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This report

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Abstract

Educational interventions to improve quality of life in people with chronic inflammatory skin diseases: systematic reviews of clinical effectiveness and cost-effectiveness

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Background: Inflammatory skin diseases include a broad range of disorders. For some people, these conditions lead to psychological comorbidities and reduced quality of life (QoL). Patient education is recommended in the management of these conditions and may improve QoL.

Objectives: To assess the clinical effectiveness and cost-effectiveness of educational interventions to improve health-related quality of life (HRQoL) in people with chronic inflammatory skin diseases.

Data sources: Twelve electronic bibliographic databases, including The Cochrane Library, MEDLINE and EMBASE, were searched to July 2014. Bibliographies of retrieved papers were searched and an Advisory Group contacted.

Review methods: Systematic reviews were conducted following standard methodologies. Clinical effectiveness studies were included if they were undertaken in people with a chronic inflammatory skin condition. Educational interventions that aimed to, or could, improve HRQoL were eligible. Studies were required to measure HRQoL, and other outcomes such as disease severity were also included. Randomised controlled trials (RCTs) or controlled clinical trials were eligible. For the review of cost-effectiveness, studies were eligible if they were full economic evaluations, cost–consequence or cost analyses.

Results: Seven RCTs were included in the review of clinical effectiveness. Two RCTs focused on children with eczema and their carers. Five RCTs were in adults. Of these, two were of people with psoriasis, one was of people with acne and two were of people with a range of conditions. There were few similarities in the interventions (e.g. the delivery mode, the topics covered, the duration of the education), which precluded any quantitative synthesis. Follow-up ranged from 4 weeks to 12 months, samples sizes were generally small and, overall, the study quality was poor. There appeared to be positive effects on HRQoL in participants with psoriasis in one trial, but no difference between groups in another trial in which participants had less severe psoriasis. Carers of children in one RCT of eczema showed improvement in HRQoL; however, in a RCT evaluating a website intervention there were no demonstrable effects on HRQoL. Neither the RCT in those adults with acne nor the RCT in those adults with mixed skin conditions demonstrated an effect on HRQoL. One RCT reported subgroups with atopic dermatitis or psoriasis and education was effective for psoriasis only. Other outcomes also showed mixed results. It is unclear how clinically meaningful any of the observed improvements are. Three studies of cost-effectiveness were included. The interventions, comparators and populations varied across the studies and, overall, the studies provided limited information on cost-effectiveness. The studies did provide detailed information on resources and costs that could be useful to inform a future cost-effectiveness evaluation in this area.

Limitations: The application of the inclusion criterion around whether the interventions were aimed at improving HRQoL or the inference that they could improve HRQoL was difficult as information was rarely reported.

Conclusions: There is uncertainty regarding whether educational interventions addressing issues that could improve HRQoL in people with chronic skin conditions are effective. Tentative conclusions about the best approach to delivering these kinds of interventions are that face-to-face, group, sessions may be beneficial; however, text messages may also be effective. Delivery over a period of time and by a multidisciplinary team may also be associated with positive outcomes. There is uncertainty over whether or not educational interventions are cost-effective.

Study registration: This study is registered as PROSPERO CRD42014007426.

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ACS	Adjustment to Chronic Skin Diseases Questionnaire
BDI	Beck Depression Inventory
BSA	body surface area
CCT	controlled clinical trial
CDLQI	Children's Dermatology Life Quality Index
CI	confidence interval
CSQ-8	Client Satisfaction Questionnaire-8
DESMOND	Diabetes Education and Self Management for ONgoing and Diagnosed
DFI	Dermatitis Family Impact
DLQI	Dermatology Life Quality Index
DVD	digital versatile disc
EASI	Eczema Area and Severity Index
EQ-5D™	European Quality of Life-5 Dimensions
ESP	educational support programme
HCP	health-care professional
HRQoL	health-related quality of life
IC	integrated care
ICER	incremental cost-effectiveness ratio
ICQ	Itching Cognitions Questionnaire
IDQoL	Infants' Dermatitis Quality of Life Index
ITT	intention to treat
JUCKKI	Juckreiz-Kognitions-Fragebogen Kinder
JUCKKU	Juckreiz-Kognitions-Fragebogen Jugendliche
MRC	Medical Research Council
NICE	National Institute for Health and Care Excellence
NP	nurse practitioner
OTC	over the counter
PASI	Psoriasis Area Severity Index
PDI	Psoriasis Disability Index
PETS	Problematic Experiences of Therapy Scale
PGA	physician's global assessment
POEM	Patient-Oriented Eczema Measure
QALY	quality-adjusted life-year
QoL	quality of life
QoLIAD	Quality of Life Index for Atopic Dermatitis
QPCAD	Quality of life in Primary Caregivers of children with Atopic Dermatitis
RCT	randomised controlled trial
SAPASI	Self-Administered Psoriasis Area Severity Index
SCORAD	SCORing Atopic Dermatitis
SD	standard deviation
SF-36	Short Form questionnaire-36 items
SIGN	Scottish Intercollegiate Guidelines Network
SMS	short message service
SPaCE	Supporting Parents and Carers of Children with Eczema
VAS	visual analogue scale
WHOQOL-26	World Health Organization Quality of Life-26 items

Plain English summary

A number of different skin conditions, such as eczema and psoriasis, are experienced by large numbers of people. Symptoms include itching and dry skin and, for some, quality of life (QoL) is reduced.

Educational interventions may be able to improve the QoL of people with these conditions. We reviewed available studies of educational interventions to improve QoL in people with these skin diseases. We included only studies with the most rigorous study design. Seven studies were included, with few similarities between them. Education appears to show some beneficial effect on QoL in psoriasis, although findings were mixed. QoL appeared to be improved in the carers of children with eczema in one study, but another study found no effect. There was no beneficial effect of education on QoL in a study of those with acne, or in a study that had populations with different itchy conditions.

We also considered studies investigating cost-effectiveness. There were differences in the interventions and comparators, and no studies reported QoL in a format that could be used in policy-making. It is uncertain whether educational interventions are cost-effective in improving QoL in those with chronic skin diseases.

Results suggest that there is uncertainty over whether or not these interventions are effective in improving QoL. The best approach to delivering these kinds of interventions may be face-to-face, group sessions; however, in some contexts, text messages may also be effective. Our report makes recommendations for future research.

Scientific summary

Background

Inflammatory skin diseases include a broad range of disorders of the skin. The most commonly recorded conditions are eczema, psoriasis and acne. People with chronic inflammatory skin diseases experience symptoms including itching, dry skin and changes in skin appearance to varying degrees of severity and bodily involvement. For some people, these conditions lead to high levels of psychological comorbidities and reduced quality of life (QoL). Patient education – typically defined as providing patients with information about, and training in, skills for managing their condition – is a recommended part of the management of chronic inflammatory skin conditions and may improve QoL. As part of these interventions, patients are often provided with information about their condition and the use of treatments. However, it has been suggested that the inclusion of additional elements in these interventions that specifically address issues related to poor QoL may enhance the impact of educational interventions on QoL. Although such interventions are available to some people with these conditions, their clinical effectiveness and cost-effectiveness is unclear.

Objectives

To undertake systematic reviews of the clinical effectiveness and cost-effectiveness of educational interventions for improving health-related quality of life (HRQoL) in people with chronic inflammatory skin diseases and to make recommendations for future research.

Methods

Electronic bibliographic resources, including MEDLINE, EMBASE, The Cochrane Library, Cumulative Index to Nursing and Allied Health Literature, and PsycINFO, were searched for published studies from inception to July 2014 for English language articles. Bibliographies of included articles and systematic reviews were also searched for additional studies. An Advisory Group was contacted to identify additional published and unpublished evidence.

Study selection

Titles and abstracts were independently screened for eligibility by two reviewers. Inclusion criteria were applied to full texts by one reviewer and checked by a second reviewer. Inclusion criteria were as follows:

- Population: adults, young people and children with a chronic inflammatory skin condition and/or their carers.
- Intervention: educational interventions that either specifically aim to improve HRQoL or could improve HRQoL.
- Comparators: any comparator was eligible.
- Outcomes: only studies that measured HRQoL as an outcome, using a validated measure, were included. Data were also extracted on outcomes, including measures of disease severity, disease control and scratching behaviour. Patient-assessed subjective outcome measures were included if assessed by validated tools.

- Studies were included in the systematic review of clinical effectiveness if they were randomised controlled trials (RCTs). If no RCT evidence was available, prospective trials with one or more concurrent control groups were eligible.
- Studies were included in the systematic review of cost-effectiveness if they were full economic evaluations (cost-effectiveness, cost–utility or cost–benefit analyses), cost–consequence analyses or cost analyses.

Full-text papers were included only if they reported results in sufficient detail. Abstracts or conference presentations were eligible for inclusion only if sufficient details of methods and results were presented.

Data extraction and quality assessment

Data extraction and quality assessment were undertaken by one reviewer and checked by a second reviewer. Differences in opinion were resolved by discussion at each stage.

Data synthesis

Data were synthesised through narrative reviews with tabulation of the results of included studies.

Results

Clinical effectiveness

From 2628 references, 63 were retrieved for consideration. Seven RCTs were included (one additional study, a controlled clinical trial, met the inclusion criteria, but was not reviewed, in line with the review protocol). Two RCTs assessed the effects of educational interventions for adults with psoriasis, one RCT assessed an education intervention for women with acne and two RCTs assessed the effects of educational interventions in children with eczema and/or their carers. Two further RCTs focused on adults with mixed skin conditions, one on those a range of pruritic skin conditions and the second on those with either psoriasis or eczema (and results for these subgroups were provided). There were few similarities between studies in terms of the interventions. The delivery mode (e.g. group or individual; face to face, online or via text messaging), the topics covered, the provider of the education, and the duration and intensity of the education differed between studies. There were also few similarities in the choices of outcome measures employed, although all studies reported HRQoL, most often with the Dermatology Life Quality Index. Follow-up ranged from 4 weeks to 12 months. The quality of the included RCTs was generally poor. Sample sizes were generally small; in one study, there was a large sample size, but results were reported for a number of different, smaller, subgroups. Three studies were reported to be pilot studies. Only two studies were based in the UK and the findings of the majority of the trials were considered to be of limited generalisability to the UK.

Three RCTs found statistically significant improvements in HRQoL. In RCTs of participants with psoriasis, the effect of the educational interventions on HRQoL appeared to be positive in two trials (one was a subgroup) when this was measured at the end of the 3-month interventions, with positive effects on one of two HRQoL measures used persisting 6 months after the intervention in the one RCT with a longer-term follow-up. In a pilot RCT of participants with mild-to-moderate psoriasis there was no statistically significant impact on HRQoL at 6 weeks' follow-up. One RCT investigated the impact of an educational intervention on children and their carers and adolescents with eczema in three age-related subgroups. HRQoL appeared to be improved in the carers of children in two age groups (3 months to 7 years and 8–12 years). HRQoL was not measured in the adolescent group (participants or carers). Another RCT evaluating an educational website for carers of children aged up to 5 years with eczema found no effects on HRQoL. An additional RCT reported on a small subgroup of adults with eczema. In this trial, there were

no significant differences between those in the educational intervention group and those in the usual care control group. In one RCT of participants with acne the educational intervention did not demonstrate positive effects on HRQoL. In an educational intervention aimed at people with chronic pruritic skin diseases (including atopic dermatitis, psoriasis and chronic urticaria) the focus was to help participants cope with the associated itch of the condition. No benefit in terms of HRQoL was demonstrated at the 9-month follow-up period. Other outcomes reported in the included studies, such as disease severity outcomes, showed mixed results.

Cost-effectiveness

Three studies were included in the systematic review. Two were cost-effectiveness studies and one was a cost analysis. The nature of the interventions and comparators varied and the populations of interest across the included studies were children and adolescents in two studies and in adults in one study. None of the studies reported HRQoL in terms of quality-adjusted life-years (QALYs) gained. The two cost-effectiveness studies were based in the Netherlands and the cost analysis study was conducted in the UK. In general, the studies provided detailed information on the resources used and unit costs. Two of the three included studies provided resource use data that could be used to inform a future de novo cost-effectiveness model. The UK-based cost analysis was conducted from the NHS perspective; however, details of data inputs in terms of QALYs and costs were not reported. It is therefore difficult to draw conclusions on the results of the analysis.

Owing to the limitations in the included studies, it is uncertain whether educational interventions are cost-effective in the treatment of chronic inflammatory skin diseases.

To inform future modelling in this area, these three included studies, and four additional studies that had been retrieved for screening for inclusion into the systematic review of cost-effectiveness but not included, were scrutinised in more detail to determine the resources and costs used. There was heterogeneity between these studies; however, the range of relevant resources can be grouped under three broad categories – interventional, service use, non-service use – and these are discussed. A second area of focus from the overview of these seven studies to inform future modelling was in terms of the choice of outcomes. Again, heterogeneity between the studies meant that making conclusions was difficult; however, the report makes recommendations for the choice of outcome measure in any future studies that include the use of preference-based generic measures of HRQoL or disease-specific measures of HRQoL that can be mapped to generic measures.

Discussion

Commonalities between effective interventions were a long delivery period (ranging from 6 weeks to 3 months) and delivery by a multidisciplinary team; however, this was not tested in any way and it remains uncertain from the current evidence base which elements of educational interventions may be associated with improvements in HRQoL. Our review has identified a number of gaps in the clinical effectiveness and cost-effectiveness evidence base. In particular, no studies focused on the less common skin conditions. In addition, approximately one-third of the evidence that met our eligibility criteria did not provide adequate information about the results and could not be included. Few of the studies that were included reported adequate details of the intervention, such as the aim or the theoretical basis. This indicates the need for better reporting in this research area.

Strengths of our research are that the systematic reviews were conducted in line with good practice following a published protocol. A limitation to the review is that the application of the inclusion criterion around whether the interventions were aimed at improving HRQoL, or the inference that they could improve HRQoL, was rarely reported.

Conclusions

Overall, there is uncertainty over whether or not educational interventions addressing issues that could improve HRQoL in people with chronic inflammatory skin conditions are effective. Tentative conclusions about the best approach to delivering these kinds of interventions are that face-to-face, group sessions may be beneficial; however, evidence also suggests that text messages may be effective. There are some indications that delivery over a period ranging from 6 weeks to 3 months and delivery by a multidisciplinary team may also be associated with positive outcomes. Based on available evidence, there is uncertainty over whether or not educational interventions are cost-effective in terms of improving HRQoL. Priorities for research are high-quality, adequately powered RCTs that evaluate theory-based interventions and include an adequate long-term follow-up in all chronic inflammatory skin conditions. Ideally, such RCTs should include an economic evaluation and a process evaluation.

Funding

Funding for this study was provided by the Health Technology Assessment programme of the National Institute for Health Research.

Chapter 1 Background

Description of the underlying health problem

Chronic inflammatory skin diseases are commonly encountered conditions in dermatology. They include commonly reported conditions, such as eczema, psoriasis and acne, which are associated with skin inflammation. This inflammation can range in severity from mild to severe and, in some patients, can have associated health complications. The focus of this report is on chronic inflammatory skin diseases that have lasted for at least 12 weeks and may have caused significant tissue destruction and, potentially, impacted the individual significantly. Our initial scoping of this project identified a number of conditions that come under the term chronic inflammatory skin diseases; however, only the most commonly studied in educational intervention studies are discussed in the background of this report.

Classification of disease

Dermatologists in the UK use a disease classification based on aetiology and anatomical site which has been developed by the British Association of Dermatologists.[1] This is a very detailed and comprehensive system used to obtain information about skin diseases and, as such, has not been described here. Common types of chronic inflammatory skin conditions include eczema (a general term covering a range of conditions, which may or may not be atopic), psoriasis and acne vulgaris (commonly known as acne). There is also a wide range of other types of skin condition such as rosacea, lichen planus, hidradenitis suppurativa, cutaneous lupus erythematosus, lichen sclerosus and seborroeic dermatitis. The working definitions, causes and epidemiology for the three most common conditions are summarised below.

Eczema

Eczema (of which atopic dermatitis eczema is the most common type) is a common skin condition that presents as red, dry, itchy skin, often on the elbow, knee or face, but sometimes all over the body.[2,3] Often associated with atopy (a predisposition to developing hypersensitivity reactions), the predominant symptom is itching.[4] In some people, the skin can weep or blister and become thickened. In the chronic form of the condition there can also be altered skin pigmentation and exaggerated surface markings.[2] Eczema can start at any age, but is most common in children. It is considered to be caused by a combination of genetic and environmental factors.[2] Concurrent illness and psychological factors such as stress can also function as a trigger.[5] For the purpose of this report, we refer to the general term ‘eczema’ unless an individual study specifies that the condition is atopic dermatitis or atopic eczema.

Psoriasis

Psoriasis is a skin disease that is typically characterised by pink or red lesions which are covered with scales.[6] These lesions are well delineated and can vary in extent and shape, and the severity of psoriasis typically follows a relapsing and remitting course.[6,7] The most common form, plaque psoriasis, occurs in approximately 90% of people with the condition. Other types include guttate psoriasis and pustular forms.[7] The cause of psoriasis is thought to be a complex interplay between genetic and environmental factors, with the immune system having an important role in the disease process.[8]

Acne vulgaris

Acne vulgaris (commonly known as acne) is a common inflammatory skin disease, which usually starts during puberty. It is characterised by a combination of comedones (blackheads and whiteheads), papules, pustules, nodules and scarring.[9] Genetic and hormonal causes are some of the key factors that trigger the condition.[10]

Epidemiology

Scholfied and colleagues[1] undertook a health-care needs assessment in 2009 and reported that 55% of the overall population in the UK have had some form of skin disease, and that in previous studies 23–33% of people have had a skin problem that could benefit from medical care (i.e. a moderate or severe condition). This section presents a brief overview of the incidence and prevalence across the different inflammatory skin conditions discussed above.

