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Identification of potential candidates for varicella vaccination by history: questionnaire and seroprevalence study

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Guidance from the Joint Committee on Vaccination and Immunisation regarding varicella vaccination of workers in healthcare settings is imminent.¹ The new recommendations will advise that all those with a negative or uncertain history of chickenpox or shingles at pre-employment assessment should be tested for varicella zoster virus IgG. Vaccination with the newly licensed varicella vaccine will be advised for those with a seronegative result.

A history of chickenpox has a high positive predictive value for immunity among healthcare workers in Europe, where the seroprevalence is as high as 98.5%.² The validity of a history of chickenpox is unknown in those from tropical countries, however, where the mean age of infection is in early adulthood.³ Guy's and St Thomas' Hospital NHS Trust in inner London has some 8000 staff and 4700 healthcare students of increasingly heterogeneous origins.^{4,5} We conducted a questionnaire and seroprevalence study at the hospital to ascertain the relations between history of chickenpox, countries of birth and residence, and serological status.

Participants, methods, and results

From September 2001 to July 2002 a nurse administered questionnaire was completed for 747 staff and students consecutively attending pre-employment screening. Country of birth or of first residence was noted, together with age range during subsequent residence in other countries. Recruits were asked about prior chickenpox or shingles, with details recorded. Serology was requested in line with usual practice. Immune status was determined by using the Diamedix enzyme immunoassay kit for varicella zoster virus IgG (Miami, FL, USA).

Of 629 (84%) recruits tested, six yielded equivocal results and were excluded from further analysis. Those who denied or were unsure of past infection were considered as one group. We assigned participants to "temperate" or "tropical" subgroups according to country of birth or first residence. We compared differences in seroprevalence and proportions of groups with a positive history by using the χ^2 test; we also analysed other variables (unadjusted and adjusted) using logistic regression.

The table shows the results. Additional information about prior chickenpox (nature and site of rash, residual scar) did not increase the positive predictive value. Shingles had a positive predictive value of 100%, however, with all 22 participants testing IgG positive. Twenty nine participants in the temperate group had not lived solely in temperate zones during their first 12 years and had a reduced risk of testing seropositive (odds ratio 0.35 compared with those born and brought up in a temperate climate)—similar to that of those born and brought up in a tropical climate (odds ratio 0.36).

Participants from Sub-Saharan Africa and the Caribbean were disproportionately represented among the 52 seronegative participants (29% (15) and 17% (9) respectively, compared with just 18% (113) and 5% (31) respectively among all new recruits). Among participants with a history of prior infection, the false positive rate was 9.3% in the tropical group versus 3.7% in the temperate group ($P=0.019$) (table).

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Primary care

Results and statistical analysis of differences between temperate and tropical subgroups

	All (n=623)	Temperate (n=431)*	Tropical (n=192)*	P value
Average age (years)†	27.5	25.0	34.1	
Sex‡				
Men (%)	115 (18.6)	84 (19.5)	31 (16.3)	
Women (%)	503 (81.4)	344 (80.4)	159 (83.7)	
Seroprevalence of varicella zoster virus (%)	571 (91.7)	409 (94.9§)	162 (84.4§)	<0.001
False positive history (%)¶	23 (5.0)	13 (3.7)	10 (9.3)	0.019
Sensitivity (%)	77.2	83.9	60.5	<0.001
Specificity (%)	55.8	40.9	66.7	0.065
Positive predictive value (%)	95.0	96.3	90.7	
Negative predictive value (%)	18.2	12.0	23.8	

* Temperate regions are defined as United Kingdom, rest of Europe, North America, Antipodes, Middle East, and Indian sub-continent; tropical regions are defined as sub-Saharan Africa, South East Asia, and Caribbean and Central America.

† Age was recorded for 451 individuals (temperate, n=327; tropical, n=124). Among the 451 individuals for whom age was known, the odds ratio for seropositivity in the tropical versus the temperate group was 0.48, modified to 0.50 after adjustment for age group.

‡ Sex was recorded in 618 individuals.

§ 95% confidence intervals: temperate 92.8% to 97.0%; tropical 79.2% to 89.6%.

¶ 1-positive predictive value.

Comment

Candidates for varicella vaccination (seronegative staff) will inevitably be missed if a blanket policy of screening by history alone is implemented. As shown here, their number will increase considerably if groups with a significantly higher false positive rate account for a substantial proportion of the workforce.

The overall seroprevalence and positive predictive value are lower than figures usually quoted for health-care workers in Europe, but the distribution of geographical origins largely explains the discrepancy. It is a weakness of this study that some of the countries defined as temperate in the questionnaire—for example, India—also contain regions with tropical climates. Serological testing of recruits from these areas should also be considered. Individuals born or raised in tropical climates should have serological screening regardless of a history of chickenpox.

What is already known on this topic

A history of chickenpox is a reliable indicator of past infection in temperate climates

What this study adds

Seronegative candidates for varicella vaccination will be missed if a blanket policy of screening by history alone is applied to people born or raised in tropical climates

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Ethical approval: St Thomas' Research Ethics Committee.

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A memorable teacher

What am I doing here?

In our separate ways, we and Professor Harold Scarborough started at the Welsh National School of Medicine in the early 1950s—he as professor of medicine, and we as first year clinical medical students. As the coauthor of a standard textbook of physiology (Bell, Davidson, and Scarborough), his name was already well known.

From the outset, he introduced a clear break from the didactic nature of teaching to which we were accustomed. His technique was always testing and interrogatory, probing our logic and beliefs and the validity of our observations. A classic example from one of the final medicine examination papers at the time was "What is the value of routine clinical examination of the tongue?" He told us later that he would have considered awarding full marks for anyone who had simply written "None." This was at a time when examination of the tongue was a preliminary ritual to any clinical examination.

His intention was to make us think clearly, and this was usually achieved with an element of theatricality. A slow soft spoken voice, a sharp intake of breath at our replies, and a light footed spin often made it difficult to know whether we had said

something of brilliance or stupidity. When we finally managed to divine the correct answer to the question asked, it remained in the memory.

His address at a medical graduation ceremony in Cardiff was also memorable and remains highly relevant. He began by commenting that the graduates had been subjected to a great deal of questioning in their recent examinations, but asked them to consider one further question, and explained that this was one that they should ask themselves at regular intervals throughout their careers. It was "What am I doing here?"

There then followed an analysis and amplification of the question: "What am I doing here? What am I doing here? What am I doing here? What am I doing here?" One can imagine the implications of the question, and some of the possible answers that might suggest themselves.

It was a typical performance of a fine and memorable teacher.

David Crosby *retired surgeon*

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