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Personalising care: using infliximab drug trough and anti-drug antibody levels improves clinical treatment decisions and is a cost-effective strategy in spondyloarthritis

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Aims

Personalised medicine is treatment tailored to the individual's needs. This approach is being encouraged by NHS England to improve patient care. The advent of biosimilar drugs in rheumatology has led to therapy re-appraisals driven by the clinical commissioning group's demand for cost-effective interventions. Yet biologic drug dosing is standardised and little is known about the rationale and efficacy of dose adjustment. As part of a service evaluation exercise within the Leeds Spondyloarthritis (SpA) Service, we measured serum drug trough levels (DLs) and anti-drug antibodies (ADAbs) in our cohort of SpA patients receiving bio-originator infliximab (Remicade) with the aims of a) informing our decision-making before switching to a biosimilar drug and b) assessing the impact of this approach to our clinical practice.

Methods

Eligible patients were identified, counselled and consented by an experienced specialist nurse on measuring DLs and ADAbs including the possible associated outcomes such as a change in drug, dose, infusion interval, as well as switching from bio-originator infliximab to the biosimilar infliximab CT-P13 (Infectra). We developed a treatment algorithm to act as a guide for the treating physician and recorded clinical outcome data as per routine practice including DL and ADAb concentrations and associated clinical therapy outcomes following these measurements.

Results

We identified 53 subjects with characteristics outlined in Table 1. Based upon disease activity, DL and ADAb concentration, infliximab was discontinued in three (6%) subjects, the infusion interval was extended in eight (15%), shortened in three (6%), and the dose reduced in three (6%) subjects (Table 2). Four patients (8%) changed to an alternative biologic due to persistent high disease activity on infliximab. ADAbs were absent in 20/28 (71%) subjects on concomitant methotrexate (MTX). Very high titre ADAbs were identified in eight (15%) subjects with corresponding very low (n=2) or undetectable (n=6) DLs suggesting a likely drug-neutralising effect. The total estimated cost-savings from drug discontinuation and interval extension or dose reduction based on informed decisions by DL and ADAb were an added £28,689 per annum in addition to the biosimilar switch saving to CT-P13 of £41,184 per annum.

Table 1. Patient characteristics

Patient characteristics	Diagnosis	
	axSpA (n=32, 60%)	PsA (n=21, 40%)
Median age, years (interquartile range (IQR))	49 (41–58)	57 (50–63)
Male:female ratio	30:1	7:14
Infliximab duration (years)	11 (8–15)	9 (6–14)
Median weight, kg (IQR)	80.5 (72–93)	76 (64–97)
Concomitant csDMARD, n (%)	12 (36)	17 (81)
Methotrexate, n (%), dose	12 (100%), 15 mg/week	16 (94%), 10 mg/week
Hydroxychloroquine, n (%), dose	0 (0)	1 (6), 200 mg/day
Previous bDMARD, n (%)	5 (16)	5 (24)

axSpA = Axial spondyloarthritis; bDMARD = biological disease-modifying antirheumatic drug; csDMARD = conventional synthetic disease-modifying antirheumatic drug; PsA = psoriatic arthritis.

Conclusion

These data from this cohort suggest that measuring ADAbs and DLs to characterise treatment response, tailor the treatment regimen and inform biosimilar switching, is a clinically efficacious and cost-effective strategy in infliximab-treated SpA patients. We anticipate further significant savings with our cohort receiving subcutaneous therapies. This approach unlocks the potential to provide 'personalised medicine' which supports individualised treatment and brings significant savings to the NHS. ■

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Table 2. Results

Results, n (%)	axSpA (n=32, 60%)	PsA (n=21, 40%)
Positive ADAbs, n (%), median (IQR) AU/mL	12 (37), 46.5 (18–74)	8 (38), 86.5 (29–212)
Therapeutic drug levels, n (%)	14 (44)	10 (48)
High ADAbs and very low or undetectable drug (likely drug-neutralising), n (%)	4 (13)	4 (27)
Drug discontinuation (no alternative biologic required), n (%)	1 (3)	2 (10)
Dose reduced or interval extended, n (%)	8 (25)	3 (14)
Change to alternative biologic (either within the same class or to a different mode of action biologic), n (%)	1 (3)	3 (14)
Switched to biosimilar, n (%)	14 (44)	10 (48)

ADAbs = anti-drug antibodies; axSpA = Axial spondyloarthritis; PsA = psoriatic arthritis.