Cardiovascular education for people with rheumatoid arthritis: what can existing patient education programmes teach us?

Holly John1,2, Douglas Carroll2 and George D. Kitas1,3

Abstract

Patient education is an integral component of the management of chronic diseases. Education programmes designed for people with RA have historically aimed to improve their arthritis symptoms and outcomes. Novel educational material is required to address significant comorbidities, particularly cardiovascular disease (CVD) associated with RA. We appraise the components of education programmes incorporated in disease management in people with RA and programmes used for CVD prevention in the general population, including their design and delivery, use of behaviour theory, evaluation and long-term efficacy. We then integrate the findings in order to inform the development of educational material specifically addressing CVD in RA. This approach may be useful for other major comorbidities of RA as well as other musculoskeletal conditions.

Key words: Rheumatoid arthritis, Cardiovascular disease, Social cognition theory, Stages of change theory, Patient education.

Introduction

RA is a chronic disabling inflammatory arthritis [1] and patients require long-term patient-centred care. Concordance between patients and health professionals will help the patient commit to necessary complex medication regimens, self-management and lifestyle behaviour modifications [2]. Patient education, defined as any set of planned educational activities designed to improve patients’ health behaviours and/or health status [3], is at the heart of patient-centred care. Education can be provided verbally during the outpatient appointment, using leaflets, such as those by Arthritis Research UK [4], audio-visual material or as specifically developed patient education programmes [5]. The generic chronic disease self-management programme [6] and arthritis-specific version [7] are well-known examples of patient education programmes; additionally, a wealth of RA-specific programmes have been developed, published and reviewed [8, 9]. Broadly, these have aimed to improve bio-clinical features of arthritis such as pain and disability, self-management skills and psychosocial status; 28 of the 37 studies (involving 9955 patients in total) reviewed by Albano et al. [9] reported positive results. Specifically, the Cochrane review found that RA patient education effected, when compared with no intervention at first follow-up, a 10% improvement in functional disability, measured using the HAQ, a 12% improvement in the arthritis impact measurement scales and arthritis impact subscale and a 12% improvement in depression [8]. Although depression has been included as a topic/outcome measure [8], other comorbidities of RA have been largely neglected. This is particularly pertinent because these comorbid conditions not only affect quality of life [10], but also account for the excess morbidity and mortality associated with RA [1].

Cardiovascular disease (CVD) accounts for ~50% of the excess mortality in RA [11]. This is thought to be due to accelerated atherosclerosis occurring as a result of classical CVD risk factors such as hypertension [12], dyslipidaemia [13], obesity [14] and physical inactivity [15], which may be adversely affected by RA or its medications [16, 17], as well as more recently implicated risk factors, particularly high-grade systemic inflammation [18–20]. Guidelines, therefore, suggest that patients with
RA should have an annual cardiovascular risk assessment [21, 22]; A shared care approach to CVD risk management seems sensible; when surveyed, only 5% of general practitioners (GPs) felt CVD risk management in people with RA should occur in secondary care, suggesting their perceived ownership [23]. Local protocols defining explicit but integrated roles for primary and secondary physicians will be important. Education for people with RA is required to compliment these clinical consultations about CVD. However, no patient education about CVD exists that is specifically designed for people with RA, and this has been identified as an unmet need [24]. Experience from CVD education initiatives for the general population and other high-risk patient groups is valuable, but may not be wholly transferable to the RA population. For example, advice about increasing exercise or achieving a normal weight must be provided within the context of any physical and psychosocial constraints of RA. Fear of causing joint damage or the requirement for some medications, especially corticosteroids (CSs), may affect a patient’s perceptions of these as realistic goals [24]. These patient beliefs need to be acknowledged and explored before patients are receptive to current medical evidence emphasizing the contrary and commit themselves to substantial lifestyle changes.

In this review we appraise existing patient education programmes for patients with RA and identify which specific features are characteristic of successful interventions. Similarly, we examine patient education programmes used in primary and secondary prevention of CVD. We then integrate the findings to provide a theoretical framework on how novel patient education addressing CVD in RA might be constructed.

Patient education in RA

There have been four systematic reviews/meta-analyses [8, 25–27] of the RA patient education literature (summarized by Christie et al. [28]), which relate to studies published up until 2002. In addition, we have identified a further 10 randomized controlled trials (RCTs) of RA patient education programmes published since 2002; 5 were self-management programmes [29–33], 1 aimed to improve drug adherence [34] and 4 were therapeutic education programmes [35–38]. We review these programmes in order to identify common patterns of structure and delivery, and which aspects are most effective [39].

