

New-Onset Rhinitis Symptoms Among Hospitalized Patients: Are Flowers a Culprit?

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ABSTRACT

New-onset rhinitis symptoms following admission to the hospital were reported by 12.7% of surveyed patients. Presence of flower arrangements in the proximity of patients' beds was highly associated with the development of new rhinitis (odds ratio, 9.7; 95% confidence interval, 4.3-21.7), or what may be more aptly referred to as "florocomial" rhinitis (*Infect Control Hosp Epidemiol* 2001;22:111-113).

Rhinitis, or inflammation of the membranes lining the nose, is a common affliction with many widely-accepted causes, including allergic, infectious, occupational, hormonal, drug-induced, and food-related.¹ To the best of my knowledge, development of rhinitis following admission to the hospital has not been studied systematically. The present study was performed to evaluate the frequency of new-onset rhinitis symptoms ([NORS] defined as the development of clear rhinorrhea or postnasal drip following admission) in a select sample of hospitalized patients and to explore the association of such rhinitis with several variables, including the presence of floral arrangements in patients' rooms.

TABLE 1

UNIVARIATE ANALYSIS OF THE FREQUENCY OF NEW-ONSET RHINITIS SYMPTOMS AMONG 387 HOSPITALIZED PATIENTS BY VARIOUS ATTRIBUTES

Attribute	Proportion (%)		P	OR (CI ₉₅)
	No. With Rhinitis/Total (%)			
Gender			.01	2.4 (1.3-4.4)
Female	32/182	(17.6)		
Male	17/205	(8.3)		
Fresh flowers			<.0001	10.6 (4.9-22.6)
Present	40/140	(28.6)		
Absent	9/247	(3.6)		
Seasonal allergy			.11	1.7 (0.9-3.1)
Present	20/116	(17.2)		
Absent	29/269	(10.8)		
Antihistamine or corticosteroid use			.15	2.0 (0.8-5.3)
Present	5/70	(7.1)		
Absent	41/306	(13.4)		

Abbreviations: CI₉₅, 95% confidence interval; OR, odds ratio.

METHODS

As part of the hospital epidemiology quality-improvement activities at a tertiary-care medical center, all patients seen by the author in consultation for evaluation and management of infectious diseases from October 1998 through June 1999 were considered for the survey. In the course of their routine medical evaluation, patients were asked about their history of "seasonal allergy," defined as allergy (with or without skin testing) to pollen, flowers, or having "hay fever." Treatment (or lack thereof) with H₁ antihistaminic agents or nasal or systemic corticosteroids (equivalent to 10 mg/d of prednisone or greater) up to 48 hours prior to the initial interview also was noted. Patients hospitalized for less than 24 hours carrying the diagnosis of sinusitis at the time of admission and those on mechanical ventilation or with nasogastric tubes were excluded from the survey. At the time of the initial medical interview, all evaluable patients were asked about NORS following admission to the hospital. The presence or absence of at least one fresh flower arrangement in the immediate proximity of the patient's bed (usually within 3 to 4 ft) also was noted; originally dried or artificial flower arrangements and nonflowering green plants were not considered fresh flowers. No patient was included in the study more than once.

Statistical Analysis

Chi-square and Fisher's Exact tests were used for comparison of categorical data. Multivariate analysis was performed by the use of stepwise logistic regression, including in the model variables associated with NORS at $P < .2$ level. Student's *t* test was used for comparison of continuous data. A $P < .05$ was considered statistically significant. Statistica (StatSoft, Tulsa, OK) and InStat (GraphPad, San Diego, CA) software were used for data analysis.

RESULTS

Of 457 potentially evaluable unique patients, 61 gave a history of rhinitis symptoms at the time of admission, 8 had mental status changes confounding the reliability of their medical history, and 1 was inadvertently not asked about NORS, leaving a total of 387 ultimately evaluable patients. The median age of evaluable patients was 56 (range, 16-95; mean, 54) years; 205 (53%) were male. The median days of hospitalization prior to the initial interview was 4 (range, 1-120; mean, 7.2) days. The presence or absence of one or more floral arrangements was noted in the immediate proximity of the patient's hospital bed in 140 (36%) cases (mean, 2.0 flower arrangements; range, 1-12). Female patients were significantly more likely to have at least one floral arrangement in the proximity of their beds, compared to male patients: 93 (51%) of 182 female patients versus 45 (22%) of 205 male patients, respectively (chi-square, $P < .0001$, odds ratio [OR], 3.7; 95% confidence interval [CI₉₅], 2.4-5.7).

