

The initial coverage and impact of the pneumococcal and influenza vaccination program for at-risk Indigenous adults in Far North Queensland

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Following the recognition of the high risk of invasive pneumococcal disease in Indigenous adults in Far North Queensland,¹ a pneumococcal and influenza vaccination program for at-risk Indigenous adults commenced in Cape York in 1996. It was extended to include the Torres Strait and Cairns in 1997. Queensland Health then funded a State-wide Indigenous pneumococcal and influenza vaccination program in 1998; the Commonwealth did likewise for a national program that began in 1999.²

An Indigenous public health officer (IPHO) was recruited to (among other tasks) promote the program when it began in Cape York. The IPHO developed several resources for the program, not only for potential Indigenous clients but also for Indigenous health workers. As the program extended the resources were modified following focus testing in a variety of settings reflecting the diverse Indigenous environments in north Queensland.³

Key stakeholders, including the local Indigenous medical services, the relevant Queensland Health services, the Cairns Division of General Practice and the Royal Flying Doctor Service, were involved in the early planning and promotion of the program. Vaccination service providers were advised to offer the vaccines to all Indigenous adults ≥ 50 years of age, and to those

Indigenous adults 15-49 years of age with either pre-existing conditions (such as diabetes) or alcohol-related problems.⁴ It was emphasised that the vaccines should be offered to those still in relatively good health, before the chronic or severe complications of pre-existing conditions develop.¹

The systematic collection of pneumococcal and influenza vaccination records onto an Epi Info database began in 1996. The database enabled listings of those due for either vaccine to be sent to each community early in the subsequent years, in time for the program's annual vaccination 'season' (March-June inclusive). When funds from the Commonwealth became available in 1999, Queensland Health recruited a data officer for the statewide Indigenous pneumococcal and influenza vaccination program. The data officer uses the State-wide computerised immunisation register VIVAS (Vaccination Information and Vaccination Administration System).⁵ During 2000, information was transferred from the (now obsolete) Epi Info database to the VIVAS database.

The objectives of this preliminary report are to describe the pneumococcal and influenza vaccination coverages in the at-risk Indigenous adult population of Far North Queensland, and to determine the impact of the first five years of the program on the

Abstract

Objectives: To describe the initial coverage and impact of a pneumococcal and influenza vaccination program for at-risk Indigenous adults in Far North Queensland that formally commenced in 1996.

Design: Ascertainment of vaccine coverages, and prospective laboratory surveillance of invasive pneumococcal disease occurring in Indigenous adults in the region.

Main outcome measures: Coverages of the first doses of both vaccines administered since 1995, and the incidence of invasive pneumococcal disease in Indigenous adults in the region between 1993-2000.

Results: Most (96% and 73%) of the Indigenous adults ≥ 50 years of age received influenza and pneumococcal vaccines, respectively, for the first time between 1995-2000. Assuming that either 33% or 50% of Indigenous adults 15-49 years of age in Far North Queensland were eligible for vaccination, then either 109% or 72% of this population received influenza vaccine, and either 75% or 50% received pneumococcal vaccine, respectively, for the first time between 1995-2000. The incidence of vaccine-preventable invasive pneumococcal disease fell from 111 (95% confidence interval [CI] 77-154) cases per 100,000 per year in 1993/94 to 28 (95% CI 13-53) cases per 100,000 per year in 1999-2000 ($p < 0.05$).

Conclusion: Although there was a significant decline in the incidence of invasive pneumococcal disease, the vaccine coverages after five years of the program were suboptimal. Because of the difficulties in targeting the 15-49 years age group and because of unrecognised risk factors, we suggest that a universal Indigenous adult pneumococcal and influenza vaccination program should be considered.

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Table 1: The number of first doses of pneumococcal and influenza vaccines recorded as having been given to Indigenous adults in Far North Queensland by the end of 2000.

Age (years)	Pneumococcal vaccine			Influenza vaccine		
	Male	Female	Total	Male	Female	Total
15-49	1768	1506	3274	2531	2232	4763
≥50	908	1063	1971	1213	1369	2582
Total	2676	2569	5245	3744	3601	7345

incidence of invasive pneumococcal disease in Indigenous adults in the region.

