Abstract
A survey looking at firework-related injuries arising from Territory Day has been undertaken annually since 1998. This report covers the data collected in 2017 and makes comparisons with previous years. In 2017 there were a record number of injuries with 38 people presenting to the surveyed health facilities during the survey period. A substantial number of children and bystanders was injured. Some of the people setting off fireworks and causing injury were reported to have been consuming alcohol. The reason for the high number of injuries is not clear, but once again it raises the question of whether the health and other costs associated with the private use of fireworks is considered to be reasonable.

Key words: Fireworks; injury; Territory Day; children; bystanders.

Background
An annual survey of firework-related injuries arising from the Territory Day celebrations in the Northern Territory (NT) has been carried out by the Centre for Disease Control (CDC) every year since 1998. Territory Day, held on 1 July, celebrates the establishment of self-government in the NT in 1978. Up until 1980 the use of fireworks was reserved for 5 November, Guy Fawkes Day, but it was decided by the new NT cabinet that it would be more appropriate to celebrate the gaining of self-government rather than an event that happened in London in the 17th century. Since 1980 there have been restrictions of varying degrees on the sale of fireworks to the public. Currently it is legal for persons aged 18 years and older to purchase fireworks between the hours of 9am and 9pm on 1 July and to set them off between the hours of 6pm and 11pm. The purchase, transport, storage and use of fireworks come under the Dangerous Goods legislation administered by NT WorkSafe. Over the years the sale of some types of fireworks has been banned, either because they pose a
significant safety risk or because they are too loud. The NT is the only jurisdiction in Australia where fireworks can legally be purchased and used by members of the public.

Concern about the number of firework-related injuries led to the establishment of the annual survey by the CDC. The objectives of the survey are to raise awareness of the dangers of firework misuse and to try and better understand what leads to injury to thereby enable preventive strategies to be developed.

Methods
As in previous years the Emergency Departments of the 5 public hospitals in the NT, the 24 hour Palmerston Super Clinic and the Australian Defence Force Health Services were invited to participate in the survey. The survey was conducted from 1 minute past midnight on 1 July 2017 to midnight on 8 July. During this period people presenting with a firework-related injury to any of the facilities were asked to participate in the survey. If they declined to participate, only demographic data and the nature of the injury were recorded. If they agreed to participate, more detailed information was recorded including the nature and severity of the injury, the location at which the injury was sustained, the type of fireworks involved, whether the person was a bystander or was using the firework themselves, whether the person had been consuming alcohol and what first aid measures had been applied. The data have been added to those of previous years to establish whether there are any trends and to further contribute to our understanding of firework-related injuries in the NT.

Results
Since 1998 a total of 406 people have been recorded as sustaining a firework-related injury with an average of 20 per year. In 2017 there were 38 firework-related presentations to the facilities surveyed during the period 1 to 8 July. This is the highest on record (see Figure 1).

Of those injured, 27 (79%) were male and 11 (21%) were female. The highest number (11 people) were injured in the 10–19 year old age group (29%), followed by 9 people (9%) in the over 40 years age group. There were 7 children under the age of 10 years with firework-related injuries in 2017 (see Figure 2). This is the highest number since 1998 when 9 children under 10 years were injured.

Of those injured, 18 (47%) were bystanders which is higher than the 14 (37%) who were injured while setting off the firework. There are no data for the remaining 6 people (see Figure 3).

The most common form of injury was burns (24, 63%), followed by injuries to the eye (6, 16%), lacerations (3, 8%), injuries to the ear (2, 5%) and other (1, 3%). One person had 2 injuries and there are no data for 3 people.

The data on severity are unreliable because of inconsistencies in the recording, however it is

Figure 1. Annual frequency of firework-related injuries in the NT (1998-2017) by hospitalisations, bystander status and total injured
known that 1 person with a serious eye injury and 1 with a burn were admitted to hospital. This is low compared to previous years, when the mean number of admissions to hospital was 3.3 per year.

There were 16 (42%) injuries to the head including face, ears and eyes, 11 (29%) to the lower limb, 7 (18%) to the upper limb and 3 (8%) to the torso. Burns were reported in 9 people and 1 had tinnitus due to an explosion.

While basic data are available for all people presenting with firework related injuries, only 10 people agreed to participate in a survey with a full questionnaire administered and not all of these questionnaires were completed. Questionnaires were completed for 1 child under 10 years, 4 from those aged between 10 and 20 years and the rest were from those 20 years and over. Of those who completed the questionnaires, 7 of the 10 injured were bystanders. One of the people admitted to hospital completed the survey and 5 other people required follow up with the remaining 4 categorised as having minor injuries. Alcohol had been consumed by 4 of the people who were setting off the firework, 5 had not consumed alcohol and the status of 1 is unknown. Multi-shot fireworks were implicated in 3 injuries, single-shot in 2, a candle in 1 and the type of firework was not recorded in 4 cases.

Examining the data from the last 20 years, the highest numbers of firework-related injuries have occurred on a Saturday (38 in 2017 and 35 in 2006), but the pattern is inconsistent with the third highest occurring on a Tuesday (2003) and the lowest number recorded occurring also on a Saturday in 2003 (see Figure 4).

**Discussion**

The year of 2017 was clearly one in which there were significant harms caused by fireworks. As well as the highest ever number of firework-related injuries, the Fire and
Emergencies Services responded to around 400 blazes compared to 159 in 2016. The reasons for this are unclear; the fact that Territory Day occurred on a Saturday may have been a factor but there are insufficient data to confirm this. It is of concern that children and bystanders sustained injuries that required a visit to a hospital, suggesting reduced attention to the safe handling and responsible use of fireworks, despite numerous warnings and the distribution of advice on how to keep users and bystanders safe.

In 2007/8 a survey undertaken in Canberra found that attitudes towards the private purchase and use of fireworks were fairly evenly distributed between those who supported the practice and those who did not. The following options were put forward:

- further amend the regulations
- ban consumer fireworks
- maintain the status quo.

When the data in Canberra were examined, there was no evidence that the amendments already made had any effect, and the government was of the view that the social and environmental costs were too high to maintain the status quo and so the decision was made to ban the private purchase and use of fireworks in the ACT. This was put into effect in 2009.

It appears that there is little appetite for change in the NT, the popularity of the use of fireworks by private individuals remains high as attested to by the high volume of sales (336 tonnes) according to one source. It remains to be seen whether this year’s record breaking number of injuries and fires will be repeated next year and whether Territorians will continue to consider the health and social costs of “Cracker Night” to be acceptable.

Acknowledgements
To the staff of Royal Darwin Hospital Emergency Department and Burns Unit, the Emergency Departments of Alice Springs Hospital, Tennant Creek Hospital, Katherine District Hospital, and Gove District Hospital as well as the staff at Palmerston Super Clinic and Robertson Barracks who gave up precious time to collect data and administer questionnaires during the survey period.

References

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Figure 4. Number of firework-related injuries by year and day of the week - NT 1998-2017
Abstract

In June 2017, the Section Head of Medical Entomology of the Northern Territory Department of Health visited mosquito control programs in the United States (US) as part of the Australian and US Mosquito Control Association’s personnel exchange program. The program facilitates an exchange of mosquito surveillance and control information to enhance mosquito control capabilities both in the US and in Australia.

Key words: Mosquito control; USA; Florida; New Jersey; exchange program.

Introduction

Since the early 1990’s, the Australian and United States (US) Mosquito Control Association’s personnel exchange program has provided the opportunity for exchange of mosquito surveillance and control information. Originally the exchange only included Australian and mostly Florida mosquito control programs, but in 2017 the Mercer County program in New Jersey participated in the exchange for the first time.

As the Section Head of Medical Entomology, Centre for Disease Control (CDC), Northern Territory (NT) Department of Health (DoH), I was the successful applicant for the program in June 2017, and was invited to visit 8 mosquito control programs in New Jersey and Florida, as a representative of the NT DoH.

During the 4 weeks of my stay, I was hosted by US mosquito control staff in the Mercer, Volusia, Pasco, Manatee, Collier and Indian River Counties, with each program ensuring a smooth transfer to the next destination. I had the opportunity to discuss similarities and differences between the NT and US programs, and to participate in all aspect of mosquito surveillance and control.

While the US and the NT programs are similar, there are some differences in approaches and some aspects that could be incorporated to enhance the NT program. In this article, I would like to take the opportunity to point out some of the highlights and differences I encountered.

Differences in approaches

One of the most apparent differences was the governance of the programs. While the NT Medical Entomology unit is under the DoH umbrella, some of the US programs are ‘independent programs.’ These programs are funded by the tax payer for specific mosquito control services, and thus have an obligation to respond to all public mosquito complaints. The programs are governed by elected Commissioners, who audit the programs on a monthly basis.

While the NT and all US programs are integrated mosquito control programs, another difference is the strong focus of most of the Florida programs on adult mosquito control. In the NT, larval mosquito control is the key element of the program, with adult mosquito control only carried out following exotic vector detections or disease outbreaks. Thus, the Ocean County program in New Jersey was the most similar program to the NT, as it also focussed on larval control.

However, adult mosquito control is an important element in Florida, due to restricted opportunities for or no mosquito control on Federal land and in protected areas, and the fact that urban development occurs adjacent to extensive mosquito breeding sites without any apparent development regulations or restrictions. Thus, to protect residents, aerial and ground based adulticide missions are carried out at night over urban residential as well as breeding sites, based on mosquito landing counts (salt marsh mosquitoes in the US are not disease vectors), trap results and public complaints.

In Florida, biting midges also have a big impact on residents due to the close proximity of urban areas to biting midge breeding sites. As there are no practical control measures available for biting midges, due to the larvae breeding in mangrove
mud, ‘cages’, as seen in Figure 1, are a common structure in Florida’s backyards. These cages consist of biting insect mesh, protecting residents and enabling them to enjoy their outdoor areas when biting midge and mosquito numbers are high.

