

Self-management interventions for chronic illness

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An increasing number of interventions have been developed for patients to better manage their chronic illnesses. They are characterised by substantial responsibility taken by patients, and are commonly referred to as self-management interventions. We examine the background, content, and efficacy of such interventions for type 2 diabetes, arthritis, and asthma. Although the content and intensity of the programmes were affected by the objectives of management of the illness, the interventions differed substantially even within the three illnesses. When comparing across conditions, it is important to recognise the different objectives of the interventions and the complexity of the issues that they are attempting to tackle. For both diabetes and asthma, the objectives are concerned with the underlying control of the condition with clear strategies to achieve the desired outcome. By contrast, strategies to deal with symptoms of pain and the consequences of disability in arthritis can be more complex. The interventions that were efficacious provide some guidance as to the components needed in future programmes to achieve the best results. But to ensure that these results endure over time remains an important issue for self-management interventions.

Within the next 50 years, the number of people aged 60 years and over is estimated to more than triple, and in developed countries will account for at least a third of the population.¹ Associated with this rise will be an increase in the rate of chronic illnesses, which are currently estimated to consume about 70% of US health-care spending;² it has been suggested that these illnesses will be the primary cause of death and disability in the world by 2020.^{3,4} Finding the best management for chronic illnesses is therefore imperative to deal effectively with increasing numbers of patients and escalating costs.

Management of most chronic illnesses is characterised by extensive responsibility that patients need to take. Whether such management entails taking medication, making lifestyle changes, or undertaking preventive action, the patients, their carers, or both make the day-to-day decisions about what actions are to be taken. Patients' involvement in the management of their care is referred to as self management, which has been defined by Barlow and colleagues⁵ as "the individual's ability to manage the symptoms, treatment, physical and psychosocial consequences and life style changes inherent in living with a chronic condition". Barlow further states that for self management to be effective, it needs to encompass the "ability to monitor one's condition and to effect the cognitive, behavioural and emotional responses necessary to maintain a satisfactory quality of life". This definition implies that self management is more than simple adherence to treatment guidelines because, in addition, it incorporates the psychological and social management of living with a chronic illness. However, chronic illnesses do vary in the extent to which they intrude on psychological and social worlds, and consequently in what might be necessary for effective self management. In some cases, such as asthma, self management can mainly consist of adherence to treatment with the intention of preventing major exacerbations and consequent disruptions to quality of life. At the other

end of the continuum, self management for chronic illnesses such as rheumatoid arthritis needs not only adherence but also behavioural change and new coping strategies, because symptoms have a great effect on many areas of life.

Unfortunately, for many individuals, optimum self-management is often difficult to achieve, as indicated by poor rates of adherence to treatment guidelines,^{6–10} reduced quality of life, and poor psychological wellbeing, which are frequently reported across several chronic illnesses.^{11–16} Recognition of such difficulties has led to the development of interventions that directly target aspects of patients' management of chronic illness, commonly referred to as self-management interventions (SMIs). The key feature of these interventions is the aim of increasing patients' involvement and control in their treatment and its effect on their lives.

Search strategy and selection criteria

We searched MEDLINE, PsycINFO, and Embase (1997–2002) for each illness. Search terms were: ("diabetes") or ("asthma") or ("arthritis" or "osteoarthritis" or "musculoskeletal" or "rheum*") and ("self-management" or "self-care" or "education*" or "behav*" or "psych*" or "cognitive") and ("intervention" or "program*" or "trial") and ("random*" or "RCT"). Studies were included if (1) the study assessed an SMI: interventions that only provided information in a didactic format or manipulated delivery of information (eg, assessment of telephone consultations) were not included because provision of information alone has been recognised as insufficient for improved self management; (2) studies were published in English; (3) the study population included adults (≥ 18 years old) with type 2 diabetes, asthma, rheumatoid arthritis, or osteoarthritis; (4) the design was a randomised trial. The titles of all papers identified were screened. If the study seemed to assess an SMI, we reviewed the abstracts. We examined full articles of studies that met the inclusion criteria.

Lancet 2004; 364: 1523–37

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Various disciplines have contributed to the evolution of such interventions, which in part explains their present diversity. One of the early influences was an educational approach, which principally provided patients with information in a traditional didactic format, with the expectation that greater knowledge would lead to appropriate changes in behaviour for individuals to better manage their illness.¹⁷ However, it has become clear that although knowledge might be necessary, it is often not sufficient for behavioural change.^{18–20} Attention turned to psychology, from which three theoretical models and their constructs have had a particular effect on the development of SMIs. In social cognitive theory, behaviour is thought to be affected by expectations, with individuals' confidence in their ability to perform a given behaviour (self efficacy) particularly important.²¹ This idea has been used in SMIs through teaching of skills such as problem solving and goal setting to increase self efficacy. The stress coping model^{22,23} emphasises coping strategies to deal with the stress of the condition, and SMIs from this model tend to attempt to improve coping. Readiness to change is a concept from the transtheoretical model,^{24,25} and refers to how prepared individuals are to make changes to their behaviour. Interventions guided by this theory focus on individuals' motivation to change, and adapt their approach according to differences in participants' motivation to change a behaviour.

An additional influence on the development of SMIs has come from clinical psychology, particularly cognitive behavioural therapies. Central to these therapies is the importance of attempting to change how people think about their illness and themselves and how their thoughts feed into behaviour. Interventions based on this approach have particular benefit for mental health conditions,²⁶ and have been applied to several chronic illnesses.^{15,27–30}

The evolution of SMIs has accompanied the trend to move away from a system in which the health-care professional is seen as expert and the patient is a passive recipient of care, to more collaborative care in which expertise is shared between patient and professional and both parties work together to achieve best possible management.^{31,32} This trend has further encouraged SMIs to change from didactic provision of information to interventions teaching problem solving and coping skills.

In this review, we examine the nature and effectiveness of SMIs for chronic illness, and particularly the extent of the similarities and differences between interventions for different illnesses. We focus on three chronic illnesses: type 2 diabetes, arthritis, and asthma. These illnesses have been selected for several reasons: all three have high and increasing frequency with associated high costs to health services;^{33–38} SMIs and research are well developed; reviews have identified a minimum of 70 intervention studies for each illness;^{39–41} and it is possible to examine how the important

differences in the day-to-day management and consequences of the three illnesses influence SMIs.

We included only studies of adults, because in childhood and adolescence, these illnesses create additional issues for SMIs, such as parent-child relationships, child development, puberty, and education, which could constitute a further review (see for example Neinstein⁴²). Furthermore, our review is limited to randomised trials published between 1997 and 2002 to capture the content and effectiveness of fairly recent interventions.

Differences between interventions

We identified 21 studies for type 2 diabetes,^{43–63} 24 for arthritis (15 for rheumatoid arthritis,^{64–78} five for osteoarthritis,^{79–83} and four for both types of arthritis^{84–87}), and 18 for asthma.^{73,88–109} SMIs for diabetes, arthritis, and asthma differed in their main objectives. The objectives of the interventions for asthma tended to focus on prevention of acute exacerbations through recognition and avoidance of the triggers that provoke asthma, monitoring of symptoms and consequent adjustment of medication, and improving adherence to medication; very few addressed emotional aspects of coping with asthma. For diabetes, the objectives of the interventions tended to be more diverse, with most focusing on lifestyle issues and others on management of stress. The aim of interventions for arthritis was also quite broad with the main focus of reducing pain and improving physical and psychological functioning. These objectives affect a range of methodological and content issues.

