sparked questions as to the existence of alternative vectors of *Leishmania*. This has added to the complexity of fully understanding the parasite's interaction with its vector, which is known to be very specific.

Previous findings demonstrated *L. macropodum* infection beyond the blood meal stage in the day-biting midges *Forcipmyia* (*Lasiohelea*) Kieffer (Diptera: Ceratopogonidae) implicating them in the parasite's life cycle. Currently, there is no conclusive evidence demonstrating this suspected vector to transmit *L. macropodum* to a naïve host.

Therefore, this research aimed to investigate the vector competency of day-biting midge *F. (Lasiohelea)* to transmit *L. macropodum* utilising a novel technology that preserves nucleic acids. Honey-soaked Flinders Technology Associates (FTA®) filter-paper cards were used to obtain saliva expectorated from biting midges while sugar-feeding. *F. (Lasiohelea*) were aspirated directly off macropods from a known *Leishmania*-transmission site and were kept in a waxed paper container holding honey-coated FTA® card for feeding.

Insect identification and Taqman quantitative real-time PCR (qPCR) screening assays revealed *L. macropodum* DNA in *F. (Lasiohelea*) up to 7 days post field-collection, and in an unidentified biting midge, previously known as *F. (Lasiohelea*) sp. 1. Moreover, 7/145 (4.83%) of FTA® cards were confirmed positive with *L. macropodum* DNA after exposure to field-collected *F. (Lasiohelea*). Additionally, FTA® cards were found to be a valuable surveillance tool, given the ease of use in the field and laboratory. Overall, our findings support previous reports on *L. macropodum* transmission by an alternative vector to phlebotomine sandflies. Further studies identifying and isolating infective *L. macropodum* promastigotes is necessary to resolve questions on the *L. macropodum* vector.

Physical distancing and non-respiratory notifiable diseases in the Northern Territory, March-May 2020

Xie O, Markey PG, Draper ADK, Krause VL

Commun Dis Intell. (2018);2020:44
10.33321/cdi.2020.44.90

Strict physical distancing measures and border controls have been introduced in the Northern Territory (NT), and across Australia, to reduce the spread of coronavirus disease 2019 (COVID-19). These measures have been associated with reduced incidence of other respiratory illnesses such as influenza.

It is currently unclear what effect these measures have on non-respiratory communicable diseases. The incidence of notifiable non-respiratory communicable diseases within the NT, from 15 March to 15 May 2020, the period of most restrictive physical distancing, was monitored and is here compared with two control periods: (i)

the 4 months immediately prior and (ii) the same two month period from the preceding 5 years. During the study period, there was a decline in incidence of communicable enteric illnesses, particularly in shigellosis and rotavirus where person-to-person spread is the main transmission route. There was an increase in chlamydial conjunctivitis in areas with endemic trachoma, which is under further investigation. There was no observed increase in conditions associated with crowding, such as those related to group A streptococcal infection.

An outbreak of serotype-1 sequence type 306 invasive pneumococcal disease in an Australian Indigenous population

Cook HM, Giele CM, Jayasinghe SH, Wakefield A, Krause VL

Commun Dis Intell. (2018);2020:44
10.33321/cdi.2020.44.66

Abstract

Between 2010 and 2013, an outbreak of serotype-1 sequence type 306 (ST306) invasive pneumococcal disease (IPD) occurred primarily in remote locations of Northern and Central Australia. This is a descriptive study of the epidemiology of the outbreak using nationwide IPD surveillance data, supplemented with more detailed data held by affected jurisdictions, and of the response to the outbreak, including vaccination strategies. In the year the outbreak peaked (2011), serotype-1 IPD incidence was over 30-fold higher in the affected regions than in the rest of Australia (incidence rate ratio: 30.7 [95% CI 20.1–48.9]). The study includes 245 cases of serotype-1 IPD from the outbreak regions, with 75.5% identified as Indigenous. No reported cases of serotype-1 IPD occurred in young children who had completed either a 10- or 13-valent pneumococcal conjugate vaccine schedule. However serotype-1 IPD did occur in older children who had previously received 23-valent pneumococcal polysaccharide vaccine. Development of public-health-focused national IPD management guidelines, including suitable vaccine strategies for consistent use nationwide, could potentially decrease the duration and intensity of similar outbreaks in the future.

