

Population-based prevention of influenza in Dutch general practice

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SUMMARY

Background. Although the effectiveness of influenza vaccination in high-risk groups has been proven, vaccine coverage continues to be less than 50% in The Netherlands. To improve vaccination rates, data on the organizational factors, which should be targeted in population-based prevention of influenza, is essential.

Aim. To assess the organizational factors in Dutch general practice, which were associated with the influenza vaccination rate in 1994.

Method. A retrospective questionnaire study was undertaken in 1586 of the 4758 Dutch general practices, which were randomly selected. A total of 1251 (79%) practices returned a questionnaire. The items verified were practice profile, urbanization, delegation index, use of computer-based patient records, influenza vaccination characteristics and influenza vaccination rate.

Results. No differences were found with regard to the percentage of single-handed practices (65%), practices situated in urban areas (38%), practices with a pharmacy (12%), patients insured by the National Health Service (59%) and use of computer-based patient records (57%) when compared with national statistics. The mean overall influenza vaccination rate was 9.0% (SD 4.0%). Using a logistic regression analysis, a high vaccination rate (> 9%) was associated with the use of personal reminders (odds ratio (OR) 1.7, 1.3–2.2), monitoring patient compliance (OR 1.8, 1.3–2.4), marking risk patients in computer-based patient records (OR 1.3, 1.0–1.6), a small number of patients per full-time practice assistant (OR 1.5, 1.1–1.9), urban areas (OR 1.6, 1.3–2.1) and single-handed practices (OR 1.5, 1.1–1.9).

Conclusion. Improvement of vaccination rates in high-risk patients may be achievable by promoting the use of personal reminders and computer-based patient records, as well as monitoring patient compliance. In addition, the role of practice assistants with regard to preventive activities should be developed further. Practices situated in rural areas and group practices may need more support with a population-based approach for the prevention of influenza.

Keywords: immunization; influenza; preventive medicine; general practice.

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Introduction

INFLUENZA epidemics continue to be a major cause of excess winter morbidity and mortality.^{1–4} Immunization against influenza has been proved to be effective in reducing serious complications in high-risk patients.^{5–7} As a result, attempts are being made to improve vaccination rates in these patients in many countries, including The Netherlands.^{8–11}

In The Netherlands and the UK, influenza vaccination is a major task of general practitioners (GPs). General practices are the site of first contact for most medical conditions, and GPs have access to clinical data to identify patients at risk.^{12,13} However, not until the influenza guidelines for GPs were issued, together with a national influenza vaccination promotion campaign in September 1993, was an improvement in vaccination rates among Dutch high-risk patients noticeable.^{14,15} Even so, only about 45% of the high-risk patients with diabetes mellitus, chronic lung disease, cardiac disease, chronic renal insufficiency, chronic staphylococcal infection or immunosuppression were offered vaccines in 1994.

In 1995, the Dutch Minister of Health, the National Association of GPs and the Dutch College of GPs reached an agreement on strengthening the role of GPs in population-based prevention, imitating policy changes in the UK with regard to prevention in general practice.¹⁶ To carry out population-based prevention in general, the practice needs to be organized in such a way that patients can be traced, given the intervention and monitored efficiently.¹⁷ To our knowledge, no studies have assessed which of the many different aspects of general practice organization should be developed so that the vaccination rate is improved. Therefore, the aim of this study was to assess which organizational factors of Dutch general practice were associated with the influenza vaccination rate in 1994.

Methods

Study population

In September 1995, a retrospective questionnaire study was conducted in one third of all 4758 general practices in The Netherlands. The computerized random selection of practice addresses was carried out by the Netherlands Institute of Primary Health Care (NIVEL). The NIVEL supplied the Department with the name and address of one GP per practice.

Items collected and definitions

Over 28 items of information were collected from each practice, including GP and practice characteristics, urbanization, patients' health insurance, delegation index, use of computer-based patient records, influenza vaccination characteristics and the number of vaccinees in 1994. In order to calculate the number of patients per full-time GP (FTGP) or practice assistant (FTPA), working hours were standardized to a full-time job. The delegation index was based on the degree of delegation of the following activities by GPs to PAs: venous blood sampling, removing stitches, removing ear wax, measuring blood pressure, and freezing warts. The degree of delegation of each activity ranged from never (one point) to always (five points). The delegation index was given by the total sum score of the degree of delegation of all five activities, ranging from 0 to 25 points.¹⁸ A higher sum score meant

more delegation of these activities to PAs.

In The Netherlands, as in many other countries, healthy persons residing in retirement/nursing homes and the elderly in general are encouraged to receive vaccinations.¹⁹ Since, according to the influenza guidelines, risk groups should be reminded (preferably in writing) of the effects of vaccination,¹⁴ GPs were also asked whether these two groups of elderly subjects were offered vaccines in writing. The influenza vaccination rate was calculated as the number of all vaccinees divided by the total practice population.