In contrast, the DoH Medical Entomology unit in the NT has a strong work relationship with developers and the Department of Infrastructure Planning and Logistics, addressing potential biting insect impacts on future urban developments at an early planning stage. This cooperation facilitates 12 month baseline biting insect studies resulting in rectification of mosquito breeding sites as well as establishment of biting insect buffers to protect residents from mosquitoes and biting midges.

In addition, the Medical Entomology unit is privileged to have a combined mosquito engineering program with the City of Darwin, with funding provided to maintain and rectify storm water drains and depressions to prevent mosquito breeding. Discussions indicated that no such programs exist in New Jersey or Florida, with some drain maintenance carried out by either the mosquito control programs or other relevant authorities but without a combined effort to specifically prevent mosquito breeding.

Anyone who has ever visited Florida might be aware of the vast extent of salt marsh along the coast, and it comes as no surprise, that an extensive area in Florida was officially called ‘mosquito county’ on an old 1938 Florida map.

In the 1930’s mosquito breeding in the marshes was managed by establishment of rather large ditches to drain the marsh. However, the spoil mounds prevented proper drainage which subsequently led to a marsh restauraution program in 2000 with ditches partially filled in and mounds flattened. While the network of ditches are still reducing mosquito breeding extensively today, the emphasis has changed with the Federal Government now aiming to restore the marshes to their original state, with no further mosquito engineering works allowed. A great example of this type of marsh management was apparent in Ocean County, with a network of connected pools keeping large areas of the marshes permanently flooded, preventing the salt marsh mosquitoes to lay their eggs on moist mud (Figure 2).

Another strategy to prevent mosquito breeding in large mangrove areas are the use of impoundments, as was apparent in the Indian River Mosquito Control District (Figure 3). The structures were established to permanently flood large mangrove mosquito breeding sites at the

Figure 1. Biting insect screens at a private house in Florida

Figure 2. Marsh management at Ocean County

Figure 3. A large pump used to flood the impoundment
start of each breeding season to prevent the need for ongoing control. After initial flooding by pumping, only 1 control operation is required, as the salt marsh mosquitoes are prevented from laying further eggs in moist mud. At the end of the season water is again pumped out to prevent changes in the mangrove ecology. Although the district is still able to maintain and operate the impoundments, establishment of new structures are not allowed due to environmental concerns.

While the marshes provide extensive mosquito breeding ground, local freshwater ponds and waterways, when infested with weeds, are also producing large numbers of *Mansonina* and *Coquillettidia* mosquitoes. These mosquitoes are difficult to control, as the larvae attach themselves to the stems of water plants. The only way to effectively control these mosquitoes is through weed control. I witnessed such an operation in Pasco County, where water hyacinth and water lettuce were sprayed with herbicide to reduce mosquito numbers using an airboat (Figure 4).

**Figure 4. Water hyacinth control by airboat in a local pond**

Another interesting component of the Florida mosquito control programs is education. Officers frequently visit schools to engage with the students. I had the opportunity to accompany one of the education officers to a school camp, where she provided the students with interesting mosquito facts and explained the importance of tipping out water in backyards, before the students made their own mosquitoes (Figure 5).

**Figure 5. Students making mosquitoes at school camp in Pasco**

Students were highly enthusiastic, and I thought mosquito education was an aspect that could enhance the NT program. In addition, an open day at Collier County attracted more than 300 visitors to the program, with educational tours through the laboratory, as well as displays and information stalls. Again, I believe this could be considered by CDC as an annual event in Darwin and regional centres in the NT to further educate the public on disease prevention.

Insecticide resistance testing was another important aspect of mosquito control in Florida with a focus on synthetic pyrethroids and organophosphates. In Manatee County I assisted with a routine bottle bioassay, following established CDC protocols to test for resistance in laboratory reared dengue mosquitoes to Dibrom. This was a great experience and was followed up with discussions with researchers at the Indian River program on possible set ups for testing of resistance to biological insecticides and mosquito hormone growth regulators used in the NT.

One difference that I found rather amusing was the presence of beavers which added to the challenge of mosquito control in New Jersey due to their neat habit of damming waterways. Well, I guess we all have our own challenges, beavers in New Jersey and salt water crocs in northern Australia!

**Research into new mosquito traps**

During my visit I also had the opportunity to assist with research into new traps in the fight
against container breeding mosquitoes, which enable incursion of mosquitos from international ports. In Trenton, New Jersey, the autocidal gravid ovitrap was trialled in an effort to reduce levels of the Asian tiger mosquito, *Aedes albopictus*, which now is the number 1 pest mosquito in the area (Figure 6).

The ‘In 2 Care’ auto-dissemination trap is another trap type currently under investigation for the control of the dengue mosquito *Ae. aegypti* and *Ae. albopictus*. The trap has a dual mode of action, allowing the female to deposit her eggs while picking up and transferring the insecticide pyriproxyfen to adjacent receptacles, which will kill any larvae. At the same time the mosquito is contaminated with a fungus, which will ultimately lead to its death. Although to date there have been mixed results I am sure the mosquito world is keen on further published results for this new potential weapon.

Last but not least, a promising project in the fight against *Ae. aegypti* is currently in preparation in Lee County to be rolled out next year. It involves the release of sterile *Ae. aegypti* males, which will be released into wild populations in an effort to reduce numbers.

**Conclusion**

I was amazed by the generosity and enthusiasm of everybody I met during my visit, and it was a privilege to be able to share mosquito control related information, which without a doubt will enhance mosquito surveillance and control in both the US and Australia. I believe that the MCAA/AMCA exchange program facilitates program improvement and personal growth and I hope to be able to welcome the next US participant at our program in the NT in the near future.
As at 28 September 2017:
Meningococcal Disease in the Northern Territory

An outbreak of Meningococcal W (Men W) disease is occurring in Aboriginal children in Central Australia, Barkly and Katherine regions

1. Atypical symptoms are noted to occur in all age groups
2. Implementation of a meningococcal ACWY Vaccination Program is underway

There has been a marked increase in Men W cases occurring in Central Australia, Barkly and Katherine regions.

The Northern Territory (NT) Centre for Disease Control (CDC) has been notified of 15 cases of Men W disease in 2017. Of these, all but 2 cases have occurred since July. There have been:

- 10 confirmed cases in Central Australian region
- 3 confirmed cases in the Katherine region
- 2 confirmed case in the Barkly region

A further 4 meningococcal cases, yet to be sero-grouped, were notified in the 3 days prior to 28 September.

Please ensure suspected cases receive urgent medical care and early antibiotics due to the potential severity of the disease and rapid deterioration within hours of the first symptoms.

Be aware:

- Usual presentations of meningococcal disease with sepsis or meningitis include fevers, headache, neck stiffness, dislike of bright lights (photophobia), vomiting, purpuric rash, cold limbs, joint pains
- Babies and very young children may experience irritability, have difficulty waking, non-blanching petechial rash, bulging fontanelle, rapid or laboured breathing, refusal to walk/limping, diarrhoea, a high pitched cry or decrease oral intake
- People with Men W disease in this outbreak have had atypical presentations such as epiglottitis, septic arthritis, conjunctivitis or pneumonia that present alone (~20%) or in combination with usual findings.

Suspected cases should be notified to NT CDC. This allows CDC staff to advise on who should be identified as a contact according to the national meningococcal guidelines, as well as community wide ‘ring-fencing’ vaccination in the communities where the cases have occurred.

In relation to the cases so far, the public health response has included identifying and managing contacts according to the national meningococcal guidelines, as well as community wide ‘ring-fencing’ vaccination in the communities where the cases have occurred.

The NT Department of Health is funding a coordinated outbreak response vaccination program that is just starting to be rolled out. In this program, quadrivalent meningococcal ACWY vaccination will be available to all people aged 12 months to 19 years living in remote communities of Central Australia, the Barkly and Katherine West regions and for Aboriginal people aged 12 months to 19 years in urban Alice Springs, Tennant Creek and Katherine. This 12 month to 19 year old age group targets those most at risk of serious illness and those who are most likely to be carriers of the meningococcal bacteria.

The quadrivalent meningococcal ACWY vaccine will also be added to the NT immunisation schedule in early 2018 for all 12 month old children.

Those people who are not in the high risk groups may discuss the need for vaccination with their local health clinic or GP. It is available through a private prescription.

Resources on Men W disease and the Meningococcal ACWY vaccination program have been updated and are accessible on the CDC resources page under “M” at https://health.nt.gov.au/professionals/centre-for-disease-control/resources-and-publications.


Further information about meningococcal vaccines for health professionals is available from the NCIRS information sheet that is accessible at http://ncirs.edu.au/assets/provider_resources/fact-sheets/ meningococcal-vaccines-FAQ.pdf.

For more information contact the CDC in your region: Alice Springs 8951 7540, Darwin 89228044, Katherine 8973 9049, Nhulunbuy 8987 0357 Tennant Creek 8962 4259

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What is Meningococcal disease?
Meningococcal disease is a rare but severe infection that occurs when the germ 'invades' the body from the throat or nose.

How is it spread?
- Meningococcal disease is very hard to catch
- The germ is spread by respiratory droplets from close or prolonged person to person contact
- The germ doesn't live more than a few seconds outside the body

People DO NOT catch the germ by casual contact, breathing the air or touching the surface where someone with meningococcal germ has been.

How is it diagnosed?
Your doctor or health centre staff will recommend testing as required

How is it treated?
Meningococcal disease needs urgent treatment with antibiotics

How is it prevented?
Vaccination protects the person and reduces the spread of the disease

There are 4 types of meningococcal vaccines available in Australia

Discuss vaccination with your doctor or health centre staff

Household and close contacts
High risk contacts will be identified by local public health units and offered clearance antibiotics and vaccination as per the national guidelines. A high risk contact:
- lived in the same house or dormitory as the case in the 7 days prior to onset of illness
- engaged in Intimate kissing or was a sexual partner of a case in the 7 days prior to onset of illness
- child or staff at child care, kindergarten where the case spent 2 full days (6-8 hours per day) or a total of 20 cumulative hours in the 7 days prior to onset of illness
- sat directly next to a case in a vehicle (bus, plane, train) for greater than 8 hours

Further information contact the Centre for Disease Control
Darwin 8922 8044  Alice Springs 8951 7540  Katherine 8973 9049  Tennant Creek 8962 4259  Nhulunbuy 8987 0357
What is meningococcal disease?

