



Letter

Trends in allergy/immunology inpatient consultations, 1991–2013

Allergy/immunology consultation is an important feature of fellowship training and is a crucial service provided by the department. Profiling the spectrum of diseases that allergy/immunology fellows might encounter on an inpatient consultation service could assist in the improvement of the fellowship curriculum, provide additional educational opportunities for primary care residents, and potentially improve the care of our patients.

The allergy/immunology fellowship is a 2-year program during which fellows spend time on the inpatient consultation service at a multispecialty teaching hospital. The Department of Allergy and Clinical Immunology at this tertiary care academic medical center does not have its own inpatient service but provides consultations to other inpatient services. For 23 years, a brief record of each consultation has been kept in a book in the department office.

After institutional review board approval, information from this book served as the basis for identifying each consecutive patient seen by the fellows. Then the medical records of each patient seen from January 1, 1991, through December 31, 2013, were individually reviewed. We tested for trends using Poisson regression. $P < .05$ was considered statistically significant.

A total of 1,797 inpatient consultations on 1,564 patients were completed during the 23-year period. The number of consultations significantly decreased ($P < .001$) but increased slightly when compared with total hospitalizations. The consultation service was asked to evaluate 173 of 242,570 hospitalized patients (0.07%) in 1991 vs 71 of 69,084 (0.1%) in 2013 ($P = .01$). The most common reasons for inpatient allergy/immunology consultations overall were asthma (53%), drug allergy (21%), and immunodeficiency (9.7%). Consultations for asthma decreased significantly from 75% (130 of 173 consultations) in 1991 vs 1% (1 of 71 consultations) in 2013 ($P < .001$). There was also significant variability in the top diagnoses by age group (Table 1).

There were 387 consultations for drug allergy, 162 for aspirin, and 121 for penicillin. Aspirin allergy increased significantly, from 1 in 173 in 1991 to 23 in 71 in 2013 ($P < .001$). No trends were observed for penicillin ($P = .77$). Of the 162 consultations for aspirin allergy, 154 prompted oral challenge or desensitization. Of the 121 consultations for penicillin allergy, 22 patients' clinical histories alone were deemed sufficient and did not warrant further testing. Skin test results were positive in 10 patients and negative in 84 patients. The results of oral challenge with amoxicillin were negative in 4 additional patients.

The number of procedures performed totaled 321: 222 challenges or desensitizations and 99 skin tests. The number of procedures performed increased significantly from 15 of 173 in 1991 to 49 of 71 in 2013 ($P < .001$). Although no trends were seen for skin

testing, there was a significant increase in the number of challenges or desensitizations performed (from 2 of 173 in 1991 to 38 of 71 in 2013, $P < .001$).

The data reveal a decreasing trend for consultations, specifically for asthma, during the 23-year period. This finding mirrors that of prior studies, which also found a decrease in inpatient allergy/immunology consultations, especially for asthma.^{1–3} There was an 86% decrease in inpatient asthma consultations (21% of all consultations in the study by England et al² to 3% in the study by Otto et al¹). The significant decrease in annual consultations for asthma may reflect the success of inhaled corticosteroid therapy in the late 1990s (and management guidelines encouraging the use of inhaled corticosteroids from 1997 onward), as well as increasing clinical acumen of generalists in the management of asthma. In addition, the development of hospitalist services, pulmonology fellowship programs, and full-time intensivist positions in the early to mid-2000s might explain the observed phenomena at our institution.

Historical trends in testing for penicillin allergy might have affected the frequency of consultations for penicillin allergy and the outcome of such testing.⁴ Benzylpenicilloyl polylysine (Pre-Pen) had previously been available on the market until 2004, when the manufacturer voluntarily withdrew the product because of the lack of manufacturing facilities.⁵ When Pre-Pen was not commercially available between 2004 and 2009, our medical center laboratory was able to provide benzylpenicilloyl poly-L-lysine for testing. Thus, testing was consistently performed from 1991 to 2013, using the major determinant benzylpenicilloyl poly-L-lysine, as well as minor determinants, benzylpenicillin G, benzylpenicilloate, and penicilloyl propylamine.⁶

Temporal trends in aspirin challenges and desensitizations might be explained by the increase in aspirin use and the increase in medical literature reporting successful challenges and desensitizations.⁷ Furthermore, our medical center has recently become the referral center for this procedure in our region.

The Accreditation Council for Graduate Medical Education (ACGME) requirements for subspecialty training in allergy/immunology include competence in the diagnosis and management of various other diseases, including immunologic rheumatic disorders and hypersensitivity pneumonitis, but our data report that fellows have been seeing few inpatient consultations for these. Thus, we need to ensure that our fellows are seeing sufficient outpatient cases with supplementary rotations in allied subspecialties to enhance their breadth of clinical training.

The strength of the present study is the presentation of the overall experience of an inpatient hospital consultation service for 23 consecutive years. This study is retrospective, with all the limitations of a retrospective study. We also did not examine the influence of consultation on patient outcome. This study is also limited to one academic medical center and is mainly descriptive in nature. Thus, most conclusions may not be generalizable to other

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Table 1

Reasons for inpatient allergy/immunology consultations from 1991 to 2013—pediatric vs adult

Pediatric		Adult	
Reason for consultation	No. (%) of consultations	Reason for consultation	No. (%) of consultations
Asthma	657 (72)	Drug allergy	363 (41)
Immunodeficiency	156 (17)	Asthma	294 (33)
Drug allergy	24 (2.6)	Angioedema	51 (5.7)
Anaphylaxis	22 (2.4)	Rash	44 (5)
Rash	17 (1.8)	Anaphylaxis	40 (4.5)
Angioedema	12 (1.3)	AERD	32 (3.6)
Eosinophilia	9 (1)	Immunodeficiency	18 (2)
Food allergy	7 (0.8)	Eosinophilia	13 (1.5)
Vaccine allergy	4 (0.4)	Latex allergy	9 (1)
Other	0 (0)	Other ^a	24 (2.7)

Abbreviation: AERD, aspirin-exacerbated respiratory disease.

^aThree consultations each for sinusitis, mastocytosis, food allergy, and venom hypersensitivity; 2 consultations each for serum sickness, cystic fibrosis, and aspergillosis; and 1 consultation each for rheumatoid arthritis, pruritus without rash, immunotherapy, colitis, anergy, and allergic bronchopulmonary aspergillosis.

settings. Suggestions for the future might include appropriate off-site rotations for fellows to ensure breadth of training at centers where the consultation experience is vastly different, with national data available through the ACGME records to help pinpoint where rotations might be sought.

Evaluating the types of patients encountered on an allergy/immunology consultation service can guide the education of allergy/immunology fellows and potentially other health care professionals. Current common diagnoses of aspirin and penicillin allergies emphasize their educational importance, especially for incoming fellows in the early months of their clinical training. We

hope that by measuring the patient problems encountered on our allergy/immunology consultation service and modifying our curriculum, the education of our fellows will improve, ultimately improving the care of our patients.

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