

# Audits of the prevention and treatment of corticosteroid-induced osteoporosis in outpatients with rheumatic diseases in the West Midlands

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on behalf of the West Midlands Rheumatology Services and Training Committee

**ABSTRACT** – The management of corticosteroid-induced osteoporosis in rheumatology outpatients in the West Midlands was audited in relation to the 2002 Royal College of Physicians (RCP) Guidelines and re-audited in relation to the 1998 National Osteoporosis Society (NOS) Guidance. Practice was assessed from prospective data on all follow-up patients over a 2-week period in 13 rheumatology units. Data were analysed on 2,609 patients. Of the 626 patients fulfilling criteria for assessment against the RCP Guidelines, 351 (56.1%) were treated appropriately. The results do not allow for availability of, or wait for, DEXA scanning. Of 197 patients fulfilling the criteria for assessment against the NOS Guidance, 137 (69.5%) were treated appropriately, compared to 63% in a similar audit undertaken in 2000. Regional audit may facilitate clinical governance. These audits will inform discussion on both improving local practice and strengthening cases for improved osteoporosis services.

**KEY WORDS:** corticosteroid-induced osteoporosis, guidelines, regional audit

Osteoporotic fracture as a complication of corticosteroid therapy remains a major clinical problem,<sup>1,2</sup> despite advances in therapy for osteoporosis and the availability of bone density measurement and management guidelines. Previous studies indicate that significant numbers of at-risk patients are not receiving therapy to prevent bone loss.<sup>3–6</sup> Ongoing evaluation of the implementation of management strategies for the prevention of fracture for patients on corticosteroids is therefore crucially important.

Clinical governance requires assessment of working practice to improve patient care. Audit is central to this process, but tends to be undertaken in individual units with the generation of small amounts of data. Regional or national audit may be a useful tool to improve the quality, impact and scope of local audit.<sup>7–10</sup>

A programme of annual regional rheumatology

audit has been established by the West Midlands Rheumatology Services and Training Committee (WMRSTC). A regional audit in 2000 assessed the prevention and treatment of corticosteroid-induced osteoporosis in patients with rheumatic diseases in relation to the 1998 National Osteoporosis Society (NOS) Guidance; this demonstrated that 63.0% of patients were treated appropriately.<sup>3,11</sup>

In 2002, evidence-based guidelines from the Royal College of Physicians (RCP) in conjunction with the Bone and Tooth Society and the NOS were published.<sup>12</sup> These reflect further understanding of corticosteroid-induced osteoporosis; bone mineral density (BMD) loss occurs in the first few months of starting treatment and can occur with lower doses of glucocorticoids than previously thought. The Guidelines also place greater emphasis on BMD measurement.

In 2003, a regional audit was undertaken to assess practice in relation to the 2002 RCP Guidelines. In addition, to assess the effectiveness of planned audit-led change, we re-audited practice against the 1998 NOS Guidance.

## Methods

All rheumatology units within the region were invited to participate in the audit, which was coordinated by specialist registrars (SpRs). Data were collected anonymously using proformas attached to all follow-up patients' case notes over a 2-week period in November 2003. Information included patient demographics, duration and dose of steroid treatment, osteoporosis risk factors, BMD results and medication prescribed for osteoporosis prophylaxis/treatment.

## Audit standard

Practice was assessed against both the 1998 Guidance and the 2002 Guidelines.<sup>11,12</sup> Briefly, the 2002 Guidelines apply to all patients exposed to any dose of oral corticosteroid for  $\geq 3$  months. Treatment is indicated if the patient is aged 65 or older or has a history of fragility fracture. All patients younger than 65 should have their BMD measured and treatment

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**Table 1. Number of patients taking steroids and number of steroid users who had their bone mineral density (BMD) measured: combined results and individual unit breakdown.**

