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Prevalence of influenza immunisation in Australia and suggestions for future targeting of campaigns

Summary

Objectives: Reports on the results of a national survey conducted in Australia, in 2000. The objectives were to determine national estimates of influenza vaccination coverage for each state and territory of Australia, to obtain information related to attitudes towards and influences on immunisation decisions and explain the factors involved with failure to immunise.
Method: The survey was conducted using the Computer Assisted Telephone Interview (CATI) system. The overall participation rate for the survey was 88.6 % and the final number of completed interviews across Australia was n = 10505.
Results: Two target groups, those aged 65 years and over and those "at risk" of influenza aged between 40 and 64 years were defined. The overall immunisation rates in these two groups were 74 % and 32 % resp. The rate of immunisation among females generally exceeded that of males. A multivariate model provided the best joint set of explanatory variables for not getting immunised. These include sex, income, general practitioner recommendation, and general perceptions regarding the influenza injection.
Conclusion: This study identified important issues in the decisions of people to immunise. It also highlighted the need to target the findings in effective immunisation policies and strategies to improve health outcomes for those at risk of adverse influenza events.

Keywords: Population surveys – Influenza – Immunisation – Epidemiology – Ageing – At risk.

Influenza has been labelled as one of the all-time great epidemics causing sporadic widespread illness every year (Victorian Department of Human Services 2000), resulting in several days of incapacity and taking several weeks to fully recover. It can occur in epidemic proportions approximately every three years and reach pandemic proportions on average every decade (Victorian Department of Human Services 2000). It has been estimated that influenza causes over 23 000 hospital admissions and 1 500 deaths every year in Australia (National Asthma Campaign 2000). Influenza can spread rapidly through populations and be devastating in specific population subgroups. Consequently, the National Health and Medical Research Council (NH & MRC) of Australia has identified at-risk groups. These are: all people over 65 years of age; Aboriginal and Torres Strait Islander people over 50 years of age; adults and children with chronic debilitating diseases; adults and children receiving immunosuppressive therapy; residents of nursing homes and chronic care facilities; staff who care for immunocompromised patients; and, staff of nursing homes and chronic care facilities who may transmit influenza to those at-risk (National Health and Medical Research Council 2000).
All of these "at-risk" groups are entitled to receive an influenza immunisation free of charge from a medical practitioner or other designated person. At the commencement

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of the influenza season in Australia, mass media campaigns are conducted reminding those at risk of influenza to undertake immunisation. General practitioners also identified patients "at risk" of influenza during face-to-face consultation or from medical records.

Immunisation for influenza has been shown to be 70% to 90% effective in preventing illness in young healthy adults when the vaccine antigens closely match the circulating influenza virus strains (Palache 1997). Immunisation can also halve hospitalisation rates for influenza complications and is associated with a similar reduction in all cause mortality (Nichol et al. 1994). For those 65 years of age and over, vaccination has been shown to reduce hospitalisations by between 30% and 70% (National Health and Medical Research Council 2000; Gross et al. 1995). In recent years it is the elderly who have been responsible for 90% of influenza related deaths (Lui & Kendal 1987; Simonsen et al. 1997) and is therefore a primary target group for promotion of immunisation.

Data indicate that there is still some way to go to achieve adequate population immunisation coverage for those most vulnerable. A recent study in the Australian state of Victoria, on the trend of immunisation uptake throughout the 1990s, shows that the prevalence of immunisation peaked at 76% for the over 65 year age group in 1999 (Victorian Department of Human Services 2000). However, among the vulnerable risk groups under 65 years of age the immunisation prevalence had declined from a peak of 30% in 1995 to 25% in 1999 (Victorian Department of Human Services 2000).

