No seasonal trends in referrals for vascular investigations: insight into the diagnosis of Raynaud's phenomenon and systemic sclerosis

Sirs,

Raynaud's phenomenon (RP), although common in the general population (affecting ~5%) is usually idiopathic ('primary RP'); however, it can be the earliest symptom of an underlying autoimmune connective tissue disease, such as systemic sclerosis (SSc) (1). Nailfold capillaroscopy (NFC) is an important diagnostic indicator for the presence of an underlying autoimmune connective tissue disease. The importance of abnormal nailfold capillaries is reflected through their inclusion in the American College of Rheumatology and the European League Against Rheumatism classification criteria for SSc (2), and the very early diagnosis of SSc criteria (3). Whereas thermographic testing with a cold challenge provides functional vascular information (4), the reliability and validity of thermography with a cold challenge has been demonstrated in patients with SSc-related RP (5).

Although individuals may suffer with Raynaud's symptoms throughout the year, many do report a significant seasonal variation (*i.e.* improvement in the warmer months), for example: those with primary RP. This seasonality is reflected, for example, in internet searches for RP which peak in the colder months (6). Conversely, patients with SSc often report symptoms of background digital ischaemia between discrete RP 'attacks' (7, 8).

Therefore, against this background, for the purposes of service planning and design, our aim was to determine whether the demand for vascular investigations (NFC and thermography) varies throughout the year, and over time.

At Salford Royal Hospital (a tertiary UK referral centre for SSc) we have been performing NFC and thermographic testing for more than 30 years. We examined routinely collected data between January 2011 and December 2022 the seasonal (and longer term) trends in referrals for vascular investigations relating to RP (Fig. 1). Approximately 75% of patients referred for testing attended for combined testing (NFC and thermography), while 23% were referred for NFC alone. A small number (~3%) attended for other non-RP thermography testing indications (*e.g.* morphea).

From the data presented in Figure 1 two things are clear: first that over the 12-year span of the data the throughput of the service has grown by approximately 50% (for example: mean tests/month 2011-2013 – 24, 2020-2022: 36); second is that there is no evidence of any seasonal variation in the throughput of the service since all monthly averages lie within 2 standard deviations of the overall mean. Our data is likely subject to individual delays in patients seeking initial healthcare utilisation, and also being seen in secondary care. Additionally, our data relate to the date of investigation, and not referral. However, the waiting time (~4-6 weeks) for patients from referral to investigation has been consistent throughout.

We present data from a large single tertiary referral centre for SSc, that receives referrals for vascular testing from across the northwest of England. Referrals are received mainly from other hospital-based clinical colleagues, although in the last two years there has been a small rise in the number of referrals received directly from GPs in primary care, and this route is likely to grow. In addition, there could be a selection bias present in the sense that patients where a clinician is confident of an underlying diagnosis of primary RP may not be referred.

In conclusion, there is no evidence of seasonal variation in vascular investigation referrals for RP throughout the year. With increasing awareness of the importance of vascular testing, particularly nailfold capillaroscopy (included in the SSc classification criteria), the implications for service provision appear solely related to growth over time. There is now a need to investigate the additional diagnostic and prognostic benefit of combining NFC and thermography, including to predict digital vascular and internal organ-based complications.

