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# Influenza vaccination perception and coverage among patients with malignant disease

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ABSTRACT

*Background:* Patients with malignancies are at increased risk of serious influenza related complications with higher rates of hospitalization and mortality than healthy cohorts. Although annual vaccination against influenza infection is recommended, vaccination rates among cancer patients are apparently low. The reasons for the low compliance to influenza vaccine and the influenza vaccination rate among Austrian cancer patients have not been studied in detail yet.
*Patients and methods:* From July 1, 2013 to October 31, 2013, 444 patients treated in the outpatient departments of the Clinical Division of Oncology and the Clinical Division of Haematology and Haemostaseology of the General Hospital Vienna participated in a survey on different aspects of influenza vaccination.
*Results:* In total, only 80 out of 444 patients (18%) had received influenza vaccination in the previous year. The influenza vaccination rate was higher amongst patients with haematological malignancies (22%) compared to patients with solid tumours (13%). Higher age was significantly associated with a higher probability for being vaccinated. Collecting information about influenza vaccination primarily from media or the internet was not significantly associated with influenza vaccination status. Information through a medical consultation or a recommendation by the attending physician resulted in significant higher influenza vaccination coverage rates. Only 199 out of the 444 patients (44.8%) were informed by a physician about influenza vaccination and only 18 out of 337 patients (5.3%) with a diagnosis of a malignant disease were informed by their treating oncologist. The main reasons for influenza vaccination denial were concerns about interaction with the malignant disease and potential side-effects.
*Conclusion:* Information about influenza vaccination during a medical consultation and a clear recommendation by the attending physician are highly predictive for acceptance of influenza vaccination. Increased awareness among physicians, especially oncologists is of utmost importance to effectively improve IVR in patients with malignant disease.



## 1. Introduction

Influenza is a usually self-limiting disease of moderate severity in healthy adults, but a significant morbidity and mortality is observed in various high risk groups. Patients aged ≥60 years or with underlying chronic illnesses such as cardiovascular or pulmonary disease, diabetes mellitus, renal disease or with immunosuppression are prone to serious influenza related complications including bacterial pneumonia or deterioration of chronic respiratory or pulmonary conditions [1]. Likewise, people with haematological or solid cancers undergoing chemotherapy as well as bone marrow transplant recipients are at increased risk of influenza related complications [2]. Among patients with cancer, hospitalization rates are four times higher and mortality is ten times higher compared to the general population [1,3,4]. Moreover, influenza and its complications may also result in delay or interruption of chemotherapy [1].

Thus, the best and most effective approach to prevent influenza related complications is vaccination. The effectiveness of influenza vaccination among cancer patients, however, is discussed controversially, as immune dysfunction caused by the malignant disease or as a result of chemotherapy might lower the response to the

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vaccine. Nonetheless, several studies effect performed among patients with cancer have shown that inactivated influenza vaccines are well tolerated and safe and have a certain protective, despite potential immunosuppression. In addition, patients with malignant disease also have more benefit from any degree of protection as the course of influenza is more severe in immunosuppressed patients [1]. Therefore, active vaccination against influenza virus infection is strongly recommended by most authors for patients with solid or haematological malignancies [1]. In Austria, however, vaccination against influenza virus infection is recommended by the Federal Ministry of Health for all persons independently of age or any risk factors for severe infection [5]. Further, vaccination against influenza virus infection is particularly recommended for patients with immunosuppressive conditions or cancer by the Federal Ministry of Health and by the Austrian Society of Infectious Disease and Tropical Medicine [5,6]. However, studies investigating the influenza vaccination rate (IVR) in patients with cancer frequently demonstrate a low acceptance and little information is available on factors influencing patients' decision for or against vaccination. Thus, the aim of this study was to investigate the IVR and the perception of influenza vaccination among patients with malignant disease.

## 2. Patients and methods

### 2.1. Study population

The study was performed at the Department of Medicine I of the General Hospital Vienna in the outpatient departments of the Clinical Division of Oncology and the Clinical Division of Haematology and Haemastaseology. These outpatient departments are consulted by approximately 12500 patients annually. All patients visiting the outpatient departments from July 1, 2013 to October 31, 2013 were invited to participate in the present survey and asked to complete an anonymous questionnaire.

### 2.2. Questionnaire

The questionnaire comprised 8 questions, divided into three main domains: (1) demographic data (age, gender), (2) knowledge about influenza vaccination, and (3) influenza vaccination (vaccination status, perceived barriers to influenza vaccination, reasons for none-vaccination) (Appendix A).