Methods

The Indigenous adults ≥15 years of age who had received a first dose of either pneumococcal or influenza vaccine in Far North Queensland up to the end of 2000 were identified from the VIVAS database. Therefore, no individual was included more than once for each vaccine.

The first-dose vaccination coverages were calculated considering that every Indigenous adult ≥50 years of age was eligible for vaccination, and assuming that either 33% or 50% of Indigenous adults 15-49 years of age were eligible for vaccination because of pre-existing conditions. There were 15,836 Indigenous adults ≥15 years of age, 17% (2,694) of whom were ≥50 years of age, in Far North Queensland in 1996 (National Census, Australian Bureau of Statistics).

Laboratory surveillance of invasive pneumococcal disease began in Far North Queensland during 1992; it became a notifiable disease in Queensland in 1996. A case was defined by an acute systemic febrile illness and the isolation of *S.pneumoniae* from a normally sterile site such as blood or cerebrospinal fluid. Details of the surveillance system, the laboratory methods and data collection have been published elsewhere.¹

All cases of invasive pneumococcal disease that occurred in Indigenous adults ≥15 years of age in Far North Queensland between 1993 and 2000 were included in the study. A case of invasive pneumococcal disease was considered as being 'vaccine-preventable' if it was caused by a serotype contained within the pneumococcal polysaccharide vaccine and the patient, although eligible for vaccination,⁴ had either never received the vaccine or received a first dose within two weeks of the onset of the illness. A case of invasive pneumococcal disease was considered as a 'vaccine failure' if it was caused by a serotype contained within the pneumococcal polysaccharide vaccine, and the patient had documented evidence of having received the vaccine more than two weeks before the onset of the illness.

Confidence intervals (CI) of the incidence rates were calculated using tabulated factors.⁶

Results

By the end of 2000, there were 5,245 and 7,345 Indigenous adults in Far North Queensland recorded (on the VIVAS data-

base) as having received first doses of pneumococcal and influenza vaccines, respectively (see Table 1). Therefore 2,100 of the adults were recorded as having received a first dose of influenza but not pneumococcal vaccine. However, the numbers of first doses of either vaccine given to males and females overall, and within each of the two age groups, were not significantly different ($p>0.05$).

Although more first doses of influenza vaccine were administered, the uptake of this vaccine lagged behind that of the first doses of pneumococcal vaccine until 1998 (see Figure 1). In the subsequent two years, more than twice as many individuals received influenza vaccine for the first time compared with those who received pneumococcal vaccine.

Most (96%) of the estimated population of Indigenous adults ≥50 years of age received influenza vaccine for the first time between 1995-2000, compared with 73% who received the pneumococcal vaccine for the first time. Assuming that 33% of Indigenous adults 15-49 years of age in Far North Queensland were eligible for vaccination, then 75% and 109% of this population received pneumococcal and influenza vaccines, respectively, for the first time between 1995-2000. Similarly, assuming that 50% of the adults 15-49 years were eligible, then 50% and 72% received pneumococcal and influenza vaccines, respectively, for the first time.

The annual incidence of vaccine-preventable invasive pneumococcal disease declined from 120 (95% CI 72-187) cases per

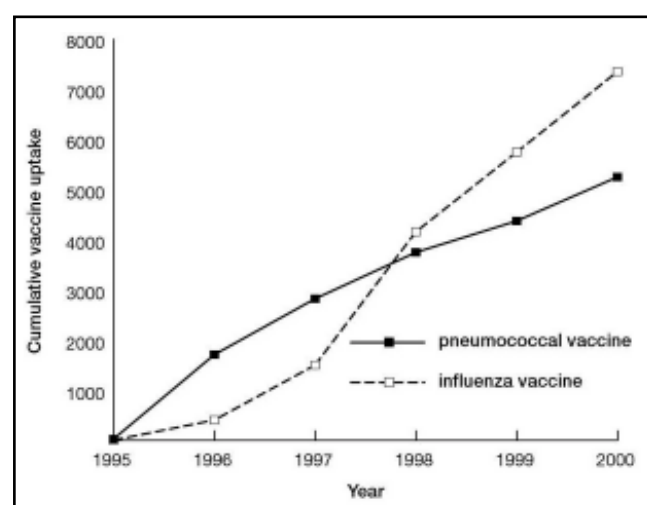


Figure 1: The cumulative uptake of first doses of the pneumococcal and influenza vaccines by Indigenous adults in Far North Queensland up to the end of 2000.