Fundamental design

The Cochrane systematic review [8] compared the results of information only (9 studies; 687 patients), counselling (5 studies; 430 patients) or behavioural interventions (24 studies; 2493 patients) vs control groups. Pooled analysis revealed no significant effects for information and counselling interventions, whereas behavioural interventions did show significant effects for scores on functional disability, patient global assessment and depression. Similarly, Niedermann et al. [27] observed that purely educational programmes were not associated with improvements in health status, whereas some psychoeducational programmes benefited both physical and psychological health. This concurs with the principle that the aims and content of an education programme must be congruent with the intended outcome; if the aim is to improve knowledge, then information may suffice; if it is to change behaviours, which may subsequently confer clinical benefits, then the programme needs to include a behavioural component.

Robust theoretical underpinning

Psychoeducational programmes are more likely to be successful if they also address the psychology behind why we adopt or maintain certain behaviours [40]. Indeed, a theoretical underpinning is thought to be instrumental to an intervention’s success [41, 42]. RA patient education programmes, particularly in the past decade, do tend to be based upon theories of human behaviour, most notably social cognition theory [29, 32–36]. This has, as a central tenet, the concept of self-efficacy (the belief in one’s own ability to succeed in a certain situation) [43]. Such interventions have aimed to enhance a patients’ self-efficacy, e.g. using motivational interviewing, and have included specific skills training in relation to encouraging behaviour change, e.g. goal setting. As inaccurate health beliefs may undermine health professionals’ efforts to encourage behaviour change, another theoretical consideration is to provide the opportunity to explore patients’ beliefs about RA or its management [44].

Structure

A variety of formats of patient education programmes have been described, such as group sessions [29–33, 35, 37, 38], one-on-one sessions [34] or a combination [36]; it has been suggested that group formats are more successful [45]. Telephone calls have been used to support participants [33]; others have included subsequent booster sessions [29, 32], although Riemsmma et al. [29] concluded that their booster sessions had little effect. Previous programmes have been facilitated by various members of multidisciplinary care teams, but nurses have been the most common educators [9]; none of the programmes was lay led. Programmes ranged in duration from several consecutive days [37], to weekly sessions over several weeks [29–33, 35, 38], to a year-long programme [36]. Programmes lasting more than 6 weeks are considered to be more effective [26, 41], although it must be remembered that increased programme length may affect attrition [46]. Shorter programmes have also produced successful outcomes; for example, Abourazzak [37] described an intensive course that delivered 18 h of education and group workshops over 3 days to 39 patients who were compared with a control group of 38 patients. Several programmes involved partners; one study was designed to analyse the effect of partner participation by comparing two groups receiving the same group self-management intervention, one group attending with a partner and the other without. Contrary to expectation, partner participation was found to decrease self-efficacy [29].
Efficacy

A wide range of outcome measures have been employed to assess the efficacy of these programmes. The measures chosen should be congruent with the aims and content of the programme [47]. Measures of knowledge, such as the patient knowledge questionnaire, have been used [38]. However, if the education programme is seeking to encourage behaviour change, measures that reflect successful behaviour modification are essential, as well as consequential clinical outcome measures, for example, pain scores, tender and swollen joint counts or measures of disability [36].

Outcome measures have usually been assessed immediately after completing an educational intervention and also after a follow-up period, ranging from 6 months [30, 35] to 3 years [37]. The Cochrane review showed a beneficial effect on clinical outcomes immediately post-intervention, but these benefits were not maintained at the final follow-up visit [8]. Some studies have, however, been able to demonstrate longer-term clinical benefits. For example, 43 patients were recruited to a study comparing a 1-year programme designed to improve self-reported disability using active learning strategies focusing on real-life situations against a control group. The programme involved individual education sessions every 3 months, as well as two group sessions with full written information provided. After 18 months, 59% of participants in the intervention group achieved an ACR20 response [48] compared with 10% of the control group [36]. Another successful study randomly assigned 85 patients with moderate to severe RA treated with infliximab to either a 9-week programme or a control group. The programme comprised four 3-h group sessions aiming to improve pain, disability and health status. Activities included a detailed home-exercise programme, written programme brochure and home guide, as well as monthly supportive telephone calls. Seventy patients completed the trial and were included in the analysis. Significant benefits on pain and disability in the intervention group persisted up to the final follow-up visit at 8 months compared with the control group [33]. The intensive 3-day course discussed earlier [37] followed up its intervention participants for 3 years. Disease activity was significantly lower in the intervention group 3 years later, but no benefit on functional impairment or quality of life could be demonstrated; however, the control participants were not followed up at 3 years, so between-group analysis was not performed.