Keywords: outbreak, serotype-1, invasive pneumococcal disease, Australian Indigenous, pneumococcal vaccine, *Streptococcus pneumoniae*

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NORTHERN TERRITORY GOVERNMENT

Centre for Disease Control

Salmonellosis

What is salmonellosis?

Salmonellosis is an infection of the bowel caused by the *Salmonella* bacteria.

How is it spread?

Salmonellosis is usually spread by eating undercooked food from infected animals such as chicken, eggs or other meats or by eating ready-to-eat foods such as fruits or vegetables that have been contaminated with faeces from an infected animal. Spread can also occur when food or drinking water has been contaminated by very small amounts of faeces from infected people.

Salmonellosis can also be acquired through contact with objects or an environment contaminated by the faeces of animals carrying *Salmonella*. Common animals that can carry *Salmonella* include chickens and other birds, reptiles (including geckoes, lizards and snakes), frogs, kangaroos, livestock, cats and dogs.

What are the symptoms?

The symptoms usually develop between 6 to 72 hours after infection, but most commonly between 12 to 36 hours.

Symptoms of salmonellosis include watery diarrhoea (sometimes with blood or mucus), fever, headache, abdominal pain, nausea, vomiting and loss of appetite.

In healthy people the diarrhoea usually improves within several days to a week but persists for longer in a small number of people. It may be several months before bowel habits are entirely normal.

Rarely the infection spreads beyond the bowel to the blood and other parts of the body. This can be very serious and require hospital treatment.

What is the infectious period?

While the *Salmonella* bacteria remains in their faeces, infected people can pass the infection on to others. This can be from several days to several weeks. Some people carry the bacteria in their bowel for months after the illness. They appear well but can still spread the infection. Children who are not toilet trained and carry the bacteria are an important source of infection to parents and within child care settings.

Who is at risk?

The most severe illness is seen in children, the elderly and those with impaired immune systems.

Children who attend childcare facilities are at greater risk of infections spread through faecal contamination. Spread occurs when children share toys or food that have become contaminated and place it in their mouths. Particular care has to be taken wherever there are children in nappies.

Travelers to developing countries where sanitation and hygiene standards are poor, are at higher risk of contracting diarrhoeal illnesses.

What is the treatment?

Antibiotics are generally not recommended for salmonellosis as the infection usually resolves on its own within days.

Anyone with diarrhoea should drink extra fluids to avoid dehydration. Children with diarrhoea, who vomit or who refuse extra fluids should see a doctor. Anyone with prolonged or severe diarrhoea, or who has symptoms causing concern should see a doctor.

Medicines to prevent vomiting or diarrhoea should not be given, especially to children, except when prescribed by a doctor.

How can salmonellosis be prevented?

Good hygiene is the best way to prevent salmonellosis.

Hands should be washed thoroughly with warm soapy water:

- after going to the toilet
- before preparing, handling or eating food
- after handling raw poultry and meats
- after every nappy change
- after changing soiled linen after touching animals, reptiles, birds or other pets.

In the kitchen:

- cook all meat and eggs thoroughly before eating
- avoid using dirty or cracked eggs
- to minimize risk, cook eggs until the white is completely firm and the yolk begins to thicken
- do not consume unpasteurised milk or dairy products made from unpasteurised dairy products
- wash hands, kitchen work surfaces, and utensils with warm soapy water immediately after they have been in contact with raw meat or poultry
- separate the preparation of raw meat from that of ready-to-eat foods (e.g. salad) by using separate utensils and chopping boards.

Other measures include:

- never change nappies on tables or counters where food is prepared or eaten
- clean change areas with warm soapy water and disinfectant after every nappy change
- clean books, toys, equipment, furnishings, floors and toilets regularly (including toilet door handles).

People with diarrhoea should not prepare or handle food that will be eaten by others.

How can it be controlled?

Anyone with diarrhoea should not attend childcare/school until there has not been a loose bowel action for 24 hours.

Anyone with diarrhoea should not swim, wade or paddle in public pools.

Doctors and public health workers are interested in preventing outbreaks of diarrhoea. If there are 2 or more cases of diarrhoea in a group, these should be reported to the local Centre for Disease Control.