100,000 Indigenous adults in Far North Queensland in 1993, to a low of 13 (95% CI 2-47) cases per 100,000 in 1999 ($p < 0.05$) (see Figure 2). Although the incidence rose in 2000 (44 (95% CI 18-91) cases per 100,000), the point estimate was still lower than that documented in 1993 ($p < 0.05$). The incidence in 1993 and 1994 combined (before either vaccine had been administered in a comprehensive manner) was 111 (95% CI 77-154) cases per 100,000 per year. This compares to 28 (95% CI 13-53) cases per 100,000 per year in 1999 and 2000 combined; by the end of 1998 71% and 57% of the total first doses of pneumococcal and influenza vaccines, respectively, had been given.

The first vaccine failure was recognised in 1997 (see Figure 2). In 1998 there were as many, and in 1999 even more, vaccine failures than vaccine-preventable cases of invasive pneumococcal disease. However, in 2000, the vaccine-preventable cases again outnumbered the vaccine failures.

Discussion

The changing differential uptake of the two vaccines over the five years of the program is intriguing. The greater uptake of the pneumococcal vaccine in the first two years may reflect the effectiveness of the client pamphlet used at the time, which emphasised the importance of the pneumococcal vaccine in particular. (The emphasis was deliberate as it was considered that the pneumococcal vaccine would be perceived as a completely 'new' vaccine by Indigenous adults, whereas they may have been aware of the influenza vaccine via the mainstream media.) A randomised trial in an inner city population in the United States demonstrated just how effective low-literacy educational leaflets can be in improving uptake of pneumococcal vaccine.⁷

However, from 1998, when the State-wide Indigenous adult vaccination program was first implemented and new client resources that had a more balanced emphasis were first used, the uptake of first doses of influenza vaccine substantially exceeded

that of pneumococcal vaccine. This differential also was not unexpected; in the United States in 1997, for example, among adults ≥ 65 years of age, 65% reported receiving influenza vaccine in the previous 12 months whereas only 45% reported ever receiving pneumococcal vaccine.⁸ Since early 2001, vaccine providers throughout north Queensland have been not only advised to check whether any 'missing' doses of pneumococcal vaccine had in fact been given, but also reminded that both vaccines should be given simultaneously if required.

The Commonwealth originally suggested coverage targets (for both vaccines) of 80% in Indigenous adults ≥ 50 years and 80% in those 15-49 years of age with risk factors for the disease.² In Far North Queensland, the coverage of the cumulative first doses of influenza vaccine exceeded these targets in those ≥ 50 years and in those 15-49 years of age, assuming that 33% of the latter had risk factors, by the end of 2000. However, the first dose influenza vaccine coverage would not have met the target for those 15-49 years of age if it were assumed that 50% had risk factors, and pneumococcal vaccine coverage failed to meet the targets for both age groups in Far North Queensland.

Smoking does not yet appear as an indication for pneumococcal vaccination in the national immunisation guidelines,⁹ but a recent study from north America documented that cigarette smoking was the strongest independent risk factor for invasive pneumococcal disease in immunocompetent non-elderly adults.¹⁰ Indeed, in that study smoking appeared to be a more important risk factor than pre-existing conditions such as diabetes and alcohol abuse.¹⁰

Since, for example, ~70% of Indigenous adults residing in Cape York smoke,¹¹ and because the incidence of invasive pneumococcal disease in Indigenous Australian adults is very high,^{1,12} the proposed coverage targets for Indigenous adults are probably too low. Meanwhile, from early 2001, vaccine providers throughout north Queensland have been advised to offer both pneumococcal and influenza vaccines to Indigenous people ≥ 15 years of age who smoke.¹³

Although the program commenced in Far North Queensland in 1996, the incidence of invasive pneumococcal disease in Indigenous adults may have been on the decline before then. However, a small number of both vaccines given in 1995 were recorded on the database and it is possible that, following some local publicity,¹⁴ more doses of the pneumococcal vaccine in particular were given in 1995 but never recorded.