Patient education in CVD

The majority of modifiable classic CVD risk factors are over-represented in people with RA [14, 18, 49]. We reviewed the literature specifically to identify studies using a multifactorial educational approach (Healthy Heart Programmes) including both primary and secondary prevention programmes.

Fundamental design

Most CVD education programmes are behaviour based. Primary prevention programmes include techniques such as goal setting or motivational interviewing [50]. Most secondary prevention programmes comprise a comprehensive lifestyle programme to address health risk behaviours via behaviour change techniques, lifestyle coaching and psychosocial support; there is usually a particular emphasis on exercise [51].

Robust theoretical underpinning

Although few secondary prevention programmes indicate an underpinning theoretical model, some primary prevention programmes do; the Stages of Change Model is the most common model used [52–54]. Some studies describe preceding research to explore patients’ expectations of CVD patient education [53] or health beliefs [55] in order to inform their subsequent CVD education programme; this approach is advocated by the literature [56].

Structure

CVD prevention programmes vary in terms of group or individual sessions, and several included follow-up telephone calls [50, 57–59] or booster sessions [54, 60]. They were facilitated by various members of the multidisciplinary team rather than lay led. Interestingly, some secondary prevention programmes relied entirely on telephone calls [61] or were delivered via the Internet (including email communication with a case manager) [62]. Primary prevention programmes vary in duration from a few hours [63] to, for example, a programme involving 28 2-h meetings over a 10-month period [58]. Most secondary prevention programmes lasted several weeks or months; for example, the Westfold Heartcare Study Group lifestyle intervention programme involved 6 weeks of heart school, including supervised physical exercise and twice-weekly group meetings (addressing dietary advice, smoking cessation, physical activity counselling, risk factor management, psychosocial management, medication and reduction of mental stress), followed by 9 weeks of twice-weekly supervised gym exercise with group meetings every 3 months [64]. The value of longer programmes is unclear; distributing a 3-month programme over 1 year was found to make no difference to its impact [65]. Further, a 2-year programme was associated with fewer clinical events [66], whereas a 3-year programme was not [51].

Efficacy

Outcome measures did not usually include measures of knowledge, but instead were behavioural (smoking status, physical activity and weight) and clinical, including changes in individual risk factors, e.g. Framingham 10-year CVD risk or subsequent rate of CVD events.

Both primary and secondary CVD prevention programmes showed improvements in CVD behaviours (50, 54, 63] and [51, 64], respectively) as well as CVD risk factors ([53, 57, 60] and [59, 66, 67], respectively). Some primary prevention programmes showed reductions in 10-year
CVD risk [57, 58]. In terms of translating risk factor modification into hard clinical endpoints, primary CVD prevention programmes have had mixed success. The large Multiple Risk Factor Intervention Trial (MRFIT) study involving 12,966 patients was successful in modifying diastolic blood pressure, serum cholesterol levels and smoking status, and maintaining this over a 6-year period; the effect on coronary heart disease mortality rate was favourable, although not significantly different from a usual care control group [66]. Similarly, the Cochrane review (reviewing the literature up until 2001) found modest improvements in risk factors following counselling and education programmes, but no significant impact on mortality [10 trials reported CVD event data comprising 903,000 patient-years of observation; for total mortality there was a pooled odds ratio of 0.96 (95% CI 0.92, 1.01) favouring intervention] [69]. However, Rachmani et al. [70] were able to demonstrate a significant reduction in CVD events over an 8-year follow-up period in 165 patients with diabetes, hypertension and dyslipidaemia. A key feature of this particular programme [70] was that, as well as lifestyle advice and a fitness programme, patients were given their risk factor measurements as well as defined target values and were encouraged to urge their GP to change their medication if target values were not met. Participants in this intervention programme had 52 CVD events compared with 80 CVD events in the control group; the relative risk, over 8 years, for the combined CVD event index in the intervention compared with the control group was 0.65. This strategy whereby patients are empowered to request to be treated to target by their doctors highlights the successful results that can be achieved when concordance in the patient–health professional partnership is achieved. A similar strategy was used as part of the COACH (Coaching patients On Achieving Cardiovascular Health) programme that aimed to improve CVD risk factors in people with coronary heart disease [61].

