

The relationship between the proportion of the population tested annually and the rate of patients with positive patch test reactions

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Summary

Background. Differences exist between the rates of patients with positive patch test reactions in different centres.

Objectives. To explore the varying relationship between the percentage of patients with one or more positive reactions (rate of patients with positive reactions) and the proportion of the population tested annually (intensity of testing) by UK centres contributing to a shared data pool.

Methods. Patch test data were pooled from 11 UK centres that use the British Society for Cutaneous Allergy (BSCA), formerly known as the British Society for Contact Dermatitis, database. The catchment population size was estimated for each centre, and the rate of patients with positive reactions to allergens in the BSCA baseline series was calculated.

Results. As the intensity of testing increases, the rate of patients with positive reactions decreases. We found a strong linear correlation in the range of interest between the intensity of patch testing and the proportion of tests returning a positive result ($R^2 = 0.598$).

Conclusion. Within the range of testing intensities covered by our reporting centres, the data show that as the intensity of testing increases, the rate of patients with positive reactions decreases.

Key words: catchment size; intensity of testing; patch testing; rate of patients with positive reactions.

Currently, allergic contact dermatitis represents 4–7% of dermatology consultations, and accounts for a significant proportion of patients presenting with occupational illness (1, 2). Patch testing is a reliable diagnostic tool in allergic contact dermatitis, with a sensitivity and specificity between 70% and 80% (3). It also provides a method for looking at trends in rates of contact allergy for both individual allergens and between different centres.

Variations exist between centres for rates of positivity of different allergens and overall rates of patients with

positive reactions as a proportion of overall numbers of patients undergoing patch testing (4). Local patient demographics, as well as patterns of exposure to irritants and individual allergens, will affect the rates of contact dermatitis. Similarly, geographical differences in the proportions of individuals employed in certain industries associated with higher levels of exposure to irritants and allergens will affect the numbers of people presenting to clinics. Different prescribing practices between geographical areas and referral patterns will also influence the rates of patients with positive reactions (5).

This study aimed to explore the varying relationship between the rates of patients with positive reactions to allergens in the British Society for Cutaneous Allergy (BSCA) baseline series and the intensity of patch testing within centres contributing data to a shared UK data pool.

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Table 1. Breakdown of the demographics for each of the UK test centres

Test centre	Demographics (MOAHFLA Index)–percentage of patients						
	Male (%)	Occupational (%)	Atopy ^a (%)	Hand (%)	Face (%)	Leg (%)	Age > 40 years (%)
UK02	33	11	42	28	30	9	58
UK04	31	12	57	23	27	10	61
UK05	31	15	51	29	26	4	70
UK07	34	8	43	32	20	10	58
UK08	31	10	16	31	27	7	55
UK09	35	9	37	35	17	8	54
UK10	33	15	43	37	26	9	70
UK11	29	11	56	30	27	10	71
UK12	34	13	48	39	23	5	68
UK30	32	18	38	53	17	5	63
UK31	35	15	40	32	21	6	55
Mean	33	12	40	34	24	8	62

^aAtopy includes all patients with a history of atopic diseases, and is not restricted to atopic dermatitis, except for UK08, where Atopy = atopic dermatitis.

Methods

Patch test data were pooled from 11 UK centres that use the BSCA database. In a 4-year period between 2004 and 2007, data were collected from nine centres, with another two contributing from 2006 onwards. Data were analysed for the BSCA baseline series.

Allergens supplied by Chemotechnique Diagnostics® (Vellinge, Sweden) or Trolab® (Hermal, Reinbeck, Germany) were tested on either Finn Chambers® or IQ chambers® (depending on local practice). The allergens were kept in contact for 2 days, after which they were removed. Readings were performed at D2 and D4, according to the International Contact Dermatitis Research Group criteria for reading patch test reactions.

The catchment population was defined by the local centres according to the normal patterns of patient flow within their respective geographical areas. Within the UK National Health Service, patients are referred from primary care doctors to the hospital service. The great majority of referrals are within a defined geographical area, which is the catchment population for that hospital. The catchment population is the total number of inhabitants of a geographical area.

The relationship between intensity of patch testing in each centre and the rate of patients with positive reactions was analysed by linear regression.

Results

A detailed breakdown of the demographics and the presentation of the dermatitis (MOAHFLA index) for each test centre is shown in Table 1. The majority of those tested were female, with little variation between centres (mean male percentage 33%, standard deviation 1.92).