Methodological issues

Most studies examined whether one or more SMIs led to better outcomes than standard care or basic information (15 [71%] for diabetes, table 1, 22 [92%] for arthritis, table 2, and 16 [89%] for asthma, table 3). The rest directly compared two or more SMIs, which could be instructive for measuring whether different components differ in their effectiveness.

For all illnesses, the number of participants recruited varied widely (20–320 for diabetes, 27–245 for asthma, 35–1099 for arthritis). Small samples are unlikely to produce reliable results because of insufficient power. This concern seems to have been recognised in the diabetes studies, which had a mean of 65 participants per intervention group in those completed in 2002, compared with 19 before 2002. However, similar patterns were not apparent for asthma or arthritis. In arthritis, particularly large samples were used in four studies that recruited volunteers from the community or from primary care, suggesting that method of recruitment could be an important determinant of sample size. Comparability of different types of SMIs is likely to be affected by the greater power of larger studies to detect significant effects compared with smaller studies.

The time demands of SMIs could result in low participation and high rates of attrition. Analysis of participation rates is difficult because many studies fail to report them, and if recruitment includes some form of advertisement or open invitation, calculation of participation rates is not possible. However, knowledge

of participation is important since it indicates the extent to which results can be generalised.¹¹⁰

Attrition rates varied widely, ranging from 0% to roughly 50% for each illness (see for example Jablon and others⁴⁶ vs Rickheim and others⁶³ for diabetes, Berg and others⁸⁸ vs Blixen and others¹⁰¹ for asthma, and Hopman-

| Author, year (country) | n (completing), mean age, % male, other characteristics | Recruitment | Follow-up | Groups (intervention group as described by study authors)* | Duration | Individual or group | Delivered by | Outcomes assessed† |
|---|---|--|-------------------------------|---|--|--|--|--|
| Agurs-Collins, ⁴³ 1997 (USA) | 64 (55), 61-7years, 33% male, all >55 years, African-American | Hospital clinics, community adverts | 3 and 6 months from baseline | (1) Standard care (2) Weight loss and exercise | 1 session 1-5 h per week for 12 weeks and 1-5 h per fortnight for 3 months and 1 individual session | Group Both | Dietician and exercise physiologist | Clinical assessment Behaviour |
| Smith, ⁴⁴ 1997 (USA) | 22 (16), 62 years, 0% male, all >50 years, obese | Advert, letter from physicians | Post intervention | (1) Behavioural weight control (2) Behavioural weight control and motivational interviewing | 16 sessions over 4 months 19 sessions over 4 months | Group Both | Multidisciplinary team Multidisciplinary team | Clinical assessment Behaviour |
| Samaras, ⁴⁵ 1997 (Australia) | 26 (not stated), 61 years, 38% male, none exercising | Outpatient clinic | 6 and 12 months from baseline | (1) Standard care (2) Exercise and support group | >1 h per month for 6 months | Group | Multidisciplinary team | Clinical assessment Behaviour Quality of life |
| Jablon, ⁴⁶ 1997 (USA) | 20 (20), 59 years, 50% male | Outpatient clinics | Post intervention | (1) Standard care (2) Progressive relaxation and biofeedback | 8 1-h sessions over 4 weeks and practice with 20-min tape twice per day | Individual | Not stated | Clinical assessment Psychological wellbeing |
| Henry, ⁴⁷ 1997 (Australia) | 21 (19), 60 years, 47% male | Outpatient clinics | Post intervention | (1) Standard care (2) Cognitive behavioural stress management | 1-5 h per week for 6 weeks | Group | Psychologist | Clinical assessment Psychological wellbeing |
| Aikens, ⁴⁸ 1997 (USA) | 22 (not stated), 61-0 years, 39% male | Urban diabetes clinic | 2 months | (1) Standard care (2) Relaxation training | 6 1-h sessions over 8 weeks and practice with 30-min tape | Group | Psychologist | Clinical assessment Psychological wellbeing |
| Vazquez, ⁴⁹ 1998 (USA) | 38 (not stated), Caribbean Latinos, obese | Community, hospital, adverts, participant referral | 3 months | (1) Standard care (2) Nutrition intervention | 12 weekly sessions and 8 bimonthly sessions | Group | Nutritionist and psychologist | Behaviour |
| Lustman, ⁵⁰ 1998 (USA) | 51 (42), 55 years, 88% male, all depressed | Advertised to physicians and in media | Post intervention, 6 months | (1) Diabetes education (2) Diabetes education and cognitive behaviour therapy | 2 h per week for 10 weeks 3 h per week for 10 weeks | Individual Individual | Educator Educator and psychologist | Clinical assessment Psychological wellbeing |
| Ridgeway, ⁵¹ 1999 (USA) | 56 (38), 64 years, 29% male | Physicians recommended to patients | 6 and 12 months | (1) Standard care (2) Education/behaviour modification programme | 1-5 h per month for 6 months and 1 session at 12 months | Both | Nurse and dietician | Clinical assessment Quality of life |
| Kirk, ⁵² 2001 (UK) | 26 (23), 49 years, 44% male, selected by readiness to change | Database and outpatients | 5 weeks from baseline | (1) Standard information (2) Exercise consultation | 30-min session 30-min session | Individual Individual | Researcher Researcher | Behaviour Psychological wellbeing Quality of life |
| McKay, ⁵³ 2001 (USA) | 78 (68), 52 years, 47% male | E-mail and online invitations | 8 weeks from baseline | (1) Internet information only (2) Internet exercise programme | Varied 8 weeks | Individual Individual | Internet Internet and occupational therapist | Behaviour Psychological wellbeing |
| Miller, ⁵⁴ 2002 (USA) | 98 (92), 73 years, 47% male, all >65 years | Adverts, news letters | Post intervention | (1) Standard care (2) Nutrition education programme | 1-5-2 h per week for 10 weeks | Group | Dietician | Clinical assessment |
| McKay, ⁵⁵ 2002 (USA) | 160 (133), 59 years, 47% male | Letters from primary care physician | 3 month - | (1) Internet information only (2) Internet self-management (3) Internet peer support (4) Internet self-management and peer support | Varied over 3 months Contacts twice per week for 3 months Varied over 3 months Varied over 3 months | Individual Individual Individual Individual | Not applicable Professional with dietary experience Not applicable Professional with dietary experience | Clinical assessment Behaviour Psychological wellbeing Quality of life |
| Levetan, ⁵⁶ 2002 (USA) | 150 (128), 59 years, 33% male, diabetes type not stated (we assume type 2) 10-min phone call | Education programme | 6 months from baseline | (1) Standard care (2) Computerised goals | | Individual | Educator | Clinical assessment |
| Kenardy, ⁵⁷ 2002 (Australia) | 34 (not stated), 55 years, 0% male, all binge eaters | Clinic | Post intervention | (1) Non-prescriptive therapy (2) Cognitive behaviour therapy | 1-5 h per week for 10 weeks 1-5 h per week for 10 weeks | Group Group | Psychologist Psychologist | Psychologist Clinical assessment Behaviour Psychological wellbeing |
| Keyserling, ⁵⁸ 2002 (USA) | 200 (varied), 59 years, 0% male, African-American women >40 years | Clinician invitation | 6 and 12 months | (1) Minimum intervention (2) Clinic intervention (3) Clinic and community Intervention | Monthly sessions for 4 months Monthly sessions for 4 months and 2 group sessions and telephone calls | Individual Both | Nutritionist Nutritionist and peer counsellor | Clinical assessment Behaviour Psychological wellbeing |