Randomised controlled trials have not conclusively determined the efficacy of the pneumococcal vaccine in those with pre-existing conditions, but retrospective studies have shown that the vaccine is ~50-80% effective in preventing invasive pneumococcal disease in that population.¹⁵ Because the effectiveness of the vaccine is only modest, it is inevitable that effective surveillance will detect vaccine failures among those at high-risk.¹⁶

Until very recently there were no observational studies on the impact of population-based vaccination on the incidence of invasive pneumococcal disease in that population. However, two recent preliminary reports, both in populations much larger (but

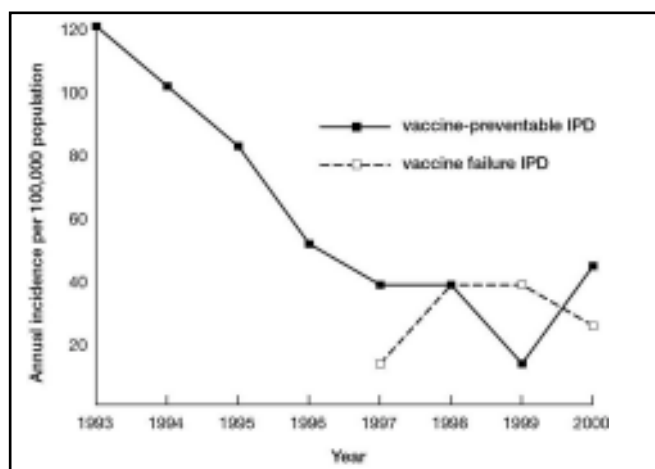


Figure 2: The annual incidence of invasive pneumococcal disease (IPD) according to whether the cases were either vaccine-preventable or vaccine failures in Indigenous adults in Far North Queensland.

probably at considerably lower risk) than that described here, have both documented a decline in invasive pneumococcal disease following population-based vaccination.^{17,18} It is gratifying that, despite suboptimal vaccine coverage, we also have been able to demonstrate a significant decrease in the incidence of vaccine-preventable invasive pneumococcal disease five years after commencing the vaccination program.

Furthermore, although clinical trials have not been able to demonstrate that the pneumococcal vaccine is effective in the elderly,¹⁵ two recent studies have documented that population-based vaccination of the elderly was associated with reduced hospital admission for pneumonia.^{18,19} Indeed the vaccine was also associated with reduced all-cause mortality in the elderly.^{18,19} Moreover, the protective effect of the vaccine against pneumonia and mortality appeared to be additional to that provided by the influenza vaccine during influenza seasons.^{19,20} Therefore, population-based pneumococcal and influenza vaccination not only reduces the incidence of invasive pneumococcal disease and influenza, but also appears to reduce hospitalisation for pneumonia, and all-cause mortality, in the elderly. Since many of the elderly have pre-existing conditions, it could be assumed that the vaccines have similar benefits for younger patients with pre-existing conditions.

Pneumococcal antibody levels wane to prevaccination levels within a few years following administration of vaccine,²¹ and there is uncertainty as to the duration of protection afforded by the vaccine.¹⁵ For this reason revaccination with the pneumococcal vaccine at five yearly intervals is currently recommended by the Australian authorities;⁹ the first revaccination is associated with self-limiting local reactions but otherwise appears quite safe.²²

The priorities in Far North Queensland will therefore be to ensure that not only coverages with the first doses of the vaccines are increased, but also high revaccination coverages are achieved. Perhaps rather than continuing with the targeted at-risk vaccination program, a more effective approach would be to adopt a universal Indigenous adult pneumococcal and influenza vaccination program similar to that implemented in the Northern Territory since mid-2000.¹² We suggest that coverage targets (for both vaccines) of 90% in Indigenous adults ≥ 50 years and 80% in all those 15-49 years of age, to be achieved within five years of adopting a universal program, are appropriate.

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