Meningococcal disease is a rare but very serious bacterial infection caused by *Neisseria meningitidis* which is also known as the *meningococcus*. About 1 in every 10 people carry this germ in the nose or throat. Although most carriers remain well, they are able to spread it to others, who, if infected may become very unwell.

There are 6 different groups of the meningococcal bacteria that cause nearly all disease globally (A, B, C, W, X and Y). The most common in Australia and the Northern Territory has been group B but since 2014 groups W and Y have been increasing. Group C disease is now rarely seen because children are vaccinated against group C at the age of 12 months. In the Northern Territory over the last 5 years there have been 2-4 cases per year of meningococcal disease.

Meningococcal disease occurs in 2 main forms:
- meningococcal septicaemia or ‘blood poisoning’
- meningococcal meningitis.

Sometimes both septicaemia and meningitis can occur at the same time.

Meningococcal disease can develop very quickly and cause death in around 5-10% of those affected. However, if diagnosed early and treated with antibiotics promptly most people will make a full recovery.

**Meningococcal septicaemia**

Meningococcal septicaemia develops when the germ gets into the bloodstream and causes ‘blood poisoning’.

Symptoms of meningococcal septicaemia may include:
- fever
- rash, this may start anywhere on the body as tiny red or purple spots which can spread and enlarge to look like fresh bruises. The rash does not fade when pressure is applied to it
- joint or muscle pains.

The rash must be taken seriously as the person requires urgent medical attention.

**Meningococcal meningitis**

Meningococcal meningitis occurs when the germ infects the outer lining around the brain and spinal cord.

Symptoms of meningococcal meningitis include:
- fever
- stiff neck
- headache
- dislike of bright lights
- vomiting and/or diarrhoea
- rash of tiny red or purple spots or larger bruises
- joint or muscle pains
- drowsiness, confusion or even coma.

The symptoms of meningococcal meningitis in young babies may be more subtle.

They can include:
- disinterest in feeding
- vomiting and/or diarrhoea
- a high pitched moaning cry
- irritability and a dislike of being handled
- a blank staring expression
- turning away from light
- extreme tiredness or floppiness
- rash or a pale blotchy complexion
- convulsions or twitching.

How easy is it to catch meningococcal disease?

Although the germ is spread in droplets from the nose or throat it is fortunately not easy to catch the disease.
The bacteria do not survive for long outside the body. Close and prolonged contact with a carrier is usually required for the germ to spread to other people. The bacteria cannot be picked up from surfaces, water supplies or animals and are not easily spread by sharing drink bottles, food or cigarettes.

Meningococcal disease can affect all ages, but babies and young children under 5 years of age and young adults (15-24 years of age) are most at risk. People of any age regularly exposed to tobacco smoking are also at increased risk.

**How can meningococcal disease be prevented?**

Meningococcal disease can be prevented by vaccination. The vaccines available provide protection against:
- meningococcal C
- meningococcal ACWY
- meningococcal B.

Meningococcal C vaccine is given routinely to 12 month-olds in a combination vaccine which also provides protection against another bacteria *Haemophilus influenzae B*.

Meningococcal ACWY vaccine is recommended for:
- travelers to countries such as Africa and Asia and pilgrims to the Hajj
- people with high risk medical conditions.

As disease caused by group W and Y is on the increase ACWY vaccine is being considered for additional age groups known to be most at risk of transmitting the meningococcal bacteria.

Meningococcal B vaccine is available for use in individuals over 2 months of age. This is recommended for:
- children aged 2 months to 2 years
- adolescents aged 15-19 years
- people with high risk medical conditions.

ACWY and group B meningococcal vaccines can be purchased privately with a prescription from your doctor.

**What happens when a case occurs?**

There is a small but real risk for very close contacts of the person with meningococcal disease to also develop disease. Sometimes cases of meningococcal disease can also occur in clusters of people when bacteria spread from a carrier to more than 1 person.

Treatment of a carrier of meningococcal bacteria with antibiotics has been shown to stop further spread. However, because there is no quick and accurate test to identify carriers, all of the ‘household contacts’ of a case are considered as potential carriers and recommended to have antibiotic treatment. The purpose of the antibiotic is to eliminate the germ from the nose or throat of the carrier in an effort to prevent further spread to others.

Vaccination may also be offered to contacts.

Contacts must be told to be alert for the symptoms of the disease even if they have taken the antibiotic. Contacts of an infected person should share the information about meningococcal disease with their close contacts to raise awareness about signs and symptoms of meningococcal disease. Early presentation of possible cases to medical care is important. The treating doctor should be made aware if the person presenting is a possible meningococcal contact.

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

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Centre for Disease Control—Meningococcal disease

July 2017
Further Immunisation updates
Ros Webby, Centre for Disease Control, Darwin

The Australian Government has recently announced awareness campaigns targeting childhood vaccination and influenza vaccine for pregnant women.

Childhood immunisations

The Australian Government has launched a childhood immunisation awareness campaign- Immunisation Facts. The ‘Get the facts about immunisation’ campaign uses a range of materials to engage with parents and carers, childcare workers and health care professionals about the importance of childhood vaccination. For information and access to the videos and communication material see https://campaigns.health.gov.au/immunisationfacts (Photo).

Influenza vaccine in pregnancy

The Commonwealth have developed a series of health promotional videos to highlight the importance of all pregnant women receiving the influenza vaccine.

The videos ‘Flu vaccination and pregnancy-Free flu shots for pregnant women’ can be found at:
- https://youtu.be/IhUoMPPGgZA
- https://youtu.be/7m0M_rFlhFY
- https://youtu.be/9nWb6daxfEY

New vaccine catch-up programs for young people and humanitarian/refugee entrants

From 1 July 2017, all young people 10 to 19 years of age as well as all humanitarian and refugee entrants are eligible for free catch-up vaccines on an ongoing basis through the National Immunisation Program (NIP). This enables a nationally consistent catch-up schedule for all young people and refugees to access recommended vaccines at no cost. The tables on page 14 show the vaccines that are funded. Please note human papillomavirus and meningococcal C vaccines are funded for people up to age 19 years.

Changes to vaccine brands on the National Immunisation Program

From 1 July, all states and territories in Australia will now use Rotarix® at 6 weeks and 4 months. Rotateq® vaccine will no longer be available. Quadracel® or Infanrix IPV® will be supplied at the 4 year old schedule point for the DTPa-IPV vaccine. Engerix B Paediatric® or H-B-Vax II Paediatric® will be supplied for the birth dose of the hepatitis B vaccine.
### Table 1. Catch-up recommendations funded on National Immunisation Program for people 10-19 years of age

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Doses required</th>
<th>Minimum interval between dose 1 and 2</th>
<th>Minimum interval between dose 2 and 3</th>
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<tbody>
<tr>
<td>Diphtheria, tetanus and pertussis</td>
<td>3 doses*</td>
<td>4 weeks</td>
<td>4 weeks</td>
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<tr>
<td>Poliomyelitis</td>
<td>3 doses</td>
<td>4 weeks</td>
<td>4 weeks</td>
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<tr>
<td>Measles, mumps and rubella</td>
<td>2 doses</td>
<td>4 weeks</td>
<td>Not required</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>3 paediatric doses</td>
<td>1 month</td>
<td>3 months †</td>
</tr>
<tr>
<td>Meningococcal C</td>
<td>1 dose</td>
<td>Not required</td>
<td>Not required</td>
</tr>
<tr>
<td>Varicella ‡</td>
<td>1 dose if aged &lt;14 years</td>
<td>Not required</td>
<td>Not required</td>
</tr>
<tr>
<td>Varicella ‡</td>
<td>2 doses if aged ≥ 14 years</td>
<td>4 weeks</td>
<td>Not required</td>
</tr>
<tr>
<td>Human papillomavirus</td>
<td>3 doses</td>
<td>4 weeks</td>
<td>12 weeks</td>
</tr>
</tbody>
</table>

* Given that dT is not funded under the NIP, up to 3 doses of dTpa may be used.
† For hepatitis B vaccine, the minimum interval between dose 1 and dose 3 is 4 months.
‡ Varicella vaccine is recommended for all non-immune persons. Children who have an uncertain clinical history of disease or no documentation of age-appropriate varicella vaccination should be considered susceptible and offered vaccination unless confident clinical diagnosis of prior natural infection is made. At least 1 dose should be given to those aged <14 years, and all persons aged ≥ 14 years should receive 2 doses.

### Table 2. Catch-up recommendations for humanitarian and refugee entrants 20 years and over

<table>
<thead>
<tr>
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<td>4 weeks</td>
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<td>Not required</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>3 adult doses</td>
<td>1 month</td>
<td>3 months †</td>
</tr>
<tr>
<td>Varicella ‡</td>
<td>2 doses</td>
<td>4 weeks</td>
<td>Not required</td>
</tr>
</tbody>
</table>

* Given that dT is not funded under the NIP, up to 3 doses of dTpa may be used.
† For hepatitis B vaccine, the minimum interval between dose 1 and dose 3 is 4 months.
‡ Varicella vaccine is recommended for all non-immune persons. Children who have an uncertain clinical history of disease or no documentation of age-appropriate varicella vaccination should be considered susceptible and offered vaccination unless confident clinical diagnosis of prior natural infection is made. At least 1 dose should be given to those aged <14 years, and all persons aged ≥ 14 years should receive 2 doses.
NT CDC measles outbreak response *circa* 2017 – using technology to mount a rapid and more effective public health response

*Anthony Draper and Christian James, Centre for Disease Control Darwin*

Abstract

In March 2017, 2 cases of imported measles were notified to the Northern Territory Centre for Disease Control in Darwin. We describe how we used short message service (SMS) and the web-based software, NetEpi© to mount an effective public health response.

