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Pre-vaccination survey of Royal Darwin Hospital health care workers on attitudes and barriers to the new pandemic (H1N1) 2009 influenza vaccine

Denise Thomas , Public Health Scholar, Health Protection, Darwin

Abstract

Background

Convincing arguments and increasing evidence support the recommendation that health care workers (HCWs) be vaccinated against influenza. Yet influenza vaccination rates among HCWs in acute care facilities remain low. Following the outbreak of the pandemic (H1N1) 2009 influenza and prior to arrival of the vaccine, attitudes, concerns and barriers related to vaccine uptake were investigated.

Method

A survey involving face-to-face delivery of a questionnaire to 140 HCWs from Royal Darwin Hospital (RDH) 1 week prior to the roll out of the pandemic (H1N1) 2009 influenza vaccination program was carried out.

Results

Overall:

- 23% (n=32) thought they may have had pandemic influenza.
- 71% (n=89) were not at all or only a little bit concerned about their individual vulnerability to infection or the consequences.
- 42% (n=58) of participants received the 2009 seasonal flu vaccination.
- 51% (n=72) intended to get the vaccine, while 25% (n=35) were unsure, and 24% (n=33) were not planning to have the pandemic (H1N1) vaccine.

The main drivers to be vaccinated were, concern about family, non–availability of paid sick leave for casual employees and concern for team functioning if the respondent was unable to attend work.

While the hospital clinic provided 85% of the seasonal influenza vaccinations for HCW in 2009, the mobile clinic was highly valued.

Appropriate, accessible and timely up-to-date information to help inform decision-making was found in 24% (n=34) of suggestions to improve uptake as was increased accessibility for shift workers in 8% (n=12).

Conclusion

The survey indicated that the uptake of the seasonal influenza vaccine among HCWs at RDH was still low and the intent to have pandemic (H1N1) 2009 influenza vaccine was only slightly higher. Intention does not necessarily translate to action and work is required if the "yes" and "undecided" respondents get vaccinated. The provision of timely up-to-date information, provision of mobile clinics and increased accessibility for shift workers have been identified as factors that may increase uptake of the pandemic (H1N1) 2009 influenza vaccine and future influenza vaccinations.

Contents

Editor: Vicki Krause
Email: vicki.krause@nt.gov.au

Assistant Editors/Design: Lesley Scott, Mark McMillan

Contributors to reports: Nina Kurucz, Jiunn-Yih Su, Matthew Parnaby, Charles Roberts, Peter Markey, Andre Wattiaux, Heather Cook, Chris Nagy

Centre for Disease Control
PO Box 40596
Casuarina
Northern Territory 0811

Website:http://www.nt.gov.au/health/cdc

Background

Why vaccinate health care workers?

Arguments supporting vaccination of health care workers (HCWs) to protect them from influenza are very strong. Influenza vaccine protects the worker[1] and reduces hospital spread to others.[2-5] It results in reduced absenteeism and reduced disruption to provision of quality care[6-8] and so has health and safety ramifications.[9,10] These factors contribute to strong ethical arguments for HCW influenza vaccination. This has resulted in increasing calls for health care facilities treating vulnerable populations to require documented declinations from HCWs to ensure they are making an informed decision when deciding not to have the recommended annual influenza vaccines.[11-15]

Health care worker vaccination rates

Despite the convincing arguments, HCW influenza vaccination rates worldwide have been repeatedly reported as being too low.[16-18] While those with comprehensive programs with large resources[18-20] or mandatory vaccination programs[21] have shown sustained increases, most HCW vaccination rates sit at about 40% .[16,18] In the Northern Territory (NT), a 2008 survey on the influenza immunisation rates of doctors at Royal Darwin Hospital (RDH) indicated that vaccination rates were similar to the international rates.[22] Many papers investigate and reflect on why the uptake of influenza vaccine by HCWs remains so low and how the vaccination rate can be improved. [23-25]

Pre pandemic (H1N1) 2009 vaccination survey

It was considered important to identify the attitudes, concerns and barriers related to the uptake of the new pandemic (H1N1) 2009 influenza vaccine in the full spectrum of RDH health care workers. This was because of an identified need for high HCW influenza vaccination rates, the current and potential impact of the pandemic (H1N1) 2009 influenza virus[23] and the imminent release of the vaccine. It was hoped that this information would assist in the planning, implementation and evaluation of the pandemic (H1N1) 2009 influenza vaccination program for HCWs.

Methodology

Setting

RDH is the NTs tertiary referral and teaching hospital and the hospital for Australia's National Critical Care and Trauma Response Centre. The hospital has a catchment population of 150,000 people spread over an area of 127,000 square km. It has 363 beds and approximately 1850 fulltime equivalent staff. The shortage and mobility of staff and the high proportion of at risk patients makes influenza immunisation of HCWs at RDH an imperative. Influenza immunisation is recommended and strongly encouraged but not mandatory. It is available free-of-charge at a weekday staff clinic or via a mobile ward clinic. The immunisation campaign involves intranet promotion, flyers and loudspeaker announcements.

Data collection – survey and participants

The Health Protection Division within the NT Department of Health and Families, with the support of the RDH management, carried out the project. The Human Research Ethics Committee of the NT Department of Health and Families and Menzies School of Health Research assessed the project and provided ethics approval. The survey involved a questionnaire devised by the Communicable Diseases Branch, New South Wales Health and delivered at RDH as an opportunistic, face-to-face interview in wards, work units and recreation areas. HCWs including doctors, nurses, patient care attendants, Aboriginal liaison staff, allied health workers, technical staff, administrators, cleaners, food delivery staff and security guards in proportions broadly representative of their groups were interviewed over a 1 week period. Executive and ward management facilitated access to wards and units.

Data analysis

Data was entered using the Epi Data V3.1 program. All analyses were performed using Stata 9 (Statacorp, California).

Results

Characteristics of participants

RDH staff from intensive care unit, emergency department, medical, surgical, maternity and paediatric wards, radiology, allied health, administrative, service and security areas were interviewed during the week beginning 13/09/09. In all, 140 health care workers participated. They included 12 doctors (9%), 53 registered and enrolled nurses (38%), 14 personal care attendants (PCA) (10%), 10 allied health workers (7%), 15 administrative staff and ward clerks (10%), 5 cleaners and kitchen staff (3%), 27 technical staff including radiographers, engineers and phlebotomists (20%) as well as 6 security staff and others (3%). This was comparable with the proportions of these staff employed at RDH. Only 62% (n=88) were born in Australia. Those born overseas included 16% (n=22) from Asian countries, 10% (n=15) from UK, 6% (n=8) from Africa, 4% (n=6) from NZ and 2% (n=3) from Europe or North America. Staff identifying as Aboriginal or Torres Strait Islander origin numbered 3 (2%).

Previous pandemic (H1N1) 2009 influenza infection

The number of staff that believed they had already contracted swine flu was 15 (11%), 17 (12%) were unsure and 108 (77%) believed they had not contracted swine flu. Interviewees answered unsure if they had developed a flu-like illness in the last few months but had not had serological testing or treatment with antivirals. Overall, 32 (23%) were sure or unsure whether they had developed the swine flu. This was consistent with the national estimated attack rate of 20% (26).

Seasonal influenza vaccination

Forty two percent of participants reported they had the seasonal influenza vaccination in 2009 (n=58). The vaccination rate varied according to role with 41% of doctors, 35% of nurses, 57% of PCAs and 60% of allied health workers vaccinated (see Table 1). Only 57% (n=80) had ever had an influenza vaccine. The hospital clinic provided vaccine for 85% (n=80) of recipients.

Sources of vaccine information

Participants were asked where they would turn to for credible information about influenza vaccination. Multiple answers were possible. Both the hospital clinic and other health professionals were identified by approximately 40% as being important valued sources. GPs and government sources were identified by 30% of respondents and 25% considered the internet was an important source of information. Only 10% considered professional bodies, the news media, family and friends or other sources provided credible information.

Concerns related to infection with swine flu

If the participants had already had swine flu, the "concerns" questions were skipped. Of those asked if they were concerned about catching swine flu, 32% (n=40) were not at all concerned and in total, 71% (n=89) were either not at all or a little bit concerned. Only 15% (n=19) were really concerned about catching the swine flu. Similar results were obtained when participants were asked if they were concerned about getting really sick. When considering concern about transmitting the disease, 79% (n=100) were either very concerned or quite concerned in regards to staff and patients and 75% (n=94) in regards to family and friends. Having to take time off work was a significant concern for 27% (n=34) interviewees. It is noteworthy that 100% of PCAs (n=14) were either quite a bit concerned or very concerned at the prospect of having to take time off work.

Table 1. 2009 Seasonal influenza vaccination according to role

Role	Yes	No	Total	% Yes
Doctor	5	7	12	42%
Nurse	21	33	54	39%
Allied Health	6	4	10	60%
Administration/clerk	5	10	15	33%
Housekeeping/Kitchen	2	3	5	40%
PCA	8	6	14	57%
Other	11	19	30	36%

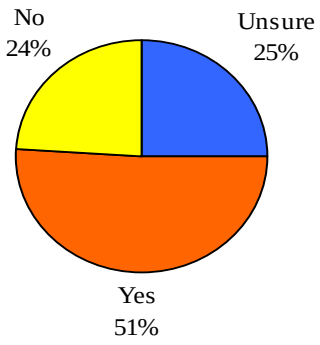
Uptake of pandemic (H1N1) 2009 influenza vaccination

Of participants, 51% (n=72) said "yes" they would have the vaccination, 24% (n=33) said "no" and 25% (n=35) were "unsure" (see Figure 1).

Uptake and position

The possible influence of position within the hospital on potential uptake was explored. Of doctors, allied health workers and RNs 50% said they would have the vaccine, 71% (n=10) of PCAs said they would have the vaccine and only 14% (n=2) said they would not. As previously noted, this group were very concerned about having to take time off work as they often have casual contracts and therefore no sick leave entitlements.

Figure 1. Potential HCW uptake of pandemic (H1N1) 2009 influenza vaccination



Barriers to having the pandemic (H1N1) 2009 influenza vaccine

Participants were asked to identify any significant barriers to their uptake of the vaccination. Not all participants identified barriers. Identified barriers included:

Side effects: 38% (n=54) specifically expressed concern about side effects. Side effects of concern included localized reaction (n=5), anaphylaxis (n=8) and Guillain Barre syndrome (n=4).