In response to this, the present study was commissioned by the Australian Commonwealth Department of Health and Aged Care to establish the prevalence of immunisation Australia wide and determine primary reasons associated with the uptake and/or refusal of immunisation in the vulnerable groups. The world literature identifies a number of influences on the decision to vaccinate. These can be divided into two major clusters of factors. The first cluster relates to the existence and perceived value of a health practitioners' recommendations to immunise and their influence on peoples' decision to seek immunisation (Fiebach & Viscoli 1991; Williams et al. 1988; Nguyen-Van-Tham & Nicholson 1993; Nichol et al. 1996; Honkanen et al. 1996; Litt & Lake 1993). The second cluster relates to the individual's perception of influenza risk and vaccine efficacy. Perception of influenza risk is concerned with whether or not the individual considers themselves to be at risk of contracting influenza (Honkanen et al. 1996; Pregliasco et al. 1999; Findlay et al. 2000). An individuals expectation of side effects (Findlay et al. 2000; Van Essen et al. 1997; Nichol & Hauge 1997) will alter the perception of vaccine efficacy, however, the risk of side effects from modern vaccines is small (Van Essen et al. 1997).

The current study was conducted between August and November 2000 at a time well beyond the recommended immunisation period during the Australian autumn (March, April) and when most people intending to be immunised should have done so. Both the prevalence of influenza vaccination and the perceptions of those vaccinated were examined.

The objectives of the survey were first, to determine the national estimate of influenza vaccination coverage and also to provide data for each state and territory of Australia. Second, to obtain information related to attitudes and influences on immunisation decisions and to explain the factors involved with failure to immunise.

Method

All households listed in the Electronic White Pages (EWP) in each of the six Australian states and two territories were eligible for selection in the sample. Use of EWP in Australian populations has been shown to be as valid as Random Digit Dialling (RDD) (Wilson et al. 1999).

The sample size varied between states as the proportion of the population aged 65 years and over varies between each state and territory in Australia. Thus to achieve the same target sample size, states had the sample size calculated individually. In addition, sample sizes differed if states were prepared to provide financial support over and above that of the Australian Commonwealth Department of Health and Aged Care, in order to conduct extra interviews with the over 65 year olds and to obtain larger samples for their own additional analyses. Initial sample calculations of the minimum sample size required was based on a prevalence estimate of 50% of the primary target group being immunised (those aged 65 years and over) and given a 95% confidence level of this estimate being within 5%. The minimum sample size obtained was for the Northern Territory (n = 569) and the maximum sample size (n = 1 111) was from the state of Victoria. A smaller sample size was required for the 40–64 year age group (n = 350) and this was achieved and exceeded in every state. All of these factors were taken into account when calculating the initial sample size required for each state and provided a final sample size of n = 15600. The final sample size for the survey was n = 10505 giving an overall survey response rate of 67%.

In this study the 40 to 64 year age group served two purposes. First, as a group who could provide estimates of

coverage for those with chronic disease and were therefore an important NH & MRC target group. Second, to provide information on "leakage" from the primary target group, i.e., those who did not have a chronic disease but still obtained immunisation from their doctor.

Interviews were conducted over a three-month period. The questionnaire was also administered in Italian and Greek. Households selected were sent a letter introducing the survey. Overall 61.1% of respondents reported receiving the letter. On contacting each household the person aged 18 years and over and who last had a birthday was initially chosen for interview. The exact age of the respondent was then ascertained. If the respondent was not aged 40 years or over, they were excused from further participation in the study. Only one person was interviewed in each household and up to six callbacks were made in order to interview the appropriate person. There was no replacement for those who were not contactable.

The questions included in the survey were based on a review of the literature and in earlier Australian work (Litt & Lake 1993). Pilot testing was undertaken on two occasions prior to the main survey (n = 150) and the original questionnaire amended slightly based on the information obtained.

Demographic variables included in the survey were gender, age, household size, country of birth, main language spoken at home, marital status, highest educational qualification, and gross household annual income. Health status of respondents was determined according to NH & MRC criteria for people deemed at risk of contracting influenza in the 40 to 64 age group. This group is the "at-risk" group for the purposes of the study. All respondents over the age of 65 years are considered to be at risk of influenza according to these criteria and were designated the primary target group for the study.

The prevalence of influenza vaccination amongst respondents was determined by asking if respondents had obtained an influenza injection in 1999 and in 2000. The questions concerned with attitudes towards the influenza vaccination identified whether the respondent felt that the influenza injection was effective in reducing the chance of getting influenza and whether they considered the severity of influenza was reduced by the vaccination. Respondents were also asked if they thought that the influenza vaccination could make them ill; whether they considered themselves to be in one of the influenza risk groups; and whether they felt that they did not need an influenza injection as they rarely got sick. Finally, the reported influence of the general practitioner on obtaining a vaccination was established.