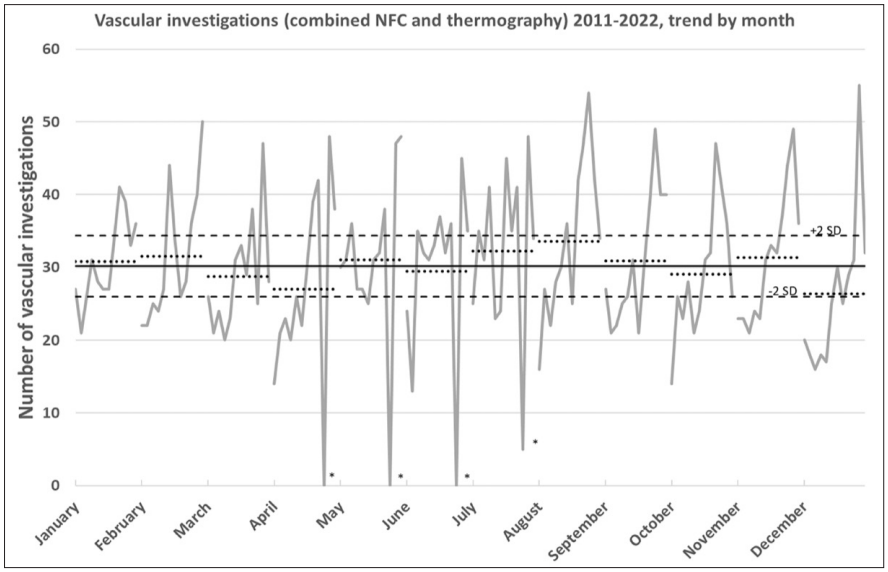

Fig. 1. Vascular investigations performed at Salford Royal Hospital over a 12-year span: 2011-2022, with trends displayed by calendar month (solid gray lines). Mean values over the 12-year period for each calendar month are shown as a dotted black line. The mean number of tests per month over the whole time span is shown with the solid black line, with corresponding ± 2 standard deviations shown with dashed black lines. Months in 2020 where few or no tests were carried out due to the COVID-19 pandemic are denoted with a star (*).

G. Dinsdale[1], *PhD*
M. Mandzuk[1]
J. Manning[1], *BSc*
A.L. Herrick[1,2], *MD*
M. Samaranayaka[1]
M. Hughes[1,2], *PhD*

[1]Department of Rheumatology, Salford Care Organisation, Northern Care Alliance NHS Foundation Trust, Salford;
[2]Division of Musculoskeletal and Dermatological Sciences, The University of Manchester, Manchester Academic Health Science Centre, Manchester, UK.

Please address correspondence to:
Michael Hughes
Department of Rheumatology,
Salford Care Organisation,
Northern Care Alliance NHS Foundation Trust,
Salford, M6 8HD, United Kingdom.

E-mail:
michael.hughes-6@postgrad.manchester.ac.uk

Competing interests: none declared.

References

1. HUGHES M, ALLANORE Y, CHUNG L, PAULING JD, DENTON CP, MATUCCI-CERINIC M: Raynaud's phenomenon and digital ulcers in systemic sclerosis. *Nat Rev Rheumatol* 2020; 16(4): 208-21. https://doi.org/10.1038/s41584-020-0386-4
2. VAN DEN HOOGEN F, KHANNA D, FRANSEN J *et al.*: 2013 classification criteria for systemic sclerosis: an American College of Rheumatology/European League against Rheumatism collaborative initiative. *Arthritis Rheum* 2013; 65(11): 2737-47. https://doi.org/10.1002/art.38098
3. BELLANDO-RANDONE S, DEL GALDO F, LEPRI G *et al.*: Progression of patients with Raynaud's phenomenon to systemic sclerosis: a five-year analysis of the European Scleroderma Trial and Research group multicentre, longitudinal registry study for Very Early Diagnosis of Systemic Sclerosis (VEDOSS). *Lancet Rheumatol* 2022; 3(12): e834-e843.
4. DINSDALE G, HERRICK AL: Vascular diagnostics for Raynaud's phenomenon. *J Vasc Diagnostics* 2014; 2: 127-39.
5. WILKINSON JD, LEGGETT SA, MARJANOVIC EJ *et al.*: A multicenter study of the validity and reliability of responses to hand cold challenge as measured by laser speckle contrast imaging and thermo-

graphy. *Arthritis Rheumatol* 2018; 70(6): 903-11. https://doi.org/10.1002/art.40457
6. HUGHES M: Effect of season on internet searches for information on Raynaud phenomenon. *J Rheumatol* 2019; 46(11): 1543-4. https://doi.org/10.3899/jrheum.190463
7. MATUCCI-CERINIC M, KAHALEH B, WIGLEY FM: Review: evidence that systemic sclerosis is a vascular disease. *Arthritis Rheum* 2013; 65(8): 1953-62. https://doi.org/10.1002/art.37988
8. HUGHES M, HUANG S, PAULING JD, SABBAGH M, KHANNA D: The clinical relevance of Raynaud's phenomenon symptom characteristics in systemic sclerosis. *Clin Rheumatol* 2022; 41(10): 3049-54. https://doi.org/10.1007/s10067-022-06206-y