

Performance of a fast-track pathway for giant cell arteritis in Waikato, Aotearoa New Zealand

Philippa van Dantzig, Douglas White, Jason Kurz, Caroline Ming, Sujatha Kamalaksha, Vicki Quincey

ABSTRACT

AIMS: Giant cell arteritis (GCA) is the most common primary vasculitis in adults over 50 years of age. To facilitate early diagnosis and reduce harms from corticosteroids and temporal artery biopsies, fast-track pathways have been established. We review the benefits of the fast-track pathway set up in Waikato, Aotearoa New Zealand.

METHODS: Patients were collected prospectively as part of the fast-track pathway from 2014 to 2022. Their records were then reviewed retrospectively to collect data on clinical features, investigations and treatment.

RESULTS: There were 648 individual patients over the study period who had a colour Doppler ultrasound (CDUS) of the temporal arteries. There were 17 true positive CDUS, giving a sensitivity of 10.3% (95% confidence interval [CI] 6.3–15.5%) and specificity of 99.8% (95% CI 99.1–100%). Patients with GCA and a positive scan had significantly fewer steroids than those with GCA and a negative scan ($p=0.0037$). There were 376 patients discharged after a CDUS who did not have a diagnosis of GCA, resulting in reduced corticosteroid and temporal artery biopsy exposure.

CONCLUSIONS: This is a real-life study that reflects the benefits of fast-track pathways in Aotearoa New Zealand to patients and healthcare systems. It also shows the effect of corticosteroids on positive CDUS, an important consideration when setting up a fast-track pathway.

Giant cell arteritis (GCA) is a large vessel vasculitis, which is the most common primary vasculitis in adults over 50 years of age. Ischaemic complications can arise, including vision loss that can be permanent. Early accurate diagnosis and prompt treatment is therefore critical.

Historically, temporal artery biopsy (TAB) has been the primary means of diagnosis; however, in recent years, there has been focus on colour Doppler ultrasound (CDUS) of the temporal and axillary arteries with particular interest in its low cost and availability.^{1,2} Numerous meta-analyses support the performance of CDUS in the diagnosis of giant cell arteritis.^{1,3–9}

Fast-track pathways in GCA aim to have a risk assessment by a specialist (usually a rheumatologist or ophthalmologist) performed at the time of referral with a CDUS organised for the same day or next working day. Decisions regarding further tests and the need to continue corticosteroids are made rapidly, reducing harms of treatment or investigations to patients. The benefits of fast-track pathways include less vision loss, reduced time to diagnosis and fewer TAB requests.^{2,10–13} Fast-track pathways also support

primary care physicians, who have highlighted access issues in the rapid investigation of patients with suspected GCA.¹⁴

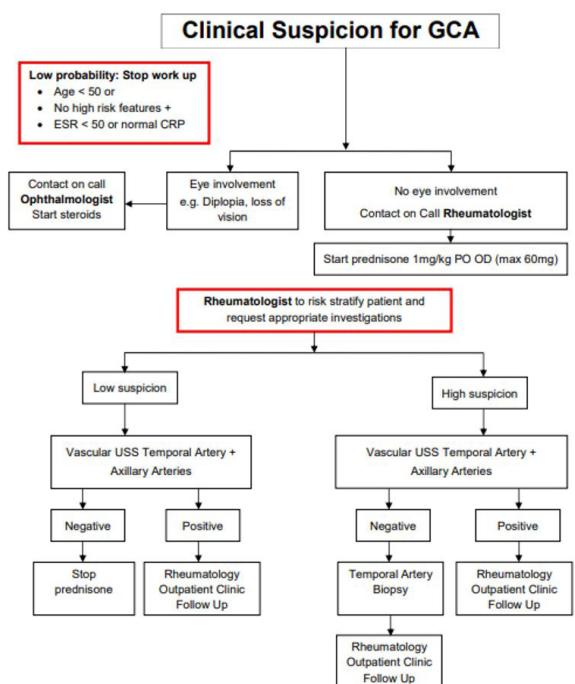
Most of the data on fast-track pathways do not take into consideration “real-world” practice. This is where our study is beneficial in reflecting the practical aspects of implementing a fast-track pathway for GCA in the hope of guiding other healthcare centres in the design of their own pathways.

