

# Patient initiated outpatient follow up in rheumatoid arthritis: six year randomised controlled trial

Sarah Hewlett, John Kirwan, Jon Pollock, Kathryn Mitchell, Maggie Hehir, Peter S Blair, David Memel, Mark G Perry

## Abstract

**Objectives** To determine whether direct access to hospital review initiated by patients with rheumatoid arthritis would result in improved clinical and psychological outcome, reduced overall use of healthcare resources, and greater satisfaction with care than seen in patients receiving regular review initiated by a rheumatologist.

**Design** Two year randomised controlled trial extended to six years.

**Setting** Rheumatology outpatient department in teaching hospital.

**Participants** 209 consecutive patients with rheumatoid arthritis for over two years; 68 (65%) in the direct access group and 52 (50%) in the control group completed the study ( $P = 0.04$ ).

**Main outcome measures** Clinical outcome: pain, disease activity, early morning stiffness, inflammatory indices, disability, grip strength, range of movement in joints, and bone erosion. Psychological status: anxiety, depression, helplessness, self efficacy, satisfaction, and confidence in the system. Number of visits to hospital physician and general practitioner for arthritis.

**Results** Participants were well matched at baseline. After six years there was only one significant difference between the two groups for the 14 clinical outcomes measured (deterioration in range of movement in elbow was less in direct access patients). There were no significant differences between groups for median change in psychological status. Satisfaction and confidence in the system were significantly higher in the direct access group at two, four, and six years: confidence 9.8 *v* 8.4, 9.4 *v* 8, 8.7 *v* 6.9; satisfaction 9.3 *v* 8.3, 9.3 *v* 7.7, 8.9 *v* 7.1 (all  $P < 0.02$ ). Patients in the direct access group had 38% fewer hospital appointments (median 8 *v* 13,  $P < 0.0001$ ).

**Conclusions** Over six years, patients with rheumatoid arthritis who initiated their reviews through direct access were clinically and psychologically at least as well as patients having traditional reviews initiated by a physician. They requested fewer appointments, found direct access more acceptable, and had more than a third fewer medical appointments. This radical responsive management could be tested in other chronic diseases.

## Introduction

Patients with chronic inflammatory diseases such as asthma, inflammatory bowel disease, and rheumatoid arthritis are traditionally managed by regular hospital reviews initiated by a physician. Prebooked reviews may occur when the patient is well and little action is taken.<sup>1</sup> The volume of appointments leads to an

unwieldy system struggling to respond rapidly to requests for help in the face of fluctuating disease.

General practitioners believe that for such patients rapid specialist access in times of need is more important than routine hospital follow up,<sup>2,3</sup> but hospital specialists may be reluctant to relinquish routine reviews.<sup>4</sup> A study in asthma<sup>5</sup> and a randomised controlled trial in rheumatoid arthritis<sup>6</sup> suggested that reviews had simply been moved into primary care<sup>5</sup> but various other professionals could be effective.<sup>6</sup>

Patients with chronic disease manage their condition every day and initiate appointments with their general practitioners when they are unwell, therefore hospital reviews initiated by the patient could be considered. This might reduce unnecessary reviews, increase capacity for rapid response to disease flares, and empower patients.<sup>7</sup> Randomised controlled trials of such "open access" in inflammatory bowel disease found no clinical detriment but no saving in resources,<sup>8</sup> while patients with ulcerative colitis managed their condition more rapidly in a crisis and requested fewer reviews.<sup>9</sup>

Rheumatoid arthritis is a chronic disease with unpredictable periods of inflammatory activity, culminating in disability, bone erosion, reduced range of movement, and fluctuating pain and psychological distress.<sup>10</sup> Patients have lifelong hospital reviews, initiated by rheumatologists every three to six months, which form about three quarters of a rheumatologist's workload.<sup>11</sup> Rheumatoid arthritis is therefore an appropriate disease to test a new system of access to review in chronic illnesses that use considerable NHS resources.<sup>12,13</sup> A two year randomised controlled trial of the two types of review (initiated by patient or by rheumatologist) found that direct access was safe, cost effective, and appreciated,<sup>14</sup> and findings were maintained at four years.<sup>15</sup>

We extended the two year trial<sup>14</sup> to six years to see whether such patients show an improvement in clinical and psychological outcome, reduce their overall use of healthcare resources, and have greater satisfaction with care compared with patients receiving traditional review initiated by a rheumatologist.