		Total group	Unit number												
			1*	2	4	5	6*	7	9	10	11	12*	13*	14*	15*
Percentage of patients (n)	Total	100 (2609)	6.0 (156)	2.9 (76)	6.0 (157)	8.8 (230)	11.7 (304)	12.7 (331)	15.6 (408)	11.4 (298)	6.5 (169)	3.6 (94)	5.3 (137)	5.4 (142)	4.1 (107)
	Taking any dose steroids for ≥3 months	24.0 (626)	29.5 (46)	30.3 (23)	12.7 (20)	18.7 (43)	23.7 (72)	31.1 (103)	22.1 (90)	25.2 (75)	13.0 (22)	29.7 (28)	31.4 (43)	27.5 (39)	20.1 (22)
	Taking ≥7.5 mg prednisolone for ≥6 months	7.6 (197)	6.4 (10)	10.5 (8)	3.2 (5)	4.3 (10)	12.2 (37)	5.7 (19)	5.6 (23)	13.4 (40)	3.0 (5)	10.6 (10)	12.4 (17)	4.9 (7)	5.6 (6)
	Taking steroids and had BMD measured	46.6 (309)	10.9 (5)	56.6 (13)	81.0 (17)	63.7 (28)	44.2 (34)	73.1 (79)	62.0 (62)	17.7 (14)	58.3 (14)	25.0 (7)	26.7 (12)	34.9 (15)	36.0 (9)

\*Units without a DEXA scanner within the NHS Trust.

commenced if the T score is ≤-1.5. The 1998 Guidance applies to patients taking ≥7.5 mg prednisolone for ≥6 months. Treatment criteria include: age 65 or older, taking ≥15 mg prednisolone daily, one or more strong risk factor, a T score of ≤-1.5 or a previous low trauma fracture. The audit standard adopted was the appropriate treatment of 80% of patients.

**Analysis**

The proformas were scanned using Formic-scanning software. Chi-squared testing was used for statistical analysis.

Results for each patient were assessed by one of the authors (ZP) to determine whether treatment was appropriate or not, for both sets of guidelines. If treatment was inappropriate, patients were further subdivided into over- or under-treatment. In assessing patients against the 2002 Guidelines, the under-treated group was further divided into patients who had not had their BMD measured when indicated, and patients who were not treated when indicated. Patients younger than 65 years taking treatment without a BMD measurement were included as treated appropriately; this was with the exception of bisphosphonate use in pre-menopausal women who were regarded as over-treated in view of the need for caution with bisphosphonate use in women of reproductive years.<sup>13</sup>

**Results**

Thirteen of the 15 rheumatology units in the region participated, including five units not involved in the original audit. Two units involved in the original audit did not participate.

Data were analysed for 2,609 patients (Table 1) – female:male ratio, 3:1 and mean age 59.9 years (males), 61.2 years (females) (range 16–91 years). There were no significant differences in the

population characteristics in these patients compared with the previous audit. Six hundred and sixty-three (25.4%) patients were taking prednisolone (any duration). The dosages are detailed in Table 2 and diagnoses in Table 3. Of the total number of female patients (497), 361 (72.6%) were postmenopausal, and of these, 68 (13.7%) prematurely (under the age of 45). Fifty-nine (8.9%) of the steroid-treated patients had a personal history, and 27 (4.1%) a family history, of low trauma fracture.

**Table 2. Dosage of steroids taken.**

Dosage of prednisolone (or equivalent) (mg)	Percentage of patients (n)
<7.5	62.6 (415)
≥7.5 and <15	30.2 (200)
≥15	7.2 (48)
Total	100 (663)

**Table 3. Diagnoses of steroid-treated patients.**

Diagnosis	Percentage of patients (n)
Rheumatoid arthritis (RA)	53.5 (355)
Polymyalgia rheumatica	12.8 (85)
Connective tissue disease	11.9 (79)
Vasculitis	5.7 (38)
Other inflammatory arthritis	5.6 (37)
RA/overlap syndrome	1.7 (11)
Other/not recorded	8.7 (58)

### Results in relation to the 2002 Guidelines

Six hundred and twenty-six (24.0%) patients had been taking prednisolone for  $\geq 3$  months and were assessed against the 2002 Guidelines. Of these patients, 351 (56.1%) were treated appropriately and 275 (43.9%) inappropriately. Of the 'inappropriate' group, 108 (39.3%) had not had their BMD measured when indicated, 131 (47.6%) were not treated when indicated, and 36 (13.1%) were over-treated. Furthermore, 60 (17.1%) of the 'appropriate' group were treated without BMD measurement when indicated. Of the total group, 172 (27.5%) had not had their BMD measured when indicated. Figure 1 depicts individual unit performance, and Figure 2, classification of the inappropriately treated group.