Eczema

A recent review noted that, although there are several studies considering the epidemiology of atopic eczema in children, a wide range of prevalence estimates are available given differences in study populations, the definitions used and the survey methods applied.[5] It is generally estimated that atopic eczema affects one in every five children in the UK at some stage[3] and it is the most commonly diagnosed dermatological disorder in children and adolescents.[11] The prevalence of atopic eczema appears to be increasing, although the reasons for this are unclear.[2,5]

A recent guideline[5] reported an increasing trend in point prevalence of the skin disease in the 1990s and early 2000s. Numerous studies, mostly of low-level evidence, were reviewed. In this overview, we have focused on those from the UK where available. The point prevalence rates differed between the studies; in five UK-based studies, the guideline reports that this ranged from 5.9% in 3- to 11-year olds to 14.2% in 4-year olds. Trends in point prevalence for those who had ever had eczema increased.[5]

One-year period prevalence was reported in two studies; this was reported as 11.5% in 3- to 11-year olds[12] and 16.5% in 1- to 5-year olds.[13] In a birth cohort study that followed children until the age of 10 years, it was reported that the period prevalence of atopic eczema was 9.6% at 1 year of age, which increased up to 10.3% at 2 years of age; 11.9% at 4 years and 14.3% at 10 years.[14] In one UK study, period prevalence rates were also reported; these were highest, at 25.6%, for children aged 6–18 months, followed by those aged 18–23 months at 23.2%, those aged between 0–6 months at 21%, and those aged 30–42 months at 19.9%.[5,15]

The prevalence of atopic eczema varies across the world. A recent systematic review of incidence and prevalence studies published between 1990 and 2010 included 69 studies. Evidence suggested that the prevalence is increasing in many regions of the world, including the UK.[16]

In one UK study reviewed in the recent guideline, the incidence of atopic eczema in children aged up to 2.5 years born in 1991 and 1992 was found to be highest at 21% during the first 6 months of life, declining to 11.2% by the age of 6–18 months, and to 3.8% by the age of 30 months.[15] In another birth cohort study set up in 1982–4 to monitor the natural history of allergic diseases for 23 years, eczema usually remitted between 1 and 7 years of age; the prevalence of eczema was more likely to persist if a child was atopic, especially in girls.[4]

Psoriasis

Psoriasis is estimated to affect around 1.3–2.2% of the population in the UK. It occurs equally in men and women, at any age, although it is uncommon in children, and can persist for up to 50 years.[6,7,17]

Gelfand and colleagues[18] estimated the overall prevalence of psoriasis in the UK from 1987 to 2002 to be 1.5%, with the prevalence increasing more rapidly in young female patients compared with their male counterparts. As the population ages, the prevalence is similar between sexes. Furthermore, the prevalence declines significantly in people aged 70 years and above, regardless of sex. In studies reviewed in a recent systematic review,[17] similar trends were noted. Another study by Seminara and colleagues[19] showed an overall prevalence of 1.9% based on the electronic records of The Health Improvement Network (THIN) database, which contained medical records of around 4.6% of the UK's total population. The database presented prevalence data based on age groups and sex. Females had a slightly higher prevalence rate compared with males (1.9% vs. 1.8%).[19] *Table 1* presents the UK-based prevalence rates reported by Gelfand and colleagues[18] and Seminara and colleagues.[19]

TABLE 1 Prevalence of psoriasis in the General Practice Research Database by age group and sex (1987 to 2002) and in THIN database by age

GPRD by age group and sex (1987–2002)											
	Age group (years)										
Prevalence/10,000	0–9	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	≥ 90	Total
Male	48.6	118.6	149.1	186.6	219.1	232.3	226.3	168.4	89.6	46.4	152.7
Female	61.8	154.8	152.6	169.8	187.9	213.7	225.7	156.6	87.9	47.6	151.4
Total	55.0	137.4	151.0	178.0	203.4	222.8	226.0	161.4	88.4	47.3	152.0
THIN database by age[19]											
	Age group (years)										
Prevalence (%)	< 10	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	> 90	
	0.1	0.6	1.5	1.7	2.1	2.5	3.0	3.0	2.6	1.4	

GPRD, General Practice Research Database.
Sources: GPRD by age group and sex (1987–2002);[18] THIN database by age.[19]

Recent estimates from a 2013 systematic review of global epidemiology of psoriasis[17] found that the UK had a prevalence of between 1% and 3% (three studies) in adults. The review authors state that these rates were lower than estimates from other countries.[17] No UK-specific studies were identified in children, but the European prevalence rates were reported to be up to 0.71%.[17] A recent Norwegian population-based cohort study, following patients for 30 years, showed that the self-reported lifetime prevalence rose from 4.8% in 1979–80 to 11.4% in 2007–8.[20]

No studies on the UK incidence of psoriasis specifically in children or adults were identified in the 2013 systematic review.[17] One UK study was identified that reported the combined incidence in all ages. The reported incidence rate was 140/100,000 person years.[21] A retrospective cohort study from the UK conducted in 2008 has since reported results that indicate an incidence of psoriasis in adults of 28/100,000 person years.[22]

Acne

Epidemiological studies of acne show broad ranges of incidence and prevalence.[23] Acne affects up to 80% of people at some point in their lives, predominantly between the ages of 15 and 17 years.[24] Chronic acne can persist, however, into adulthood,[24] and approximately 14% of people with acne are thought to consult their general practitioner (GP) (3.5 million visits annually).[9] A study suggests that this condition is prevalent in up to 50% of 14- to 16-year-olds in a community sample, and up to 30% of these teenagers had acne of sufficient severity to require medical treatment.[25] The prevalence of moderate-to-severe acne is likely to increase with age during puberty.[23] The incidence of the condition is similar in both men and women, with the numbers peaking in adults up to 25 years of age.[25]

Other conditions

Other chronic inflammatory skin conditions include rosacea, lichen planus, hidradenitis suppurativa, cutaneous lupus erythematosus, lichen sclerosus and seborrhoeic dermatitis. Rosacea may affect up to 1 in 10 people; however, epidemiological data are scarce and controversial. The reported prevalence rates have ranged from 0.09% to 22% in the UK.[26] Lichen planus is reported to affect 1–2% of the population. Although the condition can occur at any age, it typically arises in females of middle age. A study reported that the condition primarily occurred in women aged over 45 years, with an annual incidence of 27/100,000 people in 2003. Hidradenitis suppurativa may have a prevalence of approximately 1% in the UK and is more prevalent in females than males.[27] Cutaneous lupus erythematosus is an uncommon autoimmune disorder, which has a variety of types. Those most commonly affected are women aged 20 to 50 years, although

children, the elderly and males may also be affected.[28] Lichen sclerosus is a lymphocyte-mediated dermatosis that occurs in the genital skin and affects both sexes. The incidence is thought to be higher in females (peak ages of presentation are in prepubertal girls and postmenopausal women) than males.[29] Seborrhoeic dermatitis is a common form of dermatitis affecting areas rich in sebaceous glands such as the face, scalp and centre of the chest.[30] It is thought to affect between 3% and 5% of the global population and is more common in younger adults.

Impact of the diseases

People with inflammatory skin conditions can experience symptoms including itching (and sometimes pain), dry skin and changes in skin appearance, to varying degrees of severity and bodily involvement.[5,7,29] The symptoms can be distressing for patients and their carers[31,32] and, in some cases, can lead to functional impairments, particularly when conditions affect the face, genitalia, hands and feet.[7] In adults, reduced levels of employment and income have been noted in psoriasis[7] and more severe acne vulgaris.[9] Patients can feel stigmatised by their condition owing to visible skin symptoms and changes in appearance,[31,33,34] which may contribute to distress[35] and impact on their social interactions,[33,34,36] normal activities (e.g. going to a public swimming pool or to the hairdressers) and relationships with people, including sexual relationships.[34] Sleep quality can also be affected owing to itching and scratching which can be particularly intense at night, and the sleep of carers can also be disrupted through dealing with symptoms at night.[31]

Chronic inflammatory skin conditions are associated with high levels of psychological comorbidities, including depression and anxiety,[31,35,37–39] and reduced health-related quality of life (HRQoL),[9,33,39,40] which does not always correlate with disease severity.[41–43] Psychological difficulties and stress, along with symptoms (such as itching), undergoing treatment and concerns about appearance may negatively impact patients' HRQoL.[33,39,40] Self-managing a long-term skin condition, with a relapsing and remitting course, is demanding for patients and their carers, and patients may feel that they lack control owing to the unpredictability of the disease on a weekly, or even daily, basis.[31] Poor psychological health can lead to a vicious cycle in patients where symptoms can be exacerbated by stress[44] and reduced HRQoL may lead to less adherence to treatment regimens, reducing the effectiveness of treatment and resulting in greater use of health-care resources.[45]

HRQoL is a commonly used outcome measure in health care to evaluate the impact of disease on patients' lives. It is defined as a person's subjective experience and perception of the impact that their health status has on their physical, psychological and social functioning.[46,47] HRQoL instruments measure various dimensions of these three domains, including physical symptoms, social activity, mental health, ability to carry out normal activities, life satisfaction and perceived health status,[34,46,48] although the specific dimensions measured vary according to the instrument used.[48] HRQoL is a distinct concept from psychological distress (e.g. depression or anxiety), although, as described above, experiencing psychological distress is associated with poorer HRQoL in chronic inflammatory skin conditions.

Measurement of disease

A wide range of validated instruments are used to measure HRQoL and disease severity in patients with chronic inflammatory skin diseases. The Dermatology Life Quality Index (DLQI) is one of the most frequently used instruments in studies in dermatology. It has been used extensively in studies of over 40 different skin conditions, although the most common conditions it has been used for are psoriasis, atopic eczema and acne.[49] Other common measures include the Infants' Dermatitis Quality of Life Index (IDQoL), which is aimed at children aged 0–4 years old,[50] the Children's Dermatology Life Quality Index (CDLQI), which is aimed at children aged 4–16 years, the Quality of life in Primary Caregivers of children with Atopic Dermatitis (QPCAD), and the World Health Organization Quality of Life-26 items (WHOQOL-26). These instruments cover a range of dimensions of HRQoL, including the severity of the condition, quality of sleep, coping, adherence with

treatment, satisfaction and the impacts on family members, partners or carers. Some of the instruments that have been developed specifically for use in children (such as CDLQI and Quality of Life in Children Aged 14–16 Years) use proxy judgements made by someone else, such as a parent or carer.

Some of the common measures of disease severity include the Psoriasis Area Severity Index (PASI), the Self-Administered Psoriasis Area Severity Index (SAPASI), the Patient-Oriented Eczema Measure (POEM), the SCORing Atopic Dermatitis (SCORAD) and the Psoriasis Disability Index (PDI).

Appendix 1 gives an overview of some of these common instruments, including definitions of clinically meaningful changes where this is known (that is, the degree of change that is considered to be of benefit to the patient and their disease management, regardless of whether the change is statistically significant[46]).

Impact on the NHS

The need to improve patients' HRQoL and for clinicians to take a holistic approach to managing patients' skin conditions has been advocated in the research literature[34] and clinical guidelines.[5,7] This might benefit both patients and the NHS through reduced use of health-care resources. It was estimated (using 2005/6 data) that 2.23% of the total NHS expenditure (£140M) was spent on diseases of the skin and subcutaneous diseases.[1] This included prescribing costs, outpatient and inpatient costs, but not primary care consultations, which could add another £395M.[1] In a national statistical report published by the Health and Social Care Information Centre[51] on prescriptions dispensed in the community in England from 2003–13, the costs of emollient prescriptions in the year 2013 were estimated at £105,000, although these were prescribed for a range of conditions and not just for inflammatory skin diseases.

A UK-based study[1] estimated the direct costs of skin diseases to the individual and to the NHS. It reported a year-on-year increase in over-the-counter (OTC) sales of the skin disease treatments in the UK from 2001 to 2007. The OTC sales for such conditions were £413.9M in 2007; this was 18% of the total OTC sales. Of the total prescribing budget, 2.85% (£237.7M) was for prescribing costs for skin disease in England in 2007. The study reported an estimated cost of about £395M per year, or 4.4% of the General Medical Services budget for GP consultations in England and Wales. In the year 2005/6, the overall direct costs (including medical care and products) of providing care for people with skin diseases was reported as about £1819M in England and Wales. It was observed that the direct cost of skin disease to the NHS was relatively low despite the conditions being very common.[1]

Current service provision

A brief overview of the management of different chronic inflammatory skin diseases with relevance to the UK is discussed in the context of the relevant national guidelines as outlined below, including the role of education in the treatment of these conditions. Educational interventions are typically defined as providing patients with information about, and training in, skills for managing their condition.[52] In its simplest sense, education can be thought of as the provision of information that is intended to influence a specified outcome. In general, educational interventions involve encounters between teachers and learners for one or more of the following purposes: to raise awareness, to enhance or improve knowledge, or to change behaviour.[53]

Relevant national guidelines

Of all the chronic inflammatory skin diseases prevalent in the UK, national guidelines have been published on only two of the conditions: atopic eczema[5,54] and psoriasis.[7] In addition, National Institute for Health and Care Excellence (NICE) quality standards for psoriasis and atopic eczema are available and these provide quality statements describing best clinical practice, including pathways for assessment and treatment. The details of the guidelines are presented below.

Atopic eczema

Atopic eczema in children: management of atopic eczema in children from birth up to the age of 12 years. NICE Clinical guidelines, CG57. Issue date: December 2007.[5] In addition to covering the management of atopic eczema in children from birth up to 12 years, this guideline provides guidance on diagnosis and assessment, management, and providing information and education for children and their parents and carers.

Management of atopic eczema in primary care: a national clinical guideline. March 2011. Scottish Intercollegiate Guidelines Network (SIGN) guideline for atopic eczema.[54] Similarly to the NICE clinical guideline, the SIGN guideline also provides recommendations based on current evidence for the management of atopic eczema in children as well as adults in primary care in Scotland.

Psoriasis

The assessment and management of psoriasis. NICE Clinical guidelines, CG153. Issue date: October 2012.[7] This guideline provides evidence-based advice on the assessment and management of psoriasis in adults, young people and children.

Management of disease

A range of treatment options are available for inflammatory skin diseases and current recommendations for best practice are summarised here. Although these vary from condition to condition, they typically fall into topical treatments, which are applied directly to the skin; systemic pharmacological treatments (intravenous, subcutaneous or oral); bandaging techniques; and, for some conditions, phototherapy.[5,7] In addition, patients are encouraged to practise self-care (such as using emollients as indicated, avoiding known triggers) to minimise environmental triggers of their disease, to monitor their condition, maintain adherence to treatments, and to seek support groups. Education is an important way to help individuals manage the symptoms of chronic diseases[55] and, in recent years, educational interventions for people with inflammatory skin disease have been seen as a useful adjunct to usual medical care with topical and pharmacological therapies.

Atopic eczema

The NICE clinical guideline on atopic eczema[5] provides guidance on management of the condition during and between flares, in children from birth up to the age of 12 years. The guideline suggests that a holistic approach should be adopted by health-care professionals (HCPs) when assessing a child's atopic eczema. Potential trigger factors, such as irritants (e.g. soaps and detergents), skin infections, contact allergens, food allergens and inhalant allergens should be sought by the HCPs while clinically assessing children with the condition. With respect to treatment of the condition, NICE recommend the use of a stepped approach whereby the treatment step was tailored to the severity of the atopic eczema. Emollients are recommended to form the basis of atopic eczema management.

The current NICE guideline[5] states that parents and carers, along with the children with atopic eczema, should be offered information on how to recognise the symptoms and signs of bacterial infection and how to access appropriate treatment when a child's atopic eczema becomes infected. Furthermore, children, along with their parents and/or carers, should be educated about the health condition and its treatment. In addition, HCPs should provide both verbal and written information, along with practical demonstrations on quantity and frequency of the treatment to use. NICE recommends that the information should be tailored to suit an individual child's cultural practice relating to skin and the way they bathe. The NICE guideline acknowledges the impact that the disease can have on a patient's HRQoL and makes a recommendation that the effect of the condition on HRQoL should be taken into account at consultations and treatment decisions.[5] Future research recommendations were advocated by NICE to assess the clinical effectiveness and cost-effectiveness of different models of educational programmes in the management of atopic eczema in children, as lack of education about therapy could lead to poor adherence, thereby leading to treatment failure.

In addition to the above guideline, NICE Quality Standards 44[56] include a reference to the provision of education in Statement 2, that children with atopic eczema should be treated using a stepped-care plan on the basis of the recorded disease severity and that this care plan should be supported by education. The NICE pathways for atopic eczema state that quality of life (QoL) should be assessed by practitioners when making treatment decisions.

The SIGN guideline[54] identifies a Cochrane review that examined the effect of parent educational interventions on severity of eczema in children. This review showed heterogeneity with respect to the format, content and settings of the interventions and, although two of the four included studies found the intervention to be effective in reducing clinical severity scores, no recommendations in the SIGN guideline were made owing to the lack of consistency seen in the trials included.[54]

The SIGN guideline provides a checklist of information that patients and carers should have access to at the different stages of diagnosis and treatment. These largely focus on explanation of the condition, what treatment options there are, how to self-manage their conditions and look for changes in their condition. There is some limited reference to providing patients and carers with the contact details of organisations that may be able to provide advice and support. There is no specific advice regarding any educational interventions.[54]

There are no published audits of how well the national guidelines are being adhered to in clinical practice with regard to education. The general impression of our Advisory Group was that this is variable.

From a patient and carer perspective, the need to establish which is the most effective route to manage eczema has been identified by the James Lind Alliance Eczema Priority Setting Partnership.[57] One of the top research priorities for HCPs identified by the group is to establish which of the following management approaches is the most effective: education programmes, GP care, nurse-led care, dermatologist-led care or multidisciplinary care.

Psoriasis

The NICE guideline on psoriasis[7,58] provides recommendations on the management of all types of psoriasis across all age groups: children aged up to 12 years, young people and adults aged 18 years and above.

The NICE guideline[7] recommends that for people with any type of psoriasis, disease severity should be assessed, along with the impact of disease on physical, psychological and social well-being, and whether they have psoriatic arthritis or presence of comorbidities. The guideline states reasons for referral to a dermatology specialist for a number of reasons, including uncertainty over the diagnosis, severe psoriasis, psoriasis that cannot be controlled with topical therapy or psoriasis that has a major impact on a person's physical, psychological or social well-being.

It was recommended to discuss risk factors for cardiovascular comorbidities with people who have any type of psoriasis and with their families and/or carers.

With regard to treatment, practical support and advice about the use and application of topical treatments should be provided by trained and competent HCPs. For adults with trunk or limb psoriasis, NICE recommends the use of a potent corticosteroid applied once daily plus vitamin D or a vitamin D analogue applied once daily for up to 4 weeks as initial treatment. However, people with plaque or guttate-pattern psoriasis that cannot be treated with topical treatments alone should be offered narrowband ultraviolet B phototherapy two or three times a week depending on patient preference. Systemic non-biological therapy should be offered to people with any type of psoriasis if the disease cannot be controlled with topical therapies, if it has a significant impact on the patient in terms of physical, psychological or social well-being, or if it is associated with significant functional impairment.[7]

In citing the principles of care for patients with the condition and their families or carers, the guideline recommends the provision of support and information to be provided to meet the requirements of each individual. Areas of focus for information should be an understanding of their diagnosis, the available treatments (including their safe and effective use), what the associated risk factors are, when and how to seek support, and information on strategies to deal with the impact on physical, psychological and social well-being.[7] The NICE guideline also recognises the potential impact on a patient's HRQoL and notes that HRQoL should be taken into account during patient consultations and when making treatment decisions. The NICE pathways for psoriasis state that psychological well-being should be assessed by practitioners at diagnosis and when assessing response to treatments.

Similarly to the situation with eczema guidelines, there are no published audits of how well the NICE psoriasis guideline is adhered to in clinical practice with regard to education. The Advisory Group to this review believed that adherence is currently variable.

Overall, although these guidelines for eczema and psoriasis outline to some extent where patient education, information and advice sit in clinical practice, the guidance tends to focus on education relating to patients' use of treatments, self-care and understanding of the disease. It is not currently clear where educational interventions that more directly address HRQoL could be placed in the clinical pathway, including which patient groups should be targeted for these kinds of interventions. The guidance also does not currently clearly state how any type of education is best provided in primary or secondary care, such as whether it should be provided in a structured, planned way or more informally by practitioners during routine medical consultations.

Description of the technology under assessment

As stated, educational interventions are typically defined as providing patients with information about and training in skills for managing their condition (see *Current service provision*).[52] People with chronic skin conditions and their carers have several educational needs. These include an understanding of the condition (typically chronic and relapsing, with no cure at present, but in general manageable), an opportunity to try treatments to find those that suit them best, reassurance that many treatments are generally safe and effective, guidance on how best to apply topical treatments, and motivation to continue treatment when the disease is in remission.[59] Educational interventions have traditionally been based on what health-care experts believed patients need to know about their conditions rather than patients' expressed needs.[60,61] Recently, however, there has been a movement in medicine towards greater patient involvement in treatment and patient-centred care.[62] A more patient-empowering subset of educational interventions are self-management educational interventions, which focus on enabling patients to develop problem-solving skills and teach patients actions that they can take to resolve issues (including emotional and psychosocial issues) relating to their condition when they arise.[52] Self-management educational interventions will often involve the creation of patient action plans[52] and represent a collaborative approach between HCPs and patients.[60] Patient activation is also an important part of promoting self-management in chronic diseases.[63] Patient activation is defined as the extent to which patients believe and have confidence that they can play an active part in managing their health and the extent to which they carry out and maintain activities which can positively impact their condition and health more broadly. Patient activation is associated with better QoL in patients in general[64] and potentially could be improved through patient education.