## Methods

We originally invited consecutive patients who had had rheumatoid arthritis for more than two years and who were attending for routine outpatient reviews to participate in a two year randomised controlled trial, irrespective of clinical status. Patients who took part in

University of Bristol  
Academic  
Rheumatology Unit,  
Bristol Royal  
Infirmary, Bristol  
BS2 8HW

Sarah Hewlett  
senior lecturer

John Kirwan  
reader

Kathryn Mitchell  
research sister

Maggie Hehir  
research sister

Mark G Perry  
research fellow

Faculty of Health  
and Social Care,  
University of the  
West of England,  
Bristol BS16 1DD

Jon Pollock  
principal lecturer in  
epidemiology

University of Bristol  
Institute of Child  
Health, UBHT  
Education Centre,  
Bristol Royal  
Infirmary, Bristol

Peter S Blair  
medical statistician

Air Balloon  
Surgery, Bristol  
BS5 7PD

David Memel  
lead research general  
practitioner

Correspondence to:  
S Hewlett  
Sarah.Hewlett@  
bristol.ac.uk

BMJ 2005;330:171-5



This is the abridged version of an article that was posted on [bmj.com](http://bmj.com) on 16 November 2004: <http://bmj.com/cgi/doi/10.1136/bmj.38265.493773.8F>



Two tables of extra data can be found on [bmj.com](http://bmj.com)

**Table 1** Baseline characteristics (excluding deaths) of participants who completed the study. Figures are medians (interquartile range) unless stated otherwise

	Direct access group		Control group		P value*
	No of patients	Median (IQ range)	No of patients	Median (IQ range)	
Age (years)	68	58.0 (48.3 to 65.0)	52	57.0 (48.3 to 66.0)	0.91
Disease duration (years)	65	7.0 (4.0 to 13.0)	51	10.0 (5.0 to 14.0)	0.01
% female	68	66.2	52	71.1	0.58
<b>Outcome measure scale</b>					
Pain (0-10)†	68	3.00 (1.73 to 5.58)	52	3.10 (1.42 to 4.80)	0.87
Early morning stiffness (0-1440 min)†	68	30.0 (10.0 to 60.0)	52	30.0 (10.0 to 60.0)	0.49
CRP (<10-200 mg/l)†	60	11.5 (10.0 to 22.8)	46	10.0 (10.0 to 19.5)	0.08
PV (1.5-2.7 mPa)†	61	1.73 (1.67 to 1.76)	48	1.73 (1.63 to 1.79)	0.12
Haemoglobin (50-170 g/l)‡	61	125 (125 to 138)	48	125 (118 to 131)	0.28
Disability (HAQ) (0-3)†	68	1.25 (0.625 to 1.875)	52	1.375 (0.625 to 1.875)	0.19
Grip strength (0-72 kg)‡:					
Right hand	66	15.0§ (9.5 to 26.5)	51	10.0 (8.0 to 20.0)	0.04
Left hand	66	18.0§ (10.0 to 26.0)	51	10.0 (8.0 to 20.0)	0.0002
Range of movement (elbow 0-150°, knee 0-140°)‡:					
Right elbow	67	133 (120 to 140)	51	137 (120 to 143)	0.007
Left elbow	67	135 (125 to 142)	51	137 (125 to 148)	0.02
Right knee	66	115 (105 to 123.3)	51	117 (105 to 124)	0.02
Left knee	66	119 (105 to 125)	51	115 (103 to 126)	0.17
Larsen index, both hands (0-190)†	39	39 (21 to 68)	35	37 (5 to 55)	0.15
Anxiety (0-21)†	68	7.0 (4.0 to 10.0)	52	7.0 (5.0 to 9.0)	0.40
Depression (0-21)†	68	5.0 (2.0 to 7.0)	52	4.5 (2.0 to 7.8)	0.88
Helplessness (5-30)†	68	16.5 (14.0 to 19.3)	52	16.0 (12.0 to 19.0)	0.21
Self efficacy (10-100)‡:					
Pain	67	58.0 (46.0 to 70.0)	50	50.0 (34.0 to 66.2)	0.12
Function	66	67.3 (45.0 to 86.7)	50	62.2 (44.1 to 81.4)	0.45
Other	67	70.0 (53.3 to 80.0)	49	70.0 (50.9 to 80.0)	0.92
Satisfaction (0-10)‡	62	8.9 (7.3 to 9.7)	50	8.9 (7.6 to 9.6)	0.99
Confidence (0-10)‡	62	9.3 (8.0 to 9.6)	50	8.9 (6.7 to 9.5)	0.24

CRP=C reactive protein, PV=plasma viscosity, HAQ=health assessment questionnaire.