Of patients aged 65 or older, 195 (61.9%) were appropriately treated with osteoporosis prophylaxis. Twenty-four (7.7%) patients aged younger than 65 had experienced a previous low trauma fracture and 12 (50%) of these were appropriately treated.

### Results in relation to the 1998 Guidance

A total of 197 patients (7.6%) were taking  $\geq 7.5$  mg prednisolone daily for  $\geq 6$  months; 137 (69.5%) were treated appropriately. Of those inappropriately treated, 51 (85.0%) were under-treated and nine (15.0%) over-treated. As previously, the percentage of patients taking steroids varied considerably between units. A subanalysis was performed on the eight units that participated in both audits; 67.8% of patients were treated appropriately compared with 63.0% in the previous audit, which was not statistically significant. The performance of each unit compared with the 2000 audit is shown in Figure 3.

### Discussion

When assessing the re-audit results against the 1998 NOS Guidance, the percentage of patients treated appropriately improved, although this was not statistically significant and did not achieve our self-imposed audit target (80%). The results, however, compare favourably with an audit of 1,290 patients in the south of England in which 61% of patients were treated appropriately. In this study, flow charts summarising the guidelines were posted in every clinic room.<sup>4</sup> A similar audit in a group of

general medical inpatients found that only 35.3% were treated appropriately.<sup>5</sup>

The results relating to the 2002 Guidelines suggest poorer performance. The authors are unaware of any other published reports of audit of these Guidelines in any speciality. A key difference between the 1998 Guidance and 2002 Guidelines is

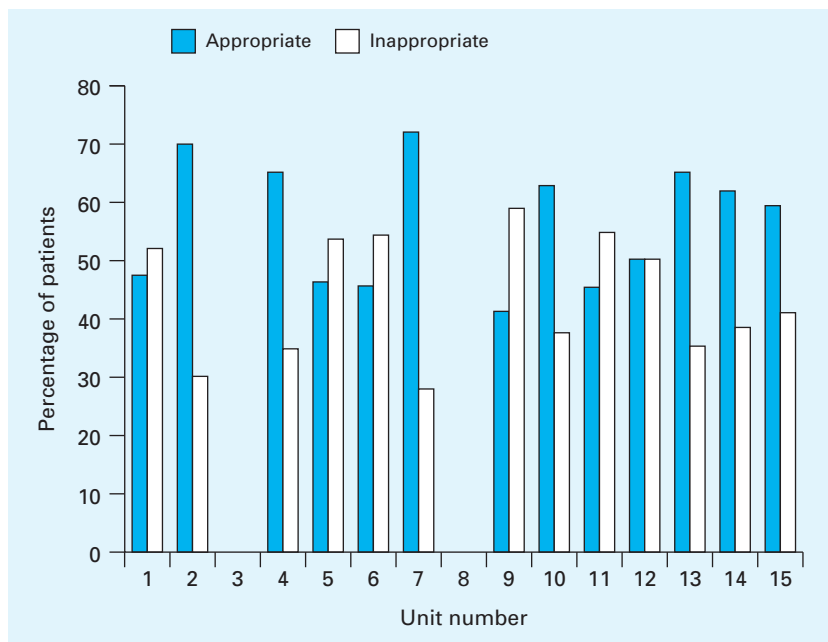


Fig 1. Appropriateness of treatment as assessed against 2002 Royal College of Physicians guidelines.