Logistical Barriers: 26% (n=36) identified accessibility as a potential barrier. These respondents were most concerned about easy access for shift workers.

Safety: 18% (n=25) expressed concern that the vaccine had not been properly tested.

Not personally vulnerable or lack of perceived severity: 14% (n=19) considered the risk of severe illness was not sufficient to warrant vaccination.

Fear of needles or pain from needles: 6% (n=9) cited fear of needles or pain from needles as a significant barrier.

Fear of contracting flu from vaccine: Only 4% (n=6) thought they might catch swine flu from the vaccine.

Significant or allergic reactions: 1 reported being allergic to influenza vaccine and 2 reported having significant previous reactions to influenza vaccine and so would not have the vaccine.

Strategies to overcome barriers

Many participants found it difficult to answer how their perceived barriers to vaccination might be overcome when this was presented as an open-ended question. Of those who gave suggestions, the responses were categorized as follows:

More information and education: 24% (n=34) of participants thought more education and information via flyers, posters and email would be an important way of reassuring and encouraging uptake. It appeared that allied health and administrative staff preferred email while most nursing staff preferred flyers and posters.

Extended accessibility: 8% (n=12) of participants made specific suggestions related to improving access such as including early morning clinic times to suit night shift workers, extending the use of the mobile immunization trolley and an internet booking system for appointments.

Discussion

Survey characteristics

The survey involved face-to-face interviews and was representative of a broad spectrum of HCWs. These factors provided the project with strengths and weaknesses. The project received a lot of support. HCWs expressed their

appreciation of being asked for their opinion on a topic that had recently significantly impacted on most of them. It appeared this demonstration of commitment by policy makers and implementers to recognize and engage all groups of HCWs in such a personal way had a positive impact. The face-to-face delivery of the questionnaire also provided an opportunity for discussion, clarification and education to groups that were involved in patient care but not directly involved in clinical decision making.

Seasonal influenza vaccination

Overall, 42% of HCWs at RDH had the 2009 seasonal flu vaccine. While this is consistent with many studies internationally,[23,25] it was anticipated that the impact of the pandemic (H1N1) 2009 influenza and the extra promotion of the seasonal flu vaccine would provide an extra stimulus. It does appear that this was the case to some extent. In 2007, at RDH, of the 62% of the 243 doctors employed at the hospital, only 28% had been vaccinated (n=22). In 2009, 41% (n=12) of doctors interviewed were vaccinated. In this survey, doctors were not the particular focus of the project, so the numbers are not sufficient to be able to be statistically compared. The allied health workers and the PCAs had the highest vaccination rates. The impression gained from the interviews was that strong teams and lack of paid sick leave, respectively, might be influences in these groups. Unfortunately, the survey was not designed to explore this and numbers were too small in these professional groups to be statistically significant. Irrespective, it is clear that vaccination rates of all HCWs are still not adequate and a much more nuanced understanding of drivers and barriers to action is required.

Hospital clinic

The hospital clinic provided 85% of 2009 seasonal influenza vaccinations. The hospital clinic and the more senior RDH HCWs were also identified as trustworthy sources of information. These factors reinforce the importance of providing an integrated staff service or "team" that has the capacity to provide accessible vaccinations and up-to-date information.

Incentives and barriers to uptake of pandemic (H1N1) 2009 influenza vaccine

Although anticipated, it was of considerable concern that only 51% of HCWs said they intended to have the vaccination. However, when added to the 25% of "unsure" responders, the potential for a responsive, effective vaccination program that achieved up to 76% was possible. The impression gained in the interviews was that while most could clearly state, "protect self, protect vulnerable patients, protect colleagues, family and friends" as factors for why one should have the vaccination they were not necessarily the factors influencing the decision to act. The survey was focused on organisational factors as well as assumptions from the health belief model that behavioural factors of vulnerability, severity and effectiveness of intervention are motivators to action, and these may not have captured all drivers for action. From the interviews, concern for family and friends, concern about unpaid time off work and concern about functioning of small teams were major drivers for potential action. The significance of these drivers however varied with different roles. The small numbers in many of the roles meant statistically significant conclusions about drivers to action within role groups could not be made.

The prevalence of concerns about safety, side effects, fear of needles was consistent with the literature on seasonal flu vaccination and while continuing to present ongoing challenges, did not present any surprises. Logistical barriers related to information, education and extended access for certain groups were clearly identified by the participants. Implementation of their suggestions should contribute to the further development of a well-supported, user-friendly staff vaccination program.

Limitations

Making the survey representative of the various HCW roles fulfilled an ideology and probably contributed to the enthusiastic response to the survey and potentially provided immeasurable good will. As the consequence was small numbers in each of the groups the impressions gained about differences in attitude or decision-making between the roles could not be verified statistically.

As the survey was interview-based, some participants commented on importance of teams, health and safety policy and hospital vaccination requirements. However, the survey did not have a truly qualitative design and so these issues were not fully explored. Many issues raised were also outside of the health belief model and organisational operational concerns and so they were not captured quantitatively either.

Conclusion

It appears that the uptake of seasonal flu vaccination among HCWs at RDH is improving but much greater uptake is required if the internationally recommended vaccination rates are to be achieved. This survey suggests that there will be a slightly greater uptake of the pandemic (H1N1) 2009 vaccine than for the seasonal influenza vaccination. Staff indicated that they want to do the right thing by protecting themselves, their patients, colleagues, family and friends. To do this they expressed a desire for appropriate information to make informed decisions and an accessible vaccination program.

There was also a sense that what motivates HCWs to actively go and have vaccines (as opposed to saying they will or might have it) was not totally captured by our survey This survey suggested that factors such as circumstances related to family and friends, team environments, availability of paid sick leave, concern for community, institutional focus and policy may also be significant motivators to action. Understanding these factors as well as the provision of timely up-to-date information, active involvement of teams or areas, the provision of mobile clinics to these areas and increased accessibility for shift workers may contribute significantly to the increased uptake of the pandemic (H1N1) 2009 influenza vaccine and future influenza vaccinations.

Acknowledgements

Dr Barbara Paterson, Chief Health Officer, Dept of Health and Families, Northern Territory Government, initiated this project. The project contributed to the author, DET, fulfilling her training requirements for the Australasian College of Public Health Medicine. We would like to acknowledge and thank the NSW Dept of Health who developed and then generously shared their questionnaire. The project would not have been possible without the support and work of Mark McMillan and Ros Treslove who enthusiastically shared their expertise and knowledge. I would also like to thank Jiunn-Yih Su for his statistical analyses and the staff from CDC and Infection Control for their assistance with the interviews. Finally, this survey would have not been possible without the HCWs of RDH would so generously volunteered to participate in the survey.

References

1. Thomas RE, Jefferson T, Demicheli V, Rivetti D. Influenza vaccination for health care workers who work with the elderly. Cochrane Database of Systematic Reviews 2006; 3:CD005187.
2. Gooskens J, Jonges M, Claas EC, Meijer A, van den Broek PJ, Kroes AM. Morbidity and mortality associated with nosocomial transmission of oseltamivir-resistant influenza A(H1N1) virus. *JAMA*. 2009; 301(10): 1042-6.
3. Maltezou HC, Nosocomial influenza: new concepts and practice. *Curr Opin Infect Dis*. 2008; 21(4):337-43.
4. Salgado CD, Farr BM, Hall KK, Hayden FG. Influenza in the acute hospital setting. *Lancet Infect Dis.* 2002; 2(3):145-55.
5. National Center for Immunization and Respiratory Diseases, CDC; Centers for Disease Control and Prevention (CDC).Use of Influenza A (H1N1) 2009 monovalent vaccine: recommendations of the Advisory Committee on Immunization Practices (ACIP) 2009; MMWR Recomm Rep; 58(RR-10):1-8.
6. Burls A, Jordan R, Barton P, Olowokure B, Wake B, Albon E, Hawker J. Vaccinating healthcare workers against influenza to protect the vulnerable—Is it a good use of healthcare resources? A systematic review of the evidence and an economic evaluation. *Vaccine 2006*; 24: 4212–4221.
7. Kheok SW, Chong CY, McCarthy G, Lim WY, Goh KT, Razak L, Tee NW, Tambyah PA. The efficacy of influenza vaccination in healthcare workers in a tropical setting: a prospective investigator blinded observational study. *Ann Acad Med Singapore.* 2008;37(6):465-9.
8. Chan SS. Does vaccinating ED health care workers against influenza reduce sickness absenteeism? *Am J Emerg Med*. 2007;25(7):808-11.
9. McLennan S, Vollweiler M, Celi LA. How can nurses' flu vaccination rates be boosted? *Nurs N Z*. 2009;15(4):12-4.
10. McLennan S, Celi LA, Roth P. The Health and Safety in Employment Act and the influenza vaccination for health care workers. *NZ Medical Journal* 2007; 120 (1250).
11. Poland GA, Tosh P, Jacobson M. Requiring influenza vaccination for health care workers: seven