Keywords: measles; Northern Territory; outbreak; public health response; SMS; NetEpi.©

Background

Measles is an extremely infectious disease caused by a virus which is a member of the genus *Morbillivirus*. Measles infection typically results in fever, conjunctivitis, coryza, cough and a characteristic red blotchy rash. Some people, particularly the very young and immunocompromised, can develop serious disease including encephalitis. Measles remains one of the leading causes of death among young children worldwide with over 134 000 deaths caused by the disease in 2015 alone.

In Australia, people born before 1966 (by having had childhood measles), are considered immune to measles, as are those born in or after 1966 who have had 2 doses of measles-mumps-rubella (MMR) vaccine. Australia has high immunisation rates.

However, overseas acquired measles cases are occasionally imported into Australia. To control and prevent spread to under-immunised people, public health units around Australia follow national guidelines in order to isolate infectious persons, identify their contacts and provide post-exposure prophylaxis where required and quarantine them as appropriate. One case of measles constitutes an outbreak, and a measles response immediately becomes a high priority for a public health unit.

In the Northern Territory (NT) there were 67 notifications of measles between 2007 and 2016. The majority of these notifications (48) occurred in early 2014 with a large number of secondary (i.e. locally acquired in the NT) cases which resulted from 6 people who acquired their infections overseas and returned to the NT (Figure 1) and spread the disease to non-immune NT residents.

![Figure 1. Measles cases notified in the NT, 2007-2016](image-url)
A western Sydney public health unit estimated that their response to a measles outbreak in 2013 cost approximately $2,434 per case of measles, with 90% of that cost attributed to staff activities: contact tracing, interviewing cases and arranging testing. Likewise, measles outbreak response activities in the NT have required extensive patient contact interviewing with data capture and recording that has been largely paper based and labour intensive. This was particularly true in the large outbreak response that occurred in January to March 2014. Each contact of a measles case would be telephoned by a staff member at the Centre for Disease Control (CDC) and a questionnaire administered. This questionnaire would capture information about immunisation status, immunocompetency and pregnancy status and helped to determine whether contacts were immune, required quarantine, or prophylaxis in the form of MMR vaccine or normal human immunoglobulin (NHIG) to avoid illness. Contact tracing often involved unsuccessful attempts to telephone contacts, voice messages being left and then contacts returning messages. With multiple staff calling people and using paper based notes, it was an inefficient system which had the potential for duplication and some contacts to be missed.

The 2017 outbreak

In March 2017, we were notified of 2 imported cases of measles (1 from Bali, Indonesia and 1 from India) within a week of each other. The first case (Case A) was notified to CDC on Friday 24 March 2017. The second unrelated case (Case B) was notified to CDC on Thursday 30 March 2017.

Methods

We undertook public health follow up of both cases as per Australian guidelines.

We interviewed both measles cases to ascertain their travel history, provide quarantine and isolation advice, establish their infectious period and to identify contacts in order to identify those at risk of secondary infection. When cases visited medical facilities (e.g. hospital emergency department, medical clinic, physiotherapist, etc.) during their infectious period, we classified any person who was in the waiting or consultation room 30 minutes before the scheduled appointment and 30 minutes after the scheduled appointment as a contact requiring follow up. Medical facilities nominated by cases were asked to provide CDC with the lists of names and contact details for contacts as well as staff who were on duty at the nominated times.

NetEpi© is an online tool available to jurisdictional public health units in Australia and enables users to create forms and databases which can be used to record and store epidemiological data. Using NetEpi© we created an online version of the Communicable Disease Network Australia’s (CDNA) Measles investigation form. The NT CDC began using NetEpi© for recording contact tracing activities during a previous measles outbreak response in November 2014. When contact lists were received from medical facilities or ascertained from interviewing the cases, basic information was entered into NetEpi© including the location and time of the possible contact with the measles case (Figure 2).

The contacts of Case A were prospectively telephoned by a pool of CDC staff and information was entered into NetEpi© at the same time. If they answered the phone call, the questionnaire was administered. If they did not answer then a text message (SMS) was sent asking them to call the NT CDC as soon as possible. We sent the SMS using the internet based, Telstra Integrated Messaging Service (TIMS). This message also contained a hyperlink to the NT Government’s measles information page and asked people to call the CDC immediately (Figure 3).

The contacts of Case B were followed up differently. Instead of prospectively telephoning them, we sent the same SMS (Figure 3) using TIMS to the mobile number provided to us by their clinic or hospital. Those without a mobile number were telephoned on fixed telephone lines by CDC public health staff. We sent SMS in batches of 20-30 and public health staff at CDC fielded return calls to complete contact tracing. Callers were transferred from the reception to individual CDC staff as their phone lines became available. As contacts rang the CDC, staff searched for their pre-entered details.
Infection Prevention and Control at Royal Darwin Hospital followed up contacts that were inpatients.

Data from NetEpi were extracted and descriptive and statistical analysis was conducted using StataIC 13 (StataCorp). We used the Mann Whitney Wilcoxon Rank Sum test to analyse the number of days to complete contact tracing.

Following the outbreak response, we conducted a survey on a convenience sample of 36 persons who were contacts of Case B to determine why they did not respond to the SMS. This sample size was the number of people who were attempted to be surveyed by 4 CDC staff over a 3 hour period. We did this by telephone and used a standard questionnaire.

Results

In total, Measles Case A had 376 contacts and Measles Case B had 284 contacts. A summary of the contacts are in Table 1.

We successfully contacted 471/660 of the contacts identified (71%). Of the 189 that were
The Northern Territory Disease Control Bulletin Vol 24, No. 3, September 2017

Table 1. Total number of contacts identified during measles outbreak response, March 2017

<table>
<thead>
<tr>
<th></th>
<th>Measles Case A</th>
<th>Measles Case B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Contacts</td>
<td>376</td>
<td>284</td>
</tr>
<tr>
<td>No. in hospital Emergency Department</td>
<td>136</td>
<td>84</td>
</tr>
<tr>
<td>No. in hospital Outpatient Department</td>
<td>153</td>
<td>0</td>
</tr>
<tr>
<td>No. of out of hospital medical centres visited</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>No. of contacts at out of hospital medical centres</td>
<td>85</td>
<td>199</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

unable to be contacted, 46 (24%) were born before 1966 and likely immune and a further 16 (8%) had 2 documented doses of measles containing vaccine in their medical records.

Of the 189 people who were not contacted, 55 (29%) had no phone number recorded or the number provided was incorrect. Of the remaining 134 persons with a telephone, 29 (22%) were left a voice message and 23 (17%) were rung but had no facility to record a voice message.

In total we were unable to contact 57/220 (26%) of ED contacts, 33/153 (22%) of OPD contacts and 98/284 (35%) of medical clinic contacts.

The public health actions that resulted from our contact tracing are outlined in Table 2 below.

Table 2. Outcomes of measles outbreak response

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advised to get MMR*</td>
<td>54</td>
</tr>
<tr>
<td>Given MMR* at CDC†</td>
<td>24</td>
</tr>
<tr>
<td>Given NHIG‡ at CDC†</td>
<td>9</td>
</tr>
<tr>
<td>Testing for immunity arranged/ advised</td>
<td>39</td>
</tr>
<tr>
<td>Testing for measles disease arranged/ advised</td>
<td>1</td>
</tr>
</tbody>
</table>

* Measles Mumps Rubella vaccine
† NT Centre for Disease Control
‡ Normal human immunoglobulin

The telephone survey of 36 persons to determine why they did not respond to the SMS resulted in the successful contacting of a further 8 people which produced a further 10 contacts. Of the 36 people we surveyed, 9 (25%) had either disconnected or incorrect phone numbers (4, 11%) had been already contacted successfully but had not had their status and details updated to ‘completed’ in NetEpi, and 1 person hung up.

Of the 8 further people we were able to contact who did not initially call CDC after receiving an SMS, 3 did not call back because they thought it did not affect them, 2 forgot to call back, 2 did not trust the source of the SMS and 1 did not bother to read it. Only 1/8 of these people opened the hyperlink in the SMS with at least 2/8 worried that it might be a ‘scam’.

The number of days taken to complete the follow up of each contact on both cases was 1 day (i.e. range 1 – 5 days). Statistical analysis showed that although the median number of days was the same, contact tracing for Case B was completed more quickly than that for Case A (p<0.02).

Discussion

Our contact tracing activities associated with this recent measles response were more efficient than during our previous measles response in November 2014 (unpublished data) when we first used NetEpi™ as a contact tracing recording tool. The median time taken to complete contact tracing for each contact during the 2014 response was 4 days (range 1-23) compared to 1 day during this response. During that measles response, each of the 293 contacts were telephoned prospectively by CDC staff without the use of SMS. Our 2017 response saw CDC contact trace almost twice as many people (660) in a shorter amount of time with the use of SMS contributing to that reduction.

The percentage of people successfully contacted in 2014 (89%) however, was higher than the percentage we contacted in 2017 (71%). This would suggest that although SMS is a fast, low-cost (10 cents per message) and rapid method for communicating with the public, it
should not be relied upon as a sole method of communication when a 100% response rate is the target. Those who have not responded to the SMS would benefit from a telephone call when staff resources allow.

Over 29% of people who were unable to be contacted had a phone number that was disconnected or incorrect. It is recommended that medical practices and hospitals attempt to keep up-to-date and correct details in their systems. Additionally, some medical practices provided handwritten transcripts of waiting lists of contacts names and phone numbers which could have contributed to error. It is preferable for CDC to receive lists in spreadsheet form. This not only reduces the risk of transcription errors but also enables us to directly upload phone numbers into TIMS to send text messages.