\*Kruskal-Wallis test except for sex, where  $\chi^2$  used with Yates's correction on 2 df.

†Lower scores indicate better health.

‡Higher scores indicate better health.

§Significant difference between the groups at 5% level.

the two year study were subsequently invited to remain in the study for a further four years.

### Access to care

Patients in the group in which review was initiated by the patient (direct access) were not offered routine hospital reviews, and their general practitioners were given a short leaflet to support day to day management of patients. Patients (or general practitioners) requested reviews with a rheumatologist, physiotherapist, or occupational therapist through a nurse led telephone helpline. Fortnightly direct access clinics gave a maximum delay of 10 working days before appointments, though patients could receive immediate advice from a nurse.

Patients in the control group continued with traditional hospital reviews ordered by the rheumatologist every three to six months according to normal practice, and, as usual, requests for urgent reviews were made by general practitioners through the secretary and accommodated as quickly as possible. At each appointment patients in both groups were managed according to clinical need.

### Outcome measures

**Clinical status**—Each year we assessed pain and the patients' opinion of disease activity (10 cm visual analogue scales), early morning stiffness, and disability (health assessment questionnaire)<sup>16</sup> by postal questionnaires. Clinical examination, x ray films, and blood tests

were performed every two years. At four, five, and six years we added a generic quality of life measure (SF-36).<sup>17</sup> Case notes were reviewed to assess complications of rheumatoid arthritis.

**Psychological status**—We also carried out annual postal assessments of anxiety and depression (hospital anxiety and depression scale),<sup>18</sup> helplessness (arthritis helplessness index subscale),<sup>19</sup> self efficacy (arthritis self efficacy scales),<sup>20</sup> and satisfaction with and confidence in the system (10 cm visual analogue scale).

**Appointment use**—We recorded all visits to hospital rheumatologists and visits to general practitioners for problems related to arthritis.

## Results

Of 302 patients invited to participate, 209 agreed. Patients who declined were significantly older than those who participated (median 69 years *v* 58 years,  $P < 0.05$ ) and more disabled (median score on health assessment questionnaire 2.2 *v* 1.5,  $P < 0.05$ ). At six years 120 patients remained for analysis (68 (65%) in direct access group and 52 (50%) in control group,  $P = 0.04$ ).

The 120 surviving patients (direct access 68, control 52) who complete the study formed the final dataset. They differed at baseline only for stronger grip strength in the direct access group (table 1).