Data were weighted by state, age, gender, and probability of selection in the household (Commonwealth Government of Australia 1999), which was based on the number of adults in the household and the number of telephone listings in the EWP that connect to the household.

The data were collected nationally using SERCIS (Social, Environmental and Risk Context Information System) which employs the CATI III (Computer Assisted Telephone Interviewing) system to conduct telephone interviews. Analysis was undertaken using SPSS Version 10.0 and Epi-Info Version 6.0.

Initially univariate analyses were conducted to determine the relationship between the variables of interest and likelihood of not being immunised in the year 2000. Secondly, all variables that had a p value less than 0.25 (Hosmer & Lemeshow 1989) (the level chosen as the critical value for statistical significance at the univariate level), were entered into a logistic regression analysis to determine the variables which impacted on the decision not to have an influenza injection in the year 2000. Once an appropriate model was obtained, the presence of multicollinearity was determined using SPSS Version 10.0. A separate model was constructed for those at risk of influenza and aged between 40 and 64 years and for those aged 65 years and over as these groups were considered to be independent of each other.

Results

The results report on the "at-risk" groups for influenza as defined by the National Health and Medical Research Council of Australia. All respondents aged 65 years and over were at risk for influenza and were included in these analyses. In the 40 to 64 year age group, 1141 of the total (n = 3277) were determined to be at risk of contracting influenza and only these were included in the analyses. This gave a total of n = 8 369 reported in this paper.

Table 1 shows the prevalence of influenza immunisation by age and sex for each of the Australian states and overall. Within the primary target group over 65 years of age there is a difference of 12 percentage points between the highest and lowest states in the prevalence of immunisation. With one state exception, males were less likely to be immunised than females.

For the age group between 40 and 64 years of age, 34.8% were determined to be the influenza risk group according to NH & MRC criteria. There are differences in prevalence of immunisation between the states with the difference between highest and lowest states for males almost doubling within this age group. Again with one exception the rates among females exceed rates for males. The salient feature of the data in Table 1 with respect to the at-risk group is the low coverage of immunisation overall.

Table 1 Prevalence (and 95% confidence interval) of influenza immunisation for each Australian state in the year 2000

State	40–64 years at risk of influenza			65 years and over		
	Male	Female	Persons	Male	Female	Persons
New South Wales	21.5 (13.4 – 32.5)	27.2 (17.5 – 39.3)	24.2 (17.7 – 32.0)	71.6 (67.2 – 75.5)	75.9 (72.4 – 79.3)	74.1 (71.3 – 76.6)
Victoria	40.5 (29.1 – 52.5)	36.4 (26.0 – 47.8)	38.3 (30.5 – 46.4)	73.7 (69.5 – 77.5)	76.2 (72.7 – 79.5)	75.1 (72.5 – 77.7)
Queensland	34.8 (22.6 – 48.7)	34.7 (24.3 – 46.6)	34.7 (26.6 – 43.5)	66.9 (62.4 – 71.0)	71.8 (67.9 – 75.3)	69.6 (66.7 – 72.3)
South Australia	27.5 (17.7 – 38.8)	36.3 (26.1 – 47.5)	32.1 (24.8 – 39.8)	80.6 (76.6 – 84.0)	80.0 (76.5 – 83.1)	80.2 (77.7 – 82.6)
Western Australia	30.7 (20.2 – 42.8)	46.0 (35.6 – 58.3)	38.9 (31.4 – 47.6)	73.2 (68.3 – 77.5)	75.3 (71.2 – 79.2)	74.4 (71.3 – 77.3)
Tasmania	29.5 (19.0 – 41.3)	43.5 (31.9 – 56.7)	36.3 (28.3 – 45.1)	78.9 (74.6 – 82.8)	78.0 (74.1 – 81.4)	78.4 (75.6 – 81.0)
Australian Capital Territory	28.7 (17.7 – 42.4)	40.2 (29.7 – 51.7)	35.5 (27.7 – 44.2)	80.5 (75.0 – 85.0)	83.8 (79.0 – 87.3)	82.4 (79.0 – 85.3)
Northern Territory	28.8 (18.6 – 41.4)	43.2 (31.9 – 55.2)	36.4 (28.6 – 45.0)	64.1 (58.4 – 69.5)	66.8 (60.8 – 72.3)	65.4 (61.3 – 69.3)
Australia overall	29.8 (26.1 – 33.9)	34.4 (30.5 – 38.4)	32.2 (29.5 – 35.0)	72.3 (70.7 – 73.8)	75.6 (74.2 – 76.9)	74.1 (73.1 – 75.1)

