

# INFLUENZA IMMUNIZATION: IMPROVING COMPLIANCE OF HEALTHCARE WORKERS

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## ABSTRACT

**OBJECTIVE:** In spite of yearly recalls, influenza immunization rates of healthcare workers (HCWs) remained low (10%) at the University Hospitals of Geneva. This study was conducted to identify HCWs' reasons for rejection of immunization, to design specific intervention methods based on these reasons, and to evaluate the impact of such interventions.

**METHODS:** Three departments with high-risk patients (geriatrics, obstetrics, and pediatrics) were selected as main targets. Questionnaires were distributed in these units. Based on HCWs' perceptions, different intervention methods were designed and used either in these departments only (educational conferences, on-site availability of a vaccination nurse) or in the whole institution (posters, personal letters). Immunization rates were collected throughout the institution.

**RESULTS:** 797 completed questionnaires from 1,092 HCWs (73%) were returned. Major reasons for immu-

nization rejection were confidence that their bodies' self-defense mechanisms would ward off infection (32%), perception of low exposure risk (23%), and doubts concerning vaccine efficacy (19%). The use of intervention methods designed to address these factors increased influenza immunization rates in the three targeted departments from 13% (95% confidence interval [CI<sub>95</sub>], 11.4-15.6) in 1995 and 1996 to 37% (CI<sub>95</sub>, 34.5-40.3) in the following season ( $P < .001$ ). In all other departments, immunization rates rose from 9% (CI<sub>95</sub>, 8.5-10.3) to 23% (CI<sub>95</sub>, 21.6-24.1;  $P < .001$ ). Nurses were, and remained, more reluctant to be immunized compared to other HCWs.

**CONCLUSIONS:** Influenza immunization rates can be increased significantly by specific interventions based on local concerns of HCWs, among which educational conferences and the on-site availability of a vaccination nurse appeared important (*Infect Control Hosp Epidemiol* 1998;19:337-342).

Influenza immunization of hospital staff is recommended to decrease the risk of influenza transmission to hospitalized high-risk patients.<sup>1-3</sup> Despite present recommendations, however, only a minority of healthcare workers (HCWs) accept yearly influenza immunization.<sup>4-6</sup>

At the University Hospitals of Geneva (HUG), Switzerland, a 1,500-bed healthcare center providing primary and tertiary care for Geneva and the sur-

rounding areas, rates of vaccination for HCWs also remained woefully low (1995-1996, 10%) in spite of yearly recalls. This study was conducted in three high-risk departments (geriatrics, obstetrics, and pediatrics) at HUG to identify HCWs' reasons for rejection of immunization, to design specific intervention methods in view of these reasons, and to evaluate the impact of such interventions in the selected areas and in the remaining departments.

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*The authors are indebted to Philippe Sudre, Nadia Colaizzi, Sinclair Wynchank, the team of the Employee Health and Infection Control Program, and all the other participating and promoting staff members.*

*This paper was presented in part at the Eighth European Congress of Clinical Microbiology and Infectious Diseases, Lausanne, Switzerland, May 25-28, 1997. Abstract P1413.*

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*97-OA-065. Harbarth S, Siegrist C-A, Schira J-C, Wunderli W, Pittet D. Influenza immunization: improving compliance of healthcare workers. *Infect Control Hosp Epidemiol* 1998;19:337-342.*

## METHODS

### *Objectives and Design*

The main objective of this study was to survey the attitudes of HCWs regarding influenza vaccine and their reasons for accepting or refusing it in three targeted departments with high-risk patients for nosocomial influenza (geriatrics, obstetrics, and pediatrics). Based on the results of the survey, efforts were made to improve HCWs' compliance with influenza immunization by designing specific intervention methods either restricted to these areas or applied to the entire institution.

In June 1996, a questionnaire consisting of 24 multiple-choice questions was distributed to 1,092 employees in the three selected departments. The questionnaire asked for specific information on knowledge, attitudes, and behavior regarding influenza and influenza vaccine. Additional information was requested regarding previous experience with influenza vaccination or homeopathic alternatives to immunization, intention towards accepting influenza vaccination in the upcoming season, and proposals to improve likelihood of influenza vaccination.