Our telephone survey of people who did not respond to the SMS revealed that a lack of trust in the authenticity of the origins of the SMS may have been a barrier to people ringing the CDC or clicking the hyperlink which contained important information we wanted to disseminate. A similar project undertaken at CDC in 2015/2016 used an identical SMS format and had a 49% response rate which may have been due to the same reason. To improve ‘trust’ in the bona fide of the origins of the SMS we have gained approval to use an ‘alpha tag’ from now on (Figure 4). An alpha tag can be displayed in a SMS instead of a phone number so that a business or institution can allow the recipient of an SMS to immediately know who the SMS has been sent from rather than the SMS be associated with a number unknown to the recipient.

We also decided that during a measles response, any media releases or NT Government Facebook posts should inform the public that we will be contacting people by SMS in an effort to improve trust and subsequent response rates.

Figure 4. SMS message sent to measles contacts during measles outbreak response with ‘NT Health’ alpha tag
The use of NetEpi© has continued to provide procedural benefits to staff at CDC during measles outbreak responses. Contact tracers can operate from their own offices or anywhere with internet access, and the direct entry of records into NetEpi© has resulted in improved data quality and greater efficiency. The discontinuation of paper forms has allowed anyone at CDC to complete contact tracing rather than a nominated contact tracer which occurred in the past. Having contact tracing records in NetEpi© also allowed for real-time situation reports to be produced which also allowed for resource requirements to be evaluated and allocated. This was particularly useful when forecasting staff requirements for out-of-hours duties and for determining whether to enlist assistance from outside of CDC.

A major limitation with analysing data from NetEpi© is that information needs to be updated continually e.g. a contact may initially be advised to receive MMR, then after they have received MMR that field then needs to be updated. As such, the data we analysed for this report only contains the final information contained in NetEpi© and not the data changes along the way.

There was an inherent lag-time from receiving contact lists from medical practices and the hospital and then pre-entering these data into NetEpi© prior to sending out the SMS. This could be reduced by receiving contact lists in spreadsheet form so they can be uploaded into the database in a single event. In any case, even with a delay in data entry, being able to send SMS in batches of 20-30 was still arguably faster than progressively calling 30 people by telephone.

**Conclusion**

A measles outbreak response can stretch the staffing resources of the NT CDC due to the intense contact tracing effort that is essential to reduce secondary cases, individual suffering and subsequent costs to the health care system. It also restricts staff from being able to complete their usual duties.

Our response to 2 imported cases of measles in March 2017 is evidence of how CDC is adopting new technologies and methods to complete contact tracing activities more effectively. SMS is a rapid low-cost method for contacting large numbers of people during an outbreak response but those not responsive to SMS should be contacted by telephone to complete contact tracing efforts. The addition of an alpha tag to SMS in future responses may increase public trust with SMS and increase response rates. SMS and other technologies should be increasingly considered for routine public health surveillance activities and outbreak responses.

**Acknowledgements**

We acknowledge all CDC staff for their efforts during the measles outbreak responses.

**References**

Elevated blood lead levels are now notifiable in the Northern Territory

Charles Douglas, Centre for Disease Control, Darwin

Following the detection of elevated blood lead levels (BLLs) in a group of children in the NT in 2014, probably related to exposure to lead shot, it was proposed that elevated BLLs should be made notifiable as they are in other jurisdictions in Australia. This was made even more relevant when an outbreak of lead toxicity among people sniffing Avgas was detected in March 2017. Prior to this only elevated BLLs related to occupational exposure were notified to NT WorkSafe. This occupational exposure notification of elevated BLLs to NT WorkSafe will continue.

As of 1 August 2017 laboratories are required to report any BLL above 5 micrograms per decilitre (µg/dL), equivalent to 0.24 micromoles per litre (µmol/L), to the Centre for Disease Control (CDC).

Upon receiving a notification of an elevated BLL from a non-occupational exposure CDC will contact the clinician. If the source of the exposure is unknown, a questionnaire will be administered by the attending medical officer, nurse, allied health professional or Aboriginal Health Worker to try and identify the source. If indicated, assistance will be sought from the Environmental Health Branch.

CDC has developed an information sheet, an exposure questionnaire and a Guideline for the Management of Elevated Blood Lead Levels all of which are available on the CDC web-site at https://health.nt.gov.au/professionals/centre-for-disease-control/resources-and-publications

- Reporting of elevated blood lead levels in the NT Guideline
- Elevated blood lead levels - Clinical Guidelines and Public Health Management
- Lead exposure questionnaire form

For any queries about an elevated BLL the Community Physician is the point of contact:

Dr. Charles Douglas:
charles.douglas@nt.gov.au, ph. 08 8922 8513

**********
What is lead?
Lead is a metal that occurs naturally in the environment. Everyone is exposed to very small amounts of lead through foods and water, but certain activities and jobs can expose people to higher than normal amounts. Lead is not needed by our bodies. It can enter bodies through breathing air or by swallowing food or objects contaminated with lead. Lead can cause a variety of health problems depending on the amount, age of the person and other health conditions.

Where is it found?
In Australia, the amount of lead around us has greatly decreased due to the removal of lead from petrol, house paint and other goods. Lead is still used in many industries. Around the home, lead may be found in: fishing sinkers, curtain weights, imported items such as food or drink containers, jewellery, traditional medicines and cosmetics, old pipes, solder and plumbing fittings, soil contaminated with old lead car batteries and old paint. Activities and hobbies that may involve lead include: hunting or eating game shot with lead shot, making fishing sinkers or ammunition, car/boat restoration, soldering, stained glass making and exposure to lead containing fuels (Avgas and some racing fuels).

What are the symptoms of lead poisoning?
At low levels, there may be no symptoms at all. Most elevated blood levels are due to longer term exposure to small amounts of lead. Levels between 5 to 10 mcg/dl are associated with increased blood pressure in adults and behavioural problems and learning difficulties in children. Blood lead levels over 10mcg/dL can cause anaemia, kidney damage and abnormal brain function. Higher levels in both children and adults can cause balance and coordination problems, abdominal pain, tiredness and poor growth.

Acute lead poisoning is caused by a recent exposure to a high amount of lead. It can cause symptoms such as drowsiness, nausea, vomiting, headache, fits and coma.

Who is at risk?
Children under 5 years of age are particularly at risk of harmful effects of lead. Pregnant women are at risk of passing lead onto their unborn child. Iron deficiency can increase the amount of lead absorbed by the body.

Who should be tested for lead exposure?
A blood lead test should be done if there is a concern a person has been exposed to lead. For example, they have been involved in lead-related activities or behaviours that put them at increased risk of lead exposure (e.g. children who swallow items such as soil).

What is the management of elevated blood lead levels?
The key aim is to find the likely source of lead and take actions to remove or reduce future exposure. Environmental risk assessment and testing can be undertaken when there is no obvious source of lead or when there is wider public health concern.

Medical intervention and hospitalisation is rarely required. Testing of family members or people who may have also been exposed to lead should be considered.

How can lead exposure be prevented?
Removing lead sources is the most effective way to prevent lead exposure. Lead containing items can be substituted (e.g. replace lead shot with steel shot) or avoided. Lead related hobbies or activities should be carried out with care to prevent swallowing/breathing in lead and contaminating surrounding areas. Washing hands is important.

For more information contact the Centre for Disease Control in your region
Alice Springs 89517540
Darwin 89228044
Katherine 89739049
Nhulunbuy 89780357
Tennant Creek 89624259

August 2017
Abstracts from peer reviewed published articles related to the 
Northern Territory

Chronic kidney disease in Australian HIV - infected patients: analysis of the Australian HIV Observational Database


Aim: To examine data from the Australian HIV Observational Database (AHOD) to, firstly, describe the incidence of chronic kidney disease (CKD) and rate of loss of renal function in HIV-infected individuals living in Australia, and then to examine the risk factors contributing to CKD in this population.

Methods: AHOD patients over 18 years of age were eligible if they had at least 2 serum creatinine measurements from 1 April 2008 until 31 March 2016 and an initial estimated glomerular filtration rate (eGFR) greater than 60 mL/min/1.73 m³. Cox proportional hazards models were used to assess risk factors for CKD, which included key patient demographic data and antiretroviral therapy (ART) exposure.

Results: Of 1924 patients included in the analysis between April 2008 and March 2016, 81 (4.2%) developed CKD (confirmed eGFR of less than 60 mL/min/1.73 m³ through 2 consecutive eGFR measurements at least 3 months apart). Of the examined risk factors, baseline age, baseline eGFR, and the route of HIV acquisition were statistically significant predictors of development of CKD. ART exposure, viral hepatitis co-infection, high viral load and low CD4 lymphocyte count were not found to be significant risk factors for CKD.

Conclusion: This is the first study to investigate the risk factors for development of CKD amongst Australian HIV-infected patients using cohort data. It highlights the need for awareness of renal risk factors, particularly amongst older patients or in those with pre-existing renal dysfunction. Further research is required to explore the discrepancy between patients who have acquired HIV through different means of exposure.

Prescribing for people with acute rheumatic fever

Ralph A, Noonan S, Boardman C, Halkon C, Currie B

Aust Prescr, 2017 Apr; Vol. 40 (2), pp. 70-75

Acute rheumatic fever (ARF) and its consequence, rheumatic heart disease (RHD), remain important problems in remote Indigenous Australian communities.

Aboriginal and Torres Strait Islander people living in urban settings, Maori and Pacific Islanders and immigrants from developing countries are also likely to be at elevated risk.

Guidelines and resources are available for healthcare professionals working with at-risk populations, and for patients with ARF or RHD and their families.

There have been some recent changes in Australian recommendations for antibiotic use, dose of aspirin, first-line choice for management of severe Sydenham’s chorea, and prevention of endocarditis.

For individuals diagnosed with ARF, the recommended treatment to prevent recurrences and development of RHD is benzathine penicillin G administered as an intramuscular injection every 4 weeks.
Trimethoprim+sulfamethoxazole reduces rates of melioidosis in high risk haemodialysis patients

Majoni S, Hughes J, Heron B, Currie B

Introduction: Melioidosis causes sepsis and death in the Top End of Northern Australia during monsoonal wet season. Dialysis-dependent adults suffer higher melioidosis rates compared to low rates among renal transplant patients who routinely receive trimethoprim+sulfamethoxazole prophylaxis.