Table 2 shows the univariate data of variables associated with not undertaking immunisation for the two target groups of interest: the 65 years and older primary target group and the 40 to 64 year old at-risk group.

The variables which best describe the primary target group 65 years of age and over less likely to have been immunised during 2000 were: male, not married, higher than secondary education, and in the higher income groups. These respondents also described their health as excellent or very good. In terms of perceptions of immunisation and the vaccine, statistically significantly higher proportions of this primary target group were not immunised among those who: had not been advised by a general practitioner to immunise, had not been immunised during the previous year, did not consider themselves to be at-risk of developing flu, did not regard the vaccine as effective in preventing flu or in reducing the severity, thought influenza vaccine could make them ill, and agreed with the statement that they did not need the injection as they rarely got ill.

The descriptive variables associated with a lower immunisation rate among the 40 to 64 year old at-risk group who were not immunised during 2000 were: living in households of three or more people, in middle and higher income categories, and who also described their health as very good or excellent. Statistically significantly higher proportions of this at-risk group were not immunised among those who had not been advised by a general practitioner to immunise, had not been immunised during the previous year, did not consider themselves to be at risk of developing flu, did not regard the vaccine as effective in preventing flu or in reducing severity, thought the influenza vaccine could make them ill and agreed with the statement they did not need it as they rarely got ill.

Variables that were statistically significant at the $p < 0.25$ level were entered into logistic regression analyses to determine the best joint explanatory variables for each of the target groups.

Table 3 shows that for the 65 years and older group the best joint set of explanatory variables for those less likely to be immunised were male, people who described their health status as excellent, had not been advised by a general practitioner to immunise, did not regard the vaccine as effective in preventing flu or in reducing severity and thought the vaccine could make them ill.

Table 3 also shows that for the 40 to 64 year at-risk age group the best joint set of explanatory variables for not getting immunised were those who were in the middle and higher income categories, had not been advised by a general practitioner to immunise, had not been immunised during the previous year, did not regard the vaccine as effective in

Table 2 Variables associated with not receiving an influenza vaccination in Australia in the year 2000