truths we must accept. *Vaccine* 2005; 23: 2251- 5.
12. Anikeeva O, Braunack-Mayer A, Rogers W. Requiring influenza vaccination for health care workers. *Am J Public Health* 2009; 99(1): 24-9.
13. Seale H, Leask J, Macintyre CR. Do they accept compulsory vaccination? Awareness, attitudes and behaviour of hospital health care workers following a new vaccination directive. *Vaccine.* 2009; 27:3022-5.
14. van Delden JJ, Ashcroft R, Dawson A, Marckmann G, Upshur R, Verweij MF. The ethics of mandatory vaccination against influenza for health care workers. *Vaccine*. 2008; 26:5562-6.
15. McLennan S, Gillett G, Celi LA. Healer, heal thyself: health care workers and the influenza vaccination. *Am J Infect Control*. 2008;36(1):1-4.
16. Lugo NR. Will carrots or sticks raise influenza immunization rates of health care personnel? *Am J Infect Control* 2007; 35(1): 1-6.
17. Blank PR, Szucs TD. Increasing influenza vaccination coverage in recommended population groups in Europe. *Expert Rev Vaccines*. 2009;8 (4):425-33.
18. Ofstead CL, Tucker SJ, Beebe TJ, Poland GA. Influenza vaccination among registered nurses: information receipt, knowledge, and decision-making at an institution with a multifaceted educational program. *Infect Control Hosp Epidemiol*. 2008;29(2):99-106.
19. Talbot TR. Improving rates of influenza vaccination among healthcare workers: educate; motivate; mandate? *Infect Control Hosp Epidemiol*. 2008 Feb;29(2):107-10.
20. Poland GA, Ofstead CL, Tucker SJ, Beebe TJ. Receptivity to mandatory influenza vaccination policies for healthcare workers among registered nurses working on inpatient units. *Infect Control Hosp Epidemiol*. 2008; 29(2): 170-3.
21. Borlaug G, Newman A, Pfister J, Davis JP. Factors that influenced rates of influenza vaccination among employees of Wisconsin acute care hospitals and nursing homes during the 2005-2006 influenza season. *Infect Control Hosp Epidemiol* 2007; 28: 1398-1400
22. Kaufman J, Davis J, Krause V. Influenza immunization of doctors at an Australian tertiary hospital: immunization rate and factors contributing to uptake. *CDI* 2008; 32(4): 443-7.
23. Hollmeyer HG, Hayden F, Poland G, Buchholz U. Influenza vaccination of health care workers in hospitals--a review of studies on attitudes and predictors. *Vaccine*. 2009;27: 3935-44.
24. Wicker S, Rabenau HF, Doerr HW, Allwinn R. Influenza vaccination compliance among health care workers in a German University Hospital. Infection 2009; 37 (3): 197-202.
25. Looijmans-van den Akker I, van Delden JJ, Verheij TJ, van Essen GA, van der Sande MA, Hulscher ME, Hak E. Which determinants should be targeted to increase influenza vaccination uptake among health care workers in nursing homes? *Vaccine.* 2009;27:4724-30.
26. Australian Department of Health and Ageing. Australian Influenza Surveillance Report, Aug 2009 accessed 07/10/09 http://www.healthemergency.gov.au/internet/healthemergency/publishing.nsf/Content/ozflucurrent.htm

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World Leprosy Day - Sunday, 31 January 2010

James Trauer, Medical Officer, Public Health Scholar, CDC Darwin

This year, 31 January marks World Leprosy Day, which aims to promote understanding of a condition that is often thought to be a disease of the past.

While the number of new cases globally is gradually declining, the number of new cases notified annually still stands at around 200,000. The improvements have been ascribed to the effectiveness of the World Health Organisation (WHO) recommended rifampicin/dapsone-based multi-drug therapy regimens, and have allowed for an increasing focus on the goal of disease elimination.

Despite this, a number of countries remain highly endemic, particularly India and Brazil, which account for over half of the annual notifications globally. From a regional perspective, although Australia has successfully maintained very low rates, nearby Timor-Leste has the greatest burden of any country in the South-East Asia region as reported in the WHO weekly epidemiological record in 2008. Over recent decades, the Northern Territory has consistently had 0 to 4 new notifications per year, but has had only 1 notification since 2006 with 1 patient currently on treatment.

The generally positive trends can conceal the true impact of the disease, as the sequelae of leprosy disease can be severe. Disability and deformity may persist or even worsen after treatment, especially where appropriate care is not provided. Worldwide, around 10 million people suffer ongoing effects. Options for treatment in these cases are limited and recent research has been disappointing. As awareness of leprosy diminishes presentations which already occur years after signs and symptoms develop and delayed diagnoses will increase. Difficulties of maintaining patients on treatment will also occur. It is important, therefore, for clinicians to remain conscious of leprosy and its modes of presentation.

A Fact sheet on Leprosy can be found at:

http://www.health.nt.gov.au/Centre_for_Disease_Control/Publications/CDC_Factsheets/index.aspx

Pandemic (H1N1) 2009 influenza vaccination uptake in the Northern Territory update

Andre Wattiaux, Head of Immunisation, CDC Darwin

In April 2009, the first case of pandemic (H1N1) 2009 influenza was reported in Mexico. Since then, the virus has spread to more than 200 countries in the world including Australia and has caused more than 11,000 reported deaths so far. While the presentation of the illness is generally mild, specific high risk groups have emerged presenting more often with severe disease. The potential to create significant disruption to essential services is high due to the worldwide naivety to the new strain.

On 30 September 2009, a pandemic (H1N1) 2009 influenza vaccine was made available in Australia. The vaccine is produced by an Australian-based manufacturer and the Australian Government has arranged for 20 million doses to be available free-of-charge to residents of Australia.

Vaccine production processes are largely similar to the ones used for the seasonal influenza vaccine. The 2 main differences are that the pandemic (H1N1) 2009 influenza vaccine contains only 1 strain of virus (the seasonal flu vaccine contains 3) and the vaccine is available as a multi-dose vial (rather than only as a 1-dose vial as is used for the all seasonal influenza vaccines).

Over the previous 3 months, immunisation providers, healthcare services and various organisations throughout the Northern Territory (NT) have been working steadily to vaccinate as many people as possible with the pandemic (H1N1) 2009 influenza vaccine.

With more than 35,000 vaccine doses already administered in the 3 months up to the end of December 2009 in the NT, an estimated 16% of the population has already been vaccinated and immunisation efforts continue. The vaccine uptake has been similar throughout all regions of the Territory. An early emphasis on those at higher risk of having severe complications (mainly due to high rates of chronic diseases or conditions) from the pandemic flu has led to over 26% of the Indigenous population being vaccinated in the NT.

Pregnant women are another group at higher risk for severe complications, but unfortunately the uptake in this group is similar to the rest of the general population when it should be greater.

Since 3 December 2009, the vaccine is also available for children 6 months of age and above. A 2 dose schedule is necessary to ensure good protection in children under 10 years of age. The vaccine dosage for children 6 months to 3 years of age is 0.25mL. Pre-filled syringes are available for that age range but multi-dose vials can be used as well. For anyone over 3 years of age the vaccine should be drawn from a multi-dose vial.

The year 2009 is coming to a close and the pandemic (H1N1) influenza activity in the NT has significantly decreased. However, in view of reports from the Northern Hemisphere, historical evidence from previous pandemics and the novelty of this influenza strain, the risk of a second wave of unknown scale and severity underscores the need for us to be prepared. While 20% have been vaccinated an unknown amount but possibly 10% or more have been exposed to the virus. The majority of the population however, is still susceptible to the disease and the impact of a second wave is unpredictable. Our best line of defence remains to achieve higher immunisation rates and this requires a renewed commitment from health professionals and an understanding by the public of the reasons for H1N1 immunisation.

For more information on the vaccine program:

http://www.healthemergency.gov.au/internet/healthemergency/publishing.nsf/Content/vaccine

http://www.health.nt.gov.au/H1N1_Swine_Flu_Vaccine/index.aspx

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Can paracetamol decrease the effect of vaccines?

A recent study has provided strong evidence that prophylactic use of paracetamol with routine immunisation, in particular with primary immunisation, decreases the immune response in infants.[1]

In view of these new findings, providers should abstain from routinely giving paracetamol as a prophylactic or comfort measure for immunisation before or within 24 hours of administering the vaccine.

Therefore, the use of paracetamol within the 24 hours of immunisation for the control of mild fever is not recommended. The risk of decreasing the antibody response to the vaccine would generally outweigh the small benefit gained by paracetamol administration. To address any discomfort or pain that may occur after vaccination, methods such as cold compresses and additional breastfeeding should be encouraged. Only if these measures are not sufficient, should paracetamol be considered.

There is no evidence about the use of ibuprofen but at this stage it should not be used prophylactically when administering vaccines.

Clinicians may decide to give special consideration for the use of antipyretics in children with a history of recurrent febrile convulsions.

Reference

1. Prymula R, et.al., Effect of prophylactic paracetamol administration at time of vaccination on febrile reactions and antibody responses in children: two open-label, randomised controlled trials. *Lancet.* 2009 Oct 17;374(9698):1339-50.

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Unintentional drowning-related deaths in the Northern Territory with alcohol involvement: 2000-2008

Justine Glover, Injury Prevention Officer & Steven Skov, Public Health Physician CDC Darwin

Abstract

Investigation of 56 unintentional drowning deaths in the NT, 2000-2008, revealed that 28 had alcohol involvement in the coroners report. The majority of these cases were in males aged 18-71 years and 50% were identified as Indigenous. 12 occurred at sea, 11 in fresh water and 5 in swimming pools. The top 2 identified activities associated with these deaths were swimming and watercraft activities.

Introduction

Understanding the circumstances of drowning deaths is important in developing appropriate public health responses and public education campaigns. Analysis of information regarding childhood deaths in home swimming pools was influential in the development of pool fencing legislation in the NT. However, there has been little in depth analysis of other drowning deaths that might inform policy in other areas. Using coronial reports from the National Coroners Information System (NCIS), this report will explore the role of alcohol in unintentional drowning in the NT between 2000 and 2008.

Methods

The time period for the analysis was 01/07/2000-30/06/2008 (based on the date the cases were notified to the Coroner).

There were 2 methodologies used to search for drowning deaths with alcohol involvement on the NCIS. These included:

1. Combination mechanism and cause of death search:

Query design: Page 4: select the mechanism of death being “threat to breathing—drowning/near drowning” and Page 5: type “alcohol” in the cause of death (select 1a, 1b, 1c, 1d, 2, and 3).

2. Combination mechanism and keyword search of Coroner’s findings:

Query design: Page 1: text in documents = enter “alcohol”, select ‘finding from the document type’. Page 4: select the mechanism of death being “threat to breathing - drowning/near drowning”.

Results

From 2000-2008 there were 76 deaths in the NT investigated by the Coroner where the mechanism of death was noted to be drowning.

Twenty deaths were excluded from this analysis as they were deemed to be intentional (i.e. suicide, assault or murder) or were the result of other external circumstances such as a crocodile attack or motor vehicle crash.

Of the 56 unintentional deaths due to drowning, 28 had alcohol involvement recorded in the coroner's report.

This report will only consider those 28 deaths where the mechanism was drowning and the coroner's report noted alcohol involvement.

Time of occurrence

The number of unintentional alcohol-related drowning deaths has been relatively constant over the past 9 years, with the exception of an increase in 2006 (Table 1).

The majority of the deaths occurred on a Friday (n=9), followed by Sunday (n=7), Saturday (n=6), Wednesday (n=2), Thursday (n=2), Monday (n=1) and Tuesday (n=1).

Of the cases, 20 (71%) were recorded in the Wet season and 8 cases (28%) recorded in the Dry season.