Methods: We performed prospective interventional study to determine the efficacy and safety of daily trimethoprim + sulfamethoxazole prophylaxis in haemodialysis patients during the wet season; 1 November 2014 to 30 April 2015. Haemodialysis (for ≥ 3 months) patients (≥ 18 years) were offered treatment. 269 patients on haemodialysis were eligible. 8/269 (3%) patients were excluded from the analysis for being on melioidosis treatment. 169/261 (64.8 %) patients received the prophylaxis and 92/261 (35.2%) did not due to allergy history (n=10), remoteness and logistical reasons (n=60), poor dialysis attendance (n=11) and refusal (n=11).

We monitored for clinical side effects 3 times weekly and neutropenia, thrombocytopenia and liver function monthly throughout treatment and for 2 months post-treatment.

Results: 169/261 (64.8 %) patients received the prophylaxis. There was no age (years) difference by group (prophylaxis vs non-prophylaxis, 54.7 (11.3) v 54.3 (11.2) (p=0.751). 16/261 (6%) patients had melioidosis. The event frequency was 0 % [(0/169) (prophylaxis) vs 17.4% (16/92) (non-prophylaxis), p<0.001]. Higher thrombocytopenia and neutropenia rates were noted in the prophylaxis group. These did not warrantee treatment stoppage. There was no difference in liver function. 3(1.8%) patients withdrew from the treatment due to side effects.

Discussion: Daily dosing was effective and safe. Post-haemodialysis dosing in the subsequent seasons was effective and safer. We recommend this approach in melioidosis prevalent regions.

Adherence to secondary prophylaxis for rheumatic heart disease is underestimated by register data

de Dassel J, Fittock M, Wilks S, Poole J, Carapetis J, Ralph A

Objective: In high-burden Australian states and territories, registers of patients with acute rheumatic fever (ARF) and rheumatic heart disease (RHD) are maintained for patient management, monitoring of system performance and research. Data validation was undertaken for the Australian Northern Territory (NT) RHD Register to determine quality and impact of data cleaning on reporting against key performance indicators: overall adherence, and proportion of patients receiving ≥ 80% of scheduled penicillin doses for secondary prophylaxis.

Methods: Register data were compared with data from health centres. Inconsistencies were identified and corrected; adherence was calculated before and after cleaning.

Results: 2780 penicillin doses were validated; 426 inconsistencies were identified, including 102 incorrect dose dates. After cleaning, mean adherence increased (63.5% to 67.3%, p<0.001) and proportion of patients receiving ≥ 80% of doses increased (34.2% to 42.1%, p = 0.06).

Conclusions: The NT RHD Register underestimates adherence, although the key performance indicator of ≥ 80% adherence was not significantly affected. Program performance is better than hitherto appreciated. However some errors could affect patient management, as well as accuracy of longitudinal or inter-jurisdictional comparisons. Adequate resources are needed for maintenance of data quality in ARF/RHD registers to ensure provision of evidence-based care and accurate assessment of program impact.
Group A streptococcus, acute rheumatic fever and rheumatic heart disease: epidemiology and clinical considerations


Curr Treat Options Cardiovasc Med], ISSN: 1092-8464, 2017 Feb; Vol. 19 (2), pp. 15

Early recognition of group A streptococcal pharyngitis and appropriate management with benzathine penicillin using local clinical prediction rules together with validated rapid-strep testing when available should be incorporated in primary health care. A directed approach to the differential diagnosis of acute rheumatic fever (ARF) now includes the concept of low-risk versus medium-to-high risk populations. Initiation of secondary prophylaxis and the establishment of early medium to long-term care plans is a key aspect of the management of ARF. It is a requirement to identify high-risk individuals with rheumatic heart disease such as those with heart failure, pregnant women, and those with severe disease and multiple valve involvement. As penicillin is the mainstay of primary and secondary prevention, further research into penicillin supply chains, alternate preparations and modes of delivery is required.

Vitamin D and activated vitamin D in tuberculosis in equatorial Malaysia: a prospective clinical study


BMC Infectious Diseases (2017) 17:312

Background: Vitamin D deficiency (low plasma 25-hydroxyvitamin D [25D] concentration) is often reported in tuberculosis. Adjunctive vitamin D has been tested for its potential to improve treatment outcomes, but has proven largely ineffective. To better understand vitamin D in tuberculosis, we investigated determinants of 25D and its immunologically active form, 1,25-dihydroxyvitamin D (1,25D), their inter-relationship in tuberculosis, longitudinal changes and association with outcome.

Methods: In a prospective observational study of adults with smear-positive pulmonary tuberculosis in Sabah, Malaysia, we measured serial 25D, 1,25D, vitamin D-binding protein (VDBP), albumin, calcium, parathyroid hormone, chest x-ray, week 8 sputum smear/ culture and end-of-treatment outcome. Healthy control subjects were enrolled for comparison.

Results: 1,25D was elevated in 172 adults with tuberculosis (mean 229.0 pmol/L, 95% confidence interval: 215.4 - 242.6) compared with 95 controls (153.9, 138.4-169.4, p < 0.001), directly proportional to radiological severity (p < 0.001), and fell rapidly within 1 week of treatment commencement. Tuberculosis patients with higher baseline 1,25D achieved significantly higher percentage weight gain over time, including when controlling for baseline weight, however persistently elevated 1,25D was associated with worse residual x-ray changes and lower end-of-treatment BMI. 1,25D was inversely associated with PTH (p < 0.001), consistent with the extra-renal origin of the 1,25D. 25D did not differ between tuberculosis patients (mean 63.9 nmol/L, 95% CI: 60.6-67.3) and controls (61.3, 57.2-65.3, p = 0.24), and was unassociated with outcomes. Among tuberculosis patients in multivariable analyses, sex, age and VDBP were associated with 25D, and age and albumin with 1,25D. 1,25-dihydroxyvitamin was not significantly associated with 25D. Vitamin D deficiency <25 nmol/L was uncommon, occurring in only 5 TB patients; 1,25D was elevated in 3 of them.

Conclusions: In an equatorial setting, high extra-re nale production of 1,25D was seen in tuberculosis, including in individuals with 25D in the deficient range; however, severe 25D deficiency was uncommon. Baseline elevation of 1,25D, a marker of macrophage activation, was associated with better weight gain but persistent elevation of 1,25D was associated with worse radiological and BMI outcomes. 1,25D warrants testing in larger datasets including TB patients less responsive to treatment, such as multi-drug resistant TB, to test its utility as a marker of tuberculosis severity and treatment response.
A cascade of care: more detailed information regarding treatment of latent tuberculosis infections in the Darwin region

Boyd R, Johnston V, Farmer B, Krause V
Centre for Disease Control, Darwin

The following is a summary of the recently published article in the Medical Journal of Australia (see Reference) with a more detailed Figure (page 27) that visually depicts the cascade of care for those diagnosed with latent tuberculosis infection (LTBI) and provides more detailed information.

Background of the study: In order to inform the Northern Territory (NT) Centre for Disease Control’s latent TB infection preventative programs and interventions the study aimed to identify the number, characteristics and treatment of people diagnosed with LTBI in the Darwin region over a 1 year period; June 2013 to July 2014.

Results: The Figure shows (page 27) the cascade of care of 573 people diagnosed with LTBI through to the 147 people who completed treatment. The cohort comprised 74% overseas-born, 14% non-Indigenous and 12% Indigenous. Indigenous people were more likely to accept treatment than overseas-born (OR 4.46; 95%: CI 1.55-12.83) and non-Indigenous (OR 7.69; 95%; CI 2.33-25.39). Overseas-born people were least likely to complete treatment comparative to Australian-born people however this finding was not statistically significant. While all children under 6 years accepted treatment, only 12/28 (43%) are documented to have completed treatment.

Reasons for LTBI screening are shown in the Figure with the cohort primarily comprising of healthcare workers (19%), contacts of active TB disease and asylum-seekers (16%). Supported by school nurses, students were most likely to complete treatment, with odds of completing 3.86 times higher than healthcare workers (95% CI 1.02-14.58).

Almost a third (31%) of the cohort on treatment moved interstate before completion. As their treatment outcome was not collected these people may well have completed treatment interstate.

Conclusions: Over half (55%) of people accepting the course of treatment for LTBI continued to completion of treatment; an outcome consistent with other Australian studies. Greatest loss to follow up was in people moving interstate, suggesting a need for greater data sharing of LTBI treatment outcomes across States/Territories. Encouragingly, a high uptake of treatment was found among Indigenous people. Further support should target optimising treatment completion in the high risk overseas-born and under-6 year old populations. The successful treatment in students supports ongoing employment of school-based nurses.