Variables	40 to 64 years at risk n = 1141		65 years and over n = 7228	
	n (%)	OR (95% CI)	n (%)	OR (95% CI)
DEMOGRAPHICS				
Sex				
Female	386 (65.6)	1.00	989 (24.4)	1.00
Male	388 (70.2)	1.23 (0.95 – 1.59)	882 (27.7)	1.18 (1.06 – 1.32)*
Household size				
1	90 (63.1)	1.00	600 (26.8)	1.00
2	392 (63.9)	1.04 (0.70 – 1.54)	1078 (25.4)	0.93 (0.83 – 1.05)
3 or more	291 (75.9)	1.86 (1.21 – 2.87)*	193 (25.8)	0.95 (0.78 – 1.15)
Marital status				
Not married	158 (62.7)	1.00	769 (27.5)	1.00
Married	611 (69.2)	1.34 (0.99 – 1.81)	1099 (24.9)	0.88 (0.79 – 0.98)*
Country of birth				
Australia	565 (66.6)	1.00	1347 (25.5)	1.00
ATSI	11 (77.5)	1.84 (0.47 – 8.35)	5 (21.8)	0.77 (0.25 – 2.18)
English speaking country	101 (74.5)	1.45 (0.94 – 2.23)	261 (25.6)	1.00 (0.86 – 1.17)
Non English speaking country	98 (67.9)	1.07 (0.72 – 1.59)	257 (28.6)	1.17 (1.00 – 1.37)
Language spoken at home				
English	743 (67.9)	1.00	1764 (25.8)	1.00
Other	31 (66.9)	0.98 (0.50 – 1.93)	107 (27.0)	1.06 (0.84 – 1.34)
Education				
Beyond secondary	393 (69.5)	1.00	616 (27.5)	1.00
Secondary	381 (66.2)	0.86 (0.66 – 1.11)	1255 (25.1)	0.88 (0.79 – 0.99)*
Income				
Under $ 20000	105 (49.8)	1.00	1119 (26.2)	1.00
$ 20001 – $ 50000	213 (70.1)	2.34 (1.60 – 3.43)*	388 (26.1)	0.99 (0.87 – 1.14)
$ 50001 and over	358 (77.5)	3.44 (2.40 – 4.95)*	125 (33.5)	1.42 (1.12 – 1.79)*
Refused	98 (59.5)	1.46 (0.95 – 2.26)	239 (21.6)	0.77 (0.66 – 0.91)*
OTHER HEALTH INDICATORS				
Self-report general health				
Excellent/very good	367 (75.5)	1.00	1009 (30.3)	1.00
Good	264 (68.2)	0.70 (0.51 – 0.95)*	523 (24.2)	0.73 (0.65 – 0.83)*
Fair/poor	143 (53.5)	0.37 (0.27 – 0.52)*	339 (19.5)	0.56 (0.48 – 0.64)*
Did GP recommend that have a flu injection?				
Yes	68 (23.8)	1.00	524 (10.9)	1.00
No	701 (82.8)	15.50 (11.05 – 21.77)*	1307 (56.2)	10.41 (9.20 – 11.79)*
Don't know	5 (58.3)	4.01 (0.90 – 18.37)* #	40 (34.3)	4.22 (2.80 – 6.36)*
Immunised in 1999				
Yes	51 (15.6)	1.00	1661 (76.2)	1.00
No/don't know	723 (88.8)	42.38 (28.84 – 62.43)*	210 (4.2)	73.57 (61.88 – 87.51)*
Perception of risk				
Are you in one of the *flu risk groups*?				
Yes	240 (47.8)	1.00	610 (16.4)	1.00
No	504 (85.1)	6.25 (4.65 – 8.41)*	1101 (37.6)	3.07 (2.73 – 3.45)*
Don't know	30 (63.9)	1.93 (1.00 – 3.75)*	160 (27.2)	1.90 (1.55 – 2.34)*
Reduces severity				
Yes	404 (58.6)	1.00	775 (16.3)	1.00
No/don't know	351 (81.3)	3.07 (2.28 – 4.12)*	1040 (43.5)	3.97 (3.55 – 4.45)*
Can make ill				
Yes	425 (80.4)	1.00	994 (52.3)	1.00
No/don't know	331 (55.7)	0.30 (0.23 – 0.40)*	821 (15.6)	0.17 (0.15 – 0.19)*
Rarely get sick				
Agree	444 (93.7)	1.00	1178 (79.6)	1.00
Disagree	292 (48.2)	0.06 (0.04 – 0.10)*	510 (9.6)	0.03 (0.02 – 0.04)*
Don't know	38 (62.0)	0.11 (0.06 – 0.22)*	183 (42.3)	0.19 (0.15 – 0.24)*
Perception of efficacy				
Reduces chance of flu				
Yes	420 (57.4)	1.00	616 (12.0)	1.00
No/don't know	336 (85.8)	4.44 (3.19 – 6.19)*	1198 (59.8)	10.94 (9.66 – 12.39)*

* Significant (χ^2 test) at $p < 0.05$ level; # Cell size less than 5 OR – odds ratio; 95% CI – 95 % confidence interval of the odds ratio.

Table 3 Multivariate analysis of variables which determined non-immunisation in the year 2000