Methods

The Rheumatology Department at the Waikato Hospital set up a GCA fast-track pathway at the end of 2013 (Figure 1) in collaboration with ophthalmologists. Patients suspected of having GCA were referred via telephone from primary care physicians, specialists or inpatient teams to either Ophthalmology (if visual symptoms were present) or Rheumatology (if no visual symptoms).

If the risk of GCA was assessed as sufficient, a CDUS of the temporal arteries was requested, which would usually be done on the day of or next day after the referral. If the referral was made out-of-hours, corticosteroids would be commenced at

Figure 1: The protocol for the GCA fast-track pathway at Waikato Hospital, Aotearoa New Zealand.



Waikato District Health Board
 Clinical Suspicion for GCA

Urgent Temporal and Axillary Ultrasound in suspected GCA Request Form
 Fax to 98872 and phone 94939 to confirm receipt of the form

Clinical Details:-

HIGH RISK	Tick if applicable
Visual symptoms:	
• Transient loss of vision (amaurosis fugax)	
• Anterior or posterior ischemic optic neuropathy	
• Central or/and branch retinal artery occlusion	
• Diplopia due to extraocular muscles palsy	
• Ocular ischemic syndrome	
Supportive signs and symptoms:	
• New onset headaches < 4 months	
• Jaw claudication	
• Scalp tenderness	
• Abnormal examination of temporal artery – beading, prominence, enlargement, tenderness	
• Elevated CRP	
Systemic symptoms:	
• Fever	
• Anaemia	
• Arm claudication	
• Polymyalgia Rheumatica	
LOW RISK	
• Absence of visual symptoms	
• Synovitis	
• Absence of temporal artery abnormalities, scalp tenderness and jaw claudication	

Signature: _____ Date: _____
 Name: _____ Designation: _____ Contact No/Pager: _____
 Consultant: _____

NB: GCA = giant cell arteritis; ESR = erythrocyte sedimentation rate; CRP = C-reactive protein; PO = oral; OD = daily; USS = ultrasound scan.

the discretion of the on-call specialist. Following the CDUS, the specialist would make a decision regarding further investigation (i.e., TAB) and on appropriate follow-up.

Ultrasound examinations were performed by experienced vascular ultrasonographers with postgraduate- or master’s-level qualifications. The protocol involved scanning both temporal and axillary arteries. Ultrasounds early in the study period were performed using the GE Logiq 9 or Philips IU22 ultrasound system with transducers of operating frequency at 3–9MHz or 5–17MHz. Over the course of the study period, newer ultrasound systems and transducers were used. By 2021, there was an upgrade to GE Logiq 10 and Philips EPIQ (with higher frequency transducers of 4–18MHz or 3–12MHz). When scanning temporal or axillary arteries, the highest frequency transducer for adequate penetration was chosen.

Cases in the fast-track pathway have been collected prospectively from January 2014 using the referral request for CDUS. The requests from January 2014 to December 2022 were reviewed retrospectively to gather data on clinical symptoms, laboratory results and to generate a list of all cases in the fast-track pathway. The electronic records for each case were searched

to collect information from referrals, results of investigations, treatment received by patients and final clinical diagnoses noted by treating physicians. In order to capture all patients going through the fast-track pathway, we also searched ultrasonography lists for patients who had a CDUS requested over this period. If the CDUS occurred alone or prior to a TAB, it was considered part of the fast-track pathway. TAB lists were also collected for the 3 years prior to the pathway to appreciate the rate of biopsy use prior to implementation of the pathway.

Ethnicities have been reported in conjunction with Statistics New Zealand (Stats NZ) reporting,¹⁵ and where patients identified with two different ethnicities (commonly Māori and New Zealand European), both were counted, thus giving a total percent as greater than 100%. This is consistent with how Stats NZ report their census data.

Given the pre-test probability of GCA was not often clear from the records, a risk score was applied, dividing patients into risk categories using an externally validated probability score established by Ing et al.¹⁶ This includes age, gender, clinical symptoms (i.e., new headache, temporal artery tenderness or reduced pulse, jaw or tongue claudication, diplopia or typical

vision loss) with erythrocyte sedimentation rate (ESR), C-reactive protein (CRP) and elevated platelets above upper limit of normal. Based on these factors, a “probability of having GCA” score was generated, organising patients into very low risk (<2.7%), low risk (<7%), moderate risk (<23%), high risk (<43%) and very high risk (>43%). This score appears to assist in the triage of patients with suspected GCA, though not without fault.^{16,17}

CDUS was classified as positive if the halo sign was present (defined as a hypoechoic ring around the lumen of the temporal or axillary artery) and indeterminate if only wall thickening was noted according to the radiology report. TAB was classified as positive if there was evidence of active inflammation consistent with GCA and the histopathologist’s report was supportive of active GCA. If there was a suggestion of possible past arteritis, this was not included as a positive TAB.