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(table 1, continued)

| Author, year (country) | n (completing), mean age, % male, other characteristics | Recruitment | Follow-up | Groups (intervention group as described by study authors)* | Duration | Individual or group | Delivered by | Outcomes assessed† |
|---------------------------------------|--|--|--------------------------------------|--|--|--|--|--|
| Glasgow, ¹¹¹ 2002 (USA) | 320 (285), 58 years, 43% male | Letter from primary-care physician | 12 months | (1) Brief dietary intervention (2) Brief dietary intervention and community resources (3) Brief dietary intervention and telephone follow-up (4) Brief dietary intervention, telephone follow-up, and community resources | 1-2 h at baseline, 3 and 6 months 1-2 h at baseline, 3 and 6 months, and 7, 15-20-min phone calls over 12 months 1-2 h at baseline, 3 and 6 months, and 7, 15-20-min phone calls over 12 months 1-2 h at baseline, 3 and 6 months | Individual Individual Individual | Nurse, dietician, educator, or psychologist | Clinical assessment Behaviour Quality of life |
| Brown, ⁶⁰ 2002 (USA) | 256 (not stated), 54 years, 19.5% male, Mexican American | Databases of other research studies | 6 and 24 months from baseline | (1) Standard care (2) Self-management education | 2 h per week for 3 months, 2 h per fortnight for 6 months, and 2 h per month for 3 months | Group | Nurse, dietician, and community workers | Clinical assessment |
| Trento, ⁶⁴ 2002 (Italy) | 112 (90), 62 years, 54% male | Clinic database | 24, 36, and 48 months | (1) Standard care (2) Interactive group visits | 15 sessions over 4 years | Group | Physician and educator | Clinical assessment Behaviour Quality of life |
| Surwit, ⁶² 2002 (USA) | 108 (72), 57 years, 58% male | Adverts, medical facilities, education, and support groups | 2, 4, 6, and 12 months from baseline | (1) Diabetes education (2) Stress management and diabetes education 0.5 hrs per week for 5 weeks | 0.5 h per week for 5 weeks | Group Group | Not stated Not stated | Clinical assessment Behaviour Psychological wellbeing |
| Rickheim, ⁶³ 2002 (USA) | 170 (92), 52 years, 66% male | Referred by primary care | 6 months from baseline | (1) Individual diabetes education (2) Group diabetes education | 2 h at baseline, 1 h at 2 weeks, and at 3 and 6 months 3 h at baseline, 2 h at 2 weeks, and 1 h at 3 and 6 months | Individual Group | Nurse and nutrition specialist Nurse and nutrition specialist | Clinical assessment Behaviour Psychological wellbeing Quality of life |

Clinical assessments included HbA1c as indicator of glycaemic control. Other clinical assessments (eg, blood lipids, weight, body-mass index) were excluded. Behaviour included measures of diabetes self-management behaviours (eg, diet, exercise, home blood glucose monitoring), but behaviours specifically related to intervention (eg, use of community resources) excluded. Psychological wellbeing included any composite measures of wellbeing or assessments of mood (eg, depression or anxiety). Perceived stress also included in this category. Both diabetes specific and generic quality of life measures included under quality-of-life category. One measure of illness intrusiveness included under this subsection to reflect reporting in original paper. Studies with mixed populations in which results were not explained separately were excluded (includes Glasgows studies). Description of every intervention aims to provide reflective summary of what each entailed; all elements of all interventions could not be included. Where duration of session is range, higher figure taken. Where mean age is presented by group, mean of those presented taken, same applies for sex. n=number randomised (available at follow-up). Post intervention=follow-up period from post intervention. *Content varies significantly despite similar titles (see webtable 1 at <http://image.thelancet.com/extras/03art5361webtable1.pdf>). †Full details in webtable 1.

Table 1: Type 2 diabetes

Rock and Westhoff⁸³ vs Cronan and others⁷⁹ for arthritis). Although long follow-up has been associated with high attrition in some instances,⁷⁹ this was not always the case.¹¹¹ The time patients spend on the intervention might be expected to change attrition, but little association was seen for any illness. For example, some SMIs for diabetes with the greatest intensity did have high attrition rates,^{50,51} but others with short durations had even higher rates.⁶² There was, however, some indication that interventions spread over long periods had high attrition rates.^{44,63,75,106} The factors leading to attrition are clearly complex and worthy of investigation to improve the benefits of SMIs, but characteristics of individuals most likely to drop out should also be investigated to ensure that these interventions are targeted most effectively.

Most (67%) SMIs for arthritis were delivered in a group setting, whereas for diabetes and asthma, individual and group settings were used in roughly similar proportions. The arguments for using group intervention include reduced costs and the potential value of group learning. Individual interventions are often justified on the basis that the intervention can be tailored to individuals' needs, and they might also be easier to integrate into clinical practice. Evidence on the

effectiveness of group or individual delivery is scarce because comparisons across studies are confounded by many other differences. One study in diabetes⁶³ specifically compared group and individual SMIs and reported that the group-based intervention resulted in greater improvements in blood glucose at 6 months' follow-up; however, no differences were recorded for any other outcomes.

Almost all programmes were delivered face to face, although the telephone was also used in some. One intervention for diabetes⁵⁶ used telephone alone, and one for asthma¹⁰⁷ and one for arthritis⁸⁴ were self administered with a workbook and an audiotape. All three showed some evidence of effectiveness, suggesting that, with some groups, a more remote approach could yield beneficial outcomes. The internet, which is likely to become increasingly used as a cost-effective medium through which self management can be delivered, was used by one group, but no improvements were recorded in any of the outcomes measured.^{53,55} Although it is too early to form conclusions, remote approaches could be particularly appealing for certain groups, for example, those in full-time employment.