**Table 2** Median changes in outcome from baseline to six years

Measurement*	Direct access group		Control group		P value†
	No of patients	Median change (IQ range)	No of patients	Median change (IQ range)	
<b>Clinical measures</b>					
Pain (0-10)	68	1.25 (−0.40 to 3.25)	52	1.1 (−1.00 to 3.60)	0.91
Disease activity (0-10)	68	0.25 (−1.35 to 2.80)	52	0.25 (−0.88 to 2.80)	0.49
Early morning stiffness (0-1440 min)	68	0 (−10.0 to 33.0)	52	5.0 (−15.0 to 20.0)	0.80
CRP (<10-200 mg/l)	58	−0.95 (−12.0 to 20.5)	39	−3.00 (−8.4 to 3.0)	0.62
PV (1.5-2.7 mPa)	58	0.07 (−0.01 to 0.14)	42	0.07 (−0.04 to 0.16)	0.78
Haemoglobin (50-170 g/l)	59	0 (−6 to 9)	44	2 (−5.5 to 7.8)	0.39
Disability (HAQ) (0-3)	68	0.19 (−0.125 to 0.75)	51	0.25 (0 to 0.75)	0.39
Grip strength (0-72 kg):					
Right hand	65	−4.0 (−10 to 0)	49	−2.0 (−5.5 to 2.0)	0.13
Left hand	65	−4.0 (−10 to 0)	49	−1.0 (−7.0 to 0)	0.07
Range of movement (elbow 0-150°, knee 0-140°):					
Right elbow	63	−17.0‡ (−35.0 to 0)	50	−25.5 (−40.5 to −14.5)	0.04
Left elbow	63	−15.0‡ (−25.0 to 0)	50	−24.5 (−40.3 to −4.0)	0.02
Right knee	62	−4.0 (−20.0 to 7.0)	47	−8.0 (−30.0 to 7.0)	0.60
Left knee	62	−5.0 (−20.0 to 5.0)	46	−8.5 (−26.3 to −8.5)	0.65
Larsen index, both hands (0-190)	39	14 (0 to 27)	35	9 (2 to 23)	0.69
<b>Psychological measures</b>					
Anxiety (0-21)	68	0 (−2.0 to 3.0)	52	0 (−2.0 to 3.0)	0.95
Depression (0-21)	68	0 (−1.0 to 3.0)	52	0 (−1.0 to 2.75)	0.80
Helplessness (5-30)	66	0.5 (−3.0 to 3.0)	52	1.0 (−1.75 to 4.0)	0.20
Self efficacy (10-100):					
Pain	67	2.0 (−12.0 to 16.0)	50	1.0 (−10.0 to 19.0)	0.49
Function	66	−2.75 (−15.9 to 5.0)	50	−6.6 (−20.6 to 2.40)	0.19
Other	67	−3.30 (−11.6 to 8.3)	49	−6.7 (−15.0 to 6.7)	0.25
Satisfaction (0-10)	62	0‡ (−0.7 to 0.9)	49	−1.1 (−2.70 to 0.25)	0.0004
Confidence (0-10)	62	−0.15‡ (−0.73 to 0.43)	49	−1.0 (−2.35 to 0.20)	0.0005

\*See table 1 for direction for better health status.

†Mann-Whitney U test.

‡Significant difference between two groups at 5% level.

*Clinical outcome at six years*—There were no significant differences between the groups in median change scores for clinical outcome (table 2), except for range of movement in the elbow, where the direct access group deteriorated less. Quality of life at four and six years was not significantly different between the groups, except for a greater deterioration in physical function in the direct access group (SF-36: direct access −5, control 0,  $P=0.04$ , see [bmj.com](http://bmj.com)), which was not shown in the disability measure specific for arthritis (health assessment questionnaire, table 2). Complications (respiratory or renal involvement, vasculitis, anaemia, drug reactions, gastrointestinal problems) and need for joint surgery were not significantly different between the groups (4 v 5 patients up to two years and 16 v 17 patients at four to six years,  $P=0.36$ ).

*Psychological status and satisfaction with the system*—There were no significant differences between the groups over the six years for median change in any of the psychological variables (table 2). There were no differences between the groups for satisfaction with and confidence in the traditional system of care at baseline (table 1), but both were significantly higher for the direct access system thereafter (fig 1), and at six years both had decreased by 10% in the control group (table 2). General practitioners' satisfaction and confidence in the system at six years was higher for direct access (satisfaction: 8.4 (7.5-9.6) v 7.5 (5.5-8.57),  $P=0.005$ ; confidence: 8.4 (7.25-9.45) v 8.0 (5.72-8.7),  $P=0.04$ ).

*Appointments with rheumatologist and general practitioners*—Direct access patients had 38% fewer hospital reviews over six years (median 8 (5-13) v 13 (11-17),  $P<0.0001$  with 34% of direct access patients

receiving more than 10 hospital reviews compared with 85% of control patients (fig 2).

## Discussion

Patients using direct access for hospital review of their rheumatoid arthritis fare as well clinically and psychologically over six years as patients receiving traditional review initiated by a rheumatologist, but use fewer appointments and are more satisfied with and confident in their system of care.

## Limitations

The 93 patients who declined to participate were older and had greater disability, possibly suggesting that such patients may be less amenable to change. After randomisation more control than direct access patients withdrew, and repeated questionnaires and research visits in the absence of perceived benefit may have been a disincentive to those in the control group. Patients who withdrew had had rheumatoid arthritis for longer and less range of movement at baseline, but outcome data available at two years showed no major differences compared with those who completed the study.

The power of the study inevitably declined over six years, but overall, out of 22 outcomes, 12 were more favourable for direct access patients (four significantly) compared with only six favouring control patients (none significantly). It is possible that with a larger population of patients completing to six years, some of these borderline differences might have reached significance, and those seen at two years (pain and self efficacy)<sup>14</sup> might have been maintained.