Demographics

Males accounted for 79% (n=22) of the alcohol-related drowning deaths. Their ages ranged from 18–71 years, with a mean age of 38 years. Ages for the 6 female deaths ranged from 19-48 years, with a mean age of 39.5 years. Males in their 30-40s were most at risk, representing 50% of all deaths.

50% of the deaths occurred in Indigenous people and 50% in non-Indigenous people.

Alcohol involvement

- In 20 cases, a blood alcohol level of over 0.100g/100ml was recorded.
- In 5 cases, a blood alcohol level of less than 0.100g/100ml was recorded.
- In 3 cases it was not possible to perform a blood alcohol test but, on the basis of other evidence, the coroner identified alcohol as a likely contributing factor.

Of the deaths with a blood alcohol level of over 0.100g/100ml

- 11 had an alcohol reading between 0.100g/100ml - 0.299g/100ml;
- 5 had an alcohol reading between 0.300g/100ml - 0.399g/100ml; and
- 4 had an alcohol reading over 0.400g/100ml[ŧ]

Place of occurrence

Six deaths occurred at Katherine (5 in the river), with 2 deaths occurring at each of the following sites: Karama, Victoria River, Mandorah, and Nightcliff.

Single deaths occurred at each of the following sites: Coconut Grove, Stokes Hill Wharf, Port Keats, Humpty Doo, Borroloola, East Point, Barunga, Sampan Creek, Bickerton Island, Jabiru, One Mile dam, Malak, Ngukurr & Lamaroo Beach.

The bodies of water involved in the deaths included:

- 12 in the sea,
- 11 in fresh water: 9 in a river and 2 in a dam, and
- 5 in a swimming pool: 4 private and 1 public.

Table 1. Unintentional drowning deaths in the NT investigated by the coroner with alcohol involvement: 2000-2008

	2000[#]	2001	2002	2003	2004	2005	2006	2007	2008[#]	Total
Deaths	2	2	4	4	3	1	7	3	2	28

[#]Not complete calendar years 01/07/2000-31/12/2000, 01/01/2008-30/06/2008

[ŧ]The majority of alcohol analyses were taken from the blood and in a minority from other body fluid.

*0.100g/100m of alcohol is equivalent to 0.10%

Circumstances

The majority of drowning deaths involving alcohol occurred whilst swimming (n=8) or undertaking watercraft activities (n=5). Other circumstances included: attempting a rescue (n=3), attempting a river crossing (n=3), a fall into a body of water (n=1) and jumping off a wharf (n=1). In the remaining 7 cases the circumstances around how the deceased came to be in the water are unclear.

Discussion

The NT has 3.6 times the national drowning rate, [1] with alcohol being a factor twice as often here as elsewhere.[2] The Northern Territory's alcohol consumption and alcohol related harm is well in excess of the rest of the country. In 2004/05 apparent consumption in the NT was 15.07 litres of pure alcohol per person age 15 years and older[3] compared to a figure of 9.83 litres for the whole of Australia.[4] In the same period the rate of alcohol attributable hospitalisations and deaths in the NT were approximately twice and three times the national rates respectively.[5] Nearly 50% of road crash deaths in the NT have alcohol involvement compared to rates of between 20% and 30% in other states.[6]

Examination of the narrative text of the coroner's findings in addition to known blood alcohol levels reveals some instances of severe intoxication resulting in the person becoming incapacitated and drowning. However in others, the level of intoxication was much less severe, but when adversity in or on the water arose, it may have reduced their capacity to effectively deal with the situation.

Alcohol has the effect of reducing inhibitions and increasing risk taking behavior while at the same time adversely affecting the body's coordination and slowing reaction time. This is potentially very dangerous while swimming or boating.[7] There is no prohibition on consuming alcohol and driving a boat in the NT in the same way as applies to driving a car. However, alcohol was involved in half of all unintentional drownings in the NT, and it should send a clear message to Territorians of the dangers of drinking alcohol while swimming or boating.

References:

1. Royal Life Saving Society: NT Drowning Report 2008 [Internet] Darwin: Royal Life Saving Society – Australia; [cited 2009 Oct 19]. Available from: www.royallifesaving.com.au/www/html/2285-nt-drowning-report-2008-.asp
2. Driscoll T, Steenkamp M, Harrison J (Research Centre for Injury Studies Flinders University, SA). Alcohol and Water Safety. National Alcohol Strategy 2001 to 2003-04 2003 January. Canberra: Commonwealth of Australia: 2003. Publication number 3193.
3. Department of Justice. Northern Territory Wholesale Alcohol Supply for the period 2001 to 2008. [Internet] Darwin: Northern Territory Government, Department of Justice [updated 2009 Dec 24; cited 2010 Jan 5] Available from: http://www.nt.gov.au/justice/policycoord/researchstats/index.shtml
4. Australian Bureau of Statistics (ABS). Apparent Consumption of Alcohol, Australia. Years 2004/05 to 2006/07. Canberra: ABS. Cat no 4307.0.55.001.
5. Pascal R, Chikritzhs T, Jones P. Trends in alcohol attributable deaths and hospitalizations in Australia 1996-2005 Perth. National Drug Research Institute, Curtin University of Technology. 2009 September. Bulletin 12.
6. Northern Territory Road Safety Task Force. Safer Road Use: A Territory Imperative. Darwin; Northern Territory Government; 2006 June.
7. Royal Life Saving Society: Fact Sheets [Internet] Broadway NSW: Royal Life Saving Society – Australia; Available from: http://www.royallifesaving.com.au/www/html/156-fact-sheets.asp

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Melioidosis in the Northern Territory

Bart Currie, Menzies School of Health Research and Infectious Diseases Department, Royal Darwin Hospital

Abstract

Each year 20-40 cases of melioidosis are diagnosed in the Top End, with the majority occurring in the wet season and resulting from recent infection. Mortality from melioidosis at Royal Darwin Hospital (RDH) is less than half what it was 20 years ago. This decreased mortality is attributed to earlier diagnosis and major improvements in management of critically ill patients with septicaemic melioidosis.

Epidemiology

Melioidosis results from infection with the soil and water bacterium *Burkholderia pseudomallei.*[1] Disease occurs in humans and many animals and mostly follows percutaneous inoculation.[2] Inhalation of aerosolised bacteria is thought to occur during severe weather events such as tropical storms and cyclones and aspiration is documented with near drowning following accidents. Ingestion can also occur, such as from mastitis-associated infected breast milk.[3] Zoonotic transmission is exceedingly rare, as are person-to-person transmission and laboratory-acquired infection.

The known endemic distribution of *B. pseudomallei* has expanded beyond the traditional melioidosis-endemic regions of Southeast Asia and northern Australia, with recent case reports of melioidosis from the Americas, Madagascar, Mauritius, India and elsewhere in south Asia, China and Taiwan.[4]

The first reported case of melioidosis in the Northern Territory was in 1960.[5] Since October 1998 we have prospectively documented all cases of melioidosis in the Top End. Over the last 20 years there have been 540 culture-confirmed cases with 77 deaths (14%) in the Darwin Prospective Melioidosis Study. Of the cases in the Top End 81% occur during the wet season (November 1–April 30).

Pathogenesis

Serological surveys suggest that most infections are asymptomatic, with rates of seropositivity by IHA of over 50% in parts of northeast Thailand.[6] In contrast, in the Top End of the Northern Territory, IHA seropositivity (titre>1:20) in long term Darwin residents is 3-5% and in remote communities in Arnhem Land it can be as high as 20% (unpublished data).

The clinical presentations of melioidosis and outcomes are thought to be determined by a combination of mode of infection, infecting dose of bacteria, putative *B. pseudomallei* strain differences in virulence and, most importantly host risk factors for disease. Diabetes is the most important risk factor for melioidosis, followed by excessive alcohol consumption, chronic lung disease, chronic renal disease, malignancy and immunosuppressive therapy.[7, 8]

Although animal studies support there being differential virulence between strains of *B. pseudomallei*, the specific virulence factors responsible for clinical disease and severe infection remain surprisingly poorly elucidated.[9]

The vast majority if melioidosis cases are from recent infection, with an incubation period of 1 to 21 days (mean, 9 days)[10], but latency with subsequent reactivation is well recognised, with the longest documented period of latency being an extraordinary 62 years.[11]

Clinical features

Around half of melioidosis cases present with pneumonia, which can be part of a fatal septicaemia, a less severe unilateral infection indistinguishable from other community-acquired pneumonias or a chronic illness mimicking tuberculosis.[12, 13] Other presentations range from skin lesions without systemic illness,[14] to overwhelming sepsis with abscesses disseminated in multiple internal organs.[8] Genitourinary disease with prostatic abscesses is especially common in the Top End.[15] Bone, joint and neurological infections are all well documented.

Diagnosis

The likelihood of diagnosing melioidosis is maximized if the diagnosis is considered in at-risk subjects and appropriate clinical samples

from a variety of sites are sent to the microbiology laboratory for microscopy and culture.

Culture is the mainstay of diagnosis. Diagnosis of melioidosis (ie active disease) is NOT made on the basis of a positive serology (IHA) result, although melioidosis serology should be ordered if melioidosis is suspected. Serologic testing alone is not a reliable method of diagnosis and culture confirmation should always be vigorously sought in patients with suspected melioidosis.

All patients with suspected melioidosis should have the following samples, if available, taken for culture:

- *Blood*
- *Sputum*
- *Urine*
- *Swab of an ulcer or skin lesion; placed into Ashdown's selective medium (purple bottle) to enhance recovery of the organism*
- *Abscess fluid*
- *Throat swab; placed into Ashdown's selective medium*
- *Rectal swab; placed into Ashdown's selective medium*

Chest X-ray should be performed in all suspected cases. In any confirmed melioidosis case (i.e. culture positive), CT abdomen and pelvis is required to detect any internal abscesses, irrespective of clinical presentation.

All confirmed cases of melioidosis in the Top End and any suspected cases without confirmation despite appropriate diagnostic work up (as above) should be referred to the RDH Infectious Diseases team.