Variables	40 to 64 years n = 1141 OR (95 % CI)	65 years and over n = 7228 OR (95 % CI)
DEMOGRAPHIC		
Sex		
Female		1.00
Male		1.21 (1.05 – 1.40)*
Income		
Under $ 20000	1.00	
$ 20001 – $ 50000	2.96 (1.59 – 5.52)*	
$ 50001 and over	2.10 (1.19 – 3.72)*	
Refused	1.76 (0.89 – 3.47)	
OTHER HEALTH INDICATORS		
Did GP recommend that have a flu injection?		
Yes	1.00	1.00
No	7.28 (4.58 – 11.58)*	11.04 (9.45 – 12.89)*
Don't know	8.43 (1.07 – 66.15)*	5.37 (3.35 – 8.61)*
Immunised in 1999		
Yes	1.00	
No/don't know	18.00 (11.46 – 28.16)*	
Rarely get sick		
Agree	1.00	
Disagree	0.24 (0.14 – 0.41)*	
Don't know	0.10 (0.04 – 0.24)*	
Self-report general health		
Excellent/very good		1.00
Good		0.80 (0.67 – 0.94)*
Fair/poor		0.63 (0.52 – 0.76)*
Reduces severity		
Yes	1.00	1.00
No/don't know	1.59 (0.98 – 2.57)*	2.07 (1.77 – 2.41)*
Can make ill		
Yes	1.00	1.00
No/don't know	0.35 (0.23 – 0.54)*	0.18 (0.16 – 0.21)*
Reduces chance of flu		
Yes	1.00	1.00
No/don't know	2.32 (1.37 – 3.94)*	7.42 (6.34 – 8.69)*

* Significant at $p < 0.05$ level.

preventing flu or in reducing severity, thought the influenza vaccine could make them ill, and agreed with the statement they didn't need it as they rarely got ill.

Discussion

This study has reported on the first national Australian CATI survey of immunisation coverage for influenza within two important priority groups: 65 years and older and those at high risk of influenza in the 40 to 64 year age group, and continues the work highlighted in a previous national survey of general practitioners and those eligible for an influenza vaccination (Litt et al. 1995). A limitation of this study involves the lack of verification of influenza immunisation status, however it has been shown previously that study subjects have correctly recalled flu shots received in the previous year (Centres for Disease Control 1988) and that self-report is a reliable survey method (Nichol et al. 1991).

This paper is concerned primarily with the national estimates of immunisation and associated issues. Although data were collected for each of the states it is considered important that, before any further comment is made about regional differences each state should have the opportunity to consider its own data.

In early modelling of the data that proved to be significant at the univariate stage, self-reported health changed considerably from a significant negative variable in the univariate analyses to a positive variable in the multivariate analyses, for the 65 and older age group but not for the 40 to 64 age group. This occurred when the variables "immunised in 1999" and "rarely get sick" were included in the first model. In other words, people who perceived themselves to be in excellent or very good health were less likely to be immunised at the univariate level but more likely to be immunised at the multivariate level when the above variables were added. Interaction terms included in the model for these variables proved to be non-significant and stratification of the model was therefore not justified as a valid explanation of the survey data. Stratification of the variables "immunised in 1999" (a dichotomous yes/no variable) and the variable "rarely get sick" (a three level agree/disagree/don't know variable), produced logistic regression models which varied considerably as explanations of the data. It was therefore considered that stratification of the model was not justified as a valid explanation of the survey data. Collinearity diagnostics failed to detect any collinearity between predictors but the behaviour of the models still seemed to produce a suppression effect on the general health variable. The most consistent final model for the older age group, agreeing with the univariate data and providing the most plausible explanations consistent with other studies, is the model shown in Table 3 in which the variables "immunised in 1999" and "rarely get sick" have been omitted in the older age group model. For the younger age group the variables behaved as expected from the univariate model and without any evidence of confounding. This leads us to the conclusion that the effects of adding the variables "immunised in 1999" and "rarely get sick" somehow acted differently in the older age group providing an age specific suppression effect.

The first conclusion that must be reached from the data reported is that a quarter of the primary target group were still not immunised against the current strain of influenza in

2000 and that coverage of the younger group at-risk is far from acceptable. Between state differences indicate room for improvement on the part of specific states, nevertheless all states need to make further progress in the level of influenza vaccination coverage. It is however, important to point out that the immunisation rate in Australia appears to be higher than that internationally (Nguyen-Van-Tham & Nicholson 1993; Pregliasco et al. 1999; Centres for Disease Control 1988). The second conclusion to be reached is that there is some concurrence between the multivariate associations for both target groups. This should help considerably in future targeting of the problem.