Secondary CVD prevention programmes have also shown an improvement in clinical events [62, 66]. For example, Giallauria et al. [66] recruited 52 post-infarction patients, who had just completed a standard 3-month cardiac rehabilitation programme, and randomly assigned them either to a further 2-year multifactorial educational and behavioural programme or a control group. The programme entailed monthly hospital visits providing dietary advice, lifestyle reinforcement and exercise; families were invited to help sustain the patient in the long term. Supportive written material was provided. This study observed CVD events in 27% of patients in the control group compared with 11% in the intervention group, although the study was not powered to detect CVD morbidity and mortality. Furthermore, the Cochrane systematic review of exercise-based cardiac (secondary) rehabilitation (involving 8440 patients) observed that cardiac mortality was reduced by 31% in exercise-only interventions and 26% in comprehensive cardiac rehabilitation schemes when compared with usual care [71]. The pooled effect estimate of secondary cardiac rehabilitation on combined mortality, non-fatal myocardial infarctions and revascularization procedures was 0.81 [71]. Can specific features be identified to explain this improvement in clinical status in secondary prevention programmes? Most obviously, these programmes involve patients who have had a cardiac event or procedure. For them, CVD is a real, rather than a potential, event; this is likely to considerably increase motivation to engage in preventative behaviours, which will translate into increased self-efficacy [72, 73]. To similarly enhance motivation in primary prevention schemes, skillful communication about the seriousness and implications of future risk will be required [74]. Alternatively or additionally, it may be the prominent role that exercise plays in secondary prevention schemes that contributes to their greater general effectiveness. Certainly exercise has a major beneficial effect on the likelihood to develop, become symptomatic or die from CVD through ameliorating multiple risk factors including obesity, dyslipidaemia, hypertension and diabetes mellitus [15]. A comparison of the successful components of patient education programmes in RA and CVD is provided in Table 1.

**Conclusion: developing novel patient education to address CVD in RA, what have existing programmes taught us?**

The principle of specifically designing patient education programmes to address a significant comorbidity is novel in itself; this design process may be transferable, both to other RA comorbidities and also other chronic diseases, with specific adjustments on a case-by-case basis. There is significant common ground between successful RA and CVD education programmes (Table 1), which can be integrated to provide a framework for designing education for RA patients about CVD.

**Fundamental design**

A behavioural approach, rather than solely the provision of information, should be provided by the intervention.

**Robust theoretical underpinning**

Research will be required to ascertain which health psychology models may be pertinent, but the existing literature suggests that Social Cognition Theory is likely to be particularly important, combined with the Stages of Change Theory [75]. Research is also required to identify patients’ expectations of the intervention.

**Structure**

The evidence suggests that a programme lasting several weeks or months would confer greatest benefit, providing the time for participants to learn and implement skills in behaviour change. A group format is recommended, and telephone calls are a possible follow-up strategy. A relationship between the nature of the facilitator and the outcome of the programme was not observed; the facilitator should therefore be the person most suitable for the role who is adequately trained and educated. Since this
The programme is providing cross-disciplinary education, training the facilitator will be particularly important; for example, the diabetes education and self-management for ongoing and newly diagnosed (DESMOND) primary prevention education programme in people with diabetes [63] describes providing 2 days of multidisciplinary training for the programme educators [55].

The actual content of the CVD education programme for people with RA will require appropriate modification to suit a rheumatoid population. Inaccurate health beliefs about CVD need to be corrected and skilful communication of the magnitude of the risk of CVD and its relevance to RA patients must be included at the outset to enhance motivation for behaviour change [76, 77].

**TABLE 1** Successful components of patient education programmes

<table>
<thead>
<tr>
<th>Component</th>
<th>RA patient education programmes</th>
<th>CVD patient education programmes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fundamental design</td>
<td>Behavioural based</td>
<td>Behavioural based</td>
</tr>
<tr>
<td>Theoretical underpinning</td>
<td>Social Cognition Theory</td>
<td>Stages of Change Theory</td>
</tr>
<tr>
<td>Structure</td>
<td>Group meetings</td>
<td>Duration of several weeks or months with frequent meetings</td>
</tr>
<tr>
<td>Duration of &gt; 6 weeks</td>
<td>Written information provided</td>
<td></td>
</tr>
<tr>
<td>Supportive follow-up telephone calls</td>
<td>Skills training in behaviour change techniques</td>
<td></td>
</tr>
<tr>
<td>Content</td>
<td>Skills training in behaviour change techniques</td>
<td>Compulsory exercise</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Accurate and skilful communication of CVD risk to enhance motivation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Empowering participants to urge doctors to treat to target their risk factors</td>
</tr>
<tr>
<td>Outcome measures</td>
<td>Measures of behaviour and clinical outcomes</td>
<td>Measures of behavioural and clinical outcomes, including hard clinical endpoints if follow-up is long enough</td>
</tr>
</tbody>
</table>