Reference
Figure. Proportion of people diagnosed with latent tuberculosis infection who were offered, accepted and completed treatment, Darwin, June 2013 – July 2014

Reason for LTBI screening, n = 573
- 140 (24%) Asylum seeker/refugee
- 106 (19%) Healthcare worker
- 97 (17%) TB contact
- 38 (7%) Immuno/Pre-Immunosuppression
- 35 (6%) School student (overseas-born)
- 35 (6%) Medical referral
- 33 (6%) Incarcerated
- 20 (3%) Immigration health undertaking
- 20 (3%) Defence force personnel
- 49 (9%) Other

Reason for not offering treatment, n= 199
- 73 (37%) Short term detention/goal sentence, (physician uncertain of future adherence)
- 69 (35%) Low risk
- 12 (6%) Excess alcohol or liver disease
- 7 (4%) Prior LTBI treatment
- 7 (4%) Pregnant/Lactation
- 3 (2%) Depression
- 28 (14%) Other

Reason for incomplete treatment, n= 118
- 36 (31%) Moved away from treatment centre
- 29 (25%) No reason given/defaulted
- 24 (20%) Did not commence treatment
- 6 (5%) Elevated liver enzymes
- 4 (3%) Peripheral neuropathy
- 3 (3%) Patient died (other – not TB)
- 2 (2%) Rash
- 14 (12%) Other
## NT NOTIFICATIONS OF DISEASES BY ONSET DATE & DISTRICTS

1 April - 30 June 2017 and 2016

<table>
<thead>
<tr>
<th>Disease</th>
<th>Alice Springs</th>
<th>Barkly</th>
<th>Darwin</th>
<th>East Arnhem</th>
<th>Katherine</th>
<th>NT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute post strep glomerulonephritis</td>
<td>4</td>
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<tr>
<td>Adverse vaccine reaction</td>
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<td>5</td>
<td>8</td>
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<td>4</td>
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<td>113</td>
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<td>0</td>
</tr>
<tr>
<td>Syphilis &lt; 2yrs duration</td>
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<td>15</td>
<td>1</td>
<td>0</td>
<td>46</td>
<td>14</td>
</tr>
<tr>
<td>Syphilis &gt; 2yrs duration or unknown</td>
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<td>3</td>
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<td>0</td>
<td>21</td>
<td>5</td>
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<td>Trichomoniasis</td>
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<td>200</td>
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<td>46</td>
<td>279</td>
<td>323</td>
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<td>0</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Typhus</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
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<td>Varicella - unspecified</td>
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<td>0</td>
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<td>3</td>
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<td>0</td>
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<td>Yersiniosis</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Zoster</td>
<td>17</td>
<td>20</td>
<td>3</td>
<td>3</td>
<td>76</td>
<td>67</td>
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<tr>
<td><strong>Total</strong></td>
<td>1,096</td>
<td>769</td>
<td>170</td>
<td>131</td>
<td>1,339</td>
<td>1,649</td>
</tr>
</tbody>
</table>

2016:

- Alice Springs: 165
- Barkly: 57
- Darwin: 26
- East Arnhem: 45
- Katherine: 6
- NT: 3412
Ratio of the number of notifications in the 2nd quarter 2017 to the 5 year mean (2012-16): selected diseases

**DECREASE**
- Tuberculosis
- Barrahd Forest
- Ross River Virus
- Dengue
- Cryptosporidiosis
- Pertussis
- Measles
- Chickenpox
- Rheumatic Fever
- Adv Vece Reaction
- Salmonellosis
- Acute post strep GN
- Pneumococcal disease
- Influenza
- Zoster
- Group A strep invasive
- Campylobacteriosis

**INCREASE**
- Shigellosis Ratio=5 (150 cases)
- Rotavirus Ratio=6.1 (270 cases)
- Mumps Ratio=9.7 (37 cases)
- Malaria
- Leptospirosis

Ratio of 2nd quarter 2017 cases to the mean 2nd quarter 2012-16

Ratio of the number of notifications in the 2nd quarter of 2017 to the 5 year mean (2012-16): sexually transmitted diseases

**DECREASE**
- Chlamydia
- Gonoroccal infection
- Trichomoniasis
- Syphilis < 2 years duration

**INCREASE**
- Syphilis > 2 years or unknown duration
- Hepatitis B - unspecified
- HIV
- HTLV1
- Hepatitis C - unspecified

Ratio of 2nd quarter 2017 cases to the mean 2nd quarter 2012-16
Comments on notifications in the 2nd quarter of 2017

Syphilis of < 2 years duration

There were 84 cases of syphilis of duration of disease less than 2 years notified in the 2nd quarter which was 3.7 times the expected number (23). This illustrates the continuation of the 2014 outbreak which has been well documented elsewhere.

Chlamydia

In the 2nd quarter of 2017 there were 661 cases of chlamydia notified; 59 (8.1%) fewer than the 5 year mean for the 1st quarter of 720.

Mumps

The mumps outbreak has continued into the 2nd quarter of 2017. There were 37 notified cases compared with the expected 3.8 based on the 5 year mean. Some cases have been linked with congregate settings. Exclusion of infectious cases from e.g. schools and ensuring high vaccination coverage were actions taken to reduce likelihood of transmission.

Rotavirus

The rotavirus outbreak started in Central Australia in mid-April and reached the Top End in June 2017. 70% of cases were Aboriginal children under 5 years of age. There were 270 cases in the 2nd quarter, over 6 times the expected number.

Shigellosis

There has been a sustained increase in shigellosis notifications since early May 2017 with 150 cases throughout the 2nd quarter (5 times the average of 30 cases). Cases have largely been dispersed in the Central, Katherine and Barkly regions, with no clustering. The increase was mainly due to *Shigella flexneri* type 2b.

Malaria

There were 3 cases of malaria notified in the NT in the 2nd quarter. The infections were acquired in Africa (2) and South East Asia (1).

HIV

There were significantly less cases of HIV notified in the 2nd quarter (2) compared to the expected (6.4). These fluctuations can be expected because of the small numbers in population in the NT.

**********

NT malaria notifications April-June 2017

*Elizabeth Stephenson, CDC Darwin*

There were 3 cases of malaria notified in the 2nd quarter of 2017. The following table provides details about where the infection was thought to be acquired, the reason exposed, the infecting agent, whether chemoprophylaxis was used and where the patient lived.

<table>
<thead>
<tr>
<th>No. cases</th>
<th>Origin of Infection</th>
<th>Reason Exposed</th>
<th>Agent</th>
<th>Chemoprophylaxis</th>
<th>NT Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>South Africa</td>
<td>Recreation</td>
<td><em>P. falciparum</em></td>
<td>No</td>
<td>Alice Springs</td>
</tr>
<tr>
<td>1</td>
<td>Liberia</td>
<td>Expatriate visiting relatives</td>
<td><em>P. vivax</em></td>
<td>No</td>
<td>Darwin</td>
</tr>
<tr>
<td>1</td>
<td>Indonesia</td>
<td>Visiting relatives</td>
<td><em>P. vivax</em></td>
<td>No</td>
<td>Darwin</td>
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</table>

**********
### Immunisation coverage for children aged 12-<15 months at 30 June 2017

<table>
<thead>
<tr>
<th>SA3 Name</th>
<th>Number in district</th>
<th>% DTP</th>
<th>% Polio</th>
<th>% HIB</th>
<th>% Hep B</th>
<th>% Pneumo</th>
<th>% Fully vaccinated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Darwin City</td>
<td>136</td>
<td>94.12</td>
<td>94.12</td>
<td>93.38</td>
<td>94.85</td>
<td>93.38</td>
<td>92.65</td>
</tr>
<tr>
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<td>92.92</td>
<td>92.04</td>
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<td>92.92</td>
<td>92.04</td>
</tr>
<tr>
<td>Litchfield</td>
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<td>90.74</td>
<td>90.74</td>
<td>90.74</td>
<td>90.74</td>
<td>90.74</td>
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<td>95.73</td>
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<td>95.00</td>
<td>96.00</td>
<td>95.00</td>
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</tr>
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<td>Barkly</td>
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<td>81.82</td>
<td>81.82</td>
<td>81.82</td>
<td>77.27</td>
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<tr>
<td>Daly-Tiwi-West Arnhem</td>
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<td>Katherine</td>
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<td>94.13%</td>
<td>93.80%</td>
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<td>93.96%</td>
<td>93.64%</td>
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<td>91.30%</td>
<td>91.01%</td>
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### Immunisation coverage for children aged 24-<27 months at 30 June 2017

<table>
<thead>
<tr>
<th>SA3 Name</th>
<th>Number in district</th>
<th>% DTP</th>
<th>% Polio</th>
<th>% HIB</th>
<th>% Hep B</th>
<th>% MMR</th>
<th>% MenC</th>
<th>% Varicella</th>
<th>% Fully vaccinated</th>
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<tbody>
<tr>
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<td>90.95</td>
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<tr>
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<td>97.73</td>
<td>97.73</td>
<td>95.45</td>
<td>97.73</td>
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<td>96.74</td>
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<td>95.45</td>
<td>89.39</td>
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<tr>
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<td>91.76</td>
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<td>Not mapped†</td>
<td>79</td>
<td>88.61</td>
<td>94.94</td>
<td>93.67</td>
<td>94.94</td>
<td>92.41</td>
<td>94.94</td>
<td></td>
<td>92.41</td>
</tr>
<tr>
<td>NT</td>
<td>971</td>
<td>91.30</td>
<td>96.70</td>
<td>95.00</td>
<td>96.20</td>
<td>92.50</td>
<td>95.00</td>
<td></td>
<td>91.20</td>
</tr>
<tr>
<td>Non-Aboriginal (NT)</td>
<td>590</td>
<td>91.69%</td>
<td>96.44%</td>
<td>93.90%</td>
<td>95.59%</td>
<td>91.86%</td>
<td>94.07%</td>
<td></td>
<td>14.24%</td>
</tr>
<tr>
<td>Aboriginal (NT)</td>
<td>379</td>
<td>90.77%</td>
<td>97.10%</td>
<td>96.57%</td>
<td>97.10%</td>
<td>93.40%</td>
<td>96.31%</td>
<td></td>
<td>22.16%</td>
</tr>
<tr>
<td>Australia</td>
<td>76591</td>
<td>92.60</td>
<td>96.40</td>
<td>95.40</td>
<td>96.30</td>
<td>93.40</td>
<td>95.40</td>
<td></td>
<td>92.90</td>
</tr>
</tbody>
</table>

† Not mapped: Individual could not be mapped to a specific location. For example a PO Box cannot be mapped to a geographical area.
Immunisation coverage for children aged 60–<63 months at 30 June 2017