Educational interventions may be delivered in a variety of ways, may include a number of inter-related elements that either singly or together may bring about change in an outcome and some tailoring to individual patient or carers' needs, and therefore could be considered 'complex interventions'.[65] Medical Research Council (MRC) guidance on the development and evaluation of complex interventions emphasises the importance of early groundwork in developing an intervention.[65] This should include specification of a clear theoretical basis for the intervention that outlines its rationale and how it might bring about change in the outcomes of interest, drawing on available evidence and theoretical models.

This is because theory-based interventions tend to be more effective than those that are not theory-based. The MRC guidance additionally recommends carrying out research, such as qualitative work, with potential users, deliverers or creators of the intervention to supplement existing theory and evidence, if needed, to further inform intervention development. The guidance also recommends that systematic reviews of current evidence for the effectiveness of the intervention and pilot studies (e.g. to evaluate feasibility) are carried out.

As another consideration in intervention development and delivery, it is also recommended in the wider literature that educational interventions in dermatology should be sensitive to and take account of patients' social and cultural backgrounds, including their education level, literacy and preferred language, and their favoured learning methods.[66,67] Some degree of tailoring of the intervention to individual needs might also be beneficial, as it has been found in health care generally that tailored interventions result in better outcomes than more generic ones.[68] Consideration might also be given to the characteristics of the intervention deliverer, because it has been suggested that interventions delivered by people who have similar characteristics to the intervention participants (such as similar social and ethnic backgrounds) might be more effective than those delivered by people who differ to the participants.[70] Ideally, evaluations of complex interventions should include process evaluations to gain insight into contextual factors during intervention delivery that may impact its effectiveness.[65]

Research studies have investigated a wide variety of approaches for educating patients with chronic inflammatory skin diseases – mostly those with eczema and psoriasis, and, in some cases, their carers or families also.[2,36,55,70] The existing evidence for educational interventions in general shows variability in whether these interventions are effective in improving HRQoL, but some studies have shown positive effects.[55,60,71] A systematic review of educational interventions for children with eczema and their parents suggests that programmes for parents that are delivered by either a nurse or a multidisciplinary team may lead to improvements in infant and child HRQoL and disease severity.[71] However, there is currently little understanding overall about which elements of educational interventions make them effective in improving HRQoL and other outcomes.[60,61]

Our project Advisory Group of patients, HCPs and researchers indicated that educational interventions are generally not widely used in UK clinical practice to supplement medical treatment for patients with chronic inflammatory skin conditions. The Group suggested that education in primary care is especially limited and will generally involve verbal instructions on medication use, provision of information leaflets and sign-posting to other information sources. The Group stated that educational interventions are more commonplace in secondary care and are often nurse-led and more likely to be planned and structured. These tend to involve information giving and advice, combined with paper- or web-based information. The Group stated that, overall, educational interventions are not sufficiently individualised and the creation of action plans is rare.

As part of educational interventions, patients with chronic inflammatory skin conditions are often provided with information about their condition and the use of treatments. However, it has been suggested that the impact of standard education in dermatology on HRQoL could be enhanced by the additional inclusion of elements that address issues related to HRQoL. This review focuses on these additional elements as per the commissioning brief. Our Advisory Group was aware of only two UK educational programmes that specifically aim to improve HRQoL. One is The Eczema Education Programme,[72] which is a nurse-led programme delivered in the community and a specialised centre, which aims to improve parents' and carers' management of their child's eczema and parents' QoL. Elements covered in the programme include: understanding the disease, trigger factors and treatment; enhancing parental confidence in using treatments; action planning; and practical strategies for reducing itching and sleep problems. A before- and after- study evaluation of the programme[73] found improvements in infant, child and parental HRQoL, indicating that this may be a potentially successful approach. The other programme is an online intervention delivered through the Supporting Parents and Carers of Children with Eczema (SPaCE) website for carers of children with eczema.[74]

As with educational interventions in general, it is currently unclear which specific elements of these interventions may enhance HRQoL or what factors should be targeted to lead to improvements in HRQoL. Where complex educational interventions for chronic skin diseases involve multiple interacting components it may not be possible to identify which intervention components are responsible for observed effects on outcomes.[75,76] However, taxonomies of intervention techniques may be used, if appropriate, to map which intervention components may be related to improved outcomes.[69,77] In line with the MRC complex interventions guidance,[65] authors of some studies evaluating educational interventions for childhood eczema aimed at improving HRQoL have provided information on the underlying theory of change. These studies have hypothesised that educational interventions may improve HRQoL through enhancing the ability to manage the disease,[72,74,78] increasing self-efficacy[72,78] (that is, patients' or carers' confidence in their ability to successfully manage the condition[79]), promoting positive outcome beliefs and behavioural capability[78] and through the use of a number of other behaviour-change techniques.[74] As far as the authors of this review are aware, however, a clear theoretical basis for such interventions, including potential underlying mechanisms of change, has not been adequately outlined in the literature.

Based on opinion from our Advisory Group, addressing the following factors may differentiate educational interventions aimed at improving HRQoL from general educational interventions: unpredictability of the disease, interaction of multiple factors, impact of everyday life (e.g. family, tiredness and personal and work life) on the condition, mental well-being, negative thinking, coping skills (e.g. to cope with the disease or for managing psychological distress), problem-solving and action planning, and management of medication side effects. Additionally, the Group suggested that it may also be important to cover issues relating to parental guilt associated with passing on a genetic disease, and parents' or carers' empathy and appreciation of the impact of the disease. The Group also stated that educational interventions that improve condition management may also result in improvements in HRQoL and emphasised the potential importance of theory-based interventions in enhancing the effects of an intervention on this (e.g. through the incorporation of elements hypothesised to improve self-efficacy from social cognitive theory[80]). The literature shows that experiencing psychological difficulties, such as depression, is associated with poor HRQoL in chronic inflammatory skin diseases, among other factors,[33,39,40] and patients experiencing a high psychosocial burden from their disease have been identified as a (psoriasis) subgroup requiring additional support.[81] Based on a model of delivery of psychosocial interventions for skin conditions generally,[82] recommended nurse-delivered interventions for patients experiencing mild to moderate psychosocial distress include training in relaxation techniques, scratching habit reversal, problem solving and ways of camouflaging skin. It may be reasonable to assume that if these aspects are part of educational interventions, they may also help enhance HRQoL.

In light of limited existing evidence, there is uncertainty about best practice methods for educational interventions. Therefore, systematic reviews of clinical effectiveness as well as cost-effectiveness of educational interventions aimed at improving QoL in people with chronic inflammatory skin diseases are required.

Overall aims and objectives of assessment

The aim of this health technology assessment is to undertake systematic reviews of the clinical effectiveness and cost-effectiveness of educational interventions for people with chronic inflammatory skin diseases.

The main objectives are:

1. to conduct systematic reviews of the clinical effectiveness and cost-effectiveness of educational interventions for improving HRQoL in patients with chronic inflammatory skin diseases
2. if data permit, to adapt an existing economic model or construct a de novo model from the perspective of the UK NHS to estimate the cost-effectiveness of educational programmes for chronic inflammatory skin diseases
3. to identify deficiencies in current knowledge and to generate recommendations for future research.

Chapter 2 Methods

The a priori methods for systematically reviewing the evidence of clinical effectiveness and cost-effectiveness were described in a research protocol which was sent to our expert Advisory Group for comment. Although helpful comments were received relating to the general content of the research protocol, none of the comments identified specific problems with the methodology of the review. The methods outlined in the protocol are briefly summarised below.

During data extraction, we made a modification to our protocol to exclude post hoc those papers that otherwise met our inclusion criteria, but which did not report a study's results in sufficient detail to be informative in the review.

Identification of studies

A comprehensive search strategy was developed, tested and refined by an experienced information specialist. Separate searches were conducted to identify studies of clinical effectiveness and cost-effectiveness. Sources of information and search terms are provided in *Appendix 2*. The most recent searches were undertaken in July 2014.

Literature was sourced from 12 electronic databases, the bibliographies of included articles and relevant systematic reviews, and our expert Advisory Group were contacted to identify any additional studies. All databases were searched from inception and limited to the English language. The following electronic databases were searched:

- The Cochrane Library, including the Cochrane Database of Systematic Reviews (CDSR), the Cochrane Central Register of Controlled Trials, Centre for Reviews and Dissemination (University of York) Database of Abstracts of Reviews of Effectiveness (DARE), the NHS Economic Evaluation Database (NHS EED) and the Health Technology Assessment (HTA) database
- MEDLINE (Ovid)
- EMBASE (Ovid)
- MEDLINE In-Process & Other Non-Indexed Citations (Ovid)
- Cumulative Index to Nursing and Allied Health Literature (CINAHL) Plus with full text (EBSCO*host*)
- PsycINFO
- Web of Science: Science Citation Index Expanded (SCIE) and Conference Proceedings Citation Index – Science (CPCI) (ISI Web of Knowledge)
- Global Resource for Eczema Trials (GREAT) database (University of Nottingham).

A comprehensive database of relevant published and unpublished articles was constructed using Reference Manager (Thomson ReseachSoft, San Francisco, CA, USA) software. Research-in-progress databases were searched for any ongoing studies of relevance.

Searches for ongoing studies were undertaken in the following databases: UK Clinical Research Network (UKCRN), controlled-trials.com, clinicaltrials.gov, World Health Organization International Clinical Trials Registry Platform (WHO ICTRP), Centre for Evidenced Based Dermatology (University of Nottingham), UK Clinical Trials Gateway (UKCTG).

Inclusion and exclusion criteria

Studies were eligible for inclusion in the systematic reviews if they met the criteria outline below.

Population
Adults, young people and children with a chronic inflammatory skin condition and/or their carers.

Intervention
Educational interventions that either specifically aimed to improve HRQoL or could improve HRQoL [e.g. by targeting patients' ability to cope with the negative effects of chronic skin disease or by targeting compliance with therapy (with the aim of reducing the degree of skin affected)]. That is, to be included in the review, the educational interventions needed explicitly to state that the aim of the intervention was to improve HRQoL or, in the absence of this, the content of the intervention needed to focus on more than just information about the specific skin disease and its treatment, and needed to address patients' ability to cope with the negative effects of the disease (e.g. by providing education on stress management, coping with itch or addressing the psychosocial effects of the disease, such as feelings of stigmatisation attributable to changes in skin appearance) or adherence to therapy.

Any type of educational technique was permitted provided that effects of education on outcomes could be isolated from effects of any non-educational intervention components that may also be present in the intervention. Therefore, any interventions that were purely psychological approaches (e.g. to manage distress) and did not seem to include an element of education were excluded.

Comparators
Any comparator was eligible. This could include treatment as usual, waiting-list controls, or other educational interventions.

Outcomes

- HRQoL: only studies that measured HRQoL as an outcome, using a validated measure, were included.

The following outcomes, where reported in the included studies, were also included:

- disease severity
- disease control
- scratching behaviour (where applicable)
- health-care utilisation
- depression
- anxiety
- patient or carer self-efficacy regarding disease management (self-efficacy is defined as a person's level of confidence in their ability to perform particular behaviours to achieve desired outcomes,[79] such as successful self-management of a condition)
- process evaluations, including adherence to therapy, attitudes and knowledge.

Patient-reported outcome measures were included if assessed by validated tools. Reviewers considered that a measure was validated if the publication stated that it was or, where this information was not available, if a consultation of the wider literature determined that the measure fulfilled at least one validity criterion.

For the systematic review of cost-effectiveness, studies reporting measures of cost-effectiveness [e.g. cost per quality-adjusted life-year (QALY), cost per life-year saved] were eligible.

Study design
For each skin disease, relevant randomised controlled trials (RCTs) were sought. If no RCT evidence existed for a given disease, prospective trials with concurrent control group(s) were eligible.

The identified systematic reviews were used as sources of references only.

Studies were included in the systematic review of cost-effectiveness if they were full economic evaluations (cost-effectiveness, cost–utility or cost–benefit analyses) that reported both measures of costs and consequences or if they were cost–consequence or cost analyses.

Studies published as abstracts or conference presentations were only included if sufficient details were presented to allow an appraisal of the methodology and the assessment of results to be undertaken.

Study selection and data extraction strategy

Studies were selected for inclusion in the systematic review of clinical effectiveness through a two-stage process using the predefined and explicit criteria specified above. Titles and abstracts from the literature search results were independently screened by two reviewers to identify all citations that possibly met the inclusion criteria. Full papers of relevant studies were retrieved and assessed by one reviewer and checked by a second reviewer using a standardised eligibility form. As far as possible, full papers or abstracts describing the same study were linked together, with the article reporting key outcomes designated as the primary publication. Any disagreements between reviewers were resolved by consensus or if necessary by arbitration by a third reviewer.

Titles and abstracts identified by the search strategy for the systematic review of cost-effectiveness were assessed for potential eligibility by two reviewers using the predetermined inclusion criteria. Full papers were formally assessed for inclusion by one reviewer with respect to their potential relevance to the research question and this was checked by another reviewer. Any disagreements between reviewers were resolved by consensus or if necessary by discussion with a third reviewer.

Data were extracted by one reviewer using a standard data extraction form and checked by a second reviewer. At each stage, any disagreements between reviewers were resolved by consensus or, if necessary, by arbitration by a third reviewer.

In the systematic review of clinical effectiveness, for each study, results for outcomes measured at the immediate end of the intervention and the longest follow-up time point (where this differed) were extracted and presented. That is, results for any intermediary time points were not extracted. During data extraction, a modified version of Schulz and colleagues'[69] intervention taxonomy was used to structure how and which information was extracted about the educational interventions in the included studies. The taxonomy characterises the different elements of interventions. Based on this, the following intervention components were extracted for each study: where it was delivered; whether it was a form of self-help; whether it was individual- or group-based; mode; materials used; provider; duration and intensity; scripting (use of a protocol guiding interaction between the interventionist and participants); sensitivity to participant characteristics; interventionist characteristics and training; content and topics (including educational strategies used); tailoring; and theoretical basis. Reviewers additionally extracted the following: intervention overview and aims; stated target group; ongoing support provided; and whether individuals' preferred learning styles were taken into account.

Critical appraisal strategy

The methodological quality and the quality of reporting of the included clinical effectiveness studies were assessed using risk of bias criteria based on those recommended by Cochrane[83] (see *Appendix 3*). Quality criteria were applied by one reviewer and checked by a second reviewer, with any differences in opinion resolved by consensus or by arbitration by a third reviewer.

Quality assessment for the systematic review of cost-effectiveness was based on a checklist for economic evaluation publications.[84]

Method of data synthesis

Studies of clinical effectiveness and cost-effectiveness were synthesised through a narrative review with tabulation of results of included studies. In the systematic review of clinical effectiveness, studies were grouped according to the condition being considered and the general age group of the participants.

It was not considered appropriate to combine the studies in a meta-analysis owing to the heterogeneity between studies in patient characteristics (ages, conditions, duration of disease, severity of disease), the interventions and the comparators.

Advisory group

The Advisory Group informed the protocol and provided comments on the near complete draft report. In addition, members of the Advisory Group provided responses to specific questions around the current use of educational interventions for chronic inflammatory skin disease, which informed the background section of the report.

Chapter 3 Results of the systematic review of clinical effectiveness

Quantity and quality of research available

Figure 1 shows the flow of studies through the review. Eight studies[74,76,85–90] met the inclusion criteria. Of these, seven were RCTs[74,76,85–89] and one was a controlled clinical trial (CCT).[90] The CCT[90] evaluated an educational intervention for psoriasis. In line with our review protocol, which pre-specified that CCTs would only be included if no RCT evidence existed for a particular condition, the CCT is not discussed further because RCT evidence was available for psoriasis.

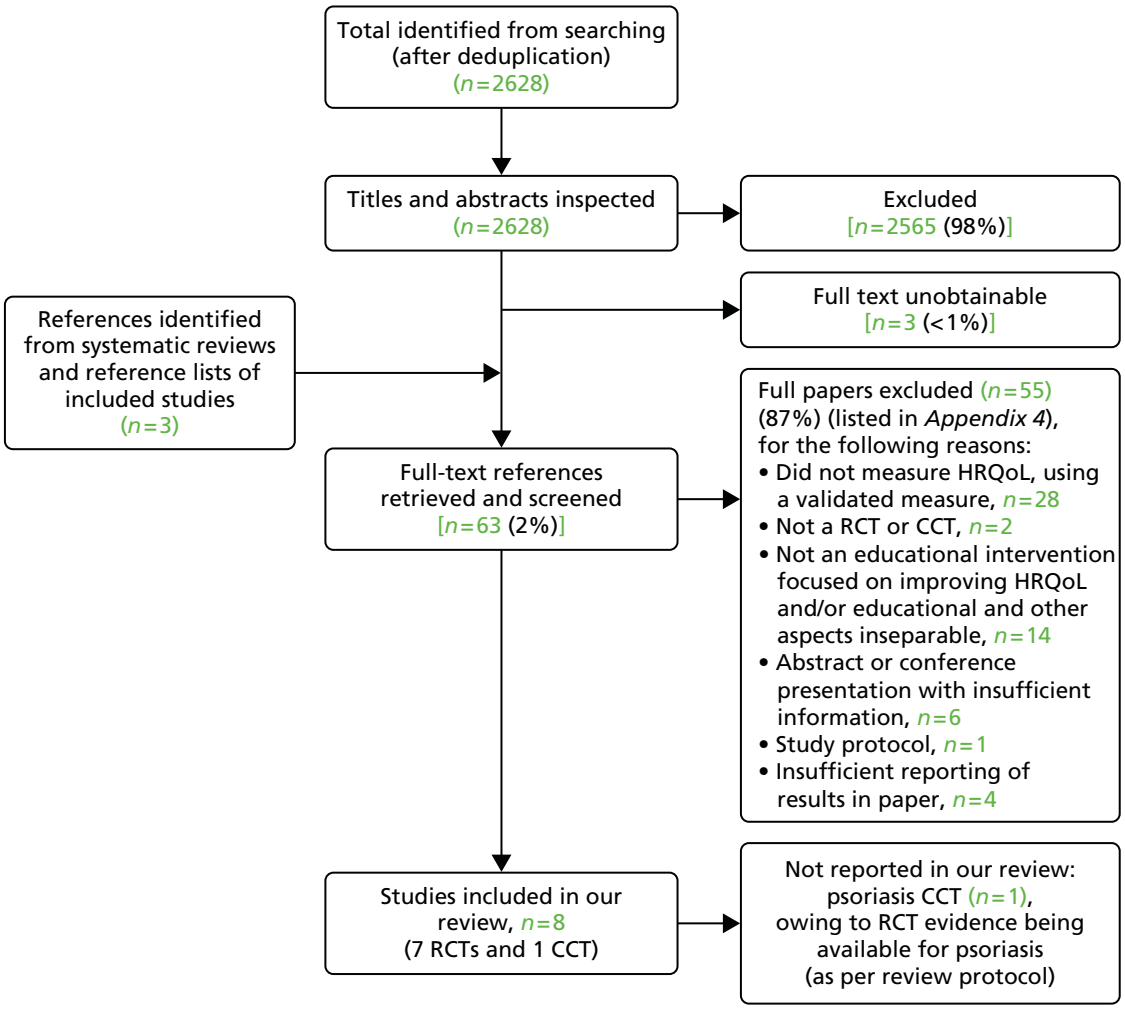

FIGURE 1 Flow chart for the identification of studies in the review of clinical effectiveness. CCT, controlled clinical trial.