Statistical analysis

Descriptive data are presented as frequencies for categorical variables. Continuous variables are presented as a mean with standard deviation (SD) and a median with interquartile range (IQR). Where symptoms were not reported, this was reported as missing data; thus, percentage calculations are a valid percent rather than a total percent. Student *t*-Tests or Welch’s *t*-Test were performed where appropriate, as were non-parametric tests (Mann–Whitney U test). All analyses were conducted in IBM SPSS 29 (New York, United States). All significance tests were two-tailed and *p*-values of less than 0.05 were considered significant.

Ethics statement

National ethics approval was granted by HDEC (Reference: 2023 EXP 15448) and there was a local assessment through the Waikato Hospital who also approved the project (RD023025), which included review by Te Puna Oranga Māori Consultation Research Review Committee.

Results

Between January 2014 and December 2022, there were 664 patients who were referred through the fast-track pathway, with 648 individual patients. There were 16 duplicate episodes that have been excluded from analysis but are detailed in the Appendix.

Baseline characteristics

Patients managed through the fast-track pathway had a mean (SD) age of 70.5 (11.0) years and 69.3% were female. The age range was 17 to 96 years, with 25 patients (3.8%) being under 50 years of age. Ethnicity, clinical and laboratory features are detailed further in Table 1.

Of those referred through the fast-track pathway, 511/648 (78.8%) patients were managed by Rheumatology, 39/648 (6.0%) by Ophthalmology, 45/648 (6.9%) by a combination of both and 53/648 (8.2%) by other teams, which included General Medicine or Neurology.

Colour Doppler ultrasound

All patients in the fast-track pathway had CDUS performed. Out of 648 CDUS scans, 18 (2.8%) were reported as positive with the halo sign, 102/648 (15.7%) had abnormal vessel wall thickening noted and were thus labelled as indeterminate and 528/648 (81.5%) were negative. Axillary involvement was noted with vessel wall thickening (no axillary halos noted) in 52/648 (8.0%) of patients. A final diagnosis of GCA was made in 166/648 (25.6%) of patients.

Figure 2 illustrates the flow of patients through the pathway, outlining investigations performed. It shows how patients exited the pathway if they did not have GCA.

For patients with a halo sign (all of which were in the temporal artery), 17/18 (94.4%) had a final diagnosis of GCA. There was one patient with a halo sign on CDUS but clinical review assessed them as not having GCA. Out of the 102 patients with an indeterminate CDUS, 60/102 (58.8%) had a final diagnosis of GCA. Out of those with a negative CDUS, 89/528 (16.8%) had a final diagnosis of GCA. The sensitivity and specificity of CDUS compared to different reference standards are summarised in Table 2.

Non-specific vessel wall thickening was noted in 102 patients (i.e., indeterminate scans) and in 21/102 (20.5%) of these patients, this was supportive enough for a final diagnosis of GCA without a TAB needing to be performed. A further 61/102 (59.8%) patients required a TAB, of which 20/61 (32.8%) were positive and thus labelled as GCA, 41/61 (67.2%) were negative and of these, 19/41 (46.3%) were diagnosed with GCA. Thus, in total, 60/102 (58.8%) of indeterminate CDUS were associated with a diagnosis of GCA.

The sensitivity of a non-negative CDUS (i.e., either halo sign present or vessel wall thickening) was 46.7% (95% confidence interval [CI] 39.1–54.3%)

Table 1: Clinical characteristics of patients in the fast-track pathway.