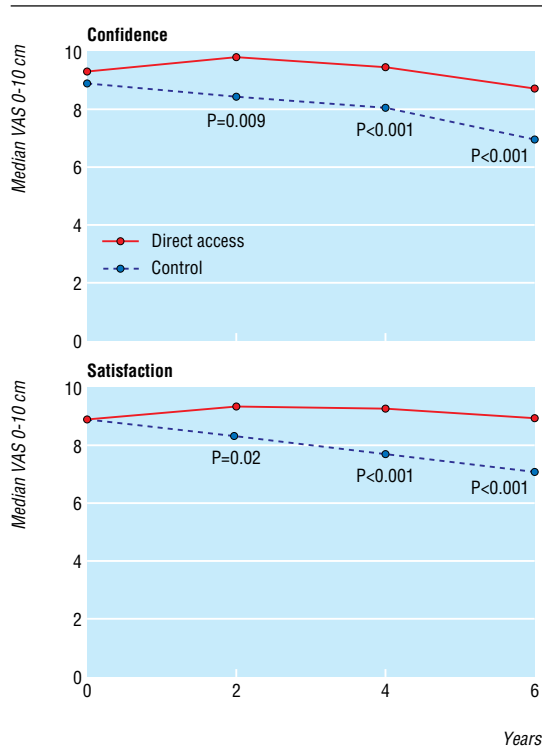


Fig 1 Patients' confidence and satisfaction with the system

Blinding of patients, the physician, and assessors to group allocation was not possible, giving the potential for bias. The study patients, however, formed a minority of the physician's caseload, and it is unlikely that a systematically different approach to these 120 patients was maintained for six years, while the use of a single physician minimised the confounding variable of differing clinical management.

**Difference to other studies**

This study differs importantly from others in that it uses direct access to replace rather than complement routine review and the key point of access is clinical, not administrative. It shows potential resource savings rather than transferring resources to primary care, and the results can be maintained without clinical detriment in the long term. Forthcoming analyses will address other important questions, including the timing and efficacy of appointments by using additional clinical data collected during years four to six, and assessing missed clinical need by analysing a combined review from the occupa-

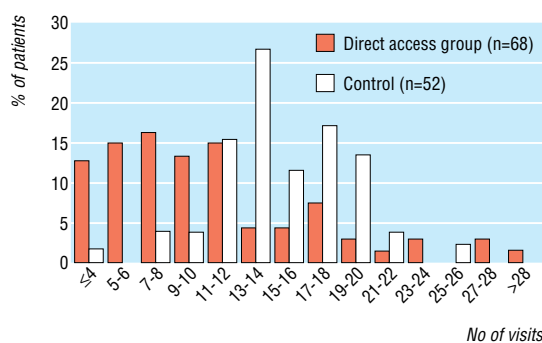


Fig 2 Hospital rheumatologist appointments over six years

**What is already known on this topic**

Follow up for patients with chronic disease is generally life long, hospital based, and medically driven

Often the patient is well at review but unable to access support rapidly when it is required

General practitioners view rapid specialist access as more important than regular specialist review

**What this study adds**

In rheumatoid arthritis, replacing traditional reviews with access initiated by the patient is not clinically detrimental and could be advantageous

Up to 38% fewer hospital medical appointments are used, and patients and general practitioners prefer the system

tional therapist and physiotherapist of a random sample of patients at six years.

**Conclusions**

The traditional system of routine hospital follow up in chronic disease is a drain on NHS resources and a burden for patients if they are well. Direct access initiated by patients challenges the traditional view that medically driven regular hospital review is required and reduces the volume of perhaps unnecessary reviews, while targeting them to support clinical need and reflect the NHS commitment to the "expert patient."<sup>27</sup> If this system was instigated on a large scale, the resources released could be used to improve care in other ways (for example, by reducing waiting times for new patients) or to increase the overall throughput of outpatients (by supporting up to a third more patients). Furthermore, this model could be tested in other chronic inflammatory illnesses that encompass a degree of self management, such as asthma, diabetes, and inflammatory bowel disease.