Based on HCWs' perceptions, different intervention methods were designed to increase compliance. In the three high-risk departments, educational conferences were organized addressing specifically the questions identified as main reasons for reluctance to influenza immunization. Furthermore, to decrease logistical obstacles to immunization, a specially trained employee health nurse took a vaccine tray to various wards, clinics, and conferences attended by HCWs.

The following methods were applied in the entire institution: a newsletter was printed, reminders were inserted in the daily electronic-mail message system, and personal letters were sent with the paycheck to encourage employees to be immunized. Color posters were produced to highlight the key messages, as well as the times, dates, and sites of the immunization clinics. Starting in the first week of October 1996, HCWs were offered free influenza immunization, as during previous years, in the employee health clinic. Immunization rates for HCWs were collected throughout the whole institution.

### *Statistical Analysis*

Differences in influenza vaccination rates were computed using the chi-squared test for binomial proportions. Means were compared by unpaired *t* tests, and 95% confidence intervals (CI<sub>95</sub>) were calculated with the method described by Fleiss.<sup>7</sup> All tests for significance were two-tailed; *P* values <.05 were considered significant.

## RESULTS

### *Survey*

Responses were obtained from 797 (73%) of 1,092 employees, including 378 nursing personnel (47%), 36 physicians (5%), and 57 midwives (7%). A total of 1,573 responses were analyzed (up to six reasons could be listed by each employee). Reasons for rejection of influenza immunization are listed in decreasing frequency in Table 1. Overall, the three most frequently cited reasons for nonacceptance of immunization by HCWs were confidence that their bodies' self-defense mechanisms would ward off infection (258, 32%), supposed low likelihood to get influenza disease (180, 23%), and doubts about vaccine efficacy (154, 19%). Notably, 14% of employees believed in homeopathic medicine to protect themselves against influenza. When asked what information or measure could stimulate accepting influenza vaccination in the upcoming season, employees stated that vaccine efficacy should be better documented (306, 38%); the fact that only minor side effects of the vaccine are expected should be better documented (146, 18%); and that more convenient immunization services should be offered (122, 15%).

Differences were noted in the attitudes of nursing personnel (n=378) compared to other surveyed HCWs (n=419). Nursing personnel were more reluctant to receive immunization compared to other HCWs; they rejected immunization with more answers justifying noncompliance compared to other categories of HCWs (mean number, 2.2 vs 1.7; *P*=.08). Furthermore, nursing personnel more often ignored the likelihood of contracting influenza (*P*<.001) and were less convinced of vaccine efficacy (*P*=.02). In contrast, groups of HCWs other than nursing personnel more frequently offered inconvenient vaccination hours as a reason for noncompliance with vaccination (*P*=.01, Table 1).

Knowledge about possible nosocomial transmission of influenza and consequences for patients' health was suboptimal; however, only 108 (13.5%) of 797 employees asked for more information on influenza-associated hospital problems.

### *Immunization Campaign*

After assessment of the factors affecting acceptance or refusal of influenza vaccine by HCWs, several intervention methods were applied, reaching either the targeted high-risk areas only or the whole institution (see Methods).

During the 16-week period after initiation of the promotion campaign, 1,416 (26%) of 5,514 HCWs received influenza immunization, compared to 551 (10%) of 5,432 HCWs during the same period the year

TABLE 1

REASONS FOR NONACCEPTANCE OF INFLUENZA VACCINE AMONG 757 EMPLOYEES IN THREE HIGH-RISK AREAS (GERIATRICS, PEDIATRICS, AND OBSTETRICS) AT THE UNIVERSITY HOSPITALS OF GENEVA

Reason	No. (%) of Respondents			P
	Total	Nursing Personnel	Other Personnel	
Believe in own host defense	258 (32)	129 (34)	129 (31)	NS
Not likely to get sick	180 (23)	127 (34)	53 (13)	.001
Vaccine doesn't work	154 (19)	86 (23)	68 (16)	.02
Never had flu	141 (18)	79 (21)	62 (15)	.02
To get flu doesn't bother	125 (16)	56 (15)	69 (16)	NS
Believe in homeopathic medicine	108 (14)	59 (15)	49 (12)	NS
Vaccination hours inconvenient	108 (14)	39 (10)	69 (16)	.01
Dislike immunization in general	94 (12)	51 (13)	43 (10)	NS
Other, not specified reasons	88 (11)	44 (12)	44 (11)	NS
Too busy or forgot	75 (9)	33 (9)	42 (10)	NS
Fear of vaccine side effects	72 (9)	42 (11)	30 (7)	NS
Dislike shots	68 (8)	47 (12)	21 (5)	.001
Got flu despite vaccination in the past	49 (6)	25 (7)	25 (6)	NS
Not informed about free immunization	31 (4)	10 (3)	21 (5)	NS
Reaction to vaccine in the past	22 (3)	10 (3)	12 (3)	NS
Total responses	1,573	836	736	
Total employees	797	378	419	