Searches identified 2628 records, of which 2565 were excluded at title and abstract screening. At the full-text screening stage of the review, 63 references were reviewed and 55 were excluded. The main reasons for exclusion were that studies did not measure HRQoL using a validated measure ($n = 28$) or that the intervention was not an educational intervention that aimed to, or could, improve HRQoL, and/or the effect of the educational component of the intervention on outcomes could not be isolated from the effect of other non-educational components of the intervention ($n = 14$) (see *Appendix 5* for a full list of reasons for specific exclusions). Three studies, reported in four publications,[78,91–93] were excluded for not reporting results in sufficient detail to be informative in the review. Of these, one reported in Staab and colleagues[93] and Wenninger and colleagues[78] was a RCT examining a theory-based programme called the 'Berlin education programme' for parents of children with atopic dermatitis, aimed at improving HRQoL and the disease course, which covered medical, nutritional and psychological issues. The authors reported limited numerical data in the results. For example, data were reported for only one of the five dimensions of a disease-specific HRQoL measure. The other two excluded studies were Jaspers and colleagues[91] and Lora and colleagues,[92] which were RCTs of a combined psychoeducational and dermatological treatment programme delivered by a multidisciplinary team for young adults with atopic dermatitis and a psychoeducation programme for patients with psoriasis, respectively. Jasper and colleagues[91] provided numerical results for only one domain of the Short Form questionnaire-36 items (SF-36) (HRQoL measure) at 10 weeks post intervention and narratively reported changes for other domains at 10, 20 and 40 weeks post intervention as non-significant. Lora and colleagues[92] presented no results for the HRQoL measure they used. Such exclusions as a result of poor quality reporting are important to note, because these studies otherwise met the review inclusion criteria and formed around one-third of the relevant evidence-base – this issue is considered further below (see *Discussion*).

Characteristics of the included trials

Table 2 provides an overview of the characteristics of the seven included RCTs. Detailed information about the educational intervention(s) evaluated in each RCT is provided in *Table 3*, with full details also provided in *Appendix 6*. The full data extraction forms are shown in *Appendix 4*. Two RCTs, by Balato and colleagues[85] and Ersser and colleagues,[86] assessed the effects of daily text message education over 12 weeks and a one-off nurse-delivered educational session for adults with psoriasis; one RCT by Matsuoka and colleagues[88] focused on instructions in make-up use and skin care from a dermatologist to adult women with acne; and two RCTS, by Staab and colleagues[87] and Santer and colleagues,[74] focused on children (and adolescents in one trial[87]) with atopic dermatitis and their parents or carers, evaluating a 6-week educational programme delivered by a multidisciplinary team and an educational website (the 'SPaCE website'), respectively. The educational interventions in the remaining two RCTs, by van Os-Medendorp and colleagues[89] and Bostoen and colleagues,[76] were delivered to people with a mixture of skin conditions. van Os-Medendorp and colleagues[89] included people with chronic pruritic skin diseases (including eczema, atopic dermatitis, pruritus, prurigo, psoriasis and chronic urticaria) and evaluated a 'Coping with itch' programme, and Bostoen and colleagues[76] included people with either psoriasis or atopic dermatitis in an evaluation of a 3-month programme delivered by a multidisciplinary team.

Five of the included RCTs[74,76,86,88,89] compared educational programmes with standard care for the skin condition. Balato and colleagues[85] and Staab and colleagues[87] compared the text message education and 3-month educational programme with a 'control intervention' and a 'no education control', respectively, but did not provide details about what, if any, treatment was given to the control conditions. In six RCTs[74,76,85,86,88,89] the educational interventions were delivered as an adjunct to standard medical care, and it was unclear if it was an adjunct in the remaining trial evaluating the 6-week programme including children with atopic dermatitis and their carers.[82] Only one RCT[74] compared two different approaches to the education delivery, in addition to comparing each educational approach with standard care. This trial compared education delivered through the SPaCE website only with education delivered through the same website, but with additional support through a one-off appointment with a HCP who promoted engagement with the website and supported participants in completing some of the modules.

TABLE 2 Summary of characteristics of included studies

Reference and design	Skin condition(s)	Population: patients (general age group), parents or carers	Intervention(s)/comparator(s)	Setting, country	Number of participants (randomised)	Length of follow-up
Balato *et al.*, 2013[85] RCT (pilot study)	Plaque psoriasis	Patients (adults)	1. Text message education 2. Control intervention (no details provided)	Home-based, Italy	40	12 weeks (intervention end)
Ersser *et al.*, 2011[86] Cluster RCT (pilot study)	Psoriasis	Patients (adults)	1. A theory-based group self-management educational intervention plus usual care 2. Control group: usual treatment (topical therapies only)	Primary care, UK	64	6 weeks[a]
Bostoen *et al.*, 2012[76] RCT	Psoriasis or atopic dermatitis	Patients (adults)	1. Group-based educational programme for patients with psoriasis and atopic dermatitis 2. Medical therapy alone	Setting not reported (reviewers inferred this as likely to be outpatients), Belgium	50	9 months (from baseline)
Santer *et al.*, 2014[74] RCT (pilot study)	Eczema	Patients (children aged ≤ 5 years) and parents/carers	1. Online educational intervention for carers delivered through SPaCE website, plus usual care 2. Online educational intervention for carers delivered through SPaCE website, plus HCP support, plus usual care 3. Usual care alone: participants consulted with GPs or attended secondary care dermatology appointments as needed	Primary care, south-west England, UK	149	3 months (from baseline)
Staab *et al.*, 2006[87] RCT	Atopic dermatitis	Patients (children and adolescents) and parents	1. Group-based educational programme, with different educational sessions for (a) parents of children aged 3 months to 7 years; (b) children aged 8–12 years and their parents; and (c) adolescents aged 13–18 years (parents optional for selected sessions) 2. No education control	Setting not reported, Germany	992	12 months[a]

continued

TABLE 2 Summary of characteristics of included studies (*continued*)

Reference and design	Skin condition(s)	Population: patients (general age group), parents or carers	Intervention(s)/comparator(s)	Setting, country	Number of participants (randomised)	Length of follow-up
Matsuoka *et al.*, 2006[88] RCT	Acne vulgaris	Patients (adults; women aged > 16 years)	1. Instructions on skin care and how to use make-up from a dermatologist, plus acne treatment 2. Control group: acne treatment. Patients were told to use cosmetics in the same way they usually do	Outpatient clinic, Kagawa, Japan	50	4 weeks[a]
van Os-Medendorp *et al.*, 2007[89] RCT	Chronic pruritic skin diseases	Patients (adults)	1. Individual-based 'Coping with itch' programme, including educational and cognitive behavioural interventions 2. Control group: normal care (outpatient consultations with a dermatologist)	Secondary care, The Netherlands	120	9 months (from baseline)

a Unclear if these follow-up time points were from baseline or the end of the intervention.

TABLE 3 Summary of the structure and content of the educational interventions in the included studies

Study	Balato *et al.*, 2013[85]	Ersser *et al.*, 2011[86]	Bostoen *et al.*, 2012[76]	Santer *et al.*, 2014[74]	Staab *et al.*, 2006[87] (further information provided by Wenninger *et al.*, 2000[78])	Matsuoka *et al.*, 2006[88]	van Os-Medendorp *et al.*, 2007[89]
Skin condition(s), population	Psoriasis, patients (adults)	Psoriasis, patients (adults)	Psoriasis or atopic dermatitis, patients (adults)	Eczema (children aged ≤ 5 years) and parents/carers	Atopic dermatitis, patients (children and adolescents) and parents	Acne, patients (adults; women aged > 16 years)	Chronic pruritic skin diseases, patients (adults)
Overview	Text message education	A theory-based self-management educational intervention	Educational programme for patients with psoriasis and atopic dermatitis	Two educational intervention groups: 1. Online intervention delivered through the SPaCE website 2. Website plus HCP support Carers took part in the interventions; outcomes were measured in carers and children	Group-based educational programme, with different educational sessions for (a) parents of children aged 3 months to 7 years; (b) children aged 8–12 years and their parents; and (c) adolescents aged 13–18 years (parents optional for selected sessions)	Instructions on skin care and how to use make-up from a dermatologist	'Coping with itch' programme – individual sessions with dermatology nurse, including educational and cognitive behavioural interventions
Intervention aim(s)	Not stated explicitly but implicit from the paper that aim was to use text messaging to improve treatment adherence and patient outcomes including HRQoL	To support self-management in psoriasis	Not explicitly stated. Study aimed to examine if the educational intervention 'added value to medical therapy' (p. 1025) and examine the effects on disease severity and QoL	Aimed to improve carers' management of their child's eczema by increasing regular use of emollients. Ultimate aim of intervention was to improve HRQoL through enhancing carers' management of the condition	Not reported in primary publication, but the intervention for children aged 3 months to 7 years was based on one reported in Staab *et al.*,[93] and Wenninger *et al.*,[78] the aim of which was to improve parents' ability to manage their child's disease and thus improve disease course and families' QoL	Not explicitly stated, but part of the aim of the study was to examine if instructions in make-up use from a dermatologist could affect female acne patients' QoL	To reduce itch and to help patients cope with itch

continued

TABLE 3 Summary of the structure and content of the educational interventions in the included studies (*continued*)

Study	Balato *et al.*, 2013[85]	Ersser *et al.*, 2011[86]	Bostoen *et al.*, 2012[76]	Santer *et al.*, 2014[74]	Staab *et al.*, 2006[87] (further information provided by Wenninger *et al.*, 2000[78])	Matsuoka *et al.*, 2006[88]	van Os-Medendorp *et al.*, 2007[89]
Mode, including if individual- or group-based mode	Text messaging, individual-based	Face to face, written and audiovisual materials, individual telephone consultation. Group-based	Face-to-face workshop, group-based	1. Online intervention, individual-based 2. Online intervention, plus face-to-face appointment with HCP, individual-based	Face-to-face, group-based sessions	Face to face, with supporting videotape instructions and detailed leaflets/ prescriptions. Not reported if individual- or group-based	Face to face, individual-based
Provider	Not reported	Nurse-led	Multidisciplinary team	1. Medical experts developed the website; website delivered through LifeGuide software 2. In addition to 1. above, HCPs provided support to participants in the website plus HCP support group	Multiprofessional team	Dermatologist	Dermatology nurse
Duration and intensity	One text message per day for a period of 12 weeks	Group session: one-off 2-hour session Telephone consultation: one-off 20-minute session	3-month programme, with two, 2-hour sessions a week	1. Two 20-minute compulsory modules. Participants could then complete other modules of their choice 2. In addition to 1. above, a one-off 20-minute appointment with a HCP	One 2-hour session a week, over 6 weeks	Not reported	Patients visited the itch clinic a mean of 2.9 times (median 3 times, range 1–6 times); duration of sessions not reported

Study	Balato *et al.*, 2013[85]	Ersser *et al.*, 2011[86]	Bostoen *et al.*, 2012[76]	Santer *et al.*, 2014[74]	Staab *et al.*, 2006[87] (further information provided by Wenninger *et al.*, 2000[78])	Matsuoka *et al.*, 2006[88]	van Os-Medendorp *et al.*, 2007[89]
Content and topics	Covered frequently asked questions about psoriasis drugs (e.g. administration and adverse effects) and general recommendations for taking care of overall health. Educational topics included daily care statements, healthy lifestyle statements, prompts about the use of treatments, and one statement about the psychosocial effects of psoriasis. Reminders reinforced many of the same principles	Practical element (no details provided), individual action planning, stress reduction (through provision of relaxation materials), feedback on action plans (through telephone consultation)	Information on specific skin disease and skin care sessions, healthy lifestyle and stress-reducing techniques, feedback sessions. Further details of the intervention provided in a separate publication[94]	1. Two compulsory modules: 'What is eczema?' and 'Emollient moisturisers'. Then 14 optional modules available covering 'common concerns of carers of children with eczema' (Santer *et al.*;[74] p. 3) Participants could also take part in a 2-week challenge involving SMS text alerts for setting goals, monitoring and rehearsing behaviours 2. In addition to (1) above, HCPs went through the two compulsory modules and 2-week challenge with participants if they had not already completed them/if participants had completed them, HCP helped them choose other modules to work through together	Intervention for parents of 3-month- to 7-year-olds was based on the one reported in Staab *et al.*[87] and Wenninger *et al.*[78] Across the three groups, the educational sessions covered medical, nutritional and psychological issues. Participants were encouraged to share experiences and to put new skills into practice. A manual specified content	Patients received instructions on use of skin care and make-up products. Instructions included general skin care and how to use 'point make-up' (e.g. eyeliner and lipstick)	Education about: itch causes, consequences and treatment; patient advocacy groups; avoiding triggers; diet; interventions to relieve itching and scratching and their consequences. Cognitive behavioural therapy including diary-based awareness training, habit reversal to reduce scratching, and relaxation. Based on an initial itch medical history assessment taken by the nurse and structured according to an individual-based nursing care plan

continued

TABLE 3 Summary of the structure and content of the educational interventions in the included studies (*continued*)

Study	Balato *et al.*, 2013[85]	Ersser *et al.*, 2011[86]	Bostoen *et al.*, 2012[76]	Santer *et al.*, 2014[74]	Staab *et al.*, 2006[87] (further information provided by Wenninger *et al.*, 2000[78])	Matsuoka *et al.*, 2006[88]	van Os-Medendorp *et al.*, 2007[89]
Ongoing support	None reported	Nurse provided one 20-minute follow-up telephone consultation 1 month after the group session (based on outline script)	Not reported	Not reported	Not reported	Not reported	Individual counselling and 'support' (not defined) provided as required (no details given)

SMS, short message service.
Full details of the educational interventions in each of the included trials are tabulated in *Appendix 6*.

Only two UK studies were identified.[74,86] One examined the effects of a one-off educational session for patients with psoriasis in primary care[86] and the other was also set in primary care, but provided education mainly through the SPaCE website.[74] The other RCTs were conducted in a range of countries and settings, including secondary care in the Netherlands[89] and Japan[88] and home-based education in Italy.[85] In the remaining RCT,[76] conducted in Belgium, the setting was unclear. The generalisability of these studies to the UK setting is, therefore, unclear.

No studies of any other chronic inflammatory skin diseases were identified in our searches.

All tables are ordered by condition and then by patient age group within condition.

The largest RCT was of 992 children and adolescents with atopic dermatitis and their parents.[87] One other RCT of mixed skin conditions had a sample size of 120 participants[89] and another of children with eczema and their parents or carers had a sample size of 149.[74] Sample sizes in the four remaining trials,[76,85,86,88] including all the RCTs of patients with psoriasis, ranged from 40 to 64 participants. One study measured outcomes at the end of the intervention only,[85] with the other six[74,76,86–89] employing various lengths of post-intervention follow-up, ranging from 4 weeks[88] to 12 months.[87] Three studies[76,87,89] had a follow-up of a reasonable duration to capture the clinical effects of the intervention (≥ 3 months post intervention; which the review Advisory Group suggested would be the minimum follow-up time necessary in studies to measure the effect and durability of patient benefits from an intervention).

Aims, content and structure of the educational interventions in the included trials

During data extraction, a modified version of a taxonomy of elements of interventions developed by Schulz and colleagues[69] was used to structure how information about the interventions in each trial was recorded (see *Methods* for more information about this). Following this principle, an overview is provided here of the educational interventions in each trial, with summary details shown in *Table 3*. More detailed information about the interventions, covering all elements extracted, can be found in *Appendix 6*.

The aims, content and structure of the educational interventions were heterogeneous across the seven included RCTs. Only one of the included studies,[74] of the SPaCE website intervention, explicitly reported that the aim of the intervention was to improve HRQoL (although another, by Staab and colleagues,[87] was in part based on the 'Berlin education programme' reported in the excluded Staab and colleagues[93] and Wenninger and colleagues[78] publications, and these linked publications state that the aim of the intervention was to improve HRQoL; see *Table 3* for more details). The other studies were included in the review because it was inferred from the content that the intervention could improve HRQoL (e.g. it included aspects that targeted compliance or patients' ability to cope with the negative effects of their disease).

Three of the studies reported that the educational interventions were theory-based. The one-off educational session for patients with psoriasis in Ersser and colleagues[86] and the 6-week programme for atopic dermatitis in Staab and colleagues[87] were based on social cognitive theory. The SPaCE website intervention in the trial by Sanler and colleagues[74] incorporated 20 of the 26 behaviour-change techniques listed in Abraham and Michie's[77] taxonomy of behaviour-change techniques. The design of the intervention in Ersser and colleagues[86] was additionally informed by findings of previous qualitative research on the self-management needs of individuals with psoriasis. Similarly, the design and content of the SPaCE website in Santer and colleagues[74] was based on qualitative interviews and input from a patient support group, as well as evidence-based patient information leaflets, 'think-aloud' interviews with users of a draft version of the website and feedback from other parents and HCPs.

The educational content and strategies used in the interventions varied across the studies. All the trials except one[86] reported that participants were provided with information about the skin disease, its treatment, skin care, or the causes, consequences and treatment of itch. The interventions also commonly

included education about stress-reducing or relaxation techniques (reported in five RCTs[74,76,86,87,89]) and living a healthy lifestyle and/or nutritional issues (reported in five RCTs[74,76,85,87,89]). Other psychosocial aspects included education on coping with the disease and managing itching, scratching and sleep,[74,87,89] managing the psychosocial consequences of the disease,[85] and provision of information about patient support groups.[89] The SPaCE website for carers of children aged 5 years or younger with eczema also contained information about how to involve their child in their treatment and guidance for carers on how to manage a consultation with their GP.[74] The intervention in the trial by Matsuoka and colleagues,[88] in which patients with acne were provided with instructions on skin care and make-up use, could be considered to help patients manage appearance concerns and the feelings of stigma associated with their condition. As well as information provision, the reported education strategies used included encouraging participants to share experiences,[87] discussion of difficulties in transferring newly learnt skills into their everyday lives,[87] individual action planning or creation of (self-)management plans,[74,86,87,89] feedback sessions,[76] a 2-week challenge involving short message service (SMS) text alerts for setting goals, monitoring and rehearsing behaviours,[74] and cognitive behavioural therapy, including habit reversal to reduce scratching.[89] Where reported, the duration and intensity of the educational interventions ranged from two 20-minute compulsory online modules (plus optional additional modules)[74] to a 3-month programme consisting of two 3-hour sessions a week.[76]

In all the RCTs except one,[85] educational interventions were delivered at least in part through face-to-face sessions, and in three trials it was also delivered in groups. Group sizes across and within the studies ranged from 5 to 23 participants.[76,86,87] In the RCT by Santer and colleagues,[74] the intervention was mainly delivered online (via the SPaCE website), but one group also received additional support from a HCP in a face-to-face appointment. Participants could also opt to take part in a 2-week challenge, which involved receiving behavioural prompts by text message. It is unclear if the instructions in skin care and using make-up were provided to patients individually or as part of groups in the RCT by Matsuoka and colleagues.[88] In one trial[85] education was provided to individuals solely by daily text messages, over a period of 12 weeks. The educational interventions were delivered by a multidisciplinary team in two RCTs,[76,87] a nurse in another two RCTs[86,89] and a dermatologist in one RCT.[88] In the Santer and colleagues RCT,[74] the SPaCE website, which had been developed by medical experts and informed by patient support groups, was the main delivery mechanism. The HCPs who provided support to one group varied across the general practices taking part and were the practice nurse in 11 practices, a health-care assistant in one practice and a GP in one practice. Only one of the HCPs was dermatology trained. In the remaining RCT, of text message education,[88] it was unclear who provided the intervention. Three trials[74,86,87] reported information about the interventionist characteristics, with all stating that the interventionists received training prior to delivering the programmes (although this was minimal in Santer and colleagues[74] and consisted of 1 hour for the HCP to familiarise themselves with the SPaCE website). None of the RCTs provided information about whether the people delivering the educational interventions had similar characteristics to the patients taking part, such as similar social and ethnic backgrounds.