| Author, year | n (completing), mean age, % male, other characteristics | Recruitment | Follow-up | Groups (intervention group as described by study authors)* | Duration | Individual or group | Delivered by | Outcomes assessed† |
|---|---|---|---|--|--|---------------------|--|--|
| Rheumatoid arthritis | | | | | | | | |
| Lindroth, ⁶⁵ 1997 (Sweden) | 100 (96), 55 years, 12% male | Referral by rheumatologists | 3 months, 12 months | (1) Standard care (2) Problem-based education | 2.5 h per week for 8 weeks | Group | Multidisciplinary team of health professionals—doctor, nurse, physiotherapist, occupational therapist, social worker, and dietician. | Symptoms Functioning Behaviour |
| Bell, ⁶⁶ 1998 (Canada) | 150 (127), 56 years, 20% male | Patients referred for physical therapy | After 12 weeks from baseline | (1) Standard care (2) Community based physical therapy and education (information booklets, physical therapy, and goal-setting) | At least 3 h or visits 4 therapist over 6-week period. | Individual | Physical therapists | Clinical assessment Symptoms |
| Brus, ⁶⁷ 1998 (Netherlands) | 60 (55), 59 years, 20% male, rheumatoid arthritis for <3 years | Rheumatology outpatients | 3 months, 6 months, 12 months | (1) Standard care (2) Education programme | Four 2-h meetings during first month plus reinforcement meetings after 4 and 8 months | Group | Unclear | Clinical assessment Symptoms Functioning Behaviour Psychological wellbeing |
| Hammond, ^{68, 1999} (UK) (NB: crossover trial; only first, controlled phase described here) | 35 (33), 55 years, 17% male | Rheumatology outpatients | 12 weeks from baseline | (1) Standard care (2) Educational-behavioural joint protection programme | 2 h per week for 4 weeks plus an optional home visit | Group | Rheumatology occupational therapist | Clinical assessment Symptoms Functioning Behaviour |
| Helliwell, ⁶⁹ 1999 (UK) | 79 (77), 56 years, 34% male, rheumatoid arthritis for <5 years | Rheumatology outpatients | Post intervention, 12 months post baseline | (1) Standard care (2) Education programme | 2 h per week for 4 weeks | Group | Non-medical health professionals | Clinical assessment Symptoms Functioning Behaviour Health-care use |
| Leibing, ⁷⁰ 1999 (Germany) | 63 (55), 53 years, 22% male (NB: results reported on only 39 patients for whom medication changes were matched) | Rheumatology outpatients | Post intervention | (1) Standard care (2) Cognitive behavioural treatment | 1.5 h per week for 12 weeks | Group | Psychotherapists | Clinical assessment Symptoms Functioning Psychological wellbeing |
| Lundgren, ⁷¹ 1999 (Sweden) | 68 (60), 57 years (median), 23% male | Patients registered at rehabilitation centre rheumatology unit | Post intervention, 6 months, 12 months | (1) Standard care (2) Relaxation training | 30 min twice a week for 10 weeks (5 weeks' muscle relaxation followed by 5 weeks' pain reduction techniques) | Group | Taped instructions. Physical therapist present to assist | Symptoms Functioning |
| Scholten, ⁷² 1999 (Austria) (NB: crossover trial; only first, controlled phase described here) | 68 (64), 48 years, 26% male | Consecutive patients | Post intervention, 6 weeks, 12 months from baseline | (1) Standard care (2) Arthritis training programme | 9 afternoons over two weeks plus monthly meetings | Group | Multidisciplinary team: rheumatologists, orthopaedists, physiotherapists, psychologists, social workers | Functioning Behaviour Psychological wellbeing |
| Smyth, ⁷³ 1999 (USA) | 51 (49), 51.1 years (median), 29% male | Volunteers, adverts in local papers, hospitals, and medical practices | 4 months | (1) Writing about emotionally neutral topics (2) Writing about stressful event | 20 min on 3 consecutive days 20 min on 3 consecutive days | Individual | Not applicable | Clinical assessment |
| Hammond, ⁷⁴ 2001 (UK) | 127 (123), 51 years (median), 24% male | Referral from rheumatology outpatients | 6 months, 12 months | (1) Standard education control group (2) Educational-behavioural joint protection programme | 4 sessions of 2 h each 4 sessions of 2 h each | Group | (1) Nursing, medical, occupational therapy and physiotherapy staff (2) Rheumatology occupational therapist | Clinical assessment Symptoms Functioning Behaviour |
| Hill ⁷⁵ 2001 (UK) | 100 (63), 63 years (median) in experimental group and 62 years (median) in control group, 27% male | Rheumatology outpatients | Post intervention | (1) Standard care (2) Education programme | Both 30 min per month over 6 months, total 7 visits | Individual | Rheumatology nurse practitioner | Clinical assessment Symptoms Behaviour |
| Multon, ⁸⁴ 2001 (USA) | 141 (128), 58 years, 56% male | Veterans hospital, university medical centre, private rheumatology practice | Post intervention 3 months, 15 months | (1) Standard care control (2) Attention control (3) Stress management maintenance session | Both interventions lasted 1.5 h per week for 10 weeks plus a at least every 3 months for 15 months | Individual | (2) and (3) both delivered by counsellors with masters degrees in psychology plus computerised multimedia component | Symptoms |

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| (table 2, continued) Author, year | n (completing), mean age, % male, other characteristics | Recruitment | Follow-up | Groups (intervention group as described by study authors)* | Duration | Individual or group | Delivered by | Outcomes assessed† |
|--|---|--|---|--|---|------------------------|---|--|
| Sharpe, ⁷⁶ 2001 (UK) | 53 (45), 55 years, 30% male, <2 years' disease history | Rheumatology outpatients, clinics | Post 6 months | (1) Standard care (2) Cognitive behavioural intervention | 1 h per week for 8 weeks | Individual | Psychologist | Clinical assessment Symptoms Functioning Psychological wellbeing |
| Evers, ⁷⁷ 2002 (Netherlands) | 64 (59), 54 years, 28% male, rheumatoid arthritis for <8 years | Rheumatology outpatients | Post intervention 6 months | (1) Standard care (2) Cognitive behavioural therapy | 10 bi-weekly 1 h sessions plus 1 booster session 4 weeks later | Individual | (1) Rheumatology consultant (2) Rheumatology consultant and therapists trained in treatment module | Clinical assessment Symptoms Functioning Behaviour Psychological wellbeing |
| Freeman, ⁷⁸ 2002 (UK) | 54 (53), 51 years, 15% male, newly diagnosed | Rheumatology clinics | 3 months, 6 months | (1) Standard arthritis education control (2) Cognitive behavioural arthritis education | Both 2 h per week for four weeks | Group | Both by multidisciplinary team | Clinical assessment Symptoms Functioning Psychological wellbeing |
| Osteoarthritis | | | | | | | | |
| Cronan, ⁷⁹ 1997 (USA) | 363 (178), 70 years, 36% male | Written invitation to members of health maintenance organisation | 1, 2, and 3 years post baseline | (1) Standard care (2) Education (3) Social support (4) Education and social support | 2 h per week for 10 weeks, followed by 2 h per month for 10 months | Group | Education delivered by professional health educators. No staff present at social support sessions | Symptoms Quality of life |
| Keefe, ⁸⁰ 1999 (USA) (NB: follow-up of Keefe et al 1996) | 88 (82), 63 years, 39% male | Volunteers | Post intervention 6 months 12 months | (1) Education with spousal support control (2) Coping skills training (3) Spouse assisted coping skills training | All 2 h per week for 10 weeks | Group | Psychologist and nurse | Symptoms Functioning Psychological wellbeing |
| Lord, ⁸¹ 1999 (UK) | 170 (126), 63 years, 27% male | Primary care | 1, 3, 6, and 12 months post baseline | (1) Standard care (2) Education programme | 1 h per week for 4 weeks | Group | Research nurse | 12-month results: Symptoms Functioning Psychological wellbeing |
| Maurer, ⁸² 1999 (USA) | 113 (98), 65 years (median), 58% male | Outpatient clinic | 8 and 12 weeks from baseline | (1) Exercise (2) Education | 3 times per week for 8 weeks 4 sessions | Group | (2) Rheumatologist, dietician, social worker, psychologist | Symptoms Functioning Quality of life |
| Hopman-Rock, ⁸³ 2000 (Netherlands) | 120 (105) with confirmed diagnosis of osteoarthritis, 65 years, 17% male | Newspaper and television adverts | Post intervention 6 months | (1) Standard care (2) Health education and exercise programme | 2 h per week for 6 weeks | Group | Peer educator, physical therapist, general practitioner (GP), occupational therapist | Symptoms Functioning Behaviour Quality of life Health-care use |
| Rheumatoid arthritis and osteoarthritis combined | | | | | | | | |
| Fries, ⁸⁴ 1997 (USA) | 1099 (809), 64 years, 28% male | Health maintenance organisation, physician referral, and participants in a general health education programme | 6 months from baseline | (1) Standard care (2) Mail-delivered individually tailored programme | Sent 3-monthly for 6 months | Individual | Self-instruction | Clinical assessment Symptoms Functioning Quality of life Health-care use |
| Lorig, ⁸⁵ 1999 (USA) (NB: only randomised part of study reported here) | 331 (285), 62.5 years, 16% male, | Not reported Spanish speakers | 4 months post baseline | (1) Standard care (2) Spanish-language adaptation of the arthritis self-management programme | 2 h per week for 6 weeks | Group | Trained lay leaders | Symptoms Functioning Behaviour Psychological wellbeing Health-care use |
| Barlow, ⁸⁶ 2000 (UK) | 544 (423), 58 years, 16% male | Arthritis charity branch networks, information placed in GP surgeries, outpatient clinics, and media announcements | 4 months post baseline | (1) Standard care (2) UK evaluation of the arthritis self-management programme | 2 h per week for 6 weeks | Group | Trained lay leaders Health-care use | Symptoms Functioning Behaviour |
| Solomon, ⁸⁷ 2002 (USA) | 178 (113), 65 years, 29% male | Primary care | 4 months post baseline | (1) Control group (2) Arthritis self- management programme | 2 h per week for 6 weeks | Group | Trained facilitator | Symptoms Functioning Quality of life Health-care use |

*Content varies significantly despite similar titles (see webtable 1 at <http://image.thelancet.com/extras/03art5361webtable2.pdf>). †Full details in webtable 2.