It is apparent from the data reported that there are minimal demographic differences between those immunised and not immunised for the two groups. In the primary target group (those aged 65 years and over) males are less likely to be immunised and in the younger target group (those at risk and aged between 40 and 64 years) there is the need for improved promotion of influenza vaccination among middle and higher income groups. Apart from these differences there is considerable overlap in the best set of explanatory variables associated with not being immunised in both target groups. These reasons are related to the influence of the general practitioner, perception of the vaccine efficacy and its effect on influenza outcomes.

Seventyfive percent of the younger "at-risk" group immunised in 1999 were again immunised in 2000. This was well above 32% overall coverage for the younger age group as shown in Table 1, indicating again that those vaccinated one year were more likely to repeat the behaviour the following year. For the older age group 90% of those immunised in 1999 were again immunised in 2000. A high prospective return rate for immunisation has also been reported previously (Nguyen-Van-Tham & Nicholson 1993, Chapman & Coups 1999). If this is a continuous feature of immunisation decision making for the at-risk population, then it would seem that the initial decision to accept immunisation is important. This operates in two ways. First, for those at risk who have never been immunised before, specific campaign communications should be targeted. Second for those at risk and previously immunised, a specific communication should be aimed at reinforcing the prior behaviours.

The effect of general practitioner advice to immunise is a powerful influence on getting immunised in this study. It would appear, however, from Australia's own 2000 campaign and previous campaigns elsewhere that we are not yet capitalising enough on the idea of professional influence and optimising the opportunities for general practitioners to communicate effectively and persuade the target groups to act (Centres for Disease Contol 1988).

What needs to be done to improve coverage?

First, we can, through controlled pilot studies, extend the notion of professional influence through the use of multimedia that promotes the general practitioners' viewpoint. The effect of this can be monitored by Australian surveillance systems to assess the persuasive impact. We can also assess how effective use of other general practice staff, such as the practice nurses, receptionists, and managers, are in promoting influenza immunisation and providing a whole of practice approach (Litt & Lake 1993). This may also extend to recall systems involving letter and phone communication. It is also important to consider the use of other health settings the target groups are likely to attend, including inpatient and emergency settings. It has already been argued that while they see a small percentage of the total at-risk population, high coverage rates can be obtained from well-organised hospital immunisation programmes (Pregliasco et al. 1999) and this may have a role within a targeting programme.

The data in this study also show the target groups have some concerns about the efficacy and safety of the vaccines. These myths regarding vaccine are persistent (Fiebach & Viscoli 1991; Van Essen et al. 1997; Chapman & Coups 1999) and need to be effectively countered in influenza immunisation campaigns. It is necessary to provide convincing arguments to the general public, particularly those at high risk, regarding the efficacy and safety of modern vaccines. The media is an important influence in this regard and journalists need to be educated. Also important are the ongoing recommendations of health professionals, but it would appear from the literature that not all health professionals are convinced regarding safety and efficacy (Gupta et al. 2000; Elder et al. 1996; Weingarten et al. 1989). If front line health professionals providing comment on immunisation lacks conviction then any work conducted with the target groups will be undermined. Begg and Nichol (1994) have covered many of the underlying reasons for immunisation myths related to childhood immunisation, some of which may also apply to influenza. In this analysis, myths largely exist for the following reasons: the lack of clear authoritative messages, inadequate undergraduate medical preparation, historical failures of some vaccines, the speed of the media to capitalise on professional ignorance, the fear of litigation, traditional folklores, and the lack of incentive for doctors to immunise (Begg & Nichol 1994). Local (pain or soreness at the vaccination site) and systemic reactions (such as fever and malaise) have also been listed (Campbell & Rumley 1997; Centres for Disease Control 2000). Severe reactions are rare however Guillian Barré syndrome has been noted to occur. But the relative risk is slight: approximately 1.7 additional

cases per million people vaccinated (Centres for Disease Control 2000). The benefits, that is, the reduction in all cause mortality, reduced hospitalisation and burden of illness greatly outweigh the disadvantages of the vaccine (Gross et al. 1995; Centres for Disease Control 2000; Nichol et al. 1998).

As part of immunisation communication it will also be necessary to convince people that ongoing perceived "good health" status is not adequate protection against influenza. Van Essen et al. (1997) showed this was a prominent and decisive factor in not immunising among elderly people. How to offset this myth of not needing immunisation due to prevailing good health, was not discussed by Begg and Nichol (1994) in their review however this aspect is a noted factor and also an important part of a persuasive professional campaign. Exploring further the issue in focus groups with those who hold these beliefs may lead to important communication strategies.