	FTP (n=648)
Ethnicity no. pts (%)	
European	553 (85.3)
Māori	63 (9.7)
Pacific peoples	7 (1.1)
Asian	9 (1.4)
MELAA	4 (0.6)
Other	10 (1.5)
Not stated	10 (1.5)
Total	(101.1)
Clinical features	
Days of symptoms—median (IQR)	14.0 (6–30)
Symptoms—no./valid no. (valid %)	
Headache (any)	565/617 (91.6)
Headache (unilateral)	288/617 (46.7)
Scalp sensitivity	278/461 (60.3)
Jaw claudication	162/486 (33.3)
Visual symptoms (any)	219/488 (44.9)
Typical visual symptoms (AION, PION, CRAO)	21/648 (3.2)†
Diplopia	20/648 (3.1)†
PMR symptoms	171/375 (45.6)
Temporal artery abnormality†	252/392 (64.3)
Laboratory features—no./valid no. (valid %)	
Haemoglobin g/L	
<115 (women)	66/426 (15.5)
<130 (men)	65/176 (37.0)
Platelets >400 (%) x10 ⁹ /L	101/616 (16.4)

Table 1 (continued): Clinical characteristics of patients in the fast-track pathway.

ESR mm/hour	
mean (SD)	30.6 (26.5)
median (IQR)	23.5 (10–41)
CRP mg/L	
mean (SD)	40.9 (66.0)
median (IQR)	10.0 (2.5– 53.0)
ACR 2022 criteria score—no. (%)	
6 or more	365/638 (57.2)
Less than 6	273/638 (42.8)
Risk using Ing risk score¹⁶ n. pts (valid %) n=503	
Very low <2.7%	37/503 (7.4)
No. with GCA (% of risk group)	2 (5.4)
Low <7, 2.7%	152/503 (30.2)
No. with GCA (% of risk group)	10 (6.6)
Moderate <23, 7.0%	171/503 (34.0)
No. with GCA (% of risk group)	34 (19.8)
High <43, 23.0%	69/503 (13.7)
No. with GCA (% of risk group)	30 (43.5)
Very high ≥43%	74/503 (14.7)
No. with GCA (% of risk group)	53 (71.6)

FTP = fast-track pathway; MELAA = Middle Eastern, Latin America, African; IQR = interquartile range; AION = anterior ischaemic optic neuropathy; PION = posterior ischaemic optic neuropathy; CRAO = central retinal artery occlusion; PMR = polymyalgia rheumatica; ESR = erythrocyte sedimentation rate; CRP = C-reactive protein; ACR = American College of Rheumatology; GCA = giant cell arteritis.

†Temporal artery abnormality—either decreased pulse or tenderness.

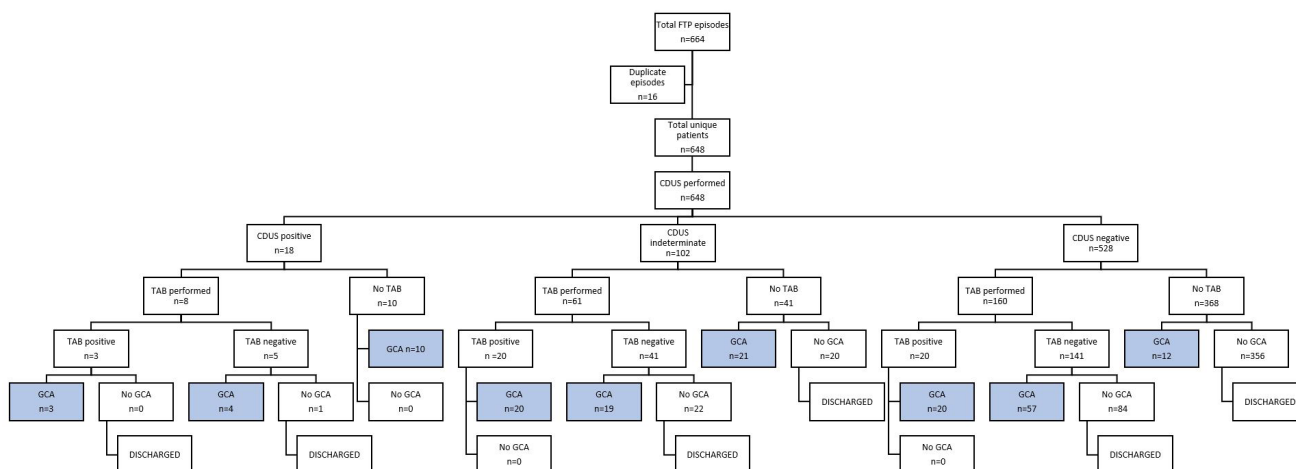
‡% calculated as number of typical symptoms out of the total number of patients in this pathway, rather than the number of variables collected.

and specificity was 91.1% (95% CI 88.3–93.4%). The positive predictive value was 64.2% (95% CI 55.4–72.4%) and negative predictive value was 83.3% (95% CI 80.0–86.3%).