For more information contact the Centre for Disease Control in your region

Alice Springs	8951 7540
Darwin	8922 8044
Katherine	8973 9049
Nhulunbuy	8987 0357
Tennant Creek	8962 4259

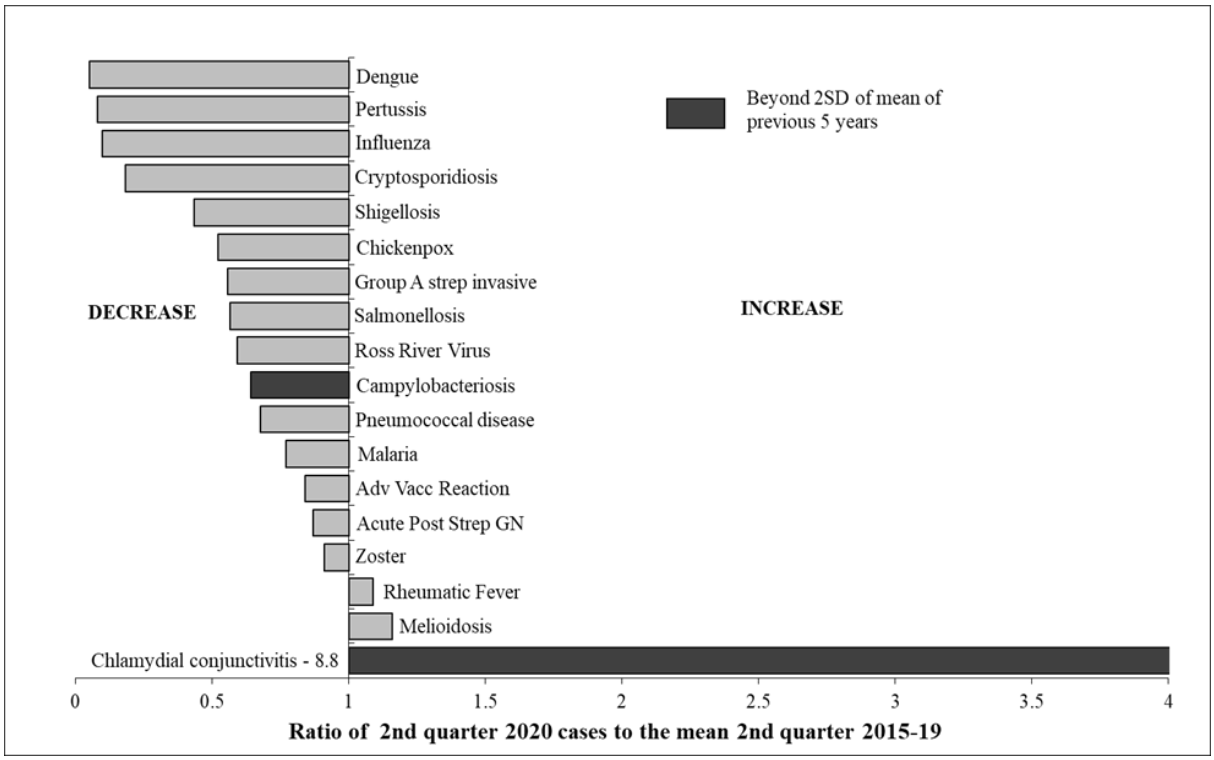