Ersser and colleagues,[86] Bostoen and colleagues[76] and Staab and colleagues[87] reported that the interventionist was required to follow a protocol, syllabus or content manual, respectively, to standardise delivery. Delivery of the text message[85] and website education[74] was also standardised (but with some optional as well as compulsory modules on the website). In Ersser and colleagues,[86] there was flexibility for the intervention to be tailored to participants' needs. Another two RCTs[74,89] also reported that, to some extent, the educational interventions were tailored to patients' individual needs. The interventions in two trials[85,87] were sensitive to participants' characteristics to some extent, by providing parent and child education according to age group[87] and ensuring that text messages were written in simple language.[85] None of the interventions took into account individuals' preferred learning styles.

Outcomes assessed in the included trials

As per our inclusion criteria, all seven RCTs measured HRQoL using one or more validated measures. All seven trials also measured disease severity as an outcome. Other measured outcomes were: depression, stress, lifestyle (measured by a set of unvalidated questions in one trial[76]), health resource use, medication

and ointment use, cost-effectiveness, itching behaviour, itch-related coping, skin-related psychosocial morbidity, general psychosocial morbidity, patient–physician relationship, attitudes and perceptions of ability to manage the condition, and treatment adherence. Only one trial[88] measured adverse events. In line with our protocol, patient-reported outcome measures were extracted and included in the review only if assessed by validated tools. HRQoL was a primary outcome in four of the trials[76,86,87,89] and a secondary outcome in one trial.[74] The remaining two trials[85,88] did not specify if outcomes were primary or secondary. Three RCTs[74,85,86] included process measures that could be regarded as 'process evaluations' (e.g. assessing patients' perceptions of the usefulness of the intervention).

Four of the included trials[76,85,86,88] measured HRQoL using the DLQI, which is a dermatology-specific, self-report measure.[95] van Os-Medendorp and colleagues[89] measured HRQoL using the QoL subscale of the Adjustment to Chronic Skin Diseases Questionnaire (ACS), which measures skin-related psychosocial morbidity. Staab and colleagues[87] measured parents' HRQoL using the German questionnaire 'Quality of life in parents of children with atopic dermatitis'. Santer and colleagues[74] measured the impact of the website for carers on each family's QoL using the Dermatitis Family Impact (DFI) questionnaire and also measured the impact on the carers' children's HRQoL using the IDQoL (for children aged ≤ 4 years) and the CDLQI (for children aged ≥ 5 years). Other HRQoL measures used in the RCTs were: Skindex-29,[76] PDI,[76] Quality of Life Index for Atopic Dermatitis (QoLIAD)[76] and WHOQOL-26.[88] For more information about the most commonly used measures and how they are interpreted, please see *Appendix 1*.

Disease severity was assessed using a range of measures, including the PASI (used in all three trials that included patients with psoriasis[76,85,86]), the SCORAD (used in two studies including patients with atopic dermatitis[76,87]) and the POEM (used in a study of children with eczema and their carers[74]). Other measures used were the Plewig and Kligman's grade measure of acne severity[88] and a patient-reported measure of the frequency and intensity of itching.[89] For more information about the most commonly used measures and how they are interpreted, see *Appendix 1*.

Participants' baseline characteristics

Table 4 shows the baseline characteristics of the participants randomised in each of the trials. Generally, across the trials, 50% or more of the participants in each study arm were women. The RCT by Matsuoka and colleagues,[88] which evaluated skin care and make-up instructions for patients with acne, focused exclusively on women. Most carers of children randomised in the trial by Santer and colleagues[74] were women. The overall mean age of participants in the studies of adult patients ranged from 38[85] to 59 years,[86] except in the trial by Matsuoka and colleagues[88] where the mean age of the women was 24 years and 25 years in each arm. In the trial of children and adolescents with atopic dermatitis,[87] the baseline mean ages were around 2 years in the 3 months to 7 years age group, 10 years in the 8–12 years age group and 15 years in the 13–18 years age group. In Santer and colleagues,[74] the majority of carers were aged between 26 and 40 years and the ages of the children were between 0 to 5 years, as per the study inclusion criteria. None of the trials reported the participants' ethnicity. Across the four trials reporting participants' socioeconomic characteristics,[74,76,85,89] there was a mixture of levels of education and employment status, see *Table 4*.

Five trials reported the length of time participants had had their skin condition.[76,85,86,88,89] In four trials, the disease duration ranged from a mean of around 11 to 24 years.[76,85,86,89] Patients with acne in the trial by Matsuoka and colleagues[88] had been diagnosed with their condition for a slightly shorter duration (for a mean of 7 years and 4 years in each study arm). Only two studies reported participants' comorbidities, and these included hypertension, dyslipidaemia, type 2 diabetes and unspecified 'complications'.[85,88] Where measured with the same tool, baseline disease severity was similar across trials of the same condition. An exception was that participants in the trial by Ersser and colleagues[86] had milder psoriasis than the participants in the two other psoriasis trials (this may be because the participants in Ersser and colleagues were recruited from primary care).[76,85]

TABLE 4 Baseline characteristics of the participants included in the studies

Study, skin condition (population)	Sex, % female	Age (years), mean (SD)	Disease duration, mean (SD) years	HRQoL, mean score (SD)	Disease severity, mean score (SD) (unless stated)	Socioeconomic characteristics, % of participants
Balato *et al.*, 2013,[85] plaque psoriasis (adults)	I: 50; C: 40	I: 38.4 (9.5); C: 39.3 (10.2)	I: 10.7 (5.3); C: 12.1 (5.8)	DLQI I: 7.9 (3.2); C: 7 (3)	PASI I: 10.64 (4.2); C: 10.13 (4.7) SAPASI I: 11 (6.6); C: 10.90 (5.9) BSA I: 16 (7.5); C: 14.2 (8) PGA I: 2.6 (1.04); C: 2.3 (1.3)	Education level and employment: Middle school I: 25; C: 30 High school I: 60; C: 50 Some college attendance I: 0; C: 5 College graduate I: 15; C: 15 Currently employed I: 80; C: 75
Ersser *et al.*, 2011,[86] psoriasis (adults)	I: 71; C: 45	I: 56.86 (12.67); C: 59.03 (13.53)	I: 22.68 (17.99); C: 24.17 (18.63)	DLQI I: 4.86 (5.14); C: 4.18 (3.19)	PASI I: 2.34 (2.66); C: 3.22 (2.26)	Not reported

Study, skin condition (population)	Sex, % female	Age (years), mean (SD)	Disease duration, mean (SD) years	HRQoL, mean score (SD)	Disease severity, mean score (SD) (unless stated)	Socioeconomic characteristics, % of participants
Bostoen *et al.*, 2012,[76] psoriasis or atopic dermatitis (adults)	I: 52; C: 52	I: 38.5 (12.3); C: 40.6 (12.2)	I: 18.9 (11.0); C: 20.1 (11.4)	DLQI I: 9.7 (6.0); C: 7.5 (5.0) Skindex-29 (total) I: 45.5 (16.1); C: 43.3 (17.7) QoLIAD (atopic dermatitis subgroup only) I: 9.1 (5.6); C: 9.6 (6.1)	PASI I: 8.4 (CI 6.0 to 10.8); C: 7.1 (CI 4.8 to 9.4) SCORAD I: 38.9 (18.0); C: 38.8 (15.5) EASI I: 11.9 (10.9); C: 10.4 (8.1)	Education level: Low I: 4; C: 4 Medium I: 22; C: 52 High I: 74; C: 44
Santer *et al.*, 2014[74]	Carers: Website: 96 Website + HCP: 98 Usual care: 98	Age of carer: the majority of participants (72–84%) across each arm were aged between 26 and 40 years Age of child: all between 0 and 5 years	Not reported	DFI Website: 5.3 (5.3) Website + HCP: 6.4 (5.6) Usual care: 5.2 (5.9)	POEM Website: 10.3 (7.0) Website + HCP: 9.4 (6.2) Usual care: 7.47 (6.2)	Age carer left education: across study arms, between 12% and 16% left school between the ages of 15 and 16 years
Staab *et al.*, 2006,[87] atopic dermatitis (children, adolescents and parents)	3 months to 7 years I: 48; C: 48 8–12 years I: 60; C: 52 13–18 years I: 59; C: 64	3 months to 7 years: I: 2.4 (1.8); C: 2.4 (1.9) 8–12 years: I: 9.5 (1.6); C: 9.5 (1.5) 13–18 years: I: 14.9 (1.7); C: 14.8 (1.7)	Not reported	Reports baseline results for parents' HRQoL across a number of HRQoL measure subscales; see the data extraction form in *Appendix 4* for baseline values	SCORAD:[a] 3 months to 7 years I: 41.1 (16.6); C: 40.6 (15.2) 8–12 years I: 41.8 (16.6); C: 40.4 (15.1) 13–18 years I: 43.1 (14.7); C: 40.4 (13.9)	Not reported

continued

TABLE 4 Baseline characteristics of the participants included in the studies (*continued*)

Study, skin condition (population)	Sex, % female	Age (years), mean (SD)	Disease duration, mean (SD) years	HRQoL, mean score (SD)	Disease severity, mean score (SD) (unless stated)	Socioeconomic characteristics, % of participants
Matsuoka *et al.*, 2006,[88] acne vulgaris (adults)	I: 100; C: 100	I: 24 (3); C: 25 (5)	I: 7 (4); C: 4 (4)	DLQI I: 8.24 (5.06); C: 6.24 (6.06) WHOQOL-26 (total mean score) I: 3.27 (0.54); C: 3.36 (0.44)	Not reported	Not reported
van Os-Medendorp *et al.*, 2007,[89] chronic pruritic skin disease (adults)	I: 55; C: 72	I: 57 (17.3); C: 55.7 (17.2)	I: 14.6 (14.4); C: 17.4 (18.3)	Impact on QoL (ACS subscale) I: 12.08 (5.00); C: 12.56 (4.93)	Patient-reported frequency and intensity of itching and scratching, *n* (%): High frequency I: 18 (72); C: 21 (66) High intensity I: 20 (80); C: 25 (78)	Education level: Low I: 46; C: 51 Medium I: 21; C: 31 High I: 32; C: 17

BSA, body surface area; C, control group; CI, confidence interval; EASI, Eczema Area and Severity Index; I, intervention group; PGA, physician's global assessment; SD, standard deviation.
a Objective and subjective SCORAD severity scores were also reported in the publication, but total SCORAD score only is reported in this table.

Four of the trials,[76,85,86,88] including all three of patients with psoriasis,[76,85,86] used the DLQI to measure HRQoL. On this measure, participants' baseline HRQoL was comparable across three of the studies, with mean scores in each study arm ranging from 6.24 to 9.7.[76,85,88] According to the DLQI website,[96] these scores indicate a moderate disease effect on patients' HRQoL. In the remaining trial[86] of patients with psoriasis, mean scores were 4.86 and 4.18 in the intervention and control groups, respectively, indicating a small effect on patients' HRQoL.[96] Participants in this trial therefore had generally experienced less impact on their HRQoL than the participants in the other psoriasis trials. In addition to the DLQI, Matsuoka and colleagues[88] used the WHOQOL-26 to measure HRQoL in patients with acne. The authors cite a normative mean score of 3.33 for healthy Japanese women aged 20–29 years, and state that the baseline scores of the participants were similar to this, suggesting that, on this measure, their HRQoL had not been extensively adversely affected by their condition. In the three trials using less common methods to assess HRQoL,[74,87,89] the meaning of the baseline scores is unclear, because authors did not provide this information.

Baseline characteristics and baseline scores for outcome measures were generally similar between the intervention and comparator groups in all the trials. Exceptions were that in the RCT by Ersser and colleagues[86] there were proportionally more women in the intervention than the control group and that in the Santer and colleagues trial[74] POEM baseline scores were slightly higher in the website and website + HCP support groups than the usual care group. In the Bostoen and colleagues trial,[76] rates of depression were higher in the intervention group than the control group.

Quality of reporting and methodology of the included trials

The quality of the reporting and methodology of the included trials was generally poor (*Table 5*), with only two studies[86,88] judged not to be at high risk of bias on at least one domain, and all RCTs including at least one domain judged to be at unclear risk of bias, with few instances of low risk of bias. Five trials[74,76,85–87] reported adequate random sequence generation, but only one of the seven included trials clearly reported how allocation was concealed and, therefore, the remaining six were judged to be at an unclear risk of bias. Most trials were judged to be at an unclear risk of performance and detection bias, because they did not report if participants, study personnel or outcome assessors were blinded to treatment allocation. Balato and colleagues[85] and Staab and colleagues[87] were judged to be at high risk of performance bias; in Balato and colleagues,[85] although it was noted that physicians were blinded to group assignment until the end of the study, no details were provided about the blinding of participants, and in Staab and colleagues[87] it was stated that participants and trainers were not blinded to treatment allocation. The trial by Staab and colleagues[87] was also judged to be at high risk of detection bias (on self-reported measures) because participants were not blinded, and it was unclear if the investigators who rated eczema severity were blinded to treatment allocation. However, it may be difficult to blind participants to the fact they are taking part in an educational intervention rather than just receiving standard medical care, but this criterion is still appropriate for demonstrating potential risks of bias.

Incomplete outcome data were adequately addressed in three trials[85,86,88] either because all participants completed the trial and were analysed according to their randomised groups,[85,88] or because attrition was balanced across arms with similar reasons for drop-out and was therefore considered unlikely to bias the results.[86] One trial[74] was rated as being at an unclear risk of bias on this criterion, because, although attrition rates were small and balanced across groups, clear reasons were not reported for the attrition, and, in addition, one participant was randomised and excluded from the analysis because technical difficulties resulted in baseline data not being available for this participant. The other three trials[76,87,89] were considered to be at high risk of attrition bias, either because drop-outs were unbalanced between groups[76,87] or because there was a high overall rate of attrition[89] (with no exact reasons provided other than that participants did not return study measures at particular time points and that four participants in the control group received the intervention and therefore were excluded) and no intention-to-treat (ITT) analyses were used. In addition, one participant in the educational intervention group in Bostoen and colleagues[76] was excluded from the analysis owing to experiencing extreme stress at work during the study.

TABLE 5 Quality assessment of the included RCTs (Cochrane risk of bias criteria)

Study, skin condition (population)	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Balato *et al.*, 2013,[85] plaque psoriasis (adults)	Low risk	Unclear risk	High risk	Unclear risk	Low risk	Low risk	Low risk
Ersser *et al.*, 2011,[86] psoriasis (adults)	Low risk	Unclear risk	Unclear risk	Unclear risk	Low risk	Low risk	Unclear risk
Bostoen *et al.*, 2012,[76] psoriasis or atopic dermatitis (adults)	Low risk	Unclear risk	Unclear risk	Unclear risk	High risk	Unclear risk	Unclear risk
Santer *et al.*, 2014,[74] eczema (children and parents/carers)	Low risk	Low risk	Unclear risk	Unclear risk	Unclear risk	High risk	Unclear risk
Staab *et al.*, 2006,[87] atopic dermatitis (children, adolescents and parents)	Low risk	Unclear risk	High risk	High risk	High risk	Unclear risk	Low risk
Matsuoka *et al.*, 2006,[88] acne vulgaris (adults)	Unclear risk	Unclear risk	Unclear risk	Unclear risk	Low risk	Unclear risk	Low risk
van Os-Medendorp *et al.*, 2007,[89] chronic pruritic skin disease (adults)	Unclear risk	Unclear risk	Unclear risk	Unclear risk	High risk	Unclear risk	Low risk

Two trials were assessed as being at low risk of selective reporting, because the authors reported results for all the outcome measurements specified in the methods section of the paper.[85,86] Four were considered to be at an unclear risk of bias for various reasons, including narratively reporting results for many of the outcomes without providing supporting numerical data;[76] converting a continuous measure to a dichotomous measure for a severity of itching and scratching outcome;[89] reporting within-group *p*-values for two HRQoL outcomes, with between-group *p*-values reported for only one of the measures;[88] and measuring outcomes at 6 and 12 months' follow-up, but not reporting the 6-month outcomes.[87] The RCT by Santer and colleagues was considered to be at high risk of selective reporting bias, because results for the IDQoL and CDLQI measures of HRQoL were not reported.[74] Results were also not reported for a number of other measures [specifically, self-report measure of emollient use; Problematic Experiences of Therapy Scale (PETS); attitudes measure; and Patient Enablement Instrument].

Other potential sources of bias were identified in three trials where this was rated as 'unclear'. In Bostoen and colleagues[76] most results were presented as subgroup analyses for atopic dermatitis and psoriasis patients and it was unclear if these were adequately powered or pre-specified. In Ersser and colleagues[86] a statistically significant higher proportion of participants in the intervention group compared with the control group were women. In Santer and colleagues,[74] there were baseline imbalances in disease severity across groups, with both website groups having slightly more severe disease at baseline than the usual care group, and it was unclear if this had been adjusted for in the data analysis. In Santer and colleagues,[74]

statistical analyses were also reported inconsistently; specifically, mean change in the POEM score was presented for the combined website groups versus usual care, not individual website groups versus usual care (therefore this result was not data extracted or presented in this review).

Completeness of reporting of the interventions

During data extraction, a modified version of a taxonomy of elements of interventions[69] was used to structure how information about the interventions in each trial was recorded. *Table 6* shows the elements extracted and whether or not each trial reported details for each. The seven included trials generally provided adequately detailed descriptions of the educational interventions, particularly the content and topics, mode of delivery, providers, materials used and duration and intensity. Few trials explicitly reported the intervention aim, whether the intervention was theory-based, where it was delivered, whether elements were tailored to participants' needs, the extent to which it was sensitive to participants' characteristics, the interventionist characteristics and training, or whether ongoing support was provided after the intervention ended.

Statistical issues

All the trials were superiority trials (where the aim is to demonstrate that one treatment is more effective than another). Only two trials[76,87] reported power calculations. Despite this, in both it is unclear if the analyses that generated the results were adequately powered. In Bostoen and colleagues[76] the results were mainly presented for subgroup analyses of patients with either psoriasis or atopic dermatitis and the power calculation was for the total sample size on an unspecified outcome [note that the subgroup results are presented separately below under each condition-specific section; results for two outcomes [stress and European Quality of Life-5 Dimensions (EQ-5D™) HRQoL measure] were reported for the total group, but only narratively and, therefore, they have not been included in this review]. In Staab and colleagues,[87] the analyses of the results for the 3 months to 7 years age group appeared to be adequately powered (power calculation was based on the primary outcome, eczema severity), but it is unclear if the analyses of the results for the 8–12 years and 13–18 years age groups were adequately powered, because fewer participants per group were analysed than the 125 per group calculated as being needed. Three of the studies that did not report power calculations, including two psoriasis studies, were pilot studies.[74,85,86] Overall, with the exception of the analyses of the 3 months to 7 years age group in the Staab and colleagues RCT,[87] it is unclear if any of the analyses presented in the trials and included in this review were adequately powered. It should also be noted that all the evidence available for psoriasis was based on either pilot studies[85,86] or subgroup analyses.[76]

Total attrition rates in five trials ranged from 0% to 26%,[74,76,85–88] with four of these[74,85,86,88] having no attrition or low attrition rates. The attrition rate in the remaining trial,[89] in which the 'Coping with itch' programme was delivered to patients with chronic pruritic skin diseases during a median of three clinic visits, was particularly high at 58% overall, with 63% and 51% of patients in the education and control groups, respectively, not completing the trial. None of the trials reported use of ITT analyses, except Santer and colleagues,[74] but reviewers note that the analyses in Santer and colleagues[74] were not true ITT analyses, as not all randomised carers were included in the analyses. As stated above, the analyses in two trials[85,88] can be regarded as ITT, as all patients were analysed according to their randomised groups.