Abbreviation: NS, not significant.

before ( $P < .0001$ , Table 2). In the three targeted departments where all described interventions were applied, influenza immunization rates rose from 13% (CI<sub>95</sub>, 11.4-15.6) in 1995 to 37% (CI<sub>95</sub>, 34.5-40.3) in the following year ( $P < .0001$ , Table 2). The highest increase was noted in the geriatric wards, where 142 (47%) of 298 employees (CI<sub>95</sub>, 41.9-53.5) were vaccinated in 1996 to 1997 compared to 31 (10%) of 293 employees (CI<sub>95</sub>, 7.3-14.7) in 1995 to 1996 ( $P < .0001$ ). In the other areas at HUG without special educational conferences and an available on-site employee-health nurse for immunization, the number of immunized healthcare personnel increased from 407 (9%) of 4,356 employees (CI<sub>95</sub>, 8.5-10.3) to 1,008 (23%) of 4,422 (CI<sub>95</sub>, 21.6-24.1;  $P < .0001$ , Table 2). Thus, vaccination coverage in the entire institution increased significantly, despite the fact that in these areas only a minor part of the intervention activities was applied. Importantly, however, the observed improvement in immunization rates was significantly higher ( $P < .001$ ) in the targeted areas compared to the other departments of the institution.

Analysis of immunization status by category of HCW is summarized in Table 3. As shown, compliance with immunization increased significantly among all categories of HCWs following the 1996 to

1997 promotion campaign (all  $P < .001$ , except for house staff,  $P = .01$ ). The most compliant HCWs were physicians during both seasons (immunization rates 19% and 37%, respectively). Nursing personnel remained more reluctant to accept influenza vaccine, despite a fourfold increase of their immunization rate in 1996 to 1997 compared to 1995 to 1996.

## DISCUSSION

This study demonstrates that yearly recalls alone are not sufficient to promote influenza immunization among HCWs of a large healthcare institution, whereas understanding workers' concerns and designing specific intervention strategies based upon such concerns can prove effective. Furthermore, the results of this survey indicate that HCWs in high-risk areas of our institution have several misconceptions about the vaccine and influenza transmission, as previously reported.<sup>4,5,8,9</sup>

We observed significant differences between the concerns expressed by HCWs of our institution compared to those reported in North American studies (Table 4). In our study, the most frequently cited reason for nonacceptance of vaccine was HCWs' confidence in their own host-defense mechanisms against influenza (32%). In contrast, the most fre-

TABLE 2

IMPACT OF AN INFLUENZA IMMUNIZATION CAMPAIGN ON COMPLIANCE OF HEALTHCARE WORKERS AT THE UNIVERSITY HOSPITALS OF GENEVA (HUG): WINTER SEASON, 1995 TO 1996 COMPARED TO 1996 TO 1997

	Selected High-Risk Areas*		Other Parts of HUG		Overall	
	1995-1996	1996-1997	1995-1996	1996-1997	1995-1996	1996-1997
Total no. of employees	1,076	1,092	4,356	4,422	5,432	5,514
No. of immunized employees	144	408	407	1,008	551	1,416
Percentage	13	37	9	23	10	26
CI <sub>95</sub> <sup>†</sup>	11.4-15.6	34.5-40.3	8.5-10.3	21.6-24.1	9.4-11.0	24.5-26.9

Abbreviation: CI<sub>95</sub>, 95% confidence interval.

\* Geriatrics, pediatrics, and obstetrics.

† Differences between yearly immunization rates were highly significant for all surveyed areas ( $P < .001$ , chi-squared test for binomial proportions).