Statistical analysis

The outcome measurement was defined as a high or low vaccination rate using the mean vaccination rate. In the uni- and multivariate analyses, the practice setting was dichotomized into single-handed or duo/group practice, the type of invitation made offering vaccination, i.e. in writing or not, and the person who vaccinated the patient with or without a PA. Significance of differences in means or medians of characteristics between practices with high and low vaccination rates was tested with Student's *t*-tests or Mann-Whitney *U*-tests; differences in proportions were tested using the Pearson chi square (χ^2) test. *P*-values given are two-sided.

In the multivariate logistic regression analysis, only those independent variables were included that were associated ($P < 0.10$) with the outcome measurement in the bivariate analyses. The likelihood ratio statistic (LRS) was used to test for improvement of the model.²⁰ Effect modification was excluded by assessing the statistical significance of added interaction terms in the model. Adjusted odds ratios (ORs) and 95% confidence intervals (95% CI) are given.

Results

Of the 1586 questionnaires sent out, 1251 (79%) were completed and returned. No substantial differences were found with regard to the percentage of single-handed practices, practices situated in urban areas, practices with a pharmacy, percentage of patients insured by the National Health Service and the use of computer-based patient records when compared with national statistics (Table 1). A full-time PA provided health care to about 450 more patients on average than a full-time GP. No national statistics were available concerning either the number of patients per full-time PA or GP, or the delegation index.

The organization of the vaccination programme is given in Table 2. Of the 287 practices that did not inform patients about vaccinations, eight did not vaccinate any patients (not included in the table). Practices that sent personal reminders (490), most frequently invited patients with diabetes mellitus, lung disease or cardiac disease (>98%), whereas patients with chronic renal insufficiency (82%), chronic staphylococcal infection (78%) or immunosuppression (51%), patients in retirement/nursing homes (59%) and elderly subjects (32%) were invited less often (not included in the table). Few practices (209) actively monitored patient compliance and reinvited non-compliers by telephone or letter.

Overall, a mean vaccination rate of 9.0% (SD 4.0%, 25th percentile 6.2%, 75th percentile 11.2%) was reported. In univariate analyses, a high vaccination rate (more than 9%) was associated with sending personal reminders ($\chi^2 = 20.6$, $P < 0.001$), monitoring and reinviting non-compliers ($\chi^2 = 13.2$, $P < 0.001$), tagging patients in computer-based patient records ($\chi^2 = 9.0$, $P < 0.001$), a low number of patients per full-time PA (mean 2823 versus 3055 patients, *t*-value = 3.95, $P < 0.001$), an urban setting ($\chi^2 = 16.0$, $P < 0.001$) and a single-handed practice ($\chi^2 = 11.2$, $P = 0.001$)

Table 1. Practice characteristics of the study sample and The Netherlands as a whole.

Characteristic	Study sample (n = 1251)	The Netherlands (n = 4758*)
Practice setting		
Single-handed	817 (65)	3322 (70)
Duo	336 (27)	1050 (22)
Group	93 (8)	386 (8)
Urban area†	477 (38)	1913 (40)
Practice with pharmacy	150 (12)	640 (13)
Computer-based patient records‡	717 (59)	2855 (60)
Percentage of NHS patients§	59%	60%
Mean number of patients/FTPA¶ (SD)	2970 (1317)	–
Mean number of patients/FTGP¶ (SD)	2520 (546)	–
Low delegation index (10)**	556 (44)	–

Values are numbers (%) unless stated otherwise. *Statistics provided by the NIVEL. †Urban is 50 000 inhabitants. ‡Values for this variable were missing for 34 practices. §Compulsory insurance for patients earning less than £21 500 (15 missing values).²⁶ ¶FTPA, full-time PA (81 missing values); FTGP, full-time general practitioner (21 missing values). **Low: a delegation index of less than 10 points indicates almost no delegation of all five activities to PAs in general (including practices without a PA, n=43).

Table 2. Organizational characteristics of the influenza vaccination programme in the study sample (n = 1251).

Characteristic	Number (%)
Invitation	
Personal reminder	490 (39)
By telephone (occasionally)	216 (17)
Mass media	250 (20)
No invitation	287 (23)
Selection of risk patients*	
Tagging in CBPR	642 (51)
Selection list	641 (51)
Tagging on consultancy card	235 (19)
Vaccination in groups	877 (70)
Vaccine supply	
In practice	786 (63)
Pharmacy	454 (36)
Vaccination person	
PA with or without GP	832 (67)
GP only	349 (28)
Vaccination team	47 (4)
Monitoring compliance and reinviting	209 (17)

*More than one method of selection could be present (total percentage >100%); CBPR, computer-based patient records.

(Table 3). The variables practice with a pharmacy, delegation index, vaccine supply, vaccination by a PA and group vaccination did not appear to be associated with the outcome measurement.

All organizational factors found in the univariate analyses were independently associated with the vaccination rate in the multivariate logistic regression analysis (Table 3). The absolute difference in mean rates between practices that sent a personal reminder or actively monitored and reinvited non-compliers (9.7%, 10.0%) and those that did not (8.4%, 8.7%) appeared most relevant.