Generally, the trials reported results as point estimates (means) for outcomes in the intervention and control groups, and provided measures of variability around these as either standard deviations (SDs) or 95% confidence intervals (CIs). In a number of instances, findings were reported only narratively, with no supporting numerical data provided (see the results sections for each skin condition in *Assessment of effectiveness* for specific details of where this occurred). Trials mostly reported the statistical significance of between-group differences, either narratively or by providing *p*-values. Only two trials[86,87] reported CIs

TABLE 6 Elements of the structure and content of the educational interventions reported in the included studies

Study, skin condition (population)	Intervention aim(s)	Where delivered	Self-help, individual- and/or group-based	Mode	Materials	Provider	Duration and intensity	Scripting[a]	Sensitivity to participant characteristics	Interventionist characteristics and training	Content and topics	Tailoring	Ongoing support	Theory
Balato *et al.*, 2013,[85] plaque psoriasis (adults)	[b]	✓	✓	✓	✓		✓	✓	✓		✓			
Ersser *et al.*, 2011,[86] psoriasis (adults)	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
Bostoen *et al.*, 2012,[76] psoriasis or atopic dermatitis (adults)	[b]		✓	✓	✓	✓	✓	✓			✓			
Santer *et al.*, 2014,[74] eczema (children and parents/carers)	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓
Staab *et al.*, 2006,[87] atopic dermatitis (children, adolescents and parents)	[b]		✓	✓	✓	✓	✓	✓	✓	✓	✓			✓
Matsuoka *et al.*, 2006,[88] acne vulgaris (adults)	[b]	✓		✓	✓	✓					✓			
van Os-Medendorp *et al.*, 2007,[89] chronic pruritic skin disease (adults)	✓	✓	✓	✓		✓	✓				✓	✓	✓	

Ticks (✓) indicate that an element was reported.
a Use of a protocol or script to guide interaction between intervention provider and participants.
b Not explicitly reported, but could be inferred from the primary paper or other cited publications.

around between-group differences. Four of the trials provided some commentary in the publications on the definitions of clinically meaningful change in particular outcomes (specifically, the DLQI,[76] PASI,[86] SCORAD[87] and POEM[74]), but only two directly applied these definitions to the interpretation of the results in the trial. Of these, one study,[74] of the SPaCE website, reported the proportion of children with eczema who had experienced a clinically meaningful improvement in disease severity. The other,[87] of a 6-week programme for atopic dermatitis, commented generally on whether the average improvement in disease severity among children and adolescents with atopic dermatitis seen in the study could be considered clinically significant.

Generalisability to UK clinical practice

The majority of the included trials are considered to be of limited generalisability to UK clinical practice, because most were small-scale studies conducted across a range of countries. The largest UK study was Santer and colleagues'[74] evaluation of education delivered through the SPaCE website to 149 carers of children with eczema, most of whom were managed in primary care. Reviewers considered this trial to be of good generalisability to patients treated in primary care in the UK, because participants were recruited from 31 general practices and a range of socioeconomic areas. The other included UK study[86] was a small pilot study in primary care, conducted in patients with psoriasis. In this study, participants' baseline HRQoL scores indicated that their psoriasis had had, on average, a small effect on their HRQoL and the participants appeared to have, on average, milder disease at baseline compared with participants in the other psoriasis trials. Given this, it is also of some generalisability to UK clinical practice in primary care and to patients whose condition has had only a small impact on their HRQoL. The large-scale German trial of an educational intervention for children and adolescents with atopic dermatitis and their parents[87] could be considered of some relevance to patients with moderate to severe atopic dermatitis seen in secondary care because it was conducted in seven centres with a range of different age groups and should thus capture a wider group of patients. However, the health-care system is likely to be different from the UK. In general, around 50% or more of the patients included in each of the arms of the studies were female, and this is reasonably representative of the chronic inflammatory skin condition populations in the UK. For example, psoriasis tends to affect equal proportions of males and females (see *Epidemiology*).[17] Acne also affects equal proportions of males and females,[25] but the one included study of acne focused exclusively on women aged over 16 years and, therefore, its results may apply only to women in this age group and are unlikely to generalise to men (given that the intervention is, in part, focused on make-up use) or younger adolescents, who are commonly affected by this condition (see *Epidemiology*). Overall, therefore, the results presented below for educational interventions for children with eczema and their carers are the most generalisable to the UK.

Assessment of effectiveness

Trials of educational interventions for psoriasis

Three small trials, by Balato and colleagues,[85] Bostoen and colleagues (a subgroup),[76] and Ersser and colleagues,[86] examined educational interventions that could improve HRQoL in patients with psoriasis, as an adjunct to standard medical care. Participants in the trial by Balato and colleagues[85] were provided with educational text messages over 12 weeks. In the trial by Bostoen and colleagues,[76] patients took part in an educational programme delivered in twice-weekly, 2-hour sessions over 3 months by a multidisciplinary team. In Ersser and colleagues,[86] a shorter (a single, 2-hour session, supplemented by a 20-minute follow-up telephone call), theory-based, nurse-delivered self-management programme, targeted at individuals with mild to moderate plaque psoriasis, was delivered in primary care. The educational interventions in both Bostoen and colleagues[76] and Ersser and colleagues,[86] were compared with usual medical care alone. In the trial by Balato and colleagues,[85] the text message education intervention was compared with an unspecified control intervention.

Balato and colleagues[85] reported results for outcomes at 12 weeks (the end of the intervention), Bostoen and colleagues[76] at 3 months (the end of the intervention), 6 months (although this was not data extracted and not reported here) and 9 months, and Ersser and colleagues[86] at 6 weeks' follow-up. At baseline, participants included in the trial by Ersser and colleagues[86] had generally milder disease and had experienced less impact on their HRQoL than the participants in the other two trials.[76,85] (see *Table 4*). The results presented were from either pilot studies[85,86] or subgroup analyses of patients with psoriasis who were part of a larger trial (see *Statistical issues*).[76]

Health-related quality-of-life outcomes

All three trials used the DLQI to measure HRQoL. Bostoen and colleagues[76] additionally used the PDI and Skindex-29. Skindex-29 results were reported only narratively, with no supporting data provided. Balato and colleagues,[85] and Bostoen and colleagues[76] found that patients who received the text message education and the 3-month educational intervention, respectively, had better DLQI scores at the end of the interventions than those who had received the control interventions (*Table 7*). However, this effect was not maintained at 9 months from baseline in Bostoen and colleagues.[76] In Bostoen and colleagues, the 3-month educational intervention group also had better PDI scores at the end of the intervention, and this was maintained at 9 months.[76] No statistically significant differences between groups were found on the Skindex-29. Ersser and colleagues[86] found no statistically significant difference between the one-off education session and usual care alone groups in change in DLQI scores between baseline and 6 weeks' follow-up.

TABLE 7 Health-related quality-of-life results in studies examining educational interventions for psoriasis (adults)

		Score, mean (95% CI) unless otherwise stated		
Study	Measure, time point	Intervention	Control	Difference between groups
Balato *et al.*, 2013[85]	DLQI, mean (SD)			
	Baseline	7.9 (3.2) ($n = 20$)	7 (3) ($n = 20$)	
	12 weeks (intervention end)	4.2[a] ($n = 20$)	5.8[a] ($n = 20$)	p-value < 0.05
Bostoen *et al.*, 2012[76]	DLQI	(n unclear for all time points)	(n unclear for all time points)	
	Baseline	8.4 (5.6, 11.2)[a]	6.6 (3.9, 9.3)[a]	
	3 months (intervention end)	4.4 (1.3, 7.4)	6.4 (3.6, 9.2)	p-value = 0.019
	9 months	4.0 (0.6, 7.4)	5.8 (2.9, 8.8)	p-value = 1.00
	PDI			
	Baseline (SD) [95% CI]	9.0 (6.8) [5.0 to 13.0][b]	7.6 (7.8) [3.8 to 11.5][b]	
	3 months (intervention end)	4.3 (0.1, 8.4)[b]	6.7 (2.9, 10.6)[b]	p-value = 0.015
	9 months	4.9 (0.3, 9.5)	7.4 (3.3, 11.6)	p-value = 0.021
Ersser *et al.*, 2011[86]	DLQI, mean (SD)			
	Baseline	4.86 (5.14) ($n = 26$)	4.18 (3.19) ($n = 33$)	
	6 weeks	4.58 (5.05) ($n = 26$)	3.70 (3.71) ($n = 33$)	
	Change from baseline	0.28 (2.16)[c] ($n = 26$)	0.48 (3.02)[c] ($n = 33$)	95% CI: –1.20 to 1.61;[d] p-value = 0.772

DLQI scores can range from 0 to 30; a higher score indicates a worse HRQoL.[97] A higher score on the PDI indicates worse HRQoL.[95]

a Estimated from a figure.

b Note, a variety of baseline and 3-month values were reported for each outcome in Bostoen and colleagues[76] with no explanation about why different values were reported.

c Change (reduction) from baseline; a reduction shows that HRQoL improved. (See *Appendix 4* for detailed information about how measures are interpreted.)

d Point estimate for difference not provided in publication.[86]

Disease severity outcomes

All three trials measured disease severity using the PASI. Balato and colleagues[85] additionally used the SAPASI, body surface area (BSA) and physician's global assessment (PGA). On all the disease severity measures employed in Balato and colleagues[85] and Bostoen and colleagues,[76] participants who received the text message education and 3-month educational intervention, respectively, showed statistically significant better scores (i.e. less severe disease) than the control groups at the end of the interventions (*Table 8*). However, Bostoen and colleagues[76] found no statistically significant difference between groups on the PASI at 9 months after the start of the intervention. Ersser and colleagues[86] found no statistically significant differences in change in disease severity between the one-off education session and usual care alone groups at the 6-week follow-up assessment.

TABLE 8 Disease severity results in studies examining educational interventions for psoriasis (adults)

Study	Measure, time point	Score, mean (SD) (unless otherwise stated)		
		Intervention	Control	Difference between groups
Balato *et al.*, 2013[85]	PASI			
	Baseline	10.64 (4.2) ($n = 20$)	10.13 (4.7) ($n = 20$)	
	12 weeks (intervention end)	5.8[a] ($n = 20$)	6.8[a] ($n = 20$)	p-value < 0.05
	SAPASI			
	Baseline	11 (6.6) ($n = 20$)	10.90 (5.9) ($n = 20$)	
	12 weeks (intervention end)	5.9[a] ($n = 20$)	8[a] ($n = 20$)	p-value < 0.05
	BSA			
	Baseline	16 (7.5) ($n = 20$)	14.2 (8) ($n = 20$)	
	12 weeks (intervention end)	5.8[a] ($n = 20$)	8[a] ($n = 20$)	p-value < 0.05
	PGA			
	Baseline	2.6 (1.04) ($n = 20$)	2.3 (1.3) ($n = 20$)	
	12 weeks (intervention end)	0.7[a] ($n = 20$)	1.5[a] ($n = 20$)	p-value < 0.05
Bostoen *et al.*, 2012[76]	PASI, mean (95% CI)	(n unclear for all time points)	(n unclear for all time points)	
	Baseline	8.4 (6.0 to 10.8)[b]	7.1 (4.8 to 9.4)[b]	
	3 months (intervention end)	6.8 (4.3 to 9.3)[b]	8.1 (5.8 to 10.4)[b]	p-value = 0.036
	9 months	7.0 (3.8 to 10.3)	7.0 (3.8 to 10.3)	p-value = 0.116
Ersser *et al.*, 2011[86]	PASI			
	Baseline	2.34 (2.66) ($n = 26$)	3.22 (2.26) ($n = 33$)	
	6 weeks	1.78 (1.62) ($n = 26$)	2.82 (2.20) ($n = 33$)	Not reported
	Change from baseline	0.56 (1.42)[c] ($n = 26$)	0.40 (1.06)[c] ($n = 33$)	95% CI: –0.81 to 0.49;[d] p-value = 0.619

PASI scores can range from 0 to 72; a higher score indicates more severe disease.
a Estimated from a figure.
b Note, a variety of baseline and 3-month values were reported for each outcome in Bostoen and colleagues[76] with no explanation about why different values were reported (see Bostoen and colleagues[76] data extraction in *Appendix 4*).
c Change (reduction) from baseline; a reduction shows that disease severity improved.
d Point estimate for difference not provided in publication.[86]

Other measured outcomes

The RCT by Bostoen and colleagues[76] was the only psoriasis trial to measure other outcomes in addition to HRQoL and disease severity, namely, depression as measured by the Beck Depression Inventory (BDI) (*Table 9*) and medication use. The 3-month education programme group had a statistically significantly higher mean depression score at the end of the intervention (3 months) than the usual medical care group, but a statistically significant lower mean depression score at 9 months after the start of the intervention. The end of intervention result for this outcome might be explained by a baseline imbalance in mean depression scores, which was higher in the education than the control group. Regarding medication use, Bostoen and colleagues[76] narratively reported that there were no differences between the groups at 3 and 9 months in the number of participants using topical, systemic or combined medication or the number not using any medication (for full results data, see the Bostoen and colleagues[76] data extraction form in *Appendix 4*). Tests of statistical significance were not conducted for this outcome, because the data were not suitable for conducting tests of significance.

Process evaluation findings

The trials by Balato and colleagues[85] and Ersser and colleagues[86] included measures that explored intervention processes. In the Balato and colleagues[85] trial, participants were asked about how useful they had found the educational text messages. A total of 85% of the participants reported that they found the text messaging useful, with 75% stating that they would recommend it to a friend and 75% also stating that they would like to continue using it. Only 15%, however, agreed that they would be willing to pay for the service.

Ersser and colleagues[86] obtained qualitative and quantitative data on participants' perceptions of the usefulness of the education programme and recorded attendance. Qualitative data showed participants thought that the intervention was practical (not too time-consuming), convenient and that it provided follow-up care. Quantitative data were collected on participants' perceptions of the usefulness of each intervention component, including the group learning session, digital versatile disc (DVD), workbook and telephone consultation. The majority of the participants (54–96%) rated each of these elements to be either moderately useful or very useful, with few (4–8%) rating them as not useful. A further 8% and 42% of the participants did not provide a response to the questions about the usefulness of the telephone consultation and DVD, respectively (there was a 100% response rate to the questions about the usefulness of the group learning session and workbook). There was good attendance at the group session, with 26 of the 28 randomised participants attending. Only 15 of the randomised participants, however, watched the DVD. Others reported that they had technical difficulties with it, did not like the DVD format and/or found that a workbook was more convenient to use periodically. One point of feedback from the research team also noted by Ersser and colleagues[86] was that the smaller group sessions resulted in more interaction between participants than the larger sessions.

TABLE 9 Depression results in a study examining an educational intervention for psoriasis (adults)

Study	Measure, time point (*n* unclear for all time points)	Mean score (95% CI)		Difference between groups
		Intervention	Control	
Bostoen *et al.*, 2012[76]	BDI (depression), mean (95% CI)	(*n* unclear for all time points)	(*n* unclear for all time points)	
	Baseline	12.3 (8.3 to 16.4)	7.4 (3.5 to 11.3)	
	3 months (intervention end)	10.5 (6.1 to 14.9)	6.3 (2.3 to 10.3)	p-value < 0.05
	9 months	6.1 (1.7 to 10.5)	7.3 (3.2 to 11.3)	p-value = 0.029

Trials of educational interventions for eczema/atopic dermatitis

Adults

One trial, by Bostoen and colleagues,[76] examined a group-based educational intervention that could improve HRQoL in adults with atopic dermatitis. This trial also included patients with psoriasis and results were reported separately for the two patient subgroups (for psoriasis subgroup results, see *Trials of educational interventions for psoriasis*). Twenty-one patients were in the atopic dermatitis subgroup. The baseline severity of atopic dermatitis was considered 'moderate' by the authors. Patients took part in an educational programme, delivered as an adjunct to usual medical care, and delivered in twice-weekly, 2-hour sessions over 3 months by a multidisciplinary team. The educational intervention was compared with medical therapy alone. Outcomes were assessed at baseline, 3 months (i.e. the end of the intervention) and at 9 months (i.e. 6 months post intervention). Outcomes were mostly described narratively, with no CIs or *p*-values reported.

Health-related quality-of-life outcomes

Health-related quality of life was specified as a primary outcome. However, apart from QoLIAD scores at baseline, no quantitative HRQoL results were reported. The authors stated narratively that there were no significant differences between the educational intervention and control groups for the DLQI or QoLIAD at 3 and 9 months.

Disease severity outcomes

Bostoen and colleagues[76] also reported baseline disease severity outcomes in adults with atopic dermatitis, but did not provide any quantitative data for follow-up assessments. The authors stated narratively that there were no significant differences between the educational intervention and control groups for the Eczema Area and Severity Index (EASI) or SCORAD measures of disease severity at 3 and 9 months.

Other measured outcomes

Bostoen and colleagues[76] reported medication use and depression outcomes. The numbers of patients in the intervention and control groups who used each type of medication (topical, systemic, both, none or total medications) did not differ significantly between the groups (*p*-values were not reported) (*Table 10*). The authors narratively reported that there were no significant differences in depression between groups over time.

Process evaluation findings

No evaluations of process were reported.

Children, adolescents and their parents

Two RCTs included children with eczema/atopic dermatitis and their parents or carers.[74,87] One study, by Staab and colleagues,[87] investigated the effectiveness of a group-based educational intervention that could improve HRQoL in children or adolescents with atopic dermatitis and their carers, which was delivered by a multiprofessional team. The study included three subgroups with atopic dermatitis: children aged 3 months to 7 years; children aged 8–12 years; and adolescents aged 13–18 years. Patients' carers participated in the interventions for the 3 months to 7 years and 8–12 years age groups, and could participate optionally in some sessions for the 13–18 years age group. The other study, by Santer and colleagues,[74] was a pilot RCT that evaluated the SPaCE website, which provided education for carers of children with eczema aged 5 years or under recruited from primary care in the UK. There were three groups in this study: website only, website + HCP support and usual care alone. Both the website intervention groups also received usual care. Outcomes were measured at 12 months' follow-up in Staab and colleagues[87] and 3 months following baseline in Santer and colleagues.[74] Overall, the trial by Staab and colleagues[87] was of a reasonable size, but it may not have been powered to detect intervention effects in the subgroups, especially the adolescent subgroup. Similarly, the Santer and colleagues[74] trial was of a reasonable size, but it was unclear if this pilot RCT was adequately powered. The trial by Santer and colleagues was the only trial included in the review explicitly stating that the aim of the intervention was to improve QoL, although publications[78,93] linked to Staab and colleagues[87] provided information that the intervention for 3-month- to 7-year-olds was based on an intervention of which part of the aim was to improve the family's HRQoL.

TABLE 10 Medication use in a study examining an educational intervention for atopic dermatitis (adults)

Study	Measure, time point[a]	Number of patients		
		Intervention ($n = 10$)[b]	Control ($n = 11$)[b]	Difference between groups
Bostoen *et al.*, 2012[76]	Topical medications			
	Baseline	8	9	
	3 months	7	8	Stated NS
	9 months	7	7	Stated NS
	Systemic medications			
	Baseline	0	0	
	3 months	0	0	Stated NS
	9 months	0	0	Stated NS
	Combination medications			
	Baseline	2	2	
	3 months	1	2	Stated NS
	9 months	1	1	Stated NS
	No medications			
	Baseline	0	0	
	3 months	1	0	Stated NS
	9 months	0	0	Stated NS
	Total medications			
	Baseline	10	11	
	3 months	9	10	Stated NS
	9 months	8	8	Stated NS

NS, not statistically significant.
a Outcomes reported also for 6 months but not extracted here.
b Not explicitly stated that outcome data are for all participants in each group.