TABLE 3

INFLUENZA VACCINE COMPLIANCE AMONG DIFFERENT CATEGORIES OF HEALTHCARE WORKERS AT THE UNIVERSITY HOSPITALS OF GENEVA: WINTER SEASON, 1995 TO 1996 COMPARED TO 1996 TO 1997

Category of Healthcare Worker	1995-1996			1996-1997		
	Total No.	No. Immunized (%)	CI <sub>95</sub>	Total No.	No. Immunized (%)	CI <sub>95</sub> *
Physicians	761	145 (19)	16.4-22.1	768	286 (37)	33.8-40.8
House staff	106	13 (12)	6.9-20.4	100	27 (27)	18.8-37.0
Radiology technicians	103	12 (11)	6.4-19.8	106	34 (32)	23.5-41.9
Others <sup>†</sup>	1,810	218 (11)	10.6-13.6	1,859	507 (27)	25.3-29.4
Nurses' aides	563	45 (8)	5.9-10.6	566	117 (21)	17.4-24.3
Housekeeping staff	161	12 (7)	4.1-12.9	181	43 (24)	17.9-30.7
Midwives	110	9 (7)	4.0-15.4	115	28 (24)	17.0-33.4
Physiotherapists	201	15 (7)	4.4-12.2	170	37 (21)	16.0-28.9
Registered nurses	1,617	82 (5)	4.0-6.3	1,649	337 (20)	18.5-22.5
Total	5,432	551 (10)	9.4-11.0	5,514	1,416 (26)	24.5-26.9

Abbreviation: CI<sub>95</sub>, 95% confidence interval.

\* Differences between yearly immunization rates were highly significant for all categories of HCWs ( $P < .0001$ , except for house staff,  $P = .01$ ).

† Others include laboratory technicians, administration personnel, pharmacists, kitchen staff, transport staff, and other hospital staff.

quently cited reasons in North American studies were only mentioned by a minority of HCWs in our institution: avoidance of medications whenever possible (33%-59% of surveyed HCWs in the United States<sup>4,6,10</sup>) and fear of adverse reactions (35%-54%<sup>5,6,8,11</sup>). Thus, intervention strategies that have been based upon HCWs' perceptions reported in other cultural settings would not have addressed the local concerns of HCWs at HUG specifically.

A common observation, however, is that time constraints and logistic barriers often contribute to a reduced vaccination coverage of busy HCWs.<sup>9,11,12</sup> Thus, although our broad educational approach led to an increased vaccination coverage in the entire

institution, the on-site availability of a vaccination nurse helped to increase immunization rates further in the targeted high-risk areas, a method also successfully used by others.<sup>11,13</sup>

Unfortunately, the group of HCWs with the closest and most intimate contact with patients, the nursing personnel, was, and remained, the most reluctant to accept immunization. As reported by Weingarten and colleagues,<sup>4</sup> this group of HCWs is likely to remain unconvinced unless their awareness of the danger of nosocomial influenza transmission to high-risk patients can be heightened.

In a recently published study from Glasgow, vaccination of HCWs in long-term-care hospitals was

TABLE 4

COMPARISON OF MAJOR REASONS FOR NONCOMPLIANCE TOWARDS INFLUENZA IMMUNIZATION AMONG HEALTHCARE WORKERS, AS REPORTED IN NORTH AMERICAN AND EUROPEAN STUDIES

Reference	Country	Year of Publication	Population Studied (N)	First Two Rejecting Criteria*	%
8	United States	1985	206	Fear of adverse reactions	39
				Belief that the vaccine is not protective	24
4	United States	1989	174	Avoid medication whenever possible	59
				Vaccine administration inconvenient	31
10	United States	1991	379	Avoid medication whenever possible	47
				Concern about getting influenza from the vaccine	45
11	United States	1992	263	Inconvenience	59
				Fear of secondary febrile illness	54
5	United States	1993	724	Heard it had bad side effects	37
				Do not like shots	27
9	Canada	1994	353	Never got offered the vaccine	35
				Influenza is not a serious illness	21
12	United States	1994	38 (only residents)	Never had time	42
				Never remembered to receive vaccine	24
15	Italy	1994	752	Assumption of not contracting the disease	58
				Risk of postvaccination reactions	11
6	United States	1995	922	Fear of side effects	35
				Avoidance of medications	33
16	United States	1997	152	Concern about side effects	36
				Not in target group	15
Present study	Switzerland	1997	797	Believe in own host defense	32
				Not likely to get sick	23

\* In all surveys, respondents gave more than one reason.

associated with a reduced rate of patient mortality and influenza-like illness.<sup>3</sup> Although our study was not designed to assess the efficacy of influenza immunization of HCWs, we can postulate on the basis of the above-cited study<sup>3</sup> that the threefold increase of vaccination coverage of HCWs in high-risk wards contributed to the protection of a substantial number of patients who were not immunized at the time of hospital admission. Nevertheless, further efforts (eg, personal telephone contacts with reluctant employees) are necessary to increase HCWs' immunization rates and to improve the efficacy of our program.