Treatment

All cases of melioidosis in the Top End are managed and followed up by the RDH Infectious Diseases team. For initial intensive therapy, use:

> *ceftazidime (wards) 2g (child: 50mg/kg up to 2g) IV, 6-hourly for at least 14 days*
>
> *OR*
>
> *meropenem (ICU) 1g (child: 25mg/kg up to 1g) IV, 8-hourly for at least 14 days*

In critically ill patients with septicemic melioidosis, granulocyte colony-stimulating factor (G-CSF) therapy should be considered. In neurological melioidosis the meropenem dose is doubled. For neurological melioidosis, osteomyelitis and septic arthritis, genitourinary infection including prostatic abscesses, and skin and soft tissue infections, add trimethoprim+sulfamethoxazole in the eradication doses as below.

Prolonged IV therapy (4 to 8 weeks) is necessary for deep-seated infection, osteomyelitis and septic arthritis.

Eradication therapy is required after the initial intensive therapy, use:

> *1trimethoprim+sulfamethoxazole 320+1600 mg (child: 8+40 mg/kg up to 320+1600 mg) orally, 12-hourly for at least a further 3 months*
>
> *PLUS*
>
> *folic acid 5mg (child: 0.1mg/kg up to 5mg) orally, daily for at least a further 3 months*

References

1. White NJ. Melioidosis. *Lancet* 2003;361 (9370):1715-22.
2. Cheng AC, et al. Melioidosis: epidemiology, pathophysiology, and management. *Clin Microbiol Rev* 2005;18(2):383-416.
3. Ralph A, et al. Transmission of Burkholderia Pseudomallei Via Breast Milk in Northern Australia. *Pediatr Infect Dis J* 2004;23(12):1169-71.
4. Currie BJ, et al. The global distribution of Burkholderia pseudomallei and melioidosis: an update. *Trans R Soc Trop Med Hyg* 2008;102 Suppl 1:S1-4.
5. Crotty JM, et al. Melioidosis in the Northern Territory: a report of two cases. *Med J Aust* 1963;i:274-5.
6. Wuthiekanun V, et al. Development of antibodies to Burkholderia pseudomallei during childhood in melioidosis-endemic northeast Thailand. *Am J Trop Med Hyg* 2006;74(6):1074-5.
7. Limmathurotsakul D, et al. Risk factors for recurrent melioidosis in northeast Thailand. *Clin Infect Dis* 2006;43(8):979-86.
8. Currie BJ, et al. Endemic melioidosis in tropical northern Australia: a 10-year prospective study and review of the literature. *Clin Infect Dis* 2000;31(4):981-6.

9. Wiersinga WJ, et al. Melioidosis: insights into the pathogenicity of Burkholderia pseudomallei. *Nat Rev Microbiol* 2006;4(4):272-82.
10. Currie BJ, et al. Melioidosis: acute and chronic disease, relapse and re-activation. *Trans R Soc Trop Med Hyg* 2000;94(3):301-4.
11. Ngauy V, et al. Cutaneous Melioidosis in a Man Who Was Taken as a Prisoner of War by the Japanese during World War II. *J Clin Microbiol* 2005;43(2):970-2.
12. Chaowagul W, et al. Melioidosis: a major cause of community-acquired septicemia in northeastern Thailand. *J Infect Dis* 1989;159:890-9.
13. Currie BJ. Melioidosis: an important cause of pneumonia in residents of and travellers returned from endemic regions. *Eur Respir J* 2003;22 (3):542-50.
14. Gibney KB, et al. Cutaneous melioidosis in the tropical top end of Australia: a prospective study and review of the literature. *Clin Infect Dis* 2008;47(5):603-9.
15. Morse LP, et al. Prostatic abscess due to Burkholderia pseudomallei: 81 cases from a 19-year prospective melioidosis study. *The Journal of urology* 2009;182(2):542-7.

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Rabies, Canine, Human—Indonesia: Bali, Alert

Rabies in Bali, Indonesia

In December 2008, the Indonesian Ministry of Agriculture reported a rabies outbreak in dogs on the island of Bali, Indonesia, to the World Organization for Animal Health (OIE). As of October 2009, the Indonesia Ministry of Health had reported 15 (human) deaths caused by rabies on Bali.[1] Cases of rabies have been identified throughout the densely populated areas in the south, south east and eastern portions of Bali. Travellers are advised to take precautions if visiting the region.

Media reports from Bali continue to add to the number of deaths attributed to rabies acquired in Bali.

Advice to give to travellers

Follow these recommendations to protect you and your family from rabies:

Avoid animal bites:

- Avoid contact with all animals, including wild animals and pets.

Act quickly if an animal bites or scratches you:

- Wash the wound well with soap and water.
- See a doctor right away, even if you don't feel sick or your wound is not serious. To prevent rabies, you may need to start a series of vaccinations immediately which may include getting an injection of immunoglobulin which is best given at the same time as the rabies vaccine but MUST be given within 7 days of receiving the rabies vaccine.
- If vaccine is not available on site be prepared to travel back to Australia or to another area to commence or complete the vaccination program. (Adequate vaccination for exposure to rabies is not available in all parts of the world.)
- After you return home, contact the Centre for Disease Control 89228044, or visit your nearest emergency department for follow-up advice and vaccination.

For further information about rabies and travel, refer to the following sites:

http://www.smartraveller.gov.au/zw-cgi/view/Advice/Indonesia

http://wwwnc.cdc.gov/travel/content/outbreak-notice/rabies-bali-indonesia2008.aspx

Reference

1. Centers for Disease Control and Prevention (CDC): Outbreak Notice Rabies in Bali, Indonesia [internet] Atlanta: CDC; 2008 Dec 22 [updated 2009 Nov 19; cited 2009 Jan 13]

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Centre for Disease Control

December 2009

Melioidosis

What is melioidosis?

Melioidosis is a disease caused by bacteria known as *Burkholderia pseudomallei*. The bacteria live below the soil's surface during the dry season but after heavy rainfall are found in surface water and mud and may become airborne.

How is it spread?

The bacteria that causes melioidosis usually enters the body via cuts and sores in the skin or via inhalation of dust or droplets and very rarely by ingestion of contaminated water.

The disease has been found among some domestic and farm animals. Melioidosis does not usually spread from one person to another or from animals to humans.

Where does melioidosis usually occur?

Melioidosis is found in tropical areas throughout the world, particularly in South East Asia and northern Australia.

In Australia cases typically occur in the Top End of the Northern Territory (NT) and in far north Queensland and the Kimberley region of Western Australia. Cases have been found in the NT as far south as Tennant Creek.

What are the symptoms?

The symptoms of melioidosis depend on the site of the infection and this can vary. Often it starts as a chest infection with a productive cough and difficulty breathing. Other possible presentations include fever with headache and confusion, or pain and/or difficulty passing urine. People can become ill from 1 to 21 days after being infected and the onset of symptoms may be sudden or gradual. The infection can be fatal and melioidosis requires urgent medical attention and treatment with specific antibiotics.

In some cases the illness may come on much more slowly with weight loss, intermittent fever, chest pain and a cough. Some people may present with skin ulcers, boils or joint or bone infections.

There have also been cases where the disease has caused illness many years after the initial infection. In these cases, the bacteria have been carried by the person and have become active due to a weakening of the immune system.

The diagnosis of melioidosis is made by growing the bacteria with laboratory testing of blood, sputum, urine or a swab from an abscess or non-healing ulcer.

Who is at risk?

People most at risk are those with conditions such as diabetes, heavy alcohol consumption, kidney disease, lung disease, and cancer and those on **immunosuppressive** therapy.

Healthy people can also get the disease if they work in muddy soil without good hand and foot protection. Children are at a lower risk for acquiring melioidosis compared with adults. However, it is still possible for children, particularly those with chronic diseases or weakened immune systems to acquire melioidosis during the wet season.

CENTRE FOR DISEASE CONTROL

What is the treatment?

All patients should be admitted to hospital initially. They are treated with antibiotics, which usually have to be continued for at least 3 months. If treatment is started early, recovery is usually complete. It is important to complete all antibiotics to prevent a relapse.

How can melioidosis be prevented?

There is currently no vaccine against melioidosis. Therefore preventive measures are the key to avoiding infection.

Waterproof shoes or boots will protect your feet when you walk in wet soil where there is pooled water or you work in muddy conditions, for example, when gardening or working in excavations. Open footwear such as sandals are not very good protection. Protective gloves should be worn when handling soil, particularly during the wet season.

Wounds should be promptly and thoroughly washed clean and covered.

If necessary, use pumping equipment to control water ingress when working in excavations.

Due to the potential for aerosolisation (airborne droplets) of *Burkholderia pseudomallei* people with risk factors such as diabetes, heavy alcohol consumption, kidney disease, lung disease and cancer and those on immunosuppressive therapy should stay indoors during periods of heavy wind and rain in the Top End.

Children should avoid playing in muddy areas, wet sandpits or places where water has pooled in grassy areas or where grassed areas are boggy. Playing on wet grass is considered to be low risk for acquiring melioidosis. Sandpits which are dry or dry enough to comfortably play in are also low risk.

These preventative measures are most important if you have any of the following conditions:

- diabetes
- heavy alcohol consumption (>20 standard drinks a week)
- kidney disease
- lung disease
- cancer
- receiving immunosuppressive therapy
- cuts or sores in your skin, particularly on the hands and feet.

For more information contact the CDC in your region

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

or

http//www.nt.gov.au/health/cdc

Climate change: Why should health care professionals care and what can they do?

Steven Skov, Public Health Physician, CDC Darwin

Abstract

Health professionals have a responsibility to understand the current and potential implications of climate change on health. This article looks at local, national and international impact of climate change on health.

Article

What do you know about health and climate change? Do you believe people are suffering and dying because of global warming? A World Health Organisation report estimated that 160,000 people died in the year 2000 due to the effects of climate change and that there were 5,500,000 Disability Adjusted Life Years (DALYs) lost.[1] A more recent analysis suggests that as many as 315,000 lives per year were lost due to climate change between 2004 and 2008.[2] About 10% of these were due to weather related disasters and the remaining 90% due to gradual degradation of the environment.

How exactly does climate change affect people's health? An increase in vector borne diseases such as dengue, tick borne encephalitis, leishmaniasis and especially malaria occurs as increasing temperatures allow the insects that carry them to expand their range. Increasing temperatures also lead to a greater incidence of common bacterial gastro-intestinal infections which has the greatest impact on young children. Extreme weather events such as floods, storms and fires are becoming more common and more extreme and cause substantial death and injury. They also have a significant mental health burden as people have to live with the stress and anxiety of such events being more frequent.