or

https://health.nt.gov.au/professionals/centre-for-disease-control/cdc-contacts

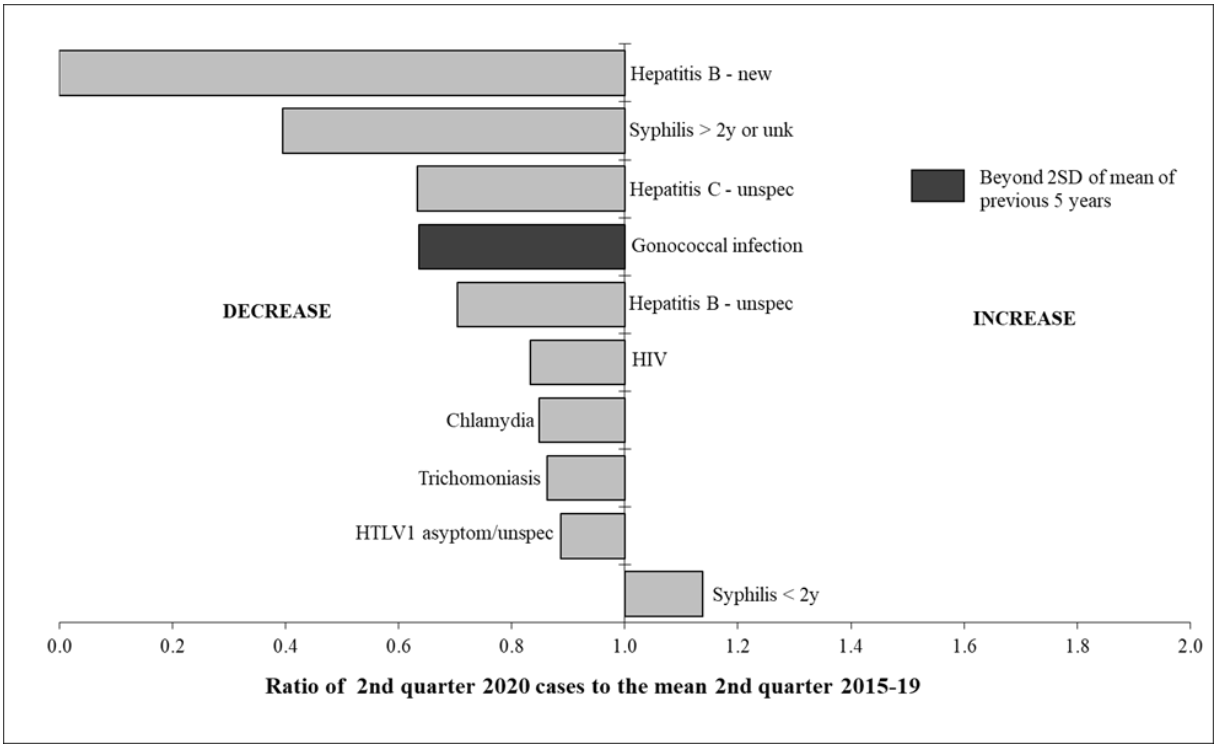
NORTHERN TERRITORY NOTIFICATIONS BY ONSET DATE AND DISTRICT
1 April—30 June (2019 and 2020)