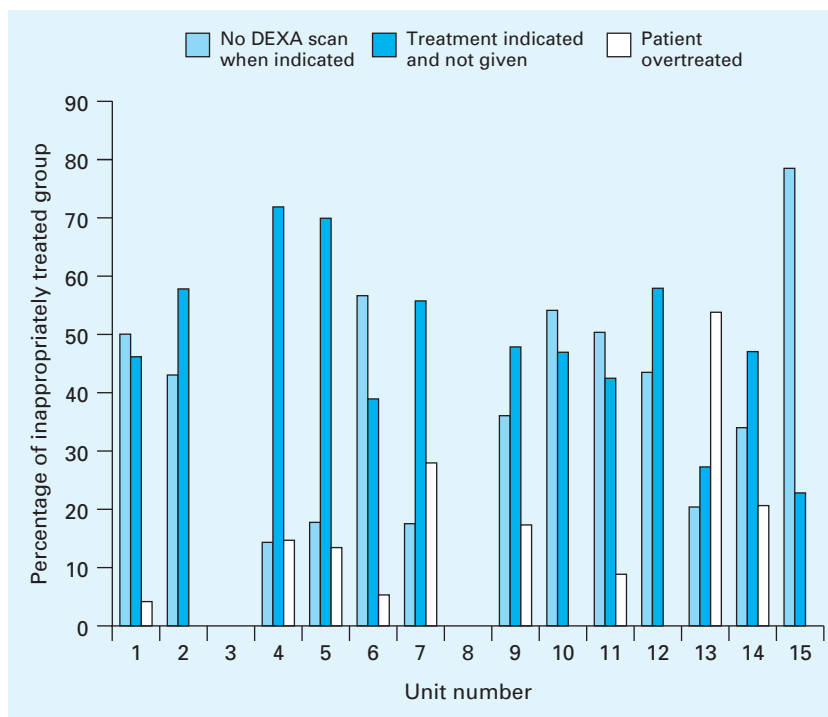
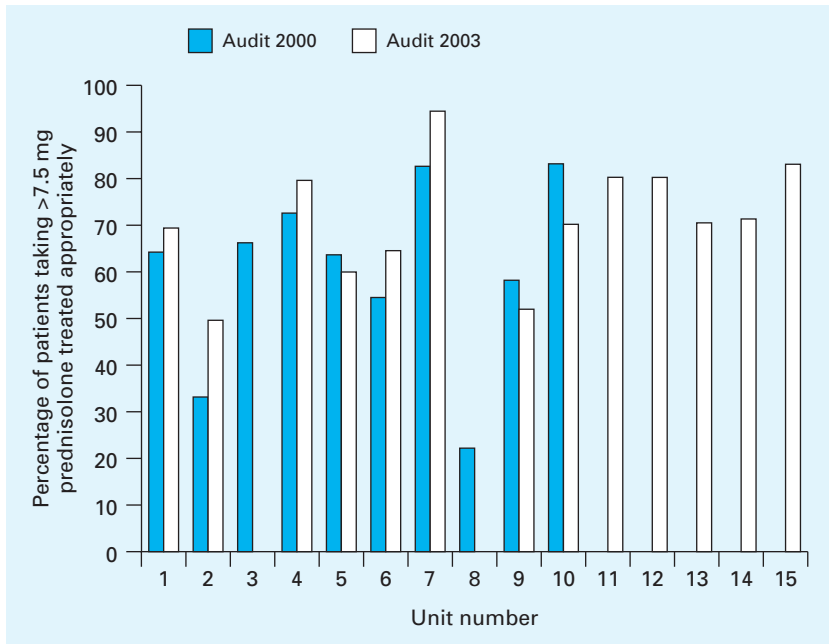


Fig 2. Breakdown of inappropriately treated group as assessed against 2002 Royal College of Physicians guidelines.



**Fig 3. Percentage of patients treated appropriately according to 1998 National Osteoporosis Society guidelines: a comparison with previous audit.**

the requirement in the latter that patients younger than 65 have their BMD measured. This may be a significant factor influencing the observed difference in audit performances. If patients younger than 65 who had not had their BMD measured had been classified as appropriately treated, the overall percentage of patients appropriately treated would be considerably greater (73.3%).