### 2.3. Ethical considerations

The Ethics Committee of the Medical University of Vienna approved the study protocol. Participation was voluntary; completion of the questionnaire implied consent for study participation. Participants were informed that all the information gathered would be anonymised and kept confidential.

### 2.4. Statistical analysis

We present continuous data as mean ± standard deviation. For categorical data we present absolute counts and percentages. We included missing information by item non-response as separate categories. We calculated frequencies of the questionnaire items together with 95% confidence intervals. We estimated the association between questionnaire items and vaccination. After tabulating data we used logistic regression to calculate crude odds ratios with vaccination (yes vs no) as the dependent variable and questionnaire items or demographic variables as covariables. In a further step we calculated these effects adjusted for age (modelled as a linear effect across quintiles), sex (female vs male) and main diagnosis (solid tumour, haematological malignancy, other, or no answer).

**Table 1**
Patient characteristics of 444 patients surveyed.

| | Number (%, 95%CI) |
|---|---|
| **Gender** | |
| Male | 183 (41.2%, 36.6–45.8) |
| Female | 261 (58.8%, 54.2–63.4) |
| **Influenza vaccination status** | |
| Vaccinated | 80 (18.02%, 14.4–21.6) |
| Not vaccinated | 364 (81.98%, 78.4–85.6) |
| Disease | |
| Solid cancer | 241 (54.3%, 49.6–58.9) |
| Hämtological disease | 96 (21.6%, 17.8–25.5) |
| Others | 77 (17.3%, 13.8–20.9) |
| No response | 30 (6.8%, 4.4–9.1) |

For data management we used MS Excel for Mac 11 and Stata 11 for Mac (Stata Corp., College Station, TX). We considered statistical significance at a two-sided type I error level of 5%.

## 3. Results

In total, 444 patients participated in the survey (Table 1). Out of these, 241 patients (54.5%) had solid tumours, 96 patients (21.9%) had a haematological malignancy, and 77 patients (17.3%) declared that they had no diagnosed malignancy at the time of visit. Thirty patients did not respond to this question. Information on age was provided by 433 participants, the median age was 60 years (range 21 to 91 years). A total of 183 patients (41.2%) were male, 261 patients (58.8%) were female. Overall, 80 patients declared that they had received vaccination against influenza virus infection in the previous year, resulting in an IVR of 18%. IVR was highest among patients with no diagnosed malignancy (31%), followed by patients with haematological malignancies (22%) and patients with solid tumours (13%). Higher age was significantly associated with a higher probability for being vaccinated against influenza infection (Table 2). Out of the 80 patients vaccinated, 60 (75%) were older than 61 years. Compared to patients younger than 45 years (6.1% vaccinated), the probability for being vaccinated against influenza was more than 5 times higher among patients between 62 and 70 years (26.4%, OR 5.5, 95%CI 2.0 to 15.3, $P = 0.001$) and more than 9 times higher among patients older than 71 years of age (38.3%, OR 9.6, 95%CI 3.5 to 25.9, $P < 0.001$).

### 3.1. Predictors for acceptance of influenza vaccination—General information

Predictors for acceptance of influenza vaccination with crude odds ratios and odds ratios adjusted for age, sex and main diagnosis are depicted in Table 3.

Among patients who received information on influenza vaccination via radio (14.0%), television 25.5%), print media (20.3%), by friends (15.8%) or through the internet (4.8%) the odds for previous influenza vaccination were 0.5 (95%CI 0.2 to 1.3), 0.6 (95%CI 0.3 to 1.1), 0.7 (95%CI 0.4 to 1.4), 0.8 (95%CI 0.4 to 1.8), and 1.7 (95%CI 0.4 to 6.7), respectively. None of these associations was statistically significant.

**Table 2**
Number of patients vaccinated according to age ($n = 433$).

| Age (years) | Number Vaccinated/total number (%) | Odds ratio (95% Confidence interval) | *P*-value |
|---|---|---|---|
| 21–44 | 5/82 (6) | Reference | – |
| 45–54 | 8/88 (9) | 1.5 (0.5–4.9) | 0.47 |
| 55–61 | 7/78 (9) | 1.5 (0.5–5.0) | 0.49 |
| 62–70 | 24/91 (26) | 5.5 (2.0–15.3) | 0.01 |
| 71–91 | 36/94 (38) | 9.6 (3.5–25.9) | <0.001 |