Table 2: Arthritis

| Author, year (country) | n (completing), mean age, % male, other characteristics | Recruitment | Follow-up | Groups (intervention group as described by study authors)* | Duration of intervention | Individual or group | Delivered by | Outcomes assessed† |
|--|--|---|--|--|---|-----------------------------------|--|--|
| Berg, ⁸⁸ 1997 (USA) | 55 (54), not reported, 36% male | Brochures placed in pharmacies and physician offices; radio and newspaper announcements | Post-intervention | (1) Standard care (2) Self-management | 2 h per week for 6 weeks | Group | Nurses | Clinical assessment Symptoms Behaviour |
| Kauppinen, ^{89,90,91} 1998, 1999, 2001 (Finland) | 162 (134), 44 years, 37% male, newly diagnosed patients | Outpatient clinic | 1, 3, and 5 years from baseline | (1) Basic education (2) Intensive patient education | 1 session 30 min individual every third month for 1 year plus a 2-h group session between the 6 and 9 month visits | Both | Respiratory nurses Respiratory nurses, chest physician, and physiotherapist | Clinical assessment Behaviour Quality of life |
| Turner, ⁹² 1998 (Canada) | 117(92), 34 years, 47% male | Primary care database adverts | 6 months from baseline | (1) Symptom based self-management (2) PEF based self-management 0.5 h per month for 6 months | 30 min per month for 6 months Individual | Individual | Nurse Nurse | Clinical assessment Symptoms Behaviour Quality of life Health-care use |
| Bailey, ⁹³ 1999 (USA) | 236 (221), 48% aged >40, 31% male | Pulmonary and critical care clinics | 6, 12, 18, and 24 months from baseline | (1) Standard care (2) Core-elements programme (3) Self-management | (2) One 15–20 min session plus one telephone call 1 week later plus follow-up letter 2 weeks later (3) 1 h individual session plus 2 group sessions (duration not specified) followed by 2 telephone calls plus 3 follow-up letters over a 6–8 week period | Individual | Both | Health educator Symptoms Functioning Behaviour Health-care use |
| George, ⁹⁴ 1999 (USA) | 77 (50), 29 years, 21% male | Patients admitted from emergency department with acute exacerbation of asthma | 6 months | (1) Standard care (2) Inpatient education programme | "Repetitive sessions" during hospital stay, telephone call 24 h post discharge, reinforcement session 1 week post discharge | Not clear | Asthma nurse specialist | Health-care use |
| de Oliveira, ⁹⁵ 1999 (Brazil) | 53(42), 40 years, 12% male, patients with moderate to severe asthma | Outpatients database | 6 months from baseline | (1) Standard care (2) Education group | 1 visit per month for 6 months and 1 h at months 3 and 4 | Both | Physician | Clinical assessment Symptoms Behaviour Quality of life Health-care use |
| Smyth, ⁷³ 1999 (USA) | 61(58), 41 years, 26% male | Volunteers, adverts in local papers, hospitals, and medical practices | 4 months | (1) Writing about emotionally neutral topics (2) Writing about stressful event | 20 min on 3 consecutive days 20 min on 3 consecutive days | Individual | Not applicable Not applicable | Clinical assessment |
| Cote, ⁹⁶ 2000 (Canada) | 188 (149), 37 years, 36% male, patients with moderate asthma requiring daily corticosteroids | Following admission or clinic visit to tertiary care unit | 12 months | (1) Control group (2) Education and symptom-based monitoring (3) Education and peak flow monitoring | 1 h 1 h | Individual | Educator Educator | Symptoms Behaviour Quality of life |
| Gallefoss, ^{97,98,99} 1999 2000, 2001 (Norway) | 78 (71), 43 years, 29% male, (this study also included patients with chronic obstructive pulmonary disease, but those results not reported here) | Patients with mild to moderate asthma, recruited at outpatient chest clinic | 12 months | (1) Standard care (2) Patient education and self-management | Four 2-h group sessions on 2 separate days plus two to four 40 min individual sessions | Both | Doctor, pharmacist, nurse, physiotherapist | Clinical assessment Behaviour Quality of life Health-care use |
| Levy, ¹⁰⁰ 2000 (UK) | 211(79–87%), 42 years, 38% male | Patients attending emergency department or admitted to hospital | 3 and 6 months from baseline | (1) Standard care (2) Patient education | 1 h then two 0.5 h sessions at 6-week intervals | Individual | Nurse | Clinical assessment Behaviour Quality of life Health-care use |
| Blixen, ¹⁰¹ 2001 (USA) | 28, 36 years, 29% male, African-Americans admitted to hospital | Patients admitted for asthma | 3 and 6 months post discharge | (1) Standard care (2) Education | Three 1-h sessions in hospital | Individual | Nurse | Behaviour Psychological wellbeing Quality of life Health-care use |
| Cote, ¹⁰² 2001 (Canada) | 126 (98), 34 years, 41% male | Patients visiting emergency room or outpatient clinic for acute exacerbation of asthma | 2 weeks, 6 months, and 12 months from baseline | (1) Standard care (2) Limited education (3) Structured education | (2) Not specified (3) One session within 2 weeks of randomisation plus one reinforcement session at 6 months | Individual Individual or group | On-call physician Not specified | Clinical assessment Behaviour Quality of life Health-care use |
| Klein, ¹⁰³ 2001, van Palen, ¹⁰⁴ 2001 (Netherlands) | 245 (174), 44 years, 45% male, patients with stable, moderate to severe asthma | Outpatient database | 4, 8, 12, 18, and 24 months from baseline | (1) Self-management education (2) Self-management education with self-treatment guidelines 1.5 h per week for 3 weeks | 1.5 h per week for 3 weeks | Group Group | Nurse Nurse | Clinical assessment Symptoms Behaviour Quality of life Health-care use |