The results do not take into account local availability of dual energy X-ray absorptiometry (DEXA) scanners. Six units did not have a DEXA scanner within their trust. The number of patients classed as inappropriately treated because they had not had their BMD measured varied significantly between the units with and without scanners (38.7% and 53.9%, respectively;  $p < 0.02$ ), although it should be noted that centre variation in DEXA use did not always mirror availability. Increased access to

### Key Points

**A regional rheumatology audit of the prevention and management of corticosteroid-induced osteoporosis in relation to Royal College of Physicians (RCP) guidelines demonstrated that only 56.1% of patients were appropriately treated**

**Re-audit in relation to National Osteoporosis Society (NOS) Guidelines demonstrated that 69.5% of patients were appropriately treated compared to 63.0% in an audit in 2000**

**Regional audit may be a valuable component of clinical governance and may facilitate improvement in local practice**

bone densitometry has been shown to increase general practitioner prescribing for osteoporosis in steroid-treated patients,<sup>14</sup> and this may also influence prescribing in secondary care. Two units without scanners at the time of audit have since introduced DEXA scanners, the business case for obtaining more scanners having been strengthened by the results of this and the previous audit.<sup>3</sup>

The Guidelines indicate rescanning at 1–3 years, but this audit did not assess frequency of scanning. In addition, in the interests of simplicity, we did not audit the investigations suggested in cases of previous fragility fracture, or the use of adjuncts to treatment. However, our data show that 258 (38.9%) of the total number of patients prescribed steroids were prescribed calcium and vitamin D, and a further 88 (13.3%) were on calcium supplementation alone.

Several other studies have demonstrated a significant discrepancy between guidance and prescribing patterns for both corticosteroid-induced<sup>3–6</sup> and postmenopausal osteoporosis.<sup>15,16</sup> Poor adherence to the guidelines

may be a result of a number of factors, including the perceived strength of the evidence base supporting the guidance, support from relevant professional bodies and availability of resources and funding.<sup>17–19</sup> When more than one set of guidelines exist, confusion may also compound poor compliance and may have contributed to our results; furthermore, this audit was performed within 12 months of the publication of the 2002 RCP Guidelines and there may not have been full awareness of these Guidelines. A recent paper on compliance with hypertension guidelines concluded that clinicians tend to overestimate their own adherence and this may act as a barrier to successful guidance implementation.<sup>20</sup> In addition, a further recent randomised controlled trial showed no improvement in the assessment and treatment of corticosteroid-induced osteoporosis following a targeted doctor education intervention designed to tackle some of these issues.<sup>21</sup> It is important to appreciate the nature of these barriers so that future practice can be improved; guidance, however, is not a diktat and there will always be individual cases where clinical judgement will take precedence.

Regional audit may be a useful component of clinical governance by highlighting areas of poor performance and informing resource planning. In addition, in our region, audits have become a key part of SpR training and have facilitated team working across units. Publication of regional audit locally, regionally and nationally may improve clinical performance and provide feedback to the RCP, NOS and Bone and Tooth Society to inform evolution of future guidance. National audits are already well established in other specialties, eg stroke medicine,<sup>22</sup> and could represent a valuable development in the future of clinical governance in rheumatology.