However, much more important than these is the impact of food and water insecurity. Many parts of the world will have an overall reduction in rainfall, more frequent droughts, and will be more prone to flooding when rain does come. This will lead to a widespread reduction in the production of food. Sea level rise will exacerbate this as the soil in many coastal areas will no longer support food crops. The effect will be that tens if not hundreds of millions of people will have to live with less water, less food and less money. Social and political instability will follow closely and many will become climate refugees forced to move in search of the basic necessities of life.

So far, the overwhelming majority of people suffering and dying from climate change have been in developing countries. But developed countries and Australia in particular are not being spared. In the 2003 summer heat waves in Europe there were some 70,000 excess deaths.[3] In early 2009, heat waves in southern Australia were accompanied by hundreds of unexpected deaths mainly of old people with 374 in Victoria alone.[4]

Of the developed world, Australia is likely to be the country most affected by climate change.[5] Australia will probably adapt well to changes in vector borne diseases and increased heat waves, but agricultural production could decline very substantially. If there is no change to the current trend in greenhouse gas emissions, it is estimated that agricultural production in the Murray Darling Basin will decline by 12% by 2030, 49% by 2050 and 92% by 2100.[6] If it does, then the price of food will rise substantially and result in poorer nutrition for Australians at the lower end of the socio economic scale. The negative effect on the livelihoods and well being of many rural communities already under stress from the drought will only get worse.

Australia will also be under pressure from significant numbers of climate refugees from the Pacific island nations and south and south east Asia. It is thought that even under a best case scenario, climate change will increase the number of displaced people in the Asia Pacific region by hundreds of thousands,[7] many of whom are likely to look towards Australia and northern Australia in particular.

The Northern Territory and northern Australia more generally will be adversely affected. Most of northern Australia's food comes from southern Australia. Food prices are already higher than in the rest of Australia and will rise more as both the cost of food production and the cost of transporting it to the north increase. In a report commissioned by the Garnaut Climate Change Review it is estimated that by the year 2070, under a mid range scenario, there would be more than 220 days per year in Darwin over 35^{o}C and up to 280 heat related deaths per year compared to only 63 in the absence of climate change.[8]

Throughout the world, marginalised populations and economically disadvantaged people will be the ones most adversely affected by climate change. This will also be true for Australian Aboriginal people. The impact on remote Aboriginal communities in northern and central Australia will most probably be even greater. Temperature rises in central Australia will be greater than in coastal areas. The cost of food and energy in remote communities is already much higher than in urban centres and this differential is likely to increase. In addition, sea level rise will damage coastal wetlands and so lead to reduced access to an important source of nutrition and a loss of valuable activities such as hunting and gathering and caring for country.[9]

Health care professionals will need to deal with the ill health caused by climate change. But, they also have a responsibility to prevent disease and so should be active in reducing the carbon emissions that are the cause of this ill health in the first place. They can do so directly in relation to the carbon footprint of the health industry and by advocating for change in the rest of society.

Beyond the direct benefits of reducing carbon emissions, many of the strategies to do so would have the co-benefit of improving health status in other ways. For example, reducing carbon emissions from coal and petroleum would also reduce ill health due to air pollution, increasing the use of public transport could reduce road traffic trauma, increasing active transport such as walking and cycling would lead to improvements in obesity, diabetes and cardiovascular disease and reducing consumption of red meat and associated saturated fat could lead to reductions in ischaemic heart disease and cancers.

The health care sector itself is a major producer of greenhouse gases. For example, the National Health Service (NHS) in the UK has calculated its carbon footprint at more than 18 million tonnes of CO_2 per year which comprises 25% of total public sector emissions and 3.2% of all emissions in the UK.[10] It is highly likely that the Australian health care sector is responsible for a similar proportion of our CO_2 emissions. In the Northern Territory, the Department of Health and Families is responsible for 38% of all government agency emissions:[11] the largest of any department.

There is much that health care professionals can do to reduce carbon emissions by action at the level of their own work unit, or by macro level system approaches such as hospital energy co-generation systems. A great deal of work has already been done in many parts of the world to reduce the health care carbon footprint.

The NHS in the UK has established a Sustainable Development Unit to drive its Carbon Reduction Strategy which aims to reduce 2007 NHS carbon emissions by 10% by 2015 as part of the UK's aim to reduce total emissions by 26% by 2020 and 80% by 2050.[12]

The World Health Organisation has recently published a discussion paper detailing 7 elements of a climate-friendly hospital: energy efficiency, green building design, alternative electricity generation, transportation for staff and patients, food which is locally grown and nutritious, waste reduction and recycling, and the conservation of water including safe alternatives to bottled water.[13]

In the US, Practice Greenhealth has created an energy impact calculator for hospitals, which allows an understanding of some of the health co-benefits which can be gained through energy efficiency and on-site energy generation (available at www.practicegreenhealth.org/tools/eic).

In New South Wales, the Sydney West Area Health Service has already embarked upon a comprehensive strategy of efficiency actions and infrastructure investments to reduce its water and energy use.[14]

But health care professionals can and should do more. With their direct knowledge of the health effects, their public health expertise, their ability to bring an understanding of evidence to policy development, and their credibility in society they are well placed and indeed have a responsibility to advocate for change in the rest of society: in the community and with government and industry.

Several of the world's leading medical journals, most notably the Lancet[15] have devoted a great deal of space in recent years to the health impacts of climate change and the need for broad societal action. In May this year, the Presidents of Colleges of Physicians and Surgeons from 12 countries, including the Royal Australasian College of Physicians, exorted doctors to demand that politicians heed the health effects of climate change and not waste the opportunity for action at the UN Copenhagen Conference on climate change.[16]

Climate change is happening now and it is not just bad for "the environment". It is bad for us. It is damaging the lives of real people today. It is a serious situation but there is much we can do. In our personal lives and our workplaces we can consider carefully the energy we do need to use and adopt more energy efficient practices. Most importantly we have to advocate with government and industry about the urgent need for readily and widely available renewable energy sources and energy efficiency measures and technologies. It is what we need to do to keep the climate, and ourselves, safe.