Health-related quality-of-life outcomes

Health-related quality of life was specified as a primary outcome in the study by Staab and colleagues[87] and was assessed using the German questionnaire 'Quality of Life in Parents of Children with Atopic Dermatitis' (*Table 11*). Parental HRQoL results were reported for the two children subgroups (3 months to 7 years and 8–12 years of age) for five questionnaire domains (psychosomatic well-being, effects on social life, confidence in medical treatment, emotional coping, and acceptance of disease). In both age groups the scores for all five questionnaire domains increased in both the intervention and control groups, but the increase was consistently larger in the intervention group than in the control group (the authors did not provide any guidance on how to interpret this measure). Apart from the psychosomatic well-being and effects on social life domains in the 8–12 years subgroup, the differences between intervention and control groups were statistically significant (see *Table 11*). Overall, these findings suggest that the educational intervention contributed to improving HRQoL among the parents of children in both age subgroups.
Santer and colleagues[74] measured the impact of the online interventions for carers on the family's QoL using the DFI questionnaire (*Table 12*). Across all three arms, DFI questionnaire scores were slightly lower at 3 months than at baseline (i.e. they had slightly improved), but the authors did not report if there were any statistically significant differences between groups in DFI questionnaire scores or changes in DFI

TABLE 11 Parents' HRQoL results from the Staab and colleagues[87] RCT, examining an educational intervention for atopic dermatitis (children, adolescents and their parents)

Study: Staab *et al.*, 2006[87]	Questionnaire item	Change in 'Quality of Life in Parents of Children with Atopic Dermatitis' score from baseline to 12 months (covariance analysis), mean (95% CI)[a]		
		Intervention ($n = 274$)	Control ($n = 244$)	Difference between groups
Age group: 3 months to 7 years	Psychosomatic well-being	4.4 (3.6 to 5.2)	3.1 (2.2 to 3.9)	1.4 (0.2 to 2.5); p-value = 0.004
	Effects on social life	1.8 (1.4 to 2.3)	1.0 (0.6 to 1.5)	0.8 (0.2 to 1.4); p-value < 0.0001
	Confidence in medical treatment	4.0 (3.5 to 4.5)	1.9 (1.4 to 2.4)	2.1 (1.4 to 2.8); p-value < 0.0001
	Emotional coping	3.1 (2.7 to 3.5)	1.1 (0.7 to 1.6)	1.9 (1.3 to 2.5); p-value < 0.0001
	Acceptance of disease	1.1 (0.8 to 1.3)	0.5 (0.3 to 0.8)	0.6 (0.2 to 0.9); p-value < 0.0001
Age group: 8–12 years	**Questionnaire item**	**Intervention ($n = 102$)**	**Control ($n = 83$)**	**Difference between groups**
	Psychosomatic well-being	3.2 (1.9 to 4.5)	2.6 (1.4 to 3.8)	0.6 (–1.2 to 2.4); p-value = 0.36
	Effects on social life	1.1 (0.4 to 1.8)	0.9 (0.2 to 1.6)	0.2 (–0.8 to 1.2); p-value = 0.94
	Confidence in medical treatment	3.1 (2.2 to 3.9)	0.1 (–0.7 to 1.0)	2.9 (1.7 to 4.1); p-value < 0.0001
	Emotional coping	2.7 (2.0 to 3.4)	0.9 (0.2 to 1.6)	1.8 (0.9 to 2.8); p-value = 0.002
	Acceptance of disease	0.8 (0.4 to 1.2)	0.2 (–0.2 to 0.6)	0.6 (0 to 1.2); p-value = 0.031

a Absolute questionnaire scores at baseline and 12 months were also reported and are given in the data extraction table for this study (see *Appendix 4*).

TABLE 12 Families' QoL results from the Santer and colleagues[74] RCT, examining an educational intervention for eczema (children aged ≤ 5 years and their parents or carers)

Study: Santer *et al.*, 2014[74]	Mean (SD)			
Measure, time point	Intervention 1: website only ($n = 44$)	Intervention 2, website + HCP support ($n = 50$)	Control: usual care alone ($n = 50$)	Difference between groups
DFI				
Baseline	5.3 (5.3)	6.4 (5.6)	5.2 (5.9)	
3 months	4.0 (4.2) ($n = 44$)	5.9 (5.3) ($n = 50$)	4.4 (5.5) ($n = 50$)	Not reported

DFI total score can range from 0 to 30, with a higher score indicating worse HRQoL.

questionnaire scores at 3 months. The authors suggest that, as scores were low at baseline (i.e. showing reasonably good QoL), the follow-up scores represent floor effects (i.e. there was no room for improvement). Santer and colleagues[74] also measured the impact of the interventions on children's HRQoL using the IDQoL and CDLQI measures, but do not report these results.

Disease severity outcomes

Disease severity was assessed by Staab and colleagues[87] for all three age groups (i.e. 3 months to 7 years, 8–12 years, and 13–18 years) using the objective and total SCORAD scores and the Skin Detective subjective score (*Table 13*). In each of these age groups, the scores on all three severity measures decreased from baseline to 12 months in both the educational intervention group and the control group. In all cases, the decreases were statistically significantly larger in the intervention group than in the control group. These findings suggest that the educational intervention consistently improved (i.e. reduced) disease severity irrespective of patients' age. In Santer and colleagues,[74] disease severity, as measured by the POEM score, improved in all three arms at 3 months in comparison to baseline, but the authors did not report if there were any statistically significant differences between arms (*Table 14*). The authors also reported the proportion of children from each trial group who showed a clinically significant change in disease severity at 3 months (defined as a change in the POEM score of ≤ 2). There were no statistically significant differences between groups in the proportion of children who showed a clinically significant improvement in their eczema.

TABLE 13 Disease severity results from the Staab and colleagues[87] RCT, examining an educational intervention for atopic dermatitis (children, adolescents and their parents)

Study: Staab *et al.*, 2006[87]		Change in disease severity score from baseline to 12 months (covariance analysis), mean (95% CI)[a]		
Age group: 3 months to 7 years	**Measure**	**Intervention ($n = 274$)**	**Control ($n = 244$)**	**Difference between groups**
	SCORAD: total severity score	–17.5 (–19.6 to –15.3)	–12.2 (–14.3 to –10.1)	–5.2 (–8.2 to –2.2), p-value = 0.0002
	SCORAD: objective severity score	–13.0 (–14.8 to –11.2)	–8.7 (–10.5 to –7.0)	–4.2 (–6.8 to –1.7), p-value = 0.0009
	'Skin Detective' subjective severity score	–3.3 (–3.9 to –2.8)	–2.2 (–2.7 to –1.6)	–1.1 (–1.9 to –0.3), p-value < 0.001
Age group: 8–12 years	**Measure**	**Intervention ($n = 102$)**	**Control ($n = 83$)**	**Difference between groups**
	SCORAD: total severity score	–16.0 (–20.0 to –12.0)	–7.8 (–11.4 to –4.3)	–8.2 (–13.6 to –2.8), p-value = 0.003
	SCORAD: objective severity score	–12.3 (–15.6 to –8.9)	–5.6 (–8.7 to –2.5)	–6.7 (–11.2 to –2.1), p-value = 0.005
	'Skin Detective' subjective severity score	–3.7 (–4.6 to –2.7)	–1.6 (–2.5 to –0.7)	–2.1 (–3.4 to –0.8), p-value < 0.001
Age group: 13–18 years	**Measure**	**Intervention ($n = 70$)**	**Control ($n = 50$)**	**Difference between groups**
	SCORAD: total severity score	–19.7 (–23.7 to –15.7)	–5.2 (–10.5 to 0.1)	–14.5 (–21.2 to –7.9), p-value < 0.0001
	SCORAD: objective severity score	–15.0 (–18.4 to –11.6)	–5.1 (–9.5 to –0.6)	–9.9 (–15.5 to –4.3), p-value < 0.0001
	'Skin Detective' subjective severity score	–3.1 (–4.1 to –2.2)	–1.0 (–2.1 to 0.1)	–2.1 (–3.5 to –0.7), p-value < 0.0002

a Absolute scores at baseline and 12 months were also reported and are given in the data extraction table for this study (see *Appendix 4*).

TABLE 14 Disease severity results from the Santer and colleagues[74] RCT, examining an educational intervention for eczema (children aged ≤ 5 years and their parents or carers)

Study: Santer *et al.*, 2014[74]	Mean (SD) (unless stated)			
Measure, time point	Intervention 1: website only ($n = 44$)	Intervention 2, website + HCP support ($n = 50$)	Control: usual care alone ($n = 49$)	Difference between groups
POEM score				
Baseline	10.3 (7.0)	9.4 (6.2)	7.47 (6.2)	
3 months	7.6 (6.1)	8.7 (7.0)	7.1 (6.6)	Not reported
Clinically significant change in POEM score between baseline and 3 months, *n/N* (%)	23/42 (55)	18/47 (38)	16/49 (33)	p-value = 0.09

POEM score can range from 0 to 28, with a higher score representing more severe disease. Clinically significant change in POEM score in a primary care context is a change of at least 2.[74]

Other measured outcomes

Santer and colleagues[74] measured other outcomes, including adherence to emollient use, adherence to the intervention, attitudes, and participants' perceptions of their abilities to manage eczema, but did not report findings for these outcomes. Staab and colleagues[87] assessed itching behaviour in two subgroups using the Juckreiz-Kognitions-Fragebogen Kinder (JUCKKI) questionnaire for 8- to 12-year-old children and the Juckreiz-Kognitions-Fragebogen Jugendliche (JUCKKU) questionnaire for adolescents aged 13–18 years. These measures yielded scores for itching catastrophisation (how the individual experiences the itching) and coping with itching (*Table 15*). In both age groups, the scores for itching catastrophisation decreased (i.e. improved) from baseline to 12 months, both in the educational intervention and control groups, with the decrease being statistically significantly larger in the intervention group than in the control group. In contrast, an improvement in coping with itching was only seen in the 8–12 years age group participants. Overall, these findings suggest that the educational intervention had an effect on reducing itch-related catastrophising, irrespective of the patient age group, but had less impact on coping with itch, which appears to have improved only in the 8- to 12-year-old group.

TABLE 15 Other measured outcome results from a study examining an educational intervention for atopic dermatitis (children, adolescents and their parents)

Study: Staab *et al.*, 2006[87]		Change in score from baseline to 12 months (covariance analysis), mean (95% CI)[a]		
Age group: 8–12 years	Measure: JUCKKI	Intervention ($n = 102$)	Control ($n = 83$)	Difference between groups
	Itching behaviour: catastrophisation	–7.0 (–8.9 to –5.1)	–1.8 (–3.5 to –0.2)	–5.2 (–7.7 to –2.7), p-value < 0.0001
	Itching behaviour: coping	1.0 (–0.3 to 2.3)	–0.4 (–1.6 to 0.8)	1.5 (–0.3 to 3.2), p-value = 0.047
Age group: 13–18 years	Measure: JUCKKU	Intervention ($n = 70$)	Control ($n = 50$)	Difference between groups
	Itching behaviour: catastrophisation	–6.8 (–8.6 to –5.0)	–2.0 (–3.9 to –0.2)	–4.7 (–7.3 to –2.2), p-value = 0.0002
	Itching behaviour: coping	–0.2 (–1.9 to 1.5)	0.4 (–1.2 to 2.1)	–0.6 (–3.0 to 1.7), p-value = 0.875

a Absolute scores at baseline and 12 months were also reported and are given in the data extraction table for this study (see *Appendix 4*).

Process evaluation findings

Only Santer and colleagues[74] carried out what could be considered a process evaluation. Quantitative data were collected on website use and uptake of the HCP appointment. Qualitative data were obtained via interviews with and feedback from participants and the HCPs. As *Table 16* shows, carers in the website + HCP support group spent more time using the website than carers in the website only group and proportionally more made three or more visits to the website. There did not appear to be any other differences between the two groups in their website use. (Note, however, that differences did not appear to have been statistically tested and the reviewers' interpretation of these data differ to the study authors',[74] who stated that there were no differences between groups.) Overall, the findings show a reasonably high completion rate of the core modules, and some use of other aspects of the intervention, but that the median time carers spent using the website in the website only group was less than intended (median of 34 minutes; it was intended that participants would spend at least 40 minutes completing at least two compulsory modules). In the website + HCP support group, 23 of the 50 participants (46%) took up the offer of a HCP appointment. Reasons for non-uptake included the participant declining the appointment ($n = 12$), the participant not being contactable, so an appointment could not be arranged ($n = 9$), and non-attendance at the appointment ($n = 6$).

Feedback from the carers about the website included that participants found it easy to use and useful. Only five of the 26 participants interviewed stated that they did not find it useful, and their reasons included that they had previously needed more support than now, and that their child's eczema was mild. There was more variation in the perceived value of the HCP support from the carers who had received this. Of those who found the support useful, reasons reported included that it had helped carers engage more with the website, it had increased their confidence for consulting with HCPs in the future, it had been an opportunity to discuss other health problems, it had been an opportunity to obtain emollient samples (not part of the intervention) and they felt more comfortable consulting with an HCP than using the website. Reasons for not finding HCP support useful included carers feeling that they did not need help in looking after their child's eczema and already feeling confident in their ability to source information from the internet. Feedback from the HCPs included that they felt pleased to play a part in helping carers to manage eczema, but they had initial reservations about not being knowledgeable enough about eczema, as most were not eczema specialists. There were some concerns that they had also received minimal training for the role. However, they reported that the consultations were useful, but perceived that some carers found it more useful than others and that some did not need HCP support.

TABLE 16 Intervention use in the Santer and colleagues[74] RCT, which evaluated a website and website + HCP support for carers of children aged ≤ 5 years with eczema

Study: Santer *et al.*, 2014[74]	*n*/*N* carers (%) (unless stated)	
Measure	Intervention 1: website only	Intervention 2: website plus HCP support
Time spent on website (minutes), median (IQR)	34 (20–50)	45 (26–70)
Completion of core modules	38/44 (86)	37/49 (76)
Three or more website visits	16/44 (36)	29/49 (59)
Watched ≥ 1 video	16/44 (36)	17/49 (35)
Took part in 2-week challenge text alerts	18/44 (41)	18/49 (37)

IQR, interquartile range.

Trials of educational interventions for acne

One small trial, by Matsuoka and colleagues,[88] examined the effects of an educational intervention in which 25 women with acne received instructions from a dermatologist on skin care and make-up use, plus acne treatment with topical therapy and/or oral medications. The educational intervention group was compared with a control group in which 25 women received acne treatment with topical and/or oral medication with no specific skin care instructions from a dermatologist. Outcomes were measured at 4 weeks post intervention.

Health-related quality-of-life outcomes

Matsuoka and colleagues[88] measured HRQoL using the DLQI and WHOQOL-26, and provided results for the total mean scores for both measures as well as scores for the various subscales of each. *Table 17* presents results for the total mean scores, and the findings for the subscales are narratively summarised here (for the full subscale results, see the data extraction form in *Appendix 4*). Matsuoka and colleagues[88] reported only the statistical significance of between-group differences for the DLQI and only one subscale of the WHOQOL-26 (the 'overall quality of life (QoL)' subscale). No statistically significant differences were found between the educational intervention and control groups' DLQI total scores at 4 weeks' follow-up. The only statistically significant difference between groups on the DLQI subscales was on the work/school aspect, with the intervention group showing significantly more disability than the control group at 4 weeks. However, as alpha levels were not adjusted for in multiple comparisons, this may be a chance finding. On the WHOQOL-26, at 4 weeks, the intervention group had a slightly lower total mean score than the control group (indicating poorer HRQoL). However, this was also the case at baseline and it was not reported if the difference at 4 weeks was statistically significant. Differences on the 'overall QOL' sub-scale of the WHOQOL-26 at 4 weeks were reported to be non-significant (*p*-value not provided).

Disease severity outcomes

Disease severity in Matsuoka and colleagues[88] was measured by Plewig and Kligman's grade method, which assessed the degree of improvement in acne severity on the right and left side of the face. No statistically significant association was found between trial arm and changes in acne severity at 4 weeks (*Table 18*).

Other measured outcomes

The only other outcome measured by Matsuoka and colleagues[88] was adverse events. The authors narratively noted that no side effects from using cosmetics or conventional medicine were reported in either group.

TABLE 17 Health-related quality-of-life results in a study examining an educational intervention for acne (adults)

		Mean (SD) score		
Study	Measure, time point	Intervention ($n = 25$)	Control ($n = 25$)	Difference between groups
Matsuoka *et al.*, 2006[88]	DLQI: total mean score			
	Baseline	8.24 (5.06)	6.24 (6.06)	
	4 weeks	3.88 (2.79)	3.24 (4.36)	NS
	WHOQOL-26: total mean score			
	Baseline	3.27 (0.54)	3.36 (0.44)	
	4 weeks	3.39 (0.45)	3.44 (0.46)	Not reported

NS, not statistically significant.
Interpretation of DLQI: a higher score indicates more disability. Interpretation of WHOQOL-26 score: a lower score indicates more disability.

TABLE 18 Disease severity results in a study examining an educational intervention for acne (adults)

Study	Measure, time point	*N* (%)		
		Intervention ($n = 25$)	Control ($n = 25$)	Difference in change categories between groups (chi-squared test)
Matsuoka *et al.*, 2006[88]	Acne severity (Plewig and Kligman's grade method): degree of improvement in acne severity on right side of face at 4 weeks			
	Markedly improved	5 (20)	8 (32)	
	Improved	10 (40)	8 (32)	
	Unchanged	10 (40)	9 (36)	
	Exacerbated	0 (0)	0 (0)	p-value = 0.62
	Acne severity (Plewig and Kligman's grade method): degree of improvement in acne severity on left side of face at 4 weeks			
	Markedly improved	9 (36)	7 (28)	
	Improved	8 (32)	9 (36)	
	Unchanged	8 (32)	9 (36)	
	Exacerbated	0 (0)	0 (0)	p-value = 0.83

Process evaluation findings

Matsuoka and colleagues[88] did not include a process evaluation.

Trials of educational interventions for mixed chronic inflammatory skin conditions

van Os-Medendorp and colleagues[89] examined the effects of an educational intervention (the 'Coping with itch' programme) for patients with chronic pruritic skin disease. The focus of the intervention was to reduce itch and help participants cope with itch. The educational intervention group was compared with a control group who had normal care, which consisted of outpatient consultations with a dermatologist and therapeutic interventions such as emollients and topical steroids.

Health-related quality-of-life outcomes

van Os-Medendorp and colleagues[89] measured HRQoL through the 'Impact on QoL' subscale of the ACS. Outcomes were reported at 3 and 9 months (the latter time point corresponding with the programme duration). For the purpose of the present review, the 9-month outcomes are reported. *Table 19* presents the results for the QoL subscale, where lower scores reflect lower skin-related psychosocial morbidity. The trial authors stated that no statistically significant differences were found between the educational

TABLE 19 Health-related quality-of-life results in a study examining an educational intervention for mixed chronic inflammatory skin conditions (adults)

Study	Measure, time point	Mean (SD) score		
		Intervention	Control	Difference between groups
van Os-Medendorp *et al.*, 2007[89]	ACS QOL subscale			
	Baseline	12.08 (5.00) ($n = 29$)	12.56 (4.93) ($n = 36$)	
	9 months	13.10 (5.25) ($n = 23$)	12.68 (4.58) ($n = 30$)	Stated NS

NS, not statistically significant.

intervention and control groups on this measure (neither *p*-values nor CIs were not reported). No power analysis was provided in the publication and there were high rates of attrition, which may have some relevance to the reported outcome as there were small numbers analysed. Other subscales of the ACS were reported in the trial; these are discussed separately below as they are not HRQoL subscales.

Disease severity outcomes

Disease severity was measured by two measures in the van Os-Medendorp and colleagues[89] trial: frequency and intensity of itching and scratching. Little detail of the scales was provided except that the two measures were derived from four factors that had been recorded in diaries (frequency and intensity of itching, frequency and intensity of scratching), where severity ranged from 0 to 10 (lowest to highest severity) and the internal consistency was high. The authors subsequently converted these scores into a dichotomous measure with an arbitrary cut-off (high frequency defined as > 4 and high intensity defined as > 3) based on averages from the original scale. The paper reports analysis of only the high frequency between groups. Results are presented in *Table 20* where it can be seen that at 9 months there were no statistically significant differences between the educational intervention and control group. No *p*-values or CIs were reported by the study authors and the numbers analysed were small, as there had been a high drop-out rate.