(continues next page)

| (table 3, continued) Author, year (country) | n (completing), mean age, % male, other characteristics | Recruitment | Follow-up | Groups (intervention group as described by authors)* | Duration of intervention | Individual or group | Delivered by | Outcomes assessed† |
|---|---|--|---|---|--|-----------------------------|----------------------------------|--|
| Schmaling 2001 ¹⁰⁵ (USA) | 27 (25), 39 years, 48% male | Referred by physician because of difficulties taking medication | 1 week | (1) Education (2) Education plus motivational interviewing | 1 brief session As for group 1 plus an additional 30–60 min session of motivational interviewing | Not clear Individual | Masters level therapists | Clinical assessment Behaviour |
| Couturaud, ¹⁰⁶ 2002 (France) | 72 (54), 38 years, 32% male, patients with moderate to severe asthma | Outpatient clinics | Post intervention (ie, 12 months after baseline) | (1) Standard care (2) Education and self-management | 0.5–1 h at baseline and at months 1, 3, 6, 9, and 12) | Individual | Nurse | Clinical assessment Symptoms Behaviour Quality of life Health-care use |
| Hockemeyer, ¹⁰⁷ 2002 (USA) | 60 (54), 21 years, 46% male, university students | Psychology classes and campus community | Post intervention | (1) Placebo control (2) Stress management programme | Workbook to be used over 4 weeks (approx 1 h per week) Workbook to be used over 4 weeks (approx 1.2 h per week) | Individual Individual | Both self-administered | Clinical assessment Psychological wellbeing |
| Marabini, ¹⁰⁸ 2002 (Italy) | 77 (not stated), 51 years, 47% male, patients with persistent mild, moderate, or severe asthma | Outpatient clinic | 3 months from baseline | (1) Standard care (2) Patient education | Three 2-h sessions | Group | Physician | Clinical assessment Symptoms Behaviour Quality of life |
| Perninger, ¹⁰⁹ 2002 (Switzerland) | 131 (115), no mean age, 60% male | Emergency department or hospital wards | 6 months from baseline | (1) Standard care (2) Patient education | 1.25 h per week for 3 weeks | Group | Physician and physiotherapist | Clinical assessment Behaviour Quality of life Health-care use |

FEV=forced expiratory volume. PEF=peak expiratory flow. *Content varies significantly despite similar titles (see webtable 3 at <http://image.thelancet.com/extras/03art5361webtable3.pdf>). †Full details in webtable 3.

Table 3: Asthma

In all but three studies, which were delivered by lay leaders, health-care professionals led the interventions. Lay leaders have the benefit of acting as role models and being less costly, but health-care professionals are more able to address factual issues related to an illness. Presently, little evidence suggests which approach is more effective. Two studies that made direct comparisons between lay-led and professional-led programmes for arthritis^{112,113} showed no improvement in pain or disability with either approach but showed differential changes in other outcomes. There is also insufficient evidence to show whether certain groups or professions are better placed to deliver SMIs. An important determinant of effectiveness is likely to be training, particularly when complex skills such as cognitive behavioural techniques are used, but information about training of course leaders was not commonly reported.

Although the duration of SMIs varied for all illnesses, asthma interventions tended to be far briefer (never more than 12 h), by comparison with both diabetes (maximum 58 h⁶⁰) or arthritis (maximum 40 h⁷⁹). This difference probably results from the different objectives of care between the illnesses, with asthma tending to focus specifically on monitoring of symptoms and better adherence to medication to decrease hospital admissions, whereas both diabetes and arthritis focused on various behavioural changes including both lifestyle and cognitive components.

Content of intervention

The theoretical approach on which SMIs were based was more often mentioned in studies of diabetes and

arthritis than of asthma, for which programmes were rarely driven by theory but tended to be principally information-based and instructional, with only a few studies incorporating techniques to address barriers to effective self-management. Diabetes and arthritis studies varied in the extent to which they explicitly stated the theory upon which the SMI was based. Sometimes only components of a theory were mentioned (eg, self-efficacy) without definition of the underlying theory. When indicated however, the interventions fell into three main areas—social learning, a cognitive behavioural model, or an educational model expanded to incorporate other components such as social support, exercise, or practical tasks. Social learning theory was commonly applied and led to use of problem-solving and goal-setting to enhance participants' self-efficacy and to increase health-related behaviours such as exercise, diet, blood glucose monitoring in diabetes, and exercise, joint protection, and techniques for cognitive pain management in arthritis. Other studies focused more specifically on a cognitive behavioural approach to target pain and physical function and to improve coping in arthritis or, for example, management of eating behaviours⁵⁸ or depression⁵⁰ in diabetes. Clearly, however, there is some overlap between these approaches and some studies used techniques from more than one approach, making assessment of the benefit of any one theory complex.

The use of theory in self-management needs to become more explicit if we are to establish which theoretical approach is most valuable for which illnesses (see also Norris and others³⁹). This is not to say that a

single theoretical approach will suffice in any area, and a more pragmatic approach could be more likely to yield results, but it remains necessary to be clear and consistent about which theoretical approaches and concepts have been used. Doing so could be aided by an electronic repository in which a full description of the SMI can be recorded, since journal editors often do not allow more detailed descriptions of the interventions because of space limitations.

Comparisons of different SMIs allows identification of components or approaches that might be more effective than others. For diabetes, three of six studies that compared different SMIs found some differences between them. One showed that a more intensive intervention led to greater improvements in exercise than a less intensive one,⁵⁸ a second reported that a group intervention improved blood glucose control compared with individual intervention,⁶³ and a third showed that adding motivational interviewing to a behaviour-modification programme led to improvement in HbA_{1c} (glycosylated haemoglobin) and increased monitoring of blood glucose.⁴⁴ For osteoarthritis, comparison between three groups observed some changes favouring the inclusion of training in coping skills.⁸⁰ In another study with osteoarthritis, greater reductions in pain were reported in an exercise group than in an education group after intervention, but findings were inconsistent for other outcomes.⁸² For asthma, no differences were seen with or without action plans,¹⁰³ and little difference was recorded between use of symptoms or peak expiratory flow to guide use of medication.

Although comparison of SMIs has great potential for identifying active components, the findings discussed show that these studies are few and do not yet give a coherent picture in any of the three illnesses. For diabetes, comparison between different SMIs has tended to increase over time, with five of the six studies comparing interventions in 2002. This trend might indicate a general acceptance of SMIs in diabetes research, and that the research agenda has moved to increasing their efficacy by establishing the most effective components.

Outcomes

To examine whether particular outcomes were focused upon, those in each study were classified into seven broad categories (table 4). Whereas the most commonly assessed outcome for diabetes and asthma was clinical assessments, the outcome measure most frequently assessed in arthritis was self-reported symptoms.

Most studies (55 [87%]) assessed more than one outcome. Many studies included outcomes that they had not specifically targeted in their programme, and this practice could dilute their overall effectiveness. To accurately assess an SMI, it is important to link the outcomes measured to those targeted for change.

For diabetes, 11 (61%) of 18 of the studies that measured HbA_{1c} showed some evidence of effectiveness at some point, as has been reported in previous reviews.^{39,114} Although concern was expressed in these reviews about the long-term retention of these effects, the studies reviewed here indicated that in four of the seven studies that assessed HbA_{1c} beyond 6 months,^{60-62,111} sustained improvements were measured. All three studies showing long-term improvements were group-based, and although two used problem-solving amongst other components, the third used an approach that emphasised stress management. Superficially, this pattern suggests that there are different approaches to design of effective SMIs that have long-term effectiveness in type 2 diabetes, although the level of description in the reports could mask their similarity.

The most commonly reported clinical outcome in arthritis was physician's assessment of the number of painful and swollen joints. Three of the 12 studies (25%) that assessed some form of joint count had significant findings.^{73,76,84} The techniques in these studies were diverse: one used cognitive behavioural therapy,⁷⁶ another expressive writing,⁷³ and a third⁸⁴ a programme delivered by mail.