Corticosteroids were started in 73.5% of patients. The mean (SD) was 13.8 (55.6) days of corticosteroids prior to CDUS and the median (IQR) was 1 (1–4) day. For patients with a final diagnosis of GCA, those with a positive CDUS had a mean (SD) duration pre-ultrasound of 0.7 (SD 1.1) days and a median (IQR) of 0 (0–1.3) days.

This compared to a mean (SD) of 14.2 (56.2) days and median (IQR) of 1 (0–4) days in patients with a negative CDUS ($p=0.007$). When patients who were already on corticosteroids for polymyalgia rheumatica were excluded from analysis, the mean and median did not change for the positive CDUS group but was reduced to a mean (SD) 3.1 (13.1) and median (IQR) 1 (0–3) days for the negative CDUS group, which remained statistically different between the two groups ($p=0.022$).

Figure 2: Flowchart of patients through the Waikato Giant Cell Arteritis fast-track pathway.



NB: FTP = fast-track pathway; CDUS = colour Doppler ultrasound; TAB = temporal artery biopsy; GCA = giant cell arteritis.

Table 2: Sensitivity and specificity of colour Doppler ultrasound compared to different reference standards.

Reference	Sensitivity	Specificity	Positive predictive value	Negative predictive value
% (95% confidence interval)				
Clinical diagnosis	10.3 (6.3–15.5)	99.8 (99.1–100)	94.4 (77.7–99.7)	76.5 (73.1–79.7)
Temporal artery biopsy	7.1 (1.8–17.5)	97.3 (94.3–99.0)	37.5 (11.0–71.0)	82.4 (77.0–87.0)
ACR 2022 criteria ≥6	4.7 (2.8–7.1)	99.6 (98.4–100.0)	94.4 (77.7–99.7)	43.9 (40.0–47.8)

ACR = American College of Rheumatology.

TAB

TAB was performed in 229/648 patients and was positive in 42/229 (18.3%) patients. The mean (SD) size of biopsy was 16.0 (9.8) mm. The British Society of Rheumatology guidelines recommend a biopsy length of at least 10mm.¹⁸ In this cohort, 48/229 patients (21.1%) had a TAB length of less than 10mm, with 5/48 (10.4%) of these biopsies being positive.

Time to TAB was mean (SD) 14.5 (20.6) days with a median (IQR) of 10 (5–17) days. Duration

of corticosteroids prior to TAB was mean (SD) 25.1 (46.1) days with a median (IQR) of 12 (4–25.5) days. The sensitivity and specificity of TAB with clinical diagnosis as a reference standard were 34.4% and 100% respectively.

TAB was avoided in 43/648 (6.6%) of patients with GCA after having a CDUS performed.

Prior to the pathway being established (i.e., 2011 to 2013), the mean annual incidence of all TAB requests was 28.1 (95% CI 23.0–33.3) per 100,000 people over 50 years. This reduced to

21.5 (95% CI 19.1–23.8) per 100,000 people over 50 years. Given the slight overlap of CIs, this was not statistically significant but was clearly trending downwards in conjunction with the introduction of the fast-track pathway.

Patients discharged from the pathway

Focussing on patients exiting the pathway, there were 376/648 patients (58.0%) who were discharged after a CDUS who did not have a final diagnosis of GCA. These patients had a mean (SD) of 15.6 (66.9) days and a median (IQR) of 1 (0–4) days of corticosteroids. Patients without GCA but who had a TAB and a CDUS performed had a mean (SD) duration of corticosteroids of 23.7 (SD 36.6) and a median of 12 (3–27) days. This is significantly longer than those patients who were discharged after only a CDUS ($p < 0.001$). When patients who were previously on corticosteroids for polymyalgia rheumatica were excluded, the mean (SD) and median (IQR) for the CDUS only group was 3.0 (16.0) days and 0 (0–2) days respectively. In the CDUS and TAB group, this was a mean (SD) of 12.4 (12) and median 9 (2–19) days, remaining a statistically significant difference ($p < 0.001$).