We thank Susan Tipler (nurse specialist managing the helpline), Julie Haynes (research sister, years one and two), Wendy Harrison (clinic coordinator), and Sarah Browning (project secretary). We are grateful to Gina Ludlum (occupational therapist), Petra Allerston (physiotherapist), Shelagh Snow, and Vanessa Lock (research sisters) for reviewing patients and case notes, and to Ben Bennett (trust manager) for administrative advice. In particular we thank the patients, without whom the study could not have taken place.

Contributors: See bmj.com

Funding: SH is funded by the Arthritis Research Campaign; JK and PSB are funded by the University of Bristol; JP is funded by the University of the West of England; KM and MH were funded by the NHS research and development programme; DM's research general practice is funded by the Department of Health research and development support for NHS providers and MGP was funded by the United Bristol Health Care Trust Special Trustees.

Competing interests: None declared.

Ethical approval: Local research ethics committee approval was given for the original two year trial and the subsequent four year extension.

- 1 Hehir M, Hewlett S, Mitchell K, Kirwan J, Memel D, Pollock J, et al. What happens in RA outpatient clinics? *Rheumatology* 2001;40:S146.
- 2 Dickson DJ. What do general practitioners expect from rheumatology clinics? *Br J Rheumatol* 1996;35:920.

- 3 Reeve H, Baxter K, Newton P, Burkey Y, Black M, Roland M. Long-term follow-up in outpatient clinics. I: The view from general practice. *Fam Pract* 1997;14:24-8.
- 4 Schulpen GJC, Vierhout SPM, Van Der Heijde DM, Landewe RB, Winkens RAG, Winkens AMK, et al. Patients at the outpatient rheumatology clinic: do they really need to be there? *Eur J Intern Med* 2003;14:158-61.
- 5 Damme R van, Drummond N, Beattie J, Douglas G. Integrated care of patients with asthma: views of general practitioners. *Br J Gen Pract* 1994; 44:9-13.
- 6 Mowat AG, Nichols PJ, Hollings EM, Haworth RJ, Aitken LC. A comparison of follow-up regimens in RA. *Ann Rheum Dis* 1980;39:12-7.
- 7 Department of Health. *The expert patient: a new approach to chronic disease management for the 21st century*. London: Department of Health, 2001.
- 8 Williams J, Cheung W, Russell I, Cohen D, Longo M, Lervy B. Open access follow-up for inflammatory bowel disease: pragmatic randomised trial and cost effectiveness study. *BMJ* 2000;320:544-8.
- 9 Robinson A, Thompson D, Wilkin D, Roberts C. Guided self-management and patient-directed follow-up of ulcerative colitis: a randomised trial. *Lancet* 2001;358:976-81.
- 10 Pincus T, Callahan L. The side effects of rheumatoid arthritis: destruction, disability and early mortality. *Br J Rheumatol* 1993;32:28-37.
- 11 Kirwan JR, Snow S. Which patients see a rheumatologist? *Br J Rheumatol* 1991;30:285-7.
- 12 Kirwan JR for the former South West Regional Advisory Committee for rheumatology. Rheumatology outpatient workload increases inexorably. *Br J Rheumatol* 1997;36:481-6.
- 13 Symmons D, Bankhead C. *Health care needs assessment for musculoskeletal diseases: the first step—estimating the number of incident and prevalent cases*. Chesterfield: Arthritis Research Campaign, 2002.
- 14 Hewlett S, Kirwan JR, Mitchell K, Hogg J, Korendovych E, Paine T. Patient-initiated hospital follow-up for rheumatoid arthritis. *Rheumatology* 2000;39:990-7.
- 15 Kirwan JR, Mitchell K, Hewlett S, Hehir M, Pollock J, Memel D, et al. Clinical and psychological outcome from a randomised controlled trial of patient-initiated direct access hospital follow-up for rheumatoid arthritis extended to 4 years. *Rheumatology* 2002;42:422-6.
- 16 Fries JF, Spitz P, Kraines RG, Holman HR. Measurement of patient outcome in arthritis. *Arth Rheum* 1980;23:137-45.
- 17 Ware J, Sherbourne C. The MOS 36 item short form health survey (SF-36). *Med Care* 1992;30:473-83.
- 18 Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand* 1983;67:361-70.
- 19 Stein MJ, Wallston KA, Nicassio PM. Factor structure of the arthritis helplessness index. *J Rheumatol* 1988;15:427-32.
- 20 Lorig K, Chastain R, Ung E, Shoor S, Holman H. Development and evaluation of a scale to measure perceived self-efficacy in people with arthritis. *Arth Rheum* 1989;32:37-44.