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## References

- Vestergaard P, Olsen ML, Paaske-Johnsen S, Rejnmark L *et al*. Corticosteroid use and risk of hip fracture: a population-based case-control study in Denmark. *J Intern Med* 2003;254:486–93.
- Van-Everdingen AA, Jacobs JWG, Siewertsz-Van-Reesema DR, Bijlsma JWJ. Low-dose prednisone therapy for patients with early active rheumatoid arthritis: clinical efficacy, disease-modifying properties, and side effects: a randomized, double-blind, placebo-controlled clinical trial. *Ann Intern Med* 2002;136:1–12.
- Erb N, Duncan RC, Raza K, Rowe IF *et al*. A regional audit of the prevention and treatment of corticosteroid-induced osteoporosis in patients with rheumatic diseases in the West Midlands. *Rheumatology* 2002;41:1021–4.
- Walker-Bone K, Wood A, Hull RG, Ledingham JM *et al*. The prevention and treatment of glucocorticoid-induced osteoporosis in clinical practice. *Clin Med* 2004;4:431–6.
- Hart SR, Green B. Osteoporosis prophylaxis during corticosteroid treatment: failure to prescribe. *Postgrad Med J* 2002;78:242–3.
- Kirchgatterer A, Wenzl HH, Aschl G, Hinterreiter M *et al*. Examination, prevention and treatment of osteoporosis in patients with inflammatory bowel disease: recommendations and reality. *Acta Med Austriaca* 2002;29:120–3.
- McClellan H, Haworth P, Clarke J. Yorkshire Multi-District Genitourinary Medicine Clinical Audit Group. Accelerating the audit cycle: data gathering, analysis and dissemination of results by electronic methods. The third Yorkshire audit of genital chlamydial management. *Int J STD AIDS* 2004;15:767–71.
- Aslam N, Mirza S, Lo S. Regional audit: perioperative management of MRSA orthopaedic patients in the Oxford region. *Int J Clin Pract* 2004;58:523–6.
- Malik MH, Gambhir AK, Bale L, Pradhan N, Porter ML. Primary total hip replacement: a comparison of a nationally agreed guide to best practice and current surgical technique as determined by the North West Regional Arthroplasty Register. *Ann R Coll Surg Engl* 2004;86:113–8.
- Lee R, Monteiro EF. Yorkshire Audit Group for HIV Related Diseases. Third regional audit of antiretroviral prescribing in HIV patients. *Int J STD AIDS* 2003;14:58–60.
- National Osteoporosis Society. *Guidance on the prevention and management of corticosteroid induced osteoporosis*. Camerton, Bath: National Osteoporosis Society, 1998.
- Royal College of Physicians. *Glucocorticoid-induced osteoporosis: A concise guide to prevention and treatment*. London: RCP, 2002.
- Franchimont N, Canalis E. Management of glucocorticoid induced osteoporosis in premenopausal women with autoimmune disease. *Autoimmun Rev* 2003;2:224–8.
- Dolan AL, Koshy E, Waker M, Goble CM. Access to bone densitometry increases general practitioners' prescribing for osteoporosis in steroid treated patients. *Ann Rheum Dis* 2004;63:183–6.
- Feldsteinn AC, Nichols GA, Elmer PJ, Smith DH *et al*. Older women with fractures: patients falling through the cracks of guideline-recommended osteoporosis screening and treatment. *J Bone Joint Surg Am* 2003;85-A:2294–302.
- Jaglal SB, McIsaac WJ, Hawker G, Carroll J *et al*. Information needs in the management of osteoporosis in family practice: an illustration of the failure of the current guideline implementation process. *Osteoporos Int* 2003;14:672–6.
- Naunton M, Peterson GM, Jones G, Griffin GM, Bleasel MD. Multifaceted educational program increases prescribing of preventive medication for corticosteroid induced osteoporosis. *J Rheumatol* 2004;31:550–6.
- Sheldon TA, Cullum N, Dawson D, Lankshear A *et al*. What's the evidence that NICE guidance has been implemented? Results from a national evaluation using time series analysis, audit of patients' notes, and interviews. *BMJ* 2004;329:999–1007.
- Samanta A, Goh L, Bawendi A. Are evidence-based guidelines being followed for the monitoring of ocular toxicity of hydroxychloroquine? A nationwide survey of practice amongst consultant rheumatologists and implications for clinical governance. *Rheumatology* 2004;43:346–8.
- Steinman MA, Fischer MA, Shlipak MG, Bosworth HB *et al*. Clinician awareness of adherence to hypertension guidelines. *Am J Med* 2004;117:747–54.
- Solomon DH, Katz JN, La Tourette AM, Coblyn JS. Multifaceted intervention to improve rheumatologists' management of glucocorticoid-induced osteoporosis: a randomized controlled trial. *Arthritis Rheum* 2004;51:383–7.
- Portelli R, Lowe D, Irwin P, Pearson M, Rudd AG. Intercollegiate Stroke Working Party. Institutionalization after stroke. *Clin Rehab* 2005;19:97–108.