A recent Cochrane review¹¹⁵ reported that although SMIs for adults with asthma had little effect on lung function overall, this outcome was better in those who adjusted their medication using a written plan than in those whose medication was adjusted by a doctor.¹¹⁵ In our review, 57% (eight of 14) of studies showed some improvement in lung function. Although most (five of eight) used a combination of education with an action plan,^{91,92,97,100,103} others that used this approach did not find any improvements in lung function.^{106,108} Additionally, a writing intervention for emotional expression⁷³ and a stress management intervention¹⁰⁷ also improved lung function, suggesting that methods directed at stress and emotions as well as behaviour can be successful in improving lung function in asthma.

Symptoms and functioning were common outcomes in both arthritis and asthma but were not measured at all in diabetes, because of the nature of the illness. Overall, roughly 40% of SMIs for arthritis showed some improvement in self-reported symptoms, as did a similar proportion for measures of disability. Of the three arthritis groupings, the least favourable outcomes were in rheumatoid arthritis, for which few studies over the 5-year period showed an effect on pain or disability. Previous reviews of the same outcomes in such arthritis have generally reported that SMIs have a small but significant short-term effect, although the changes tend not to be maintained in the long term.^{19,116-118} In these studies, some evidence suggested improvements in pain beyond 6 months in one study⁷⁴ and for disability in two.^{72,74} In agreement with a previous review,¹¹⁶ a greater effect on pain was identified for osteoarthritis, with four of five studies reporting some benefit. The reasons for

| | Arthritis (n=24) | Asthma (n=18) | Diabetes (n=21) |
|--------------------------------------|------------------|---------------|-----------------|
| Clinical and laboratory assessments* | 12 (50%) | 14 (78%) | 18 (86%) |
| Self-reported symptoms† | 22 (92%) | 8 (44%) | 0 |
| Self-reported functioning‡ | 18 (75%) | 1 (6%) | 0 |
| Psychological wellbeing§ | 10 (42%) | 2 (11%) | 10 (48%) |
| Quality of life¶ | 7 (29%) | 12 (67%) | 7 (33%) |
| Behaviour | 12 (50%) | 14 (78%) | 13 (62%) |
| Use of health care** | 6 (25%) | 11 (61%) | 0 |

*Includes for arthritis some form of joint count either alone or in combination; includes for diabetes a laboratory measure of glycosylated haemoglobin, normally HbA1c; and includes for asthma an objective measure of lung function (eg, peak expiratory flow, forced expiratory volume, or forced vital capacity). †Includes all self-reports of symptoms (eg, pain, breathing difficulties). ‡Includes self-reported measures of disability (eg, Health Assessment Questionnaire) and assessments of effect of activities of daily living on work. §Includes assessments of depression, anxiety, and composite measures of psychological wellbeing (eg, General Health Questionnaire). Where mental health subscales of quality-of-life measures were reported (eg, the mental composite score of the short form 36 (SF 36), these were included in this category. ¶Includes both generic and disease specific measures of quality of life. Where composite scales such as SF 36 were reported as a total score and as subscores, both were reported. ||Includes assessments such as exercise frequency, diet, and adherence to preventative treatments (eg, use of inhaler). **Includes measures such as numbers of hospital visits, visits to a health-care professional, and use of medication for symptomatic relief (eg, pain relief).

Table 4: Outcome measured in self-management studies for arthritis, asthma, and type 2 diabetes

the apparent difference between these two forms of arthritis are unclear, but comparison is complicated because content of interventions tends to differ between the two illnesses, and studies in rheumatoid arthritis are generally smaller and more likely to be underpowered than those for osteoarthritis.

Three studies with mixed osteoarthritis and rheumatoid arthritis groups assessed versions of the Arthritis Self-Management Programme.¹¹⁹ No effect on pain or disability was evident in the UK⁸⁶ or US primary care⁸⁷ studies; however, the Spanish-language adaptation⁸⁵ reported benefits in both pain and disability. This version was not a direct translation of the original programme but included additional features such as practice of exercise in the classes. Of note, exercise might be a crucial component in osteoarthritis interventions,¹²⁰ so further exploration of its role seems to be important. Eight of the studies^{88,92,93,95,96,103,106,108} for asthma measured severity of symptoms and frequency or the percentage of symptom-free days. The three studies that recorded reductions in severity all used education and action plans.^{92,95,96} No study identified an increase in the percentage of symptom-free days.

Assessment of psychological wellbeing as an outcome is complicated by selection of participants. Although numbers with depression and anxiety tend to be higher than in the general population, many individuals recruited into self-management programmes might show little evidence of depressed mood or increased anxiety. Expectations that these outcomes will improve after an SMI might therefore be unrealistic.¹²¹ Of the ten studies for diabetes that measured these outcomes, seven reported no differences compared with controls; the two studies that measured this outcome for asthma likewise found no differences compared with controls. By contrast, for arthritis, six of ten studies that measured psychological wellbeing reported benefits. All of those that used cognitive behavioural programmes^{70,76,77,80} and

one of five based on social learning theory⁸⁶ recorded improvement in psychological wellbeing. A multidisciplinary training programme that included cognitive behavioural and social-learning components also reported benefits.⁷² For diabetes, SMIs that showed benefits in psychological wellbeing also tended to include some cognitive behavioural components,^{47,50} suggesting that programmes that are more cognitive are more likely to yield improvements in psychological wellbeing for both arthritis and diabetes.

Quality of life was assessed in 12 (67%) of studies for asthma, but despite its widespread use in health care it was assessed in only seven (33%) for diabetes and seven (29%) for arthritis. However, measurement of quality of life for arthritis is complicated by the fact that disease-specific instruments are widely used and their subscales are generally reported under symptoms, function, and psychological wellbeing rather than as a composite measure. For both diabetes and arthritis, little effect was recorded for quality of life. One study for diabetes that reported clear benefits⁶¹ used a long intervention (4 years) and found that changes emerged only after the 24 month follow-up. This study highlights that some changes in outcomes might only develop after a long time.

Half of the studies (six) for asthma that measured quality of life, generally using an asthma-specific measure, reported significant benefits. All were based on education and a form of action plan. Importantly, three studies that failed to find such improvements were also based on the same approach; therefore, no particular pattern is discernible.

These findings suggest that in all three illnesses, the relation between SMIs and quality of life is not well understood. The changes in behaviour needed by SMIs might constrain quality of life, but the absence of evidence of such deterioration in our review suggests that SMIs have no real cost to patients' quality of life. Further research is needed to understand the complex relation between SMIs and quality of life.

Improvement of self-management behaviours, such as diet and exercise, or more cognitive behaviours, such as effective coping, is a prime focus of these types of interventions, but several did not assess behaviour for all three illnesses (diabetes eight [38%]; arthritis 12 [50%]; asthma four [22%]). These studies seem to have assumed that a simple relation exists between behaviour change and other outcomes, but it is extremely complex.¹²² This fact is illustrated by studies in which behaviour changed in the absence of changes in more clinical and symptomatic measures,^{58,67,68,86,88,106} and by cases in which changes in clinical or symptomatic measures happened in the absence of measurable changes in behaviour.^{62,63,89,102} Some of these findings could be a result of the manner in which behaviour was assessed and the threshold of behaviour changes leading to clinical or symptomatic change as

well as the multiple aspects of behaviour measured in some studies. Nonetheless, it is clear that there is no simple one-to-one relation between behaviour and measures of symptoms and clinical state. Assessment of behaviour would therefore seem valuable to further understand this relation.

Seven of 13 diabetes studies that measured the effect of SMIs on self-management behaviours indicated some change compared with a control group,^{43,44,49,52,58,61,111} and four further studies showed changes in behaviour over time.^{55,57,63,111} Alterations in diet and exercise were the most frequently measured behaviours. The findings suggest that changes in behaviour do happen after SMIs for diabetes, and are similar to those reported in the review by Norris and others,³⁹ who found a positive effect of self-management training on self-care and lifestyle behaviours.