(Accepted 27 September 2004)

doi 10.1136/bmj.38265.493773.8F

## Suicide gap among young adults in Scotland: population study

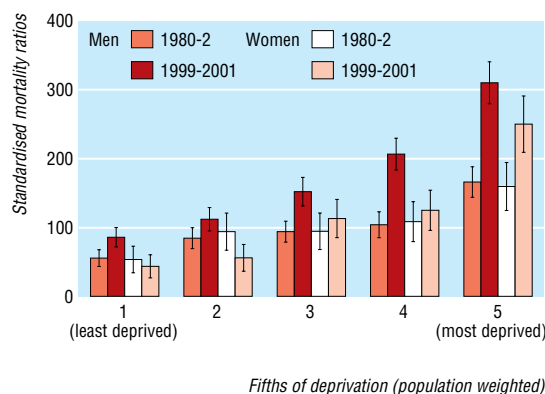
Paul Boyle, Daniel Exeter, Zhiqiang Feng, Robin Flowerdew

The number of deaths from suicide increased among young adults between 1981-3 and 1991-3 but fell among older adults.<sup>1,2</sup> The gap between such deaths in the most and least deprived areas of Scotland widened during this period, particularly for young adults. We examine changes in suicide rates between 1980-2 and 1999-2001 by area according to deprivation for young men and women to test whether the gap has widened further.

### Participants, methods, and results

The general register office for Scotland provided data on deaths from suicide and undetermined causes for 1980-2 and 1999-2001 (international classification of diseases, ninth revision (ICD-9), codes E950-E959 E980-E989; ICD-10 X60-X84, Y10-Y34, Y87.0). These were aggregated from the postcodes of those who died to about 10 000 small areas (CATTs) which are consistent through time.<sup>3</sup> The suicide rate declined significantly among older adults aged  $\geq 45$  years, from 22.99 per 100 000 (95% confidence interval 21.69 to 24.29) in 1980-2 to 16.73 (15.73 to 17.73) in 1999-2001, but increased significantly from 15.38 (14.38 to 16.38) to 24.32 (23.12 to 25.52) among younger adults aged 15-44 years. The rate increased significantly from 22.13 (20.43 to 23.83) to 38.65 (36.45 to 40.85) for young men. The rate also increased in young women but this was not significant (from 8.62 (7.52 to 9.72) to 10.55 (9.45 to 11.65)).

We aggregated areas into fifths of the Carstairs deprivation scores, each fifth containing about a million people in 1981 and 2001. The Carstairs scores ranged between -6.34 and 14.12 in 1981 and -5.94 and 17.47 in 2001. Mortality ratios, standardised to the national age-sex distribution in the 1981 census, were calculated by fifths for both periods.



Suicide among people aged 15-44 years in Scotland according to deprivation: 1980-2 and 1999-2001

For older adults ( $\geq 45$  years), suicide rates declined significantly in all deprivation fifths, and the ratio between the most and least deprived fifths widened slightly from 1.51 (1.26 to 1.81) to 1.81 (1.50 to 2.21). The gap widened much more for young adults (15-44 years) from 2.98 (2.4 to 3.72) to 4.02 (3.34 to 4.85), though this was not significant. It widened from 2.99 (2.31 to 3.87) to 3.67 (2.98 to 4.51) in young men but from 2.96 (1.95 to 4.50) to 5.77 (3.77 to 8.85) for young women (figure), explained partly by a fall in suicides in the least deprived fifth for young women that was not seen for young men (unlike 1981, the 2001 standardised mortality ratio was significantly lower for women than men in the lowest fifth). The number of suicides rose considerably more for young men in the

See also pp 167, 176

School of Geography and Geosciences, University of St Andrews, St Andrews KY16 9ST  
 Paul Boyle  
*professor of human geography*  
 Daniel Exeter  
*postgraduate student*  
 Zhiqiang Feng  
*research fellow*  
 Robin Flowerdew  
*professor of human geography*  
 Correspondence to: P Boyle  
 P.Boyle@st-andrews.ac.uk

BMJ 2005;330:175-6

This article was posted on *bmj.com* on 22 December 2004: <http://bmj.com/cgi/doi/10.1136/bmj.38328.559572.55>