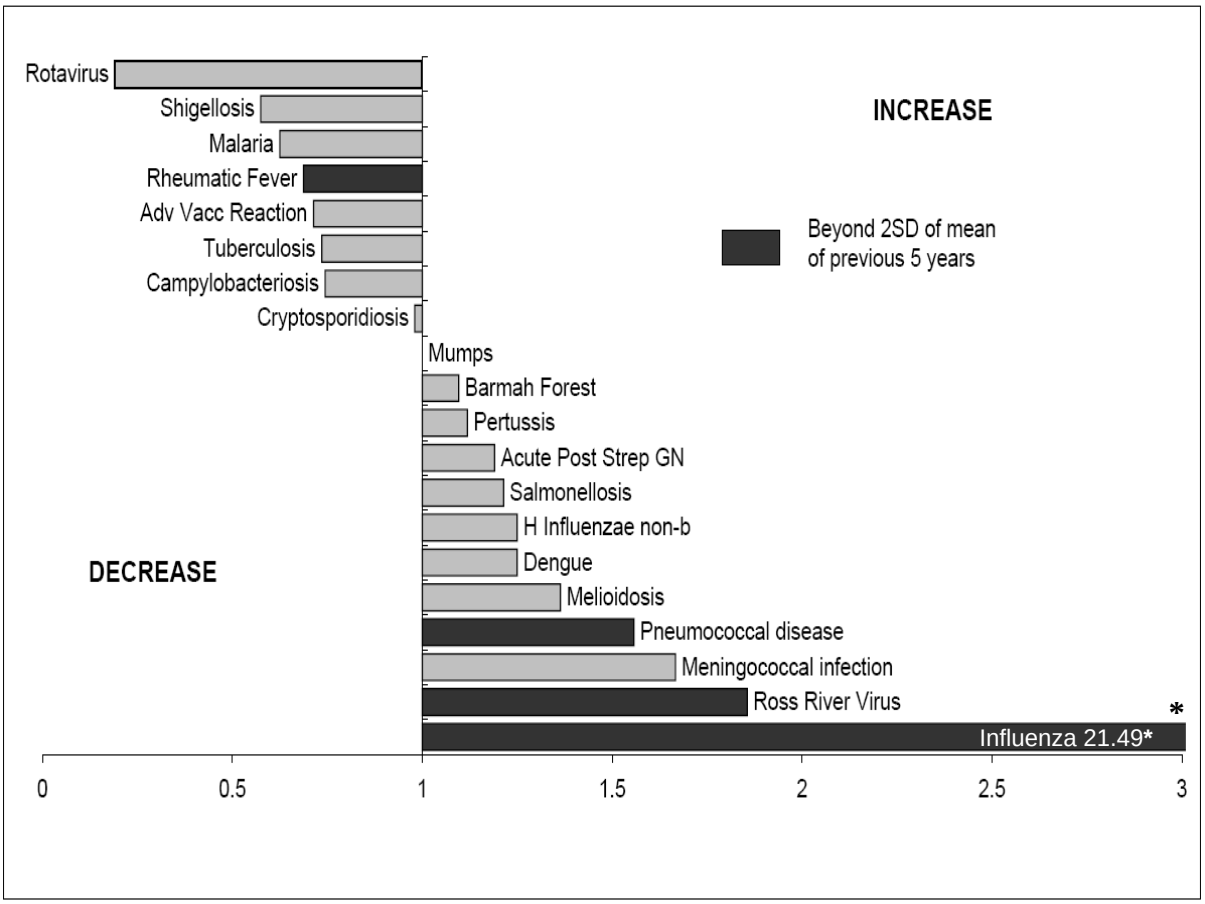
References

1. Campbell-Lendrum D, Pruss-Ustun A, Corvalan C. How much disease could climate change cause? In: McMichael AJ, Campbell-Lendrum D, Corvalan C, Ebi KL, Githeko AK, Sheraga JS, eds. Climate change and health: risks and responses. Geneva: World Health Organisation, 2003: 133-55.
2. Global Humanitarian Forum. Human Impact Report: Climate Change – The Anatomy of a Silent Crisis. Global Humanitarian Forum 2009; Geneva, Available at www.ghf-ge.org
3. Robine JM, Cheung SL, Leroy S, Van Oyen H, Griffiths C, Michel JP, Hermann FR. Death toll exceeded 70,000 in Europe during the summer of 2003 Comptes Rendus Biologies 2008 331(2): 171-78.
4. Victorian Dept of Human Services. Heatwave in Victoria: an assessment of health impacts. Victorian Dept of Human Services, 2009, Melbourne. Available at www.health.vic.gov.au.
5. Global Humanitarian Forum 2009 op cit.
6. Quiggin J, Adamson D, Schrobback P, Chambers S. Garnaut Climate Change Review. The implications for irrigation in the Murray Darling Basin. 2008 Available at www.garnautreview.org.au/CA25734ED0016A131/pages/all-reports--resources-commissioned-reports
7. Woodruff R, Hales S, Butler C, McMichael A. Climate change Health Impacts in Australia: Effects of dramatic CO2 reductions. Report for the Australian Conservation Foundation and the Australian Medical Association. National Center for Epidemiology and Public Health, Australian National University, Canberra, 2004.
8. Bambrick H, Dear K, Woodruff R, Hanigan I, McMichael A. Garnaut Climate Change Review. The impacts of climate change on three health outcomes: temperature-related mortality and hospitalisations, salmonellosis and other bacterial gastroenteritis, and population at risk from dengue. 2008. Available at www.garnautreview.org.au/CA25734ED0016A131/pages/all-reports--resources-commissioned-reports
9. Green D. Garnaut Climate Change Review. Climate impacts on the health of remote northern Australian Indigenous communities. 2008 Available at www.garnautreview.org.au/CA25734ED0016A131/pages/all-reports--resources-commissioned-reports
10. National Health Service Sustainable Development Unit. Saving Carbon, Improving Health. NHS Carbon Reduction Strategy for England. UK National Health Service January 2009. Available at www.sdu.nhs.uk.
11. NT Dept of Health and Families Annual report 2008-09. NT Dept of Health and Families, Darwin 2009. Available at http://www.health.nt.gov.au/Publications/Corporate_Publications/index.aspx
12. NHS 2009 op cit.
13. World Health Organisation. Healthy Hospitals, Healthy Planet, Healthy People. Addressing climate change in health care settings. WHO, 2008, Geneva. Available at www.who.int/globalchange/publications/healthcare_settings/en/index.html
14. Hadfield G. Reducing our environmental footprint. Conference presentation. Royal Australasian College of Physicians Physician's meeting, Darling Harbour, Sydney, May 2009.
15. Costello A, Abbas M, Allen A et al. Managing the health effects of climate change. *Lancet* 2009; 373: 1693-733.
16. Lim V, Stubbs JW, Nahar N et al. Politicians must heed the health effects of climate change. *Lancet* 2009; 374:973.

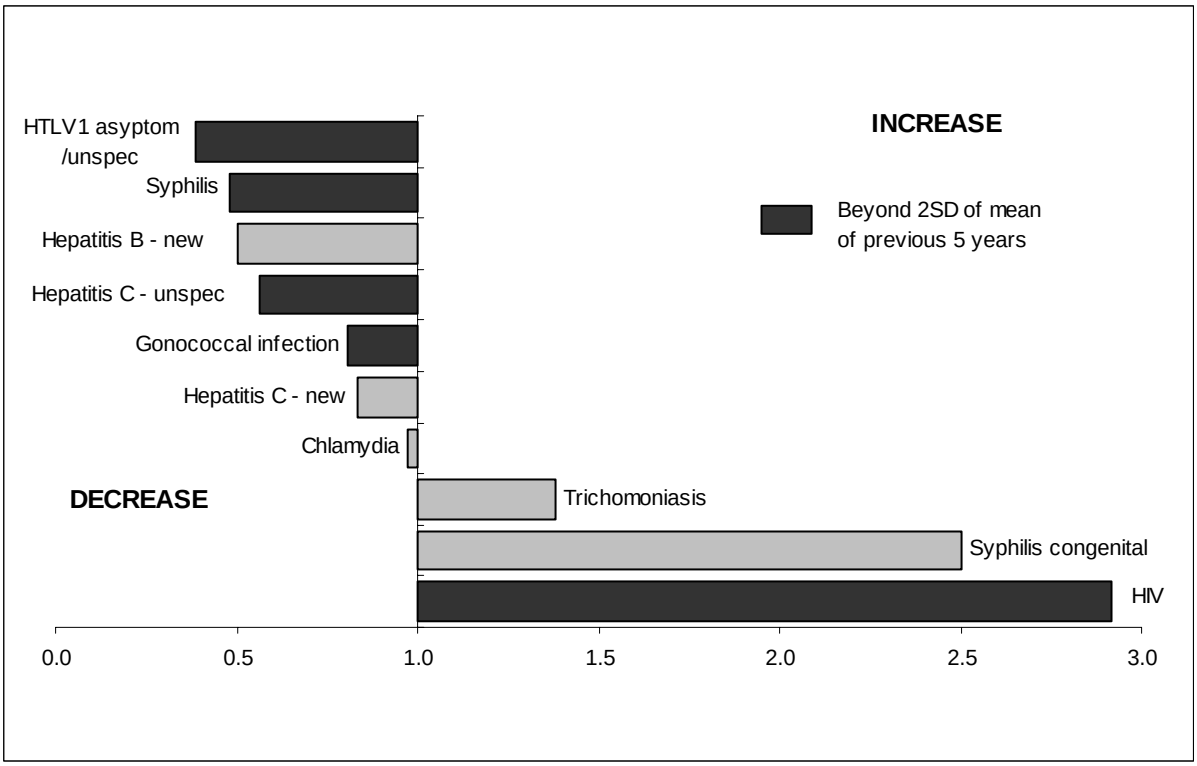
NT NOTIFICATIONS OF DISEASES BY ONSET DATE & DISTRICTS
1 July—30 September 2009 & 2008

	Alice Springs		Barkly		Darwin		East Arnhem		Katherine		NT	
	2009	**2008**	**2009**	**2008**	**2009**	**2008**	**2009**	**2008**	**2009**	**2008**	**2009**	**2008**
Acute Post Strep Glomerulonephritis	1	3	0	1	4	6	2	1	2	0	9	11
Adv Vaccine Reaction	1	0	0	0	4	3	1	0	1	0	7	3
Amoebiasis	0	0	0	0	0	2	0	0	0	0	0	2
Arbovirus not otherwise specified	0	0	0	0	1	0	0	0	0	0	1	0
Barmah Forest	3	3	0	0	11	13	1	2	1	1	16	19
Campylobacteriosis	5	16	0	0	36	43	0	1	5	7	46	67
Chickenpox	0	1	1	4	12	19	1	3	11	2	25	29
Chlamydia	119	165	9	13	212	241	28	48	57	64	425	531
Chlamydial conjunctivitis	14	6	0	0	2	0	0	0	1	0	17	6
Cryptosporidiosis	3	5	1	0	3	2	1	1	2	1	10	9
Dengue	0	1	0	0	4	3	0	1	0	0	4	5
Gonococcal infection	149	144	8	19	67	87	15	24	58	57	297	331
Hepatitis B - chronic	7	16	0	0	7	17	16	15	6	6	36	54
Hepatitis B - new	0	0	0	0	0	2	0	0	0	1	0	3
Hepatitis B - unspecified	13	11	2	1	16	37	0	2	5	9	36	60
Hepatitis C - chronic	0	0	0	0	0	0	0	2	0	0	0	2
Hepatitis C - new	0	0	0	0	0	1	0	0	0	0	0	1
Hepatitis C - unspecified	4	6	1	1	20	39	1	1	7	0	33	47
H Influenzae non-b	2	2	0	0	1	1	0	0	0	0	3	3
HIV	1	0	0	0	6	3	0	0	0	1	7	4
HTLV1 asymptomatic/unspecified	8	23	0	0	1	0	0	0	0	0	9	23
Influenza	377	48	61	12	673	40	140	1	210	5	1461	106
Legionellosis	0	0	0	0	1	1	0	0	1	0	2	1
Leprosy	0	0	0	0	0	1	0	0	0	0	0	1
Malaria	1	0	0	0	4	2	0	1	0	0	5	3
Melioidosis	0	0	0	0	3	0	0	0	0	0	3	0
Meningococcal infection	1	1	0	1	2	1	0	0	0	0	3	3
Mumps	0	19	8	0	0	1	0	0	0	0	8	20
Pertussis	9	7	1	0	29	114	7	0	3	37	49	158
Pneumococcal disease	18	9	2	0	11	8	2	2	5	0	38	19
Q Fever	2	1	0	0	0	0	0	0	0	0	2	1
Rheumatic Fever	4	2	1	2	3	10	0	1	3	3	11	18
Ross River Virus	10	5	1	0	44	34	3	4	2	0	60	43
Rotavirus	9	4	0	8	9	18	1	10	4	5	23	45
Salmonellosis	11	12	1	1	60	52	8	5	12	4	92	74
Shigellosis	5	14	2	2	5	12	3	2	2	3	17	33
Syphilis	8	21	0	1	14	28	3	3	4	11	29	64
Syphilis congenital	0	0	0	0	1	0	0	0	0	0	1	0
Trichomoniasis	129	152	21	19	151	173	53	77	102	80	456	501
Tuberculosis	1	0	0	0	2	1	0	1	2	0	5	2
Varicella unspecified	0	0	0	0	0	1	0	0	0	0	0	1
Yersiniosis	0	0	0	0	1	1	0	0	0	0	1	1
Zoster	9	6	2	2	19	23	2	0	5	3	37	34
Total	**924**	**703**	**122**	**87**	**1,439**	**1,040**	**288**	**208**	**511**	**300**	**3284**	**2338**

Ratio of the number of notifications (3rd quarter of 2009 to the mean of 2004-08) selected diseases



Ratio of the number of notifications (3rd quarter of 2009 to the mean of 2004-08) sexually transmitted diseases and other blood borne viruses.



Comments on NT notification graphs page 21

Pneumococcal disease

The 38 cases of invasive pneumococcal disease reported throughout the NT in the third quarter, continued the trend of increased numbers this year compared to recent years. The cases this third quarter have been mainly in Indigenous adults with some clustering noted, possibly associated with increased influenza cases. Serotyping reveals 12F and 18A have been the most prevalent types. 12F is contained in the adult polysaccharide vaccine. Providers are encouraged to vaccinate all eligible adults and to continue to promote timely childhood immunisations.