There are several potential limitations in the interpretation of our results. First, we did not test the generalizability of the responses in our survey. However, a high response rate (73%) compared to other studies<sup>5,8</sup> suggests that no major bias occurred by excluding the nonresponders from the analysis, as observed by Pachucki and colleagues who showed in their survey that responses of nonresponders were similar to responders.<sup>8</sup> Second, vaccination of HCWs may add benefits by reducing incidence of clinical

influenza and thus decreasing work time lost due to illness.<sup>14</sup> Although absenteeism among HCWs could have been measured and compared between 1995 to 1996 and 1996 to 1997, assessment of the part of work time lost due to influenza disease would have been extremely labor-intensive and beyond the scope of our study. Last, we could not assess the influence of a nationwide media campaign promoting influenza immunization, which was more extensive than in previous years. This factor might emerge more clearly during the next season, during which we plan to continue and extend our successful initial efforts, including educational conferences and the on-site availability of a vaccination nurse in most areas of our institution.

## REFERENCES

- Hoffman PC, Dixon RE. Control of influenza in the hospital. *Ann Intern Med* 1977;87:725-728.
- Centers for Disease Control and Prevention. Prevention and control of influenza: recommendations from the immunization practices advisory committee (ACIP). *MMWR* 1992;41:1-17.
- Potter J, Stott DJ, Roberts MA, Elder AG, O'Donnell B, Knight PV, et al. Influenza vaccination of health care workers in long-term-care hospitals reduces the mortality of elderly patients. *J*

- Infect Dis* 1997;175:1-6.
4. Weingarten S, Riedinger M, Bolton LB, Miles P, Ault M. Barriers to influenza vaccine acceptance. A survey of physicians and nurses. *Am J Infect Control* 1989;17:202-207.
  5. Watanakunakorn C, Ellis G, Gemmel D. Attitude of healthcare personnel regarding influenza immunization. *Infect Control Hosp Epidemiol* 1993;14:17-20.
  6. Heimberger T, Chang HG, Shaikh M, Crotty L, Morse D, Birkhead G. Knowledge and attitudes of healthcare workers about influenza: why are they not getting vaccinated? *Infect Control Hosp Epidemiol* 1995;16:412-415.
  7. Fleiss JL. An introduction to applied probability. In: Fleiss JL, ed. *Statistical Methods for Rates and Proportions*. 2nd ed. New York, NY: John Wiley & Sons; 1981:1-19.
  8. Pachucki CT, Lentino JR, Jackson GG. Attitudes and behavior of health care personnel regarding the use and efficacy of influenza vaccine. *J Infect Dis* 1985;151:1170-1171.
  9. Yassi A, Murdzak C, Cheang M, Tran N, Aoki FY. Influenza immunization: knowledge, attitude and behaviour of health care workers. *Canadian Journal of Infection Control* 1994;9:103-108.
  10. Christian MA. Influenza and hepatitis B vaccine acceptance: a survey of health care workers. *Am J Infect Control* 1991;19:177-184.
  11. Ohrt CK, McKinney WP. Achieving compliance with influenza immunization of medical house staff and students. A randomized controlled trial. *JAMA* 1992;267:1377-1380.
  12. Nafziger DA, Herwaldt LA. Attitudes of internal medicine residents regarding influenza vaccination. *Infect Control Hosp Epidemiol* 1994;15:32-35.
  13. Adal KA, Flowers RH, Anglim AM, Hayden FG, Titus MG, Coyner BJ, et al. Prevention of nosocomial influenza. *Infect Control Hosp Epidemiol* 1996;17:641-648.
  14. Weingarten S, Staniloff H, Ault M, Miles P, Bamberger M, Meyer RD. Do hospital employees benefit from the influenza vaccine? A placebo-controlled clinical trial. *J Gen Intern Med* 1988;3:32-37.