COVID-19 pandemic

Aotearoa New Zealand had an initial lockdown period due to the COVID-19 pandemic in March–May 2020, and a subsequent lockdown in August–September 2021 when there was community transmission. During these periods, the service remained in place where patients and physicians had access to colour Doppler ultrasound and TAB. Reviews occurred via telephone consultation unless the patient was unwell, in which case a face-to-face review was organised.

Discussion

This real-world study of the Waikato GCA fast-track pathway is the largest cohort published to date, alongside the study by Pinnell et al.¹⁹ who had 620 patients. The benefit of a fast-track pathway for GCA is clear with significant numbers of patients avoiding TAB, an invasive and costly investigation for both patients and healthcare systems.¹ This was evident for low-risk patients without GCA who had a non-positive CDUS result. This could also be appreciated by the down-trending rate of TAB requests with implementation of the pathway. The reduction in exposure to corticosteroids by only having CDUS to investigate GCA rather than needing a TAB was significant. This

would likely translate to reduced corticosteroid toxicity for patients.

We note that our data is reflective of TAB access in Aotearoa New Zealand but may not be as significant a finding in other centres with rapid access to TAB. Rheumatology patients with suspected GCA are referred to vascular surgery, an under-resourced service where waiting times to TAB are often outside of the optimal window. For a portion of patients with a higher probability of GCA, the positive or indeterminate CDUS result was supportive enough to commit to the diagnosis and avoid the need for biopsy.

This study helps assess the performance of colour Doppler ultrasound in a real-world setting where, due to practical and safety reasons, corticosteroids are commenced at the time of referral. The sensitivity in our study is significantly lower than that reported in numerous meta-analyses. Table 3 provides a comparison of our data to other meta-analyses. Corticosteroid use appears to significantly decrease the chance of a positive colour Doppler ultrasound and may be part of the reason for our lower sensitivity. Pinnell et al. also performed a real-world study that had a lower sensitivity for colour Doppler ultrasound. They demonstrated the impact that corticosteroids had on detecting a positive CDUS and an increase in sensitivity when ultrasound was performed without corticosteroids.¹⁹

Corticosteroids appear to contribute to the disappearance of the halo sign.^{1,20–22} Hauenstein et al.²⁰ noted that if colour Doppler ultrasound was performed on the first day of corticosteroid treatment, the sensitivity of the ultrasound was 88%. It dropped to 50% after 2–4 days of corticosteroids and 50% if patients had more than 4 days of corticosteroids.

While the number of positive colour Doppler ultrasounds is small, there is a larger number with increased thickening of the blood vessel wall. It remains unknown if any of these would have manifested a halo sign if corticosteroids had been withheld until after the ultrasound was performed. In the development of our fast-track pathway in Waikato, urgent corticosteroid treatment is mandatory to avoid consequences. Our protocol design and the restraints on our healthcare system cannot always guarantee a same-day CDUS.

Despite this emerging association, corticosteroid exposure may not entirely explain the discrepancy in the number of positive colour Doppler ultrasounds in our study compared

Table 3: Meta-analyses on the performance of colour Doppler ultrasound in GCA.

Study		Sensitivity (%)	Specificity (%)
Clinical diagnosis as reference standard			
Duftner 2018 ³		77	96
Sebastian 2021 ⁴		67	95
Moreel 2023 ⁵		80	95
	(including large vessels)	95	96
Nakajima 2023 ⁶		76	93
	(including axillary arteries)	86	95
Temporal artery biopsy as reference standard			
Karassa 2005 ⁷		69	82
Duftner 2018 ³		70	84
Rinagel 2019 ⁸		68	81
Sebastian 2021 ⁴		63	90
ACR criteria 1990 as reference standard			
Karassa 2005 ⁷		55	94
Arida 2010 ⁹		68	91
Current study			
	Clinical diagnosis	10.3	99.8
	Temporal artery biopsy	7.1	97.3
	ACR 2022 criteria	1.3	90.0

GCA = giant cell arteritis; ACR = American College of Rheumatology.

to others, and the reasons are probably multifactorial. There may be a larger number of low-risk patients entering the pathway, which reduces the number of true GCA cases and is reflected by 37.6% of patients being categorised as very low risk or low risk through the prediction score. Of note, Sebastian et al.⁴ and Melville et al.² had similar risk profiles in their study and yet had 37.6% and 30.2% positive scans respectively. The total number of cases of clinically diagnosed GCA

in our study was 19.7%, which is smaller than to Sebastian et al.'s and Melville et al.'s studies of 25% and 34.1% respectively.^{2,4}

Technical factors including ultrasound machines and probes may play a role given that Aotearoa New Zealand has a resource-limited healthcare system with ultrasonographers using older, less advanced equipment at the start of the study period. Our ultrasonographers are experienced in vascular ultrasound; however, it remains unclear

as to how this compares to experts internationally, specifically trained in the features of GCA on ultrasound. We are currently undertaking a retrospective audit on the ultrasounds to look for any features of GCA that had not been reported in the final report and will use this to further improve the fast-track pathway.