This study has identified important issues in the decisions of people to immunise that are largely consistent with the international literature over the last two decades. What is lacking seems to be the translation of these findings into effective policies and strategies that address the myths obstructing improved health outcomes for all people at risk for adverse influenza related events. Unnecessary mortality (the fourth leading cause of mortality in the elderly (Nichol et al. 1990)) and unnecessary morbidity (up to 20% of the population in a non-epidemic year (Victorian Department of Human Services 2000)) are the result of a continuing failure to effectively deal with the myths surrounding immunisation uptake. It is time for more effective action.

Zusammenfassung

Häufigkeit von Grippeimpfungen in Australien und Vorschläge für zukünftige Zielsetzungen von Impfungskampagnen

Ziele: Resultate einer nationalen Gesundheitsbefragung in Australien im Jahr 2000. Die nationale Grippeimpfungsrate sollte für jeden Staat und jedes Territorium in Austalien erhoben werden, verbunden mit Informationen zum Verhalten gegenüber und Einflüsse auf die Entscheidung für Impfungen. Weiterhin sollten Faktoren identifiziert werden, die für das Versagen von Impfungsprogrammen verantwortlich sind.

Methode: Die Befragung wurde mit Hilfe des computergestützten Telefon Interview (CATI) System durchgeführt. Die Gesamtbeteiligungsrate der Befragung betrug 88,6% und die Anzahl der abgeschlossenen Interviews in ganz Australien war n = 10505.

Ergebnisse: Zwei Zielgruppen wurden definiert, Personen im Alter von mindestens 65 Jahren und jene mit einem Gripperisiko im Alter von 40 bis 64 Jahren. Die Impfungsraten in diesen beiden Gruppen betrugen 74% und 32%. Die Impfungsrate war im Allgemeinen bei Frauen höher als bei Männern. Gemäss eines multivariaten Modells konnten die folgenden Erklärungsvariablen für eine Nichtimpfung ermittelt werden: Geschlecht, Einkommen, Empfehlungen des Hausarztes, allgemeine Vorstellung zur Grippespritze.

Schlussfolgerung: Diese Studie identifizierte wichtige Faktoren im Entscheidungsprozess von Personen für oder gegen eine Impfung. Es wurde auch verdeutlicht, dass es notwendig ist, die Resultate in effektiven Impfungstaktiken und -strategien aufzugreifen, um die gesundheitliche Entwicklung jener Personen zu verbessern, die für folgeschwere Grippeerkrankungen besonders gefährdet sind.

Résumé

Prévalence du vaccin antigrippal en Australie et suggestions pour les objectifs de futures campagnes

Objectifs: Apport des résultats de l'enquête nationale conduite en Australie en 2000. Les objectifs étaient d'estimer la couverture vaccinale contre l'influenza pour chaque état et territoire de l'Australie, d'obtenir des informations sur les attitudes envers la vaccination et les facteurs influençant la décision de se vacciner, et expliquer les facteurs responsables de la non vaccination.

Méthodes: Enquête menée en utilisant une interview téléphonique assistée par ordinateur. La participation a été de 88.6% et le nombre total d'interviews réalisées dans toute l'Australie a été de n = 10505.

Résultats: Les deux groupes identifiés étaient les personnes âgées de 65 ans et plus et celles «à risque» pour l'influenza âgées de 40 à 64 ans. Le taux de vaccination total dans ces deux groupes était de 74% et 32%, respectivement. Le taux de vaccination chez les femmes est en général plus grand que chez les hommes. Un modèle multivarié a généré le meilleur ensemble de variables expliquant la non vaccination. Il inclut le sexe, le revenu, la recommandation du médecin généraliste et la perception générale de l'injection du vaccin.

Conclusions: L'étude a identifié des aspects importants dans la décision des gens de se faire vacciner. Elle a aussi souligné le besoin de fixer des objectifs pour une politique de vaccination efficace et d'établir une stratégie pour améliorer la santé de ceux qui sont à risque des complications de la grippe.

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