**Fig. 1** Schematic representation of a theoretically informed CVD education programme in people with RA, making explicit how recommended theoretical models relate to the content and outcomes of the programme. *Represents enhanced results expected due to interventions driven theoretically.*
Cognitive-behavioural strategies (such as counselling, motivational interviewing [78] or lifestyle coaching) need to be deployed to change maladaptive ways of thinking and feeling about CVD and enhance participants’ perceived control over CVD lifestyle behaviours [79], combined with specific skills in how to actually implement a desired behaviour change [80], such as smoking cessation, eating a low-fat diet, weight control or increasing exercise. The benefits of CSs and non-steroidal anti-inflammatory medications for persons with RA need to be provided alongside their potential adverse effects on weight or blood pressure; it should be emphasised, however, that these adverse effects are not inevitable or fixed and may be modified through dietary control and exercise. Empowering patients with the skills to monitor their own progress with CVD risk factor reduction and seek further advice or treatment if they fail to reach target values has been shown to be a useful strategy. Existing shared care booklets for blood test monitoring related to drug therapy could be modified to incorporate RA patients’ CVD risk factor results as well as target values for BMI, smoking status, blood pressure and lipid profile [81]. Exercise should be a core component. Both physical (pain, mobility) and psychological (low levels of self-efficacy) factors are reported by RA patients as barriers to exercise [82]. Therefore, advice is required to reassure patients who exercise that they will not only improve their cardiovascular risk [15], but may also reduce RA-related inflammation and improve function, pain and mobility [82, 83] without damaging their joints [84]. Strategies that foster self-efficacy and improve intrinsic motivation [85], and tailored advice from a health care professional [86], have been recommended to promote exercise participation.

Efficacy

Evaluation of the efficacy of a new intervention is essential. Knowledge of CVD can be measured using a questionnaire specifically designed and validated for people with RA [87]. Alongside measuring actual behaviours, self-efficacy measures [88–91] and Stages of Change measures for the different lifestyle behaviours could be used [92]. Clinical outcomes could include risk factors, 10-year CVD Framingham risk or other risk algorithms [22], and, if follow-up is long enough, rates of CVD events. These suggestions for developing a successful CVD education programme are summarized in Fig. 1.

Other considerations

There are other practical factors that need to be considered in delivering CVD education to patients with RA [9, 93] (Table 2). When is the optimum time to deliver this intervention? Patients interviewed suggested once initial control of RA is established rather than at diagnosis [44]. However, behavioural and cognitive-emotional adaptations have been shown to manifest early in RA [95], so education is required early enough to ensure appropriate behaviours are implemented and maintained. Inclusion of patients from ethnic minorities is particularly important, as South Asians are at increased risk of CVD [96]. How these barriers can be overcome will be an important component in the design of the intervention [93]. Only future implementation and evaluation of an education programme underpinned by these recommendations will allow us to judge how effective this process has been in providing a theoretical framework on which a novel education intervention may be constructed.

### Table 2 Additional factors to consider in designing CVD education for people with RA

<table>
<thead>
<tr>
<th>Question</th>
<th>Consideration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the intervention available at different times of the day to be</td>
<td>convenient for those who are retired and those with small children?</td>
</tr>
<tr>
<td>held in a convenient venue for participants, which is accessible by the</td>
<td>Is the educational intervention held in a convenient venue for</td>
</tr>
<tr>
<td>disabled?</td>
<td>participants, which is accessible by the disabled?</td>
</tr>
<tr>
<td>Is the written material suitable for the reading age of the target</td>
<td>Have financial costs to the participants attending been minimized?</td>
</tr>
<tr>
<td>audience (many RA patients have limited health literacy [94])?</td>
<td></td>
</tr>
<tr>
<td>Is the educational intervention given to H.J. (grant number: 17883) and</td>
<td>Funding: This work was supported by an Arthritis Research UK Educational</td>
</tr>
<tr>
<td>an infrastructure support grant from Arthritis Research UK given to</td>
<td>Research Fellowship given to H.J. (grant number: 17883) and an infrastructure</td>
</tr>
<tr>
<td>the Dudley Group of Hospitals, NHS Trust, Department of Rheumatology?</td>
<td>support grant from Arthritis Research UK given to the Dudley Group of</td>
</tr>
<tr>
<td>(grant number: 17682).</td>
<td>Hospitals, NHS Trust, Department of Rheumatology (grant number: 17682).</td>
</tr>
<tr>
<td>Is the reading material available in large text, Braille and appropriate</td>
<td>Acknowledgements: The authors have declared no conflicts of interest.</td>
</tr>
<tr>
<td>ethnic languages?</td>
<td></td>
</tr>
</tbody>
</table>
| When is the appropriate time, in relation to participants’ disease      | References