The majority of patients in this cohort are referred to Rheumatology with smaller proportions of referrals to Ophthalmology. Other studies have not noted this discrepancy between specialties.¹⁹ Our fast-track pathway protocol recommends that patients with any vision symptoms are referred to Ophthalmology. Rheumatology had 25% of their patients reporting any vision symptoms, suggesting some of their patients should be seen by Ophthalmology instead.

As we reflect on the implementation of this fast-track pathway in Waikato, we can visualise potential improvements. The fact that 3.8% of patients were under 50 years raises the question that many low-risk patients were entering the pathway, perhaps inappropriately. There is a significant proportion (189/648 [37.6%]) of patients who are low or very low risk entering the pathway, though 12/189 (6.3%) of these had a final diagnosis of GCA. It is difficult to know if this reflects the weaknesses of prediction scores for GCA or the entry of too many low-risk patients to the pathway. As a real-world study, physicians have varying levels of confidence in excluding GCA in low-risk patients and this is reflected in our data. We must note that when the pathway was developed in 2013, in order to validate the safety, efficacy and accuracy of the pathway for the investigation of GCA, all patients regardless of risk needed to go through the path-

way. The CDUS was a new test to the department and caution was exercised. Given the pathway is now well established, review of entry criteria and exploring other prediction tools would be appropriate to reduce unnecessary patients going through. Clearly, ultrasound access has improved but access to TAB is delayed and more focus could be on improving this aspect of the pathway.

We acknowledge other limitations to this study. It is a retrospective study and there was missing data due to inadequate documentation. We have not included patients from the private health community in Aotearoa New Zealand. However, the private sector does not have the same rapid access to colour Doppler ultrasound as this pathway does; thus, most patients would have entered the public health system to access the pathway. Lastly, we acknowledge that there are no conventional pathway data to provide a true reflection of the benefit that this pathway has had on the Waikato community.

Conclusion

Fast-track pathways using temporal artery colour Doppler ultrasound in the investigation of GCA are beneficial to patients and our healthcare systems. There is a reduction in the number of temporal artery biopsies required and subsequent reduction in exposure to corticosteroids in patients without GCA. Corticosteroid exposure, while often mandatory in preventing serious complications, appears to reduce the sensitivity of colour Doppler ultrasound and remains an issue to consider when designing a fast-track pathway. Reflection around entry criteria to such pathway is also crucial.

COMPETING INTERESTS

Nil.

Philippa van Dantzig has been employed part-time by the Waikato Hospital (Te Whatu Ora) for 12 months in a research position to carry out this research project among others, as well as perform a clinical role. There is no other specific funding towards the project.

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Appendix

Table 4: Duplicate episodes in the fast-track pathway with reasons for subsequent episode.

Number of patients (n=16)	Reason for duplicate episode		
Patients n=3	Repeat GCA-like symptoms with negative tests and no clinical diagnosis of GCA.		
Patients n=3	Repeat investigation to look for objective evidence in patients with a diagnosis of GCA. One of these had a subsequent positive CDUS after previous negative CDUS (difference between scans was 918 days).		
Patients n=7	Repeat testing to look for recurrence of GCA in patients who already had a diagnosis of GCA.		
Possible missed diagnosis n=3	See descriptions below.		
	1st episode	2nd episode	Final outcome
Patient 1	Negative CDUS. No GCA.	380 days later. Negative CDUS + negative TAB.	GCA after 2nd episode.
Patient 2	Headache, CDUS indeterminate. TAB negative. No GCA.	572 days later. Positive CDUS. No TAB done.	GCA after 2nd episode.
Patient 3	Negative CDUS.	6 years later. Negative CDUS. Negative TAB.	GCA after 2nd episode.