Of 12 studies that assessed changes in behaviour for arthritis, ten reported some evidence of change.^{65,67,68,72,74,75,83–86} Seven^{65,67,68,74,84–86} showed increases in exercise, joint protection, or both, compared with controls, and two showed changes over time in these behaviours.^{72,83} Most of these interventions were based on a social-learning approach. Four studies for arthritis^{67,69,75,77} assessed adherence, but only two specifically targeted adherence to medication in the intervention,^{67,75} of which one⁷⁵ reported a positive outcome.

Many (14 [78%]) asthma interventions targeted some aspect of behaviour, usually adherence to preventive medications, recognition and appropriate use of rescue medications as well as inhaler technique, self-monitoring, and avoidance of asthma triggers. Significant changes in behaviour were reported in eight (57%) of these studies, six of which used an education and action-plan approach.

Behaviour change, the focus of SMIs, is the most successful outcome assessed in these studies. Importantly, the behaviours examined are very different in the three illnesses. Some, as in asthma, are specifically related to the illness, whereas others such as diet and exercise are more integrated with lifestyle and potentially more difficult to change. The fact that other variables did not change as a result of behaviour change in some studies makes it important to consider the relation between behaviour and more clinical outcomes, and raises the important question of whether changes in behaviour should be the key outcome for SMIs.

Reduction in use of health care is one of the possible economic benefits of SMIs, and was most frequently assessed for asthma but not at all for diabetes (table 4). 64% (seven of 11) of interventions for asthma showed reductions in such use, and six of these used an education and action-plan approach.^{92,94,95,98,100,103} Only one study that used this approach and assessed this outcome did not find any reduction.¹⁰⁶ This finding suggests that the education and action-plan approach is effective at reducing use of health care in asthma (see also Gibson and colleagues¹¹⁵).

By contrast with asthma, SMIs for arthritis and diabetes were less likely to have an immediate effect on use of health care, since control of symptoms to restrict emergency visits is not the focus of these interventions. Nonetheless, improved self-management could change use of health care. Six studies examined such use for arthritis, including all four that combined both rheumatoid arthritis and osteoarthritis. Two found some reduction in visits to health care professionals.^{83,84}

An enduring issue for SMIs is the duration of any effects observed. Studies on asthma tended to follow up patients for longer than those for both diabetes and arthritis, perhaps partly because asthma studies tended to measure use of health care, such as emergency room visits, and these tend to need a long period of assessment to obtain some range in results. Few SMIs for diabetes and arthritis assessed findings for more than 12 months, and in those that did, many showed that benefits tend not to be retained at long-term follow-up, although this might be changing for diabetes.^{60,61} Although expectation of long-term effects from SMIs might be unreasonable because of the short-term nature of many of the interventions, it remains important not only to examine whether people are able to adopt self-management behaviours in the long term, but also to devise techniques that can lead to long-term change in behaviour. In this context, the possible benefits of booster sessions to reinforce such change need more examination.

Discussion

The SMIs for each of the three illnesses conditions in this review have general differences in content, which seem to result from the different objectives for management of each illness. Some of the studies for asthma attempted to halt development of symptoms, whereas those for arthritis tended to try to reduce the effect of the symptoms and illness, and therefore tended to have broader focus. For diabetes, many of the studies were concerned with aspects of integration of the complex regimen into patients' lifestyles. As such, these SMIs also tended to be broader than those for asthma. One approach to definition of self management³ could consider the studies of asthma as intensive management of symptoms rather than true self management. Alternatively, to the extent that these interventions engage patients in a further attempt to manage and take control over their illness to avoid a major effect on quality of life, they may be classed as self management as opposed to disease management. Whether or not patients with asthma could benefit further by broadening of the interventions to encompass emotional aspects of coping remains to be established.

An alternative approach to the disease-specific SMIs considered in this review is to adopt a generic approach based on the premise that a core generic set of skills—eg, problem solving and goal setting—might be

sufficient to improve management. The chronic disease self-management programme^{123,124} takes this approach and includes people with different chronic illnesses in the same self-management group. Establishing the extent to which these generic rather than disease-specific skills are sufficient for the desired change in any illness would be an important step in the developing field of self management.

Although there were general differences between illnesses in the content of SMIs, the range and diversity within illnesses was also large. This range raises the challenge of how to interpret the findings within each illness. Some reviews of SMIs have used meta-analysis,^{117,125} but its applicability has to be questioned when interventions are so diverse, as illustrated in the tables. By incorporating all SMIs into one analysis, one cannot find out which of the different types of intervention are effective and for which outcomes. A more discursive approach that examines the nature and content of the studies that showed positive results might be a more pragmatic method of advancing our understanding in this specialty.

When considering self management for diabetes, arthritis, and asthma, it is important to bear in mind the limitations of our review. We considered only studies published between 1997 and 2002. Although the studies were assessed against several outcomes, not all outcomes (in particular all clinical outcomes) were included. Furthermore, psychosocial constructs, which could explain how change happens in the intervention, were not considered because of space limitations. We have also not considered the relative sensitivity of the instruments used to assess change. However, the examination of the processes leading to change after SMIs remains an important area of study, not only to understand the processes at work, but also to examine differences between participants.

This review is also likely to present a fairly optimistic view of SMIs, since most measured several outcomes, which increases the chance of a positive outcome. Moreover, where differences between groups were not available, changes over time were also considered. Changes over time are subject to attentional influences and are a much weaker design than those studies with a control group.

A limiting factor when attempting to make sense of this area is the description of the interventions in reports. Previous reviews have criticised studies for not fully describing the content of the interventions and providing little detail of their theoretical backgrounds.^{126,127} As has been suggested,^{39,127} this problem could be overcome if authors published protocols and manuals of their programmes; this would not only allow accurate interpretation of the intervention but would also help ensure that within a programme, each facilitator delivers the same content in a consistent manner. Descriptions of standard care should also be

offered, particularly if this consists of some form of education, as is commonly the case for diabetes. This description is important because of the likely variation between locations and the changes in standard practice over time as care of these illnesses evolves.

Finally, our review was limited to randomised trials. Although randomised control trials are the gold standard for assessment of interventions in health care, there is debate as to whether this is the most suitable method for SMIs. One criticism of these designs is that the over-riding focus is efficacy, with less attention to factors that could influence effectiveness¹²⁸—ie, whether the benefits of interventions are still evident when integrated into wider health care services (eg, Glasgow and others¹²⁹). One mechanism to assist integration is recognition of the need for SMIs within national standards of care. Increasingly, such standards do endorse the need for self management (see asthma in both the UK¹³⁰ and the USA,¹³¹ and diabetes in the USA¹³²).

For SMIs to have greater uptake, thought should be given to how and when they are offered to patients. Introduction and endorsement of these programmes at a physician visit will probably ensure higher rates of participation. It should also be recognised, however, that as with medication, one therapy or programme might not be suitable for all patients. Identifying who benefits most from which SMIs is an important addition to any assessment, and could lead to more effective targeting of resources.

If SMIs are to be more widely adopted in health care, training in skills such as group facilitation, problem solving, goal setting, and cognitive-behavioural techniques need to be enhanced; they are not usually part of most health-care professionals' training. If these interventions are to be delivered appropriately and effectively, training in the skills needed by health-care professionals who deliver these programmes needs to be recognised and appropriate courses developed.

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