Acute rheumatic fever

It is unclear why the number of acute rheumatic fever (ARF) cases have dropped. It may be that primary prevention such as the treatment of skin sores and acute sore throats, as well as awareness in remote communities is contributing to the decreased numbers. It would be hoped that the trends currently being witnessed continue, reducing the notifications of ARF even further.

Ross River Virus

This is the highest number of cases (n=59) for the third quarter (July to September) since 1990/91. Most of the RRV cases occurred in the Darwin region (n=42), with 21 of those cases occurring in the Palmerston and Darwin rural area, where limited to no mosquito control is carried out. The increased number of cases is probably due to elevated numbers of salt marsh mosquitoes following a high tide in August, as well as increased numbers of the common banded mosquitoes.

Influenza

The number of notified cases of influenza was over 20 times the mean of the previous 5 influenza seasons due to the arrival of the pandemic (H1N1) 2009 strain of influenza in Australia as well as the associated increase in testing.

HTLV-1

The reason for the decrease is unknown.

Syphilis

This is consistent with an existing decreasing trend noted in the last few years. This decrease is most likely due to decreased transmission and prevalence. The implementation of the NT-wide syphilis register resulting in better case management in recent years may have played an important role.

Hepatitis C unspecified

This is consistent with an existing decreasing trend noted in the last few years. The reason for this decreasing trend is not clear.

Gonococcal infection

This is consistent with an existing decreasing trend noted in the last few years. An analysis on the laboratory testing data currently available suggests that this decrease was not due to decreased testing. It is likely to reflect a decrease in disease occurrence.

HIV

The majority of cases newly notified were Australian residents contracting the infection locally via heterosexual contact. Notably some HIV infections were heterosexually acquired by travellers to countries with high HIV prevalence.

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Immunisation coverage for children aged 12-<15 months at 30 Sept 2009

Region	Number in District	% DTP	% Polio	% HIB	% Hep B	% Fully vaccinated
Darwin	292	94.9%	94.9%	96.2%	96.6%	94.5%
Winnellie PO Bag	80	93.8%	93.8%	95.0%	98.8%	91.3%
Palm/Rural	250	90.0%	90.0%	93.6%	94.4%	89.2%
Katherine	79	96.2%	96.2%	96.2%	98.7%	93.7%
Barkly	22	86.4%	86.4%	95.5%	100.0%	81.8%
Alice Springs	126	90.5%	90.5%	93.7%	95.2%	88.9%
Alice Springs PO Bag	76	94.7%	94.7%	96.1%	98.7%	93.4%
East Arnhem	55	96.4%	96.4%	96.4%	98.2%	96.4%
NT	980	93.0%	93.0%	95.1%	96.5%	91.8%
NT Indigenous	361	93.4%	93.4%	95.3%	97.2%	92.0%
NT Non-Indigenous	619	92.7%	92.7%	95.0%	96.1%	91.8%
Australia Indigenous	3,521	86.1%	86.0%	92.9%	93.3%	85.7%
Australia Non Indigenous	68,679	92.7%	92.7%	95.0%	94.9%	92.3%
Australia Total	72,200	92.4%	92.4%	94.9%	94.8%	92.0%

Immunisation coverage for children aged 24-<27 months at 30 Sept 2009

Region	Number in District	% DTP	% Polio	% HIB	% Hep B	% MMR	% Fully vaccinated
Darwin	269	93.3%	93.3%	91.4%	94.4%	93.7%	90.3%
Winnellie PO Bag	88	97.7%	97.7%	97.7%	98.9%	96.6%	96.6%
Palm/Rural	236	96.6%	96.6%	94.9%	98.3%	96.2%	94.5%
Katherine	95	95.8%	95.8%	95.8%	95.8%	95.8%	95.8%
Barkly	28	100.0%	100.0%	96.4%	100.0%	100.0%	96.4%
Alice Springs	129	93.8%	93.8%	91.5%	96.1%	95.3%	91.5%
Alice Springs PO Bag	71	97.2%	97.2%	97.2%	97.2%	97.2%	97.2%
East Arnhem	62	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
NT	978	95.7%	95.7%	94.4%	96.8%	95.8%	93.9%
NT Indigenous	410	96.1%	96.1%	94.4%	98.0%	96.6%	93.9%
NT Non-Indigenous	568	95.4%	95.4%	94.4%	96.0%	95.2%	93.8%
Australia Indigenous	3,437	94.4%	94.4%	93.5%	96.7%	94.5%	91.7%
Australia Non Indigenous	69,829	95.0%	95.0%	94.7%	95.6%	94.0%	92.8%
Australia Total	73,266	95.0%	94.9%	94.7%	95.7%	94.0%	92.7%

Immunisation coverage for children aged 60-<63 months 30 Sept 2009

Region	Number in District	% DTP	% Polio	% MMR	% Fully vaccinated
Darwin	252	72.6%	72.2%	70.6%	70.6%
Winnellie PO Bag	82	92.7%	92.7%	93.9%	92.7%
Palm/Rural	189	74.6%	74.6%	76.2%	74.6%
Katherine	87	92.0%	92.0%	92.0%	92.0%
Barkly	21	66.7%	66.7%	71.4%	66.7%
Alice Springs	124	81.5%	81.5%	81.5%	80.6%
Alice Springs PO Bag	51	94.1%	94.1%	94.1%	94.1%
East Arnhem	58	82.8%	82.8%	82.8%	82.8%
NT	864	80.0%	79.9%	80.0%	79.3%
NT Indigenous	357	82.9%	82.9%	83.8%	82.6%
NT Non-Indigenous	507	77.9%	77.7%	77.3%	76.9%
Australia Indigenous	2,978	78.5%	78.4%	78.8%	77.9%
Australia Non Indigenous	62,543	83.1%	83.1%	82.8%	82.3%
Australia Total	66385	82.9%	82.8%	82.6%	82.1%

Immunisation coverage 30 September 2009

Immunisation coverage rates for NT children by regions based on Medicare address postcode as estimated by the Australian Childhood Immunisation Register are shown on page 23.

Background information to interpret coverage

Winnellie PO Bag is postcode 0822, which includes most Darwin Rural District communities, some East Arnhem District communities and some people who live in the Darwin "rural area" who collect mail from the Virginia store or Bees Creek. Alice Springs PO Bag is postcode 0872, which includes Alice Springs District, Nganampa and Ngaanyatjarra communities.

The cohort of children assessed at 12 to <15 months of age on 30 Sep 2009 were born between 01 Jul 2008 and 30 Sep 2008 inclusive. To be considered fully vaccinated, these children must have received 3 valid doses of vaccines containing diphtheria, tetanus, pertussis, and poliomyelitis antigens, either 2 doses of PRP-OMP Hib or 3 doses of another Hib vaccine, and 2 doses of hepatitis B vaccine (not including the birth dose) (latest doses due at 6 months of age). 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 Sep 2009 were born between 01 Jul 2007 and 30 Sept 2007 inclusive. To be considered fully vaccinated, these children must have received 3 valid doses of vaccines containing diphtheria, tetanus, pertussis, and poliomyelitis antigens, either 3 doses of PRP-OMP Hib or 4 doses of another Hib vaccine, and 2 doses of hepatitis B vaccine (not including the birth dose) and 1 dose of measles, mumps, rubella vaccine (latest doses due at 12 months of age). 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 Sep 2009 were born between 01 Jul 2004 and 30 Sep 2004 inclusive. To be considered fully vaccinated, these children must have received 4 valid doses of vaccines containing diphtheria, tetanus, pertussis antigens, 4 doses of poliomyelitis vaccine and 2 valid doses of measles, mumps, rubella vaccine (latest doses due at 4 years of age). All vaccinations must have been administered by 60 months (5 years) of age.

Interpretation

Immunisation coverage in NT children was above the national average in the 24 to <27 months cohort but below the national average in the 12 to <15 months and 60 to <63 months cohorts. Immunisation coverage in Indigenous children in the NT was higher across all cohorts compared to the national coverage of Indigenous children. Indigenous NT children had higher coverage than non-Indigenous NT children in the 12 to <15 months and 60 to <63 months cohorts and on par with non-Indigenous NT children in the 24 to <27 months cohort.

Immunisation coverage for NT children as a whole at 60 to <63 months of age (79.3%) remains lower than the younger cohorts, and this is a concern across Australia, with the national average for this cohort being 82.1%. For Indigenous NT children, immunisation coverage is higher at a younger age (i.e. 92.0% at 12 to <15 months, 93.9% at 24 to <27 months) but lower for the older age group (i.e. 82.6% at 60 to <63 months). Two CDC positions have been established to identify barriers to timely immunisation and improve coverage.

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NT Malaria notifications July 1-September 30 2009

Merv Fairley, CDC, Darwin

Five notifications of malaria were received for the third quarter of 2009. The following table provides details about where the infection was thought to be acquired, the infecting agent and whether chemo-prophylaxis was used.

Two were duel infections

Number of cases	Origin of infection	Reason exposed	Agent	Chemoprophylaxis
1	PNG	Holiday	P. vivax	Yes
1	Honduras	Holiday	P. vivax	Yes
1	Thailand	Holiday	{ P. vivax, P. falciparum }	No
1	East Timor	Resident	{ P. vivax, P. falciparum }	No
1	East Timor	Holiday	P. vivax	No

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Disease Control staff updates

Immunisation

Andre Wattiaux commenced as the Head of Immunisation for 12 months replacing **Ros Webby** who commenced maternity leave.

Sexual Health

Oanh Nguyen commenced a 2 year contract as the NT Blood Borne Virus Policy Officer for Darwin.

Mark Ryan commenced a 6 month contract as a Sexual Health Nurse with the Darwin Urban Team. Mark was previously working in the intensive care unit at the Royal Darwin Hospital.

Anguree Jansen van Rensburg commenced a 6 month contract as an Administration Assistant / Receptionist at Clinic 34 Darwin.

Tilly Todhunter commenced a temporary contract as a Public Health Nurse with Clinic 34 in Darwin.

Alice Springs

Lauren Coelli commenced a 6 month contract as a CNC Remote Sexual Health Coordinator in Alice Springs.

Jodi Pipes commenced as the Sexual Health Unit Regional Coordinator in Alice Springs.
Alice Springs.

Heather Wilson commenced as part of the trachoma team.

Michael Borenstein commenced a 2 year contract as the Coordinator / Health Promotion Specialist with the Centre for Sexual Health in Alice Springs.

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