Table 3. Organizational factors associated with the vaccination rate: results of multivariate logistic regression analysis (n = 1087).*

Organizational factor	Low rate (< 9%)	High rate (≥ 9%)	Adjusted OR (95% CI)	Difference in mean vaccination rate†
Reminder‡	213/635 (34)	250/537 (47)	1.7 (1.3–2.2)	1.3
Monitoring/reinviting§	86/632 (14)	116/535 (22)	1.8 (1.3–2.4)	1.3
Tagging patients in CBPR¶	306/631 (48)	305/532 (57)	1.3 (1.0–1.6)	0.8
Low number of patients/FTPAA**	324/594 (55)	334/513 (65)	1.5 (1.1–1.9)	0.6
Urban area††	208/636 (33)	238/540 (44)	1.6 (1.3–2.1)	0.7
Single-handed‡‡	394/635 (62)	385/540 (71)	1.5 (1.1–1.9)	0.6

Values are numbers (percentage) unless stated otherwise. *Reference: low vaccination rate (< 9%); values for the vaccination rate (75) and user variables were missing for 164 practices. LRS of the final model: 77.1, $P < 0.001$. †Absolute difference in mean rates (%) between the two levels of the organizational factors. ‡Versus no personal reminder. §Versus no reinvitation of non-compliers. ¶Versus no tagging in computer-based patient records. **Versus high number (2970) of patients per full-time PA. ††Versus rural area (<50 000 inhabitants). ‡‡Versus duo or group practice.

Discussion

A population-based approach towards the prevention of influenza was practised by only a minority of Dutch general practices in 1994. The results of this study show that sending personal reminders, monitoring and reinviting non-compliers, using computer-based patient records for the selection of high-risk patients and having enough time available for PAs should be part of such an approach. These identified measures may equally improve the uptake of preventive activities other than immunization, such as cervical or breast cancer screening.

The overall vaccination rate, as used in our study, may not accurately reflect the rate in high-risk patients. We were not able to obtain information from 1251 practices on age structure and high-risk patients listed because of the lack of full age and disease registers. Since, in The Netherlands in 1994/95, vaccination was mainly limited to high-risk patients, extrapolation of the given rate will only modestly overestimate the absolute numbers of high-risk patients vaccinated at the national level.¹⁷ Furthermore, there is no evidence of certain groups of practices with different age structure, which might explain the associations between established measures and the vaccination rate. In The Netherlands, a 1.3% higher mean vaccination rate, as found in practices that sent reminders or actively monitored patient compliance, would equate with approximately 195 000 vaccinated high-risk patients at the national level. This result confirms earlier evidence of the efficacy of postal reminders and monitoring in targeting the population at risk.^{4,21–23} Since only 40% of the practices complied with the influenza guideline of sending personal reminders, some recommended patient groups were barely approached. Also, an active attitude towards non-compliers was practised by fewer than one fifth of the practices. These aspects should therefore be developed in strategies for improving population-based influenza prevention.

Despite the fact that the practice budget should be sufficient to employ a full-time PA in a full-time practice, this was often not the case. Dutch PAs (clergies) are in between a practice nurse and a secretary. Tasks that may be carried out by PAs include medical-technical, such as taking blood pressure or immunizing, as mentioned in our delegation index, or secretarial-like administration or intake appointments. It was surprising to find no association between the degree of delegation and the vaccination rate. In the study of Nijland *et al*,¹⁸ a high association between the number of PAs (full-time equivalents) and the delegation index was reported, which would also suggest that only the available time for the organization of the vaccination might have been most important. We did not include other possible determinants of workload, since no such information is currently available in The Netherlands. However, we suppose that the organizational

competence of GPs to delegate tasks to PAs may be considered the main determinant. Thus, increasing awareness of the preventive activities that assistants can perform and the prerequisite of sufficient time available for these activities is urgently needed.

The use of computer-based patient records is financially supported by the Dutch government and has grown exponentially over the past few years.²⁴ These records can supply GPs with useful information about their patients and can facilitate the tracing and monitoring of risk patients.^{1,24,25} Recently, an influenza software module, which runs through the records upon installation and selects risk patients based on diagnosis, medication or tags, was developed by software-providing companies of GP information systems. This influenza module, together with the continued use of computer-based patient records, should therefore be promoted.

A higher vaccination rate in practices situated in urban areas may be the result of the support of other health organizations. In most cities with over 50 000 citizens, a so-called health authority is present. These organizations aim to improve the health of citizens and are involved with several preventive activities, including informing about immunization. Also, many patient organizations or groups supporting the elderly are mainly present in urban areas. Finally, it is difficult to find an explanation as to why single-handed practices performed better than group practices. Possible reasons may include: (1) the number of vaccinees in duo/group practices might have been under-reported; and (2) the organization of the immunization programme might have been more complex.

In conclusion, improvement of vaccination rates in high-risk patients, and presumably other preventive activities, may be achieved by promoting the use of personal reminders and active monitoring of patient compliance. Furthermore, the continued use of computer-based patient records in general practices should be encouraged and the role of PAs with regard to preventive activities developed further. Finally, practices situated in rural areas and group practices may need more support in a population-based approach towards the prevention of influenza.

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