Details of the total number of patients tested in each centre, the numbers of test per year, the catchment population, the intensity of testing and the rate of patients with positive reactions are shown in Table 2.

The rate of patients with positive reactions was plotted against the intensity of patch testing for each test centre, and is shown in Fig. 1.

As the number of tests per year per catchment population increases, the percentage of patients with one or more positive reactions decreases. Within the range covered by the data, the relationship appears to be approximately linear. Linear regression analysis shows a significant correlation between the two axes ($R^2 = 0.598$, $p < 0.005$). Although we know that the relationship cannot be linear for more extreme cases, the approximation applies within the range tested.

Discussion

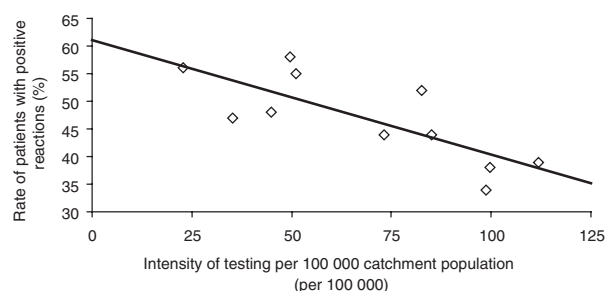
This study examined the relationship between the rates of patients with positive reactions and the intensity of patch testing. There has been a lack of previous publications showing this direct relationship.

An earlier study showed that, as the number of patients tested increased up to 1 in 700, the number of positive reactions recorded also increased (6). The data in the current study do not contradict this finding, as we are reporting the percentage of patients with one or more positive reactions rather than the absolute number of positive reactions to one or more allergens. The patch testing intensity in the reporting centres ranged from 1 in 894 of the catchment population to 1 in 4419, with a median of 1 in 1366.

Within the range of testing intensities covered by our reporting centres, the data show that as the intensity of

Table 2. Details of the total number of patients tested in each centre, the numbers of test per year, the catchment population, intensity of testing, and the rate of patients with positive reactions

Individual test centre	Total tested	Tests/year	Catchment population	Intensity of patch testing per 100 000 catchment population	Tests/year per catchment population as 1 in X	Rate of patients with positive reactions (%)
UK02	1973	493	494 000	97.9	1002	37.6
UK04	806	403	900 000	44.8	2233	48.1
UK05	1652	413	500 000	82.6	1210	51.5
UK07	2011	503	450 000	111.8	894	39.3
UK08	3058	789	800 000	98.6	1013	33.6
UK09	1124	281	550 000	51.1	1957	54.7
UK10	1193	298	850 000	35.1	2852	47.1
UK11	1234	308	620 000	49.7	2012	58.2
UK12	415	204	900 000	22.7	4411	55.9
UK30	730	183	250 000	73.2	1366	43.8
UK31	1192	298	350 000	85.1	1174	44.3
Total	15 388	4173	6 664 000			
Median	1193	308	550 000	73.2	1366	47.1

**Fig. 1.** Graph of the rate of patients with positive reactions against the intensity of testing.

testing increases, the rate of patients with positive reactions decreases. The probable explanation for this is that when the number of patients undergoing patch testing is restricted for any reason, then the patients selected for testing are more likely to be those for whom there is a strong probability that a positive reaction will be identified. The evidence indicates that where patch testing is undertaken only when the clinical history is strongly suspicious of allergic contact dermatitis, a significant proportion of potentially relevant positive reactions will be overlooked. Many would advocate a less restricted approach to testing of certain groups of patients, particularly for body sites where identification of allergens from the history alone is often less than reliable, for example the hands and face (7). There may be a number of valid reasons why patch testing intensity may be lower in one area than in another; a key factor is often the geographical distance and/or travelling time between the patient's residence and the centre where patch testing is performed.

Although the catchment population is an approximation based on local knowledge of patient referral patterns,

the number of patients crossing boundaries is generally small; the number of patients leaving an area to be seen in adjacent areas is probably balanced by those flowing into the area where specialized services in contact dermatitis are made available.

The importance of this finding relates to making the most efficient use of the patch test service. Although a higher intensity of referral gives a lower rate of positive reactions, it will inevitably identify more patients with potentially relevant positive reactions. There is no optimum referral rate for patch testing; each case should be decided on the basis of individual clinical need. These data provide some insights into one significant explanation for differences in positivity rates for patch tests in different settings. The relationship between the intensity of patch testing and the rate of positivity of individual allergens will be explored in a separate article.

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