At the time of the initial interview, 49 patients (12.7%) reported NORS symptoms following admission to the hospital. There was no statistically significant difference in age (mean, 55.4 years in NORS patients vs 54 years in non-NORS patients, $P = .6$) or the number of hospital days prior to patient interview (mean, 7.6 days vs 7.1 days for those with or without NORS, respectively; $P = .82$). Univariate statistical analysis revealed a significant association between NORS and female gender and the presence of one or more flower arrangements in the proximity of patient's bed; prior history of seasonal allergy and concurrent antihistamine or corticosteroid use were not significantly associated with NORS in this analysis (Table 1). Multivariate logistic-regression analysis, including in the model variables associated with NORS at $P < .2$ level, revealed that presence of flowers, seasonal allergy history, and lack of antihistamine or corticosteroid use were associated independently with

TABLE 2
MULTIVARIATE LOGISTIC REGRESSION ANALYSIS OF THE
ASSOCIATION OF VARIOUS ATTRIBUTES WITH NEW-ONSET
RHINITIS AMONG 387 HOSPITALIZED PATIENTS

Attribute	P	OR (CI ₉₅)
Fresh flowers	.0001	9.7 (4.3-21.7)
Seasonal allergy	.01	2.5 (1.2-5.1)
Lack of antihistamine or corticosteroid use	.03	3.2 (1.1-9.2)
Female gender	.4	1.4 (0.7-2.8)

Abbreviations: CI₉₅, 95% confidence interval; OR, odds ratio.

the development of NORS (Table 2). The presence of flowers in the proximity of patients' beds was highly associated with NORS (OR, 9.7; CI₉₅, 4.3-21.7; $P < .0001$). Of 27 patients with history of seasonal allergy who had not been taking any antihistamines or corticosteroids and who were noted to have fresh flowers in the proximity of their beds, 16 (59.3%) reported NORS, compared with 5 (3.7%) of 136 patients who gave no history of seasonal allergy, had not been receiving antihistamine or corticosteroid therapy, and had no flowers in the proximity of their beds (OR, 38.1; CI₉₅, 11.7-123.8; Fisher's Exact Test; $P < .0001$).

DISCUSSION

To the best of my knowledge, this is the first reported study of rhinitis symptoms among hospitalized patients. The results of this cross-sectional study suggest that NORS is not uncommon among hospitalized patients and that the presence of flower arrangements in the proximity of patients' beds—and to a lesser extent, lack of antihistamines or corticosteroid therapy and prior history of seasonal allergy—may play an important role. Possible explanations for the development of such "florocomial" rhinitis among hospitalized patients include the often close (sometimes within 1 to 2 ft of the head of the patient) and constant (often 24 h/d) exposure to pollen from flower arrangements next to the patient's bed, a situation that is rather unique to the stay in a hospital room. Although no attempt was made to assess the cost of NORS in hospitalized patients, the morbidity and cost associated with allergic rhinitis in the general population is thought to be substantial.¹

Several limitations of this study are worthy of discussion. First, only patients personally seen by the author for infectious disease consultation were surveyed; therefore, the generalizability of the study findings to other hospitalized patients cannot necessarily be assumed. Second, no attempt was made to verify objectively or to quantify the severity of NORS, although it is interesting to note that many patients freely complained about NORS even before being asked about it. Third, the time period (days vs hours) that the flower arrangements had been present prior to the initial patient interview was not known. Fourth, because this was not a longitudinal study, it is possible that the true incidence of NORS during patients' hospital stay actually

was higher. Last, it is likely that factors other than flower arrangements in the proximity of the patients' bed contributed to the development of NORS (eg, mold, dust, latex powder, and other potential allergens in the hospital environment), as supported by the finding of independent associations between NORS, lack of use of antihistamines or corticosteroids, and patient-reported history of seasonal allergy. Further studies are needed to better evaluate the full extent and potential causes of NORS in hospitalized patients. Until then, patients and physicians may not need to look much further than the fresh flowers in patients' rooms for the cause of NORS. A simple intervention such as removal of fresh flowers from patient's immediate hospital environment may be all that is needed to alleviate "florocomial" rhinitis.

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