<table>
<thead>
<tr>
<th>SA3 Name</th>
<th>Number in district</th>
<th>% DTP</th>
<th>% Polio</th>
<th>% MMR</th>
<th>% Fully vaccinated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Darwin City</td>
<td>110</td>
<td>94.55</td>
<td>94.55</td>
<td>97.27</td>
<td>94.55</td>
</tr>
<tr>
<td>Darwin Suburbs</td>
<td>214</td>
<td>92.52</td>
<td>92.52</td>
<td>93.93</td>
<td>92.06</td>
</tr>
<tr>
<td>Litchfield</td>
<td>61</td>
<td>98.36</td>
<td>98.36</td>
<td>100.00</td>
<td>98.36</td>
</tr>
<tr>
<td>Palmerston</td>
<td>172</td>
<td>97.09</td>
<td>97.09</td>
<td>99.42</td>
<td>97.09</td>
</tr>
<tr>
<td>Alice Springs</td>
<td>63</td>
<td>88.89</td>
<td>88.89</td>
<td>95.24</td>
<td>88.89</td>
</tr>
<tr>
<td>Barkly</td>
<td>21</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
<td>100.00</td>
</tr>
<tr>
<td>Daly - Tiwi - West Arnhem</td>
<td>31</td>
<td>93.55</td>
<td>93.55</td>
<td>93.55</td>
<td>93.55</td>
</tr>
<tr>
<td>East Arnhem</td>
<td>46</td>
<td>93.48</td>
<td>93.48</td>
<td>97.83</td>
<td>93.48</td>
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<tr>
<td>Katherine</td>
<td>87</td>
<td>98.85</td>
<td>98.85</td>
<td>100.00</td>
<td>98.85</td>
</tr>
<tr>
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<td>98</td>
<td>91.84</td>
<td>91.84</td>
<td>93.88</td>
<td>90.82</td>
</tr>
<tr>
<td>NT</td>
<td>903</td>
<td>94.60</td>
<td>94.60</td>
<td>96.80</td>
<td>94.40</td>
</tr>
<tr>
<td>Non-Aboriginal (NT)</td>
<td>567</td>
<td>94.36%</td>
<td>94.36%</td>
<td>96.12%</td>
<td>94.18%</td>
</tr>
<tr>
<td>Aboriginal (NT)</td>
<td>336</td>
<td>94.94%</td>
<td>94.94%</td>
<td>97.92%</td>
<td>94.64%</td>
</tr>
<tr>
<td>Australia</td>
<td>81025</td>
<td>94.30</td>
<td>94.40</td>
<td>96.10</td>
<td>93.90</td>
</tr>
</tbody>
</table>

† Not mapped: Individual could not be mapped to a specific location. For example a PO Box cannot be mapped to a geographical area

Immunisation coverage at 30 June 2017

Holly Carmichael, CDC, Darwin

Background information to interpret coverage

Commencing in this issue of the Bulletin, immunisation coverage will be reported by Australian Bureau of Statistics (ABS) Statistical Area Level 3 (SA3) rather than postcode. SA3s are ABS standardised geographical areas to which children have been assigned based on their Medicare address as recorded on the Australian Immunisation Register (AIR). The region ‘Not Mapped’ captures the children whose residency could not be mapped to a specific location within the Northern Territory, this includes PO Box addresses. Maps of these geographic area boundaries can be found at [http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/B0AC271BC8160338CA257801000E0692/$File/1270055001_asgs_2011_nt_maps.pdf](http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/B0AC271BC8160338CA257801000E0692/$File/1270055001_asgs_2011_nt_maps.pdf)

The cohort of children assessed at 12 to <15 months of age on 30 June 2017 were born between 1 January 2016 and 31 March 2016 inclusive. To be considered fully vaccinated, these children must have received 3 valid doses of a vaccine containing diphtheria, tetanus, pertussis, and poliomyelitis antigens, either 2 or 3 doses of PRP-OMP Hib or 3 doses of another Hib vaccine, 3 doses of hepatitis B vaccine and 3 doses of pneumococcal vaccine. All vaccinations must have been administered by 12 months of age.

The cohort of children assessed at 24 to <27 months of age on 30 June 2017 were born between 1 January 2015 and 31 March 2015 inclusive. To be considered fully vaccinated, these children must have received meningococcal C vaccination (given at the 12 month schedule point), and a second dose of measles, mumps, rubella (MMR) and the first dose of the varicella vaccination (given in combination as MMRV at the 18 months schedule point). All vaccinations must have been administered by 24 months of age.

The cohort of children assessed at 60 to <63 months of age on 30 June 2017 were born between 1 January 2012 and 31 March 2012 inclusive. To be considered fully vaccinated, these children must have received 4 or 5 valid doses of a vaccine containing diphtheria, tetanus, pertussis antigens, 4 doses of poliomyelitis
vaccine and 2 valid doses of MMR vaccine. All vaccinations must have been administered by 60 months (5 years) of age.

**Interpretation and comment**

Immunisation coverage rates for NT children by SA3 and Aboriginal status, as estimated by the AIR, are shown on pages 27-28. Coverage for all Australian children is also provided.

Children in the NT were less likely to be fully immunised in the 12 <15 months cohort (NT 92.6%, National 93.9%) and the 24 to <27 months cohort (NT 88%, National 90.5%) though more likely to be fully immunised in the 60 to <63 months cohort (NT 94.4%, National 93.9%).

Aboriginal children were less likely to be fully immunised than non-Aboriginal children in the 12 to <15 month cohort (Aboriginal 90.7%, non -Aboriginal 93.6%) and in the 24 to <27 month cohort (Aboriginal 85.7%, non-Aboriginal 89.3%) but slightly more likely to be fully immunised in the 60 to <63 month cohort (Aboriginal 94.6%, non-Aboriginal 94.1%).

Coverage by SA3 in the Table shows variation between high and low coverage areas. Katherine had the lowest coverage for Aboriginal 12 to <15 months and Aboriginal 24 to <27 months but highest coverage in Aboriginal 60 to <63 months. Alice Springs SA3 reported the highest non Aboriginal 12 to <15 months coverage but the lowest non Aboriginal 60 to <63 month coverage.

CDC are currently reviewing the reasons for lower coverage rates in both Aboriginal and non - Aboriginal children. CDC is working with the Australian Immunisation Register to review data quality and processing of vaccine recording, and reviewing other strategies to improve childhood immunisation coverage. Further information about the Australian Childhood Immunisation Register coverage may be found at: [http://ncirs.edu.au/immunisation/coverage/index.php](http://ncirs.edu.au/immunisation/coverage/index.php)

**Table. Variation between high and low coverage areas in the Northern Territory**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Aboriginal</th>
<th>Non-Aboriginal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lowest SA3</td>
<td>Highest SA3</td>
</tr>
<tr>
<td>12 -&lt;15 months</td>
<td>Katherine 84.2%</td>
<td>Daly-Tiwi-West Arnhem 96.7%</td>
</tr>
<tr>
<td></td>
<td>Litchfield 90%</td>
<td>Alice Springs 98.2%</td>
</tr>
<tr>
<td>24 -&lt;27 months</td>
<td>Katherine 78%</td>
<td>Barkly 95%</td>
</tr>
<tr>
<td></td>
<td>Litchfield 84.3%</td>
<td>Palmerston 95.7%</td>
</tr>
<tr>
<td>60 -&lt;63 months</td>
<td>Darwin city 91.5%</td>
<td>Katherine 100%</td>
</tr>
<tr>
<td></td>
<td>Alice Springs 87.8%</td>
<td>Litchfield 98.2%</td>
</tr>
</tbody>
</table>

*************
Disease Control staff updates July-September 2017

Top End

Philippa May started working as the Mycobacterial Public Health Medical Officer in July 2017. Philippa is a Public Health Physician who was previously the Medical Epidemiologist for South Eastern Sydney Local Health District in New South Wales (NSW) and prior to that had various public health medical officer roles in Broome, WA. Philippa has replaced Pasqualina Coffey who is travelling overseas for a few months.

In September 2017 Fiona MacFarlane commenced in the Syphilis Register Top End role until June 2018. Fiona was previously working in Mount Isa but has worked in the Northern Territory (NT) previously. While Fiona is in that role, Roxana Sherry is in the Top End Remote Sexual Health Coordinator role in the Remote Sexual Health Team.

Kaylene Prince started at Darwin Centre for Disease Control (CDC) in September as a Clinical Nurse Advisor (Immunisation) to work on an immunisation project. Kaylene transferred from Alice Springs CDC where she was working as a Clinical Nurse Specialist (Immunisation). Kaylene has worked with CDC for several years on various immunisation and surveillance positions with a stint in NSW Health as an Immunisation Coordinator in Western Sydney.

Rebecca Jarman, Community Paediatric Allied Health Professional, has left CDC after winning the Manager of the Adult Allied Health Team, Disability Equipment Program and SEAT Service position at the Office of Disability.

Congratulations to Gabrielle Watt, Trachoma Program Manager, on the birth of baby Ruth. Gabrielle and Ruth are doing well and Gabrielle is now on maternity leave.

There has been a new addition to Cath Milne’s family. Cath works as the Data Analyst for the NT Rheumatic Heart Disease (RHD) Control Program and has been based in Melbourne for the past few years. Everyone is doing well and baby Jack is being very spoilt by his 3 siblings. Cath will be on maternity leave until mid-December. Jess de Dassel is filling in for Cath Milne as the RHD Control Program Data Analyst. Jess is working 2 days a week with CDC until December and is spending the rest of her time progressing her PhD in adherence to secondary prophylaxis for patients with Acute Rheumatic Fever or RHD and the effect on recurrences and other outcomes.

Central Australia

Khim Tan joined Clinic 34 as a Clinical Nurse Specialist (CNS) Hepatitis and is job-sharing the position with Leanne O’Connor. The CNS Hepatitis position became vacant following the resignation of Kate Wales who has relocated to Queensland.

Sheree Greenwood started in the role of Receptionist/ Administration Support Officer in a full time capacity in September 2017. The position became vacant following the resignation of Jessica Gunner who transferred to a similar position in the Sexual Assault Referral Centre.

Sarah Wyatt has transferred to the Sexual Assault Referral Centre for 6 months and has been replaced by Helen Rudolph. Helen had previously worked in the Trachoma Program in 2014 before transferring to Primary Health Care Remote.

Ani Goswami is now the Data and Administrative Officer of the Trachoma Program following the return of Alycia Bongiorno to her substantive position at Alice Springs Hospital. Ani has previously worked at the Mercy Hospital in Melbourne as a project officer.