	Alice Springs		Barkly		Darwin		East Arnhem		Katherine		N T	
	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019
Acute Post Strep GN	3	0	2	0	3	0	0	0	0	0	8	0
Adv Vacc Reaction	2	1	0	2	16	20	0	1	0	2	18	26
Barmah Forest	0	0	0	0	0	0	1	0	0	0	1	0
Campylobacteriosis	19	36	3	7	40	68	5	0	5	7	72	118
Chickenpox	3	3	0	0	6	16	0	3	0	0	9	22
Chlamydia	183	274	14	27	272	380	46	52	90	93	605	826
Chlamydial conj	33	2	1	2	2	1	0	0	24	2	60	7
Cholera	0	0	0	0	0	1	0	0	0	0	0	1
Coronavirus - pandemic potential	0	0	0	0	6	0	0	0	0	0	6	0
Crusted scabies	1	5	1	2	9	1	4	3	1	1	16	12
Cryptosporidiosis	2	14	3	1	4	38	1	2	0	2	10	57
Dengue	0	0	0	0	1	13	0	2	0	0	1	15
Gastro - related cases	0	0	0	0	0	0	0	1	0	0	0	1
Gonococcal conj	1	0	0	0	0	1	0	0	0	2	1	3
Gonococcal infection	131	179	20	17	78	94	23	24	39	55	291	369
Gonococcal neon ophth	0	1	0	0	0	0	0	0	0	0	0	1
Group A strep invasive	6	11	1	5	2	6	0	0	2	2	11	24
Hepatitis A	0	0	0	0	0	1	0	0	0	0	0	1
Hepatitis B - chronic	0	0	1	0	4	5	0	0	0	1	5	6
Hepatitis B - new	0	1	0	1	0	0	0	0	0	1	0	3
Hepatitis B - unspec	1	8	0	0	18	17	0	1	0	1	19	27
Hepatitis C - new	0	0	0	0	0	1	0	0	0	0	0	1
Hepatitis C - unspec	6	9	0	1	18	28	0	2	3	2	27	42
Hepatitis E	0	0	0	0	0	2	0	0	0	0	0	2
H Influenzae b	1	1	0	0	0	0	0	0	0	0	1	1
H Influenzae non-b	0	0	0	0	0	1	0	0	0	0	0	1
HIV	1	1	0	0	5	9	0	0	0	0	6	10
HTLV1 asyptom/unspec	7	16	1	0	0	0	0	0	3	0	11	16
Influenza	6	321	0	37	7	297	4	19	2	74	19	748
Lead - elevated	0	0	0	0	141	11	11	12	1	0	153	23
Legionellosis	0	0	0	0	0	2	0	0	0	0	0	2
Leptospirosis	0	0	0	0	0	0	0	0	0	1	0	1
LGV	0	0	0	0	0	0	0	1	0	0	0	1
Malaria	1	2	0	0	1	1	0	0	0	0	2	3
Melioidosis	0	0	0	0	13	9	1	4	2	0	16	13
Meningococcal infection	0	2	0	1	0	1	0	0	0	1	0	5
Mumps	0	0	0	0	2	0	0	0	1	0	3	0
Non TB Mycobacteria	0	0	1	0	1	4	0	0	0	0	2	4
Pertussis	0	1	0	0	2	8	0	0	0	1	2	10
Pneumococcal disease	5	9	0	0	5	1	0	2	0	3	10	15
Rheumatic Fever	8	23	7	6	10	15	13	7	6	3	44	54
Rheumatic heart disease	6	10	2	2	6	13	2	9	7	3	23	37
Ross River Virus	1	4	1	2	19	35	4	4	2	4	27	49
Rotavirus	4	1	1	0	3	10	0	0	0	1	8	12
Salmonellosis	7	11	4	5	75	78	9	5	8	14	103	113
Shigellosis	15	43	3	10	12	22	3	8	4	8	37	91
STEC/VTEC	0	0	0	0	1	0	0	0	0	0	1	0
Syphilis < 2 y	20	22	8	2	33	38	6	3	9	14	76	79
Syphilis > 2 y or unknown	2	1	0	2	6	10	0	2	1	5	9	20
Syphilis congenital	1	0	1	0	0	0	0	0	0	0	2	0
Trichomoniasis	201	189	57	36	216	107	92	48	105	44	671	424
Tuberculosis	0	0	0	0	3	4	0	0	1	3	4	7
Typhus	0	0	0	0	0	1	0	0	0	0	0	1
Varicella - unspec	0	1	0	0	15	2	0	0	0	0	15	3
Vibrio food poisoning	0	0	0	0	0	0	1	0	0	0	1	0
Yersiniosis	0	0	0	0	2	4	0	0	1	0	3	4
Zoster	14	10	3	5	65	90	6	3	6	12	94	120
Sum:	691	1,212	135	173	1,122	1,466	232	218	323	362	2,503	3,431

Ratio of the number of notifications in the 2nd quarter of 2020 to the 5 year mean (2015-19): Selected diseases



Ratio of the number of notifications in the 2nd quarter of 2020 to the 5 year mean (2015-19): Sexually transmitted diseases



Comments on notifications

Chlamydial conjunctivitis
There were 60 cases of chlamydial conjunctivitis notified in the 2nd quarter which was almost 9 times the expected number based on the 5 year mean of 6.8. This was treated as an outbreak and investigated by CDC staff, the report will be published in a later edition of *The Bulletin*.

Campylobacteriosis
The number of notified cases of campylobacteriosis was 36% fewer than expected in the 2nd quarter based on the 5 year mean (72 vs 112). This was thought to be due to the restrictions on movement which were in place during the quarter due to the Covid-19 pandemic.

The restrictions may have meant that fewer specimens were being sent from remote communities to the laboratories for testing.

Gonococcal infection
There were 291 cases of gonococcal infection in the 2nd quarter which was 46% fewer than the expected number of 458. This fall in gonococcal infection rates has been recognised since late in 2018. This fall seems to be real rather than due to a drop in testing but the cause is unknown and still being investigated.

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NT Malaria Notifications April to June 2020

Liz Stephenson, Clinical Nurse Manager, TB/Leprosy Clinic Manager, CDC Darwin

There were 2 cases of malaria notified in the 2nd quarter of 2020.

No. cases	Origin of infection	Agent	Chemoprophylaxis	NT region
1	Papua New Guinea	*Plasmodium vivax*	No	Darwin
1	Solomon Islands	*P. vivax*	No	Alice Springs