Other measured outcomes

van Os-Medendorp and colleagues[89] measured general psychosocial morbidity using the Symptom Checklist-90. On this measure, lower scores reflect lower general psychosocial burden. Results can be seen in *Table 21*, where it is apparent that there were no statistically significant differences between those in the educational intervention and control groups.

Other outcomes measured in the van Os-Medendorp and colleagues[89] trial included the Itching Cognitions Questionnaire (ICQ), other subscales of the ACS, medication use, and the proportion of patients visiting the dermatologist. The results of these various measures and indices are summarised narratively here (see the data extraction form in *Appendix 4* for the full subscale results).

No statistically significant differences were seen between the educational intervention and control groups on the ICQ subscales of catastrophising and helpless coping, and problem-focused coping. Six subscales of the ACS were reported (skin-related psychosocial morbidity, social anxiety and avoidance, vicious circle of itching and scratching, helplessness, anxious depressive mood, and deficit in active coping). No statistically significant differences were seen on these scales between those receiving the educational intervention and those receiving the control intervention.

TABLE 20 Disease severity results in studies examining educational interventions for mixed chronic inflammatory skin conditions (adults)

		n (%)		
Study	Measure, time point	Intervention	Control	Difference between groups
van Os-Medendorp *et al.*, 2007[89]	Patients with high frequency of itching and scratching			
	Baseline	18 (72) (*n* = 25)	21 (66) (*n* = 32)	
	9 months	12 (50) (*n* = 24)	15 (52) (*n* = 29)	Stated NS
	Patients with high intensity of itching and scratching			
	Baseline	20 (80) (*n* = 25)	25 (78) (*n* = 32)	
	9 months	12 (50) (*n* = 24)	16 (55) (*n* = 29)	Stated NS

NS, not statistically significant.

TABLE 21 Other measured outcome results in a study examining an educational interventions for mixed chronic inflammatory skin conditions (adults)

Study	Measure, time point	Score, mean (SD)		
		Intervention	Control	Difference between groups
van Os-Medendorp *et al.*, 2007[89]	SCL-90			
	Baseline	146.30 (60.02) ($n = 29$)	151.18 (52.60) ($n = 36$)	
	9 months	134.41 (47.68) ($n = 23$)	159.81 (57.69) ($n = 30$)	Stated NS

NS, not statistically significant.

No statistically significant differences between groups were observed on the use of mild, moderately potent, potent, or very potent corticosteroids; systemic medication use; or itch-relieving medication use between groups (see *Appendix 4*). The proportion of participants visiting the dermatologist was statistically significantly lower in those in the educational intervention group initially (1–3 months), but by 7–9 months there were no statistically significant differences between the two groups.

For all of these analyses the numbers of participants in each group were small and it is unlikely that the analyses were powered to detect a difference between the groups.

Process evaluation findings

The van Os-Medendorp and colleagues[89] trial did not report a process evaluation.

Summary of clinical effectiveness

Only seven RCTs, with adequately reported results, were identified that evaluated the effects of educational interventions that could improve HRQoL in people with chronic inflammatory skin conditions. Only one study[74] explicitly stated in the primary publication that the intervention was aimed at improving HRQoL (but in one other[87] the intervention for one of three age groups of participants in the study was based on an intervention of which part of the aim was to improve HRQoL[78,93]), and only three evaluated theory-based interventions. The current evidence base is mainly limited to small studies (four trials included between 40 to 64 participants; it was unclear if any of these were adequately powered, and one reported subgroup results only and two were pilot studies), of generally poor methodological quality, focusing on psoriasis, atopic dermatitis and acne, and studies including adults. Only two studies included children and adolescents and their parents or carers; these were the largest trials included in the review (992 and 148 randomised participants, respectively, with the smaller study being a pilot study).

The educational interventions have commonly been delivered face to face (either in a group or individually), as an adjunct to standard medical care, and have provided participants with information about their condition and methods for coping with stress or the negative effects of their disease, such as itch or appearance concerns. There have been some attempts to tailor interventions to individual needs or participants' characteristics. The participants included in the trials generally had had their skin condition for a number of years and no studies were found that specifically targeted newly diagnosed patients. In two of the seven included studies, participants' mean baseline HRQoL scores indicated that, generally, their disease had had a minimal impact on their HRQoL. Three studies had a follow-up of a reasonable duration to capture the clinical effects of the intervention (≥ 3 months post intervention). Adverse effects were evaluated in only one trial. The majority of the studies were considered to be of limited generalisability to UK clinical practice. Exceptions were the two large RCTs examining the effects of an online educational intervention (the SPaCE website) aimed at the carers of children with eczema in primary care and the group-based educational programme, delivered by a multidisciplinary team over 6 weeks, aimed at

children and adolescents with atopic dermatitis and the children's carers, which was delivered to patients recruited from secondary care. The UK trial by Ersser and colleagues[86] of nurse-led education for psoriasis may also have some generalisability to patients seen in primary care whose disease has not extensively affected their HRQoL.

Three trials found statistically significant improvements in HRQoL following the educational interventions. Of these, two found benefits for adult patients with psoriasis at the end of the text message education intervention delivered over 12 weeks and the 3-month, group-based, educational programme intervention delivered by a multidisciplinary team compared with an unspecified control and usual medical therapy, respectively. The other one found benefits for parents of children with atopic eczema at 12 months' follow-up (it was unclear if this follow-up time point was from baseline or the end of the intervention) from a 6-week group-based programme delivered by a multidisciplinary team compared with a no education control. All these trials also found improvements in patients' disease severity at these time points. Only one of these psoriasis trials (of the group-based education) measured outcomes in the longer-term post intervention (specifically, 6 months after the end of the intervention) and it found that the improvements on only one of the two HRQoL measures used persisted over time, whereas improvements in disease severity were not maintained. In one of these studies, the same intervention was delivered to patients with psoriasis and patients with atopic dermatitis, but it did not improve HRQoL or disease severity in those with atopic dermatitis despite being effective for psoriasis, and the reasons for this are unclear. It could have been a chance finding, as the results were from potentially under-powered subgroup analyses, which were at unclear risk of bias because it was not stated if these were pre-specified. Of the trials reporting statistically significant improvements in HRQoL and disease severity, only one[87] discussed how clinically meaningful the changes were to patients (suggesting that, on average, a meaningful improvement in disease severity had occurred in the children with atopic dermatitis in the trial of the multidisciplinary 6-week programme), but, generally, the clinical significance of the improvements found in these studies is unclear.

No effects of education on HRQoL or disease severity in comparison with usual care were found in studies of a one-off nurse-delivered educational session for adults with psoriasis, instructions on skin care and make-up use to women with acne, the SPaCE website (with or without HCP support) for carers of children with eczema or in a 'Coping with itch' programme for participants with a range of conditions delivered in a median of three sessions. It was unclear if any of these studies were adequately powered. However, two were pilot studies, so although they were possibly not powered adequately, they provided useful information about the feasibility and acceptability of the intervention to inform a more rigorous evaluation, as recommended by the MRC guidance on complex intervention development and evaluation.[65] Furthermore, in two studies, participants' baseline HRQoL scores indicated that their disease had had minimal impact on their HRQOL, which may partly explain the lack of effects (e.g. no room for improvement). The 'Coping with itch' study had a high attrition rate, and as no process evaluation was included in the study, it was unclear why so many participants did not complete the study or what programme factors may have led to this.

The review findings also indicate that educational interventions may result in improvements in other outcomes, including decreases in itching catastrophisation, some improvements in coping with itch, reductions in depression and short-term reductions in consultations with HCPs. No impact on medication use was found. The one study that reported adverse effects found no negative impact of the intervention.

It is not possible to determine from the studies in this review the educational intervention components or characteristics that may contribute to improving patients' and parents' or carers' HRQoL. Commonalities between effective interventions were delivery by a multidisciplinary team and delivery over a longer period than the interventions in the trials which did not find any statistically significant effects (ranging from 6 weeks to 3 months). However, given the limitations of the evidence, these commonalities should only be regarded as early indications of factors that may characterise effective interventions.

Overall, the current evidence base suggests that educational interventions including elements that could improve HRQoL do show some promise for improving HRQoL and disease severity in adults with psoriasis directly at the end of the intervention (with some indication that improvements in HRQoL may be maintained 6 months after the intervention, whereas improvements in disease severity may not be maintained), as well as for improving the HRQoL of parents of children with atopic dermatitis, and children and adolescents' atopic dermatitis disease severity, in the longer term, up to 12 months. There was no evidence of effectiveness on HRQoL in adults with acne or atopic dermatitis or for an intervention aimed at improving itch in a mixed skin diseases population or for an online educational intervention (with or without HCP support) aimed at the carers of children with eczema. Based on the findings of two studies, there are indications that interventions aimed at mixed populations with different skin conditions may not be effective or may be more effective for one of the included patients groups than another. Characteristics of effective interventions may include intensive delivery over a period ranging from 6 weeks to 3 months (rather than shorter, less intensive interventions of one or a few sessions) and delivery by a multidisciplinary team, but, overall, at this stage, it is not possible to identify the intervention factors that may lead to improvements in HRQoL.

Ongoing studies

Six ongoing RCTs were identified that appear to meet the inclusion criteria for the systematic review (*Table 22*). Three of the RCTs are being conducted in Europe (excluding the UK), two in the USA and one in Japan. According to the study dates specified in trial registries, three of the six RCTs should have been completed, but we have classified these as ongoing trials given that their results have not yet been published.

Three of the RCTs are being conducted with children with atopic dermatitis, although one also includes their parents; one RCT includes adults with psoriasis; one RCT includes adults with psoriasis or eczema; and one RCT includes adults with occupational hand eczema. The interventions are reported to varying levels of detail in trial registries, but appear to consist mostly of various types of group education. Each of the RCTs contains two arms, in which an educational intervention is compared with a comparator. In four RCTs, the interventions are being compared against no education, whereas in two RCTs the comparator is a different type of education. Four of the RCTs specified HRQoL as a primary outcome and two RCTs specified HRQoL as a secondary outcome. The target numbers of patients randomised ranges from 50 to 742. The specified completion dates of the RCTs range from August 2011 to December 2015, although no completion date is specified for the Japanese RCT (see *Table 22*).

TABLE 22 Ongoing studies

Title, trial number, funding and/or sponsor	Study design (country), study dates, estimated enrolment	Study aims	Population	Intervention(s)/ comparator(s)	Outcomes
Group Eczema Education Visits: Impact on Patient and Family Quality of Life NCT01143012 Sponsor: Oregon Health and Science University	RCT (USA) May 2010–August 2011 (final data collection) Estimated $n = 60$ (completed but not published)	To examine if group education improves patients' QoL and other outcomes, including health-care resource use and disease severity	Atopic dermatitis (children aged 2 months to 6 years and parents)	1. Group eczema education session 2. No education control group	*Primary:* HRQoL (CADIS) *Secondary:* disease severity (EASI); health-care resource use
A Psycho-educational Prevention for the Treatment of Atopic Dermatitis in Youth and Their Families NCT02067234 Sponsor: Seton Family of Hospitals	RCT (USA) March 2014–December 2014 Estimated $n = 50$	To determine whether the inclusion of a parent/patient psychoeducational session in initial dermatology appointments with new paediatric atopic dermatitis patients affects (a) extent of medical follow-up, (b) patient's QoL, and (c) parenting stress in comparison to treatment as usual	New paediatric patients (aged 2 months to 12 years) with atopic dermatitis	1. Psycho-education/coping prevention + routine care 2. Education + routine care	*Primary:* disease severity (SCORAD) *Secondary:* HRQoL (Parenting Stress index, CDLQI, IDQoL index) *Disease severity* (PO-SCORAD)
A Randomised Clinical Trial on the Effect of Group Education on Patients With Occupational Hand Eczema (PREVEX)[97] NCT01899287 Sponsor: University of Copenhagen; Copenhagen University Hospital	RCT (Denmark) July 2012–December 2013 Estimated $n = 742$ (completed but not published)	To evaluate the effect of group education on sick leave, HRQoL and disease severity among individuals with newly notified occupational hand eczema	Aged 18–65 years with self-reported occupational hand eczema	1. Group education on skin care 2. No education	*Primary:* total sickness absence; HRQoL (DLQI); subjective disease severity (photographic guide) *Secondary:* eczema-related sickness absence; several exploratory outcomes

continued

TABLE 22 Ongoing studies (*continued*)

Title, trial number, funding and/or sponsor	Study design (country), study dates, estimated enrolment	Study aims	Population	Intervention(s)/ comparator(s)	Outcomes
A Prospective, Randomised, Controlled Study of the Impact of Education and Stress-reduction Techniques on Psoriasis and Eczema NCT02205593 Sponsor: University of Zurich	RCT (Switzerland) July 2012–December 2015 Estimated $n = 80$	For patients to learn effective self-management strategies and attitude to one's chronic skin disease and consequently improving QoL	Aged ≥ 18 years with chronic psoriasis or eczema	1. 'Haut Tief' (Skin Deep) patient education (including stress reduction with yoga, sport, meditation) 2. No intervention	*Primary:* HRQoL (DLQI, Skindex-29, SF-36, EQ-5D, EQ-5D VAS) *Secondary:* disease severity (EASI, PASI); depression (BDI)
The Effect of Patient Education in Initial Treatment of Children with Atopic Dermatitis by Paediatric Allergy Educator UMIN000012867 Sponsor: Tokyo Metropolitan Children's Medical Centre	RCT (Japan) April 2014–(end date not specified) Target $n = 120$	To test whether paediatric allergy educator leads the effectiveness of patient education at the stage of initial treatment for paediatric patients with atopic dermatitis	Children aged 1–10 years with atopic dermatitis	1. Standard therapy and patient education by paediatric allergy educator 2. Standard therapy and patient education by paediatrician or/and allergist	*Primary:* disease severity (SCORAD) *Secondary:* family impact (DFI); HRQoL (QPCAD); skin care; medication use
The efficacy of a HRQoL intervention during 48 weeks of biologic treatment of patients with moderate to severe psoriasis[98] Netherlands National Trial Register (NTR): NTR1364 Sponsor: Pfizer B.V., Rotterdam, the Netherlands	RCT (the Netherlands) October 2008–December 2012 Target $n = 200$ (completed but not published)	1. To assess the efficacy of HRQoL-assessment and HRQoL-communication in dermatological practice during 48 weeks of treatment of psoriasis patients with etanercept (Enbrel®, Pfizer) 2. To examine the course of HRQoL during 48 weeks of treatment with etanercept, and to assess the degree of improvement of HRQoL	Patients aged ≥ 18 years with moderate or severe psoriasis who are receiving etanercept	1. Etanercept treatment plus HRQoL intervention (communication of Skindex-29 score to patient and provision of printed patient information on HRQoL) 2. Etanercept treatment only	*Primary:* HRQoL (DLQI); doctor–patient communication (study-specific questionnaire) *Secondary:* health status (SF-36); disease severity (PASI, IGA, PGA); patient satisfaction (ad hoc questionnaire); intervention feasibility (ad hoc questionnaire)

CADIS, Childhood Atopic Dermatitis Scale; IGA, investigator global assessment (disease severity); PO-SCORAD, patient-orientated version of SCORAD; VAS, visual analogue scale.

Chapter 4 Economic analysis

The following section has two parts. First, the methods and findings of the systematic review of the cost-effectiveness of educational interventions as an adjunct to standard medical care in the treatment of patients with chronic inflammatory skin diseases is presented. The objective of this review is to provide useful information to inform the development of an economic model. The second part outlines a list of recommendations on the different aspects that should be considered in the development of any future health economic model to assess cost-effectiveness of educational interventions for chronic inflammatory skin conditions, based on the findings of the systematic review.

Systematic review of existing cost-effectiveness evidence

The methods of the systematic review are described above (see *Inclusion and exclusion criteria*), although the inclusion criteria were modified slightly from those used in the review of clinical effectiveness. First, the inclusion criteria for this review were not limited to studies where the effects of education on overall outcomes had to be isolated from effects of any non-educational intervention components that may also be present in the intervention. Second, studies that did not specifically aim to improve HRQoL were also included. The reason for incorporating broader criteria on HRQoL was because the reviewers anticipated fewer studies at the beginning of this review.

The studies are described in terms of their quality and generalisability to the UK and key issues arising from each of the studies are discussed.

Quantity and quality of published research

A total of 1394 citations were identified through the systematic searches. Following examination of titles and abstracts, 13 potentially relevant papers were retrieved for a more detailed inspection. Of these, 10 papers were excluded. The reasons for exclusion were: the nature of the intervention was not educational as defined within the scope of the project;[99–102] the study design was inappropriate;[75,93,103,104] the study was not published in English[105,106] (see *Appendix 7*). Three studies were eligible for inclusion; one was based on adults with chronic pruritic skin diseases[107] and the remaining two studies were on eczema in children.[108,109] In the study on pruritic skin disease, van Os-Medendorp and colleagues[107] assessed health-care costs and costs associated with loss of work in patients with different chronic pruritic skin diseases (*Table 23*) enrolled in the nursing programme 'Coping with itch' compared with a control group of patients receiving usual dermatological care. Of the two eczema-based studies, Mason and colleagues[108] conducted a cost analysis that examined the effectiveness of an educational support programme to increase emollient use and reduce atopic eczema symptoms in children, whereas Schuttelaar and colleagues[109] conducted a cost-effectiveness analysis of care provided by nurse practitioners (NPs) versus dermatologists.

The study by van Os-Medendorp and colleagues[107] was included in the review of clinical effectiveness studies (discussed in *Clinical effectiveness, Results*), whereas the studies by Mason and colleagues[108] and Schuttelaar and colleagues[109] were excluded. This was due to the difference in HRQoL inclusion criteria between the two reviews as stated above (see *Systematic review of existing cost-effectiveness evidence*). In this context, the reviewers deemed the study by van Os-Medendorp and colleagues[107] to be the most relevant of the three studies identified through the systematic searches, given that it also met the inclusion criteria for clinical effectiveness. As a result, this study[107] is discussed in depth (see *Description and results of the published economic evaluations*); this is followed by discussion of the remaining two studies[108,109] that met the inclusion criteria.

TABLE 23 Characteristics of economic evaluations

Author	van Os-Medendorp *et al.*, 2008[107]	Mason *et al.*, 2013[108]	Schuttelaar *et al.*, 2011[109]
Publication year	2008	2013	2011
Country	The Netherlands	UK	The Netherlands
Study type	Economic evaluation based on the results of a RCT	Cost analysis based on a before-and-after study	Economic evaluation based on the results of a RCT
Perspective	Not reported	NHS	Societal
Study population	Adults with chronic pruritic skin diseases including eczema; atopic dermatitis; pruritus; prurigo; psoriasis; chronic urticaria; other skin disease including allergies, mycosis, fungoides, lichen ruber planus, Darier disease; unknown and non-skin diseases	Atopic eczema (children + carers)	Children with eczema
Intervention(s)	Intervention: nursing care according to the programme 'Coping with itch' consisting of educational and cognitive behavioural interventions. It was carried out in a specialised itch clinic run by dermatology nurses who provided individual sessions at the dermatology outpatient department (see also *Clinical effectiveness, Results*) Comparator: usual dermatologist care	Educational support programme for parents and carers included an educational DVD, online daily diary and telephone helpline with dermatology nurses	Intervention: care provided in terms of education and coaching by a NP Comparator: conventional care by a dermatologist
Key outcome measure	Frequency of itching and scratching as recorded in patient diaries	Emollient use	Between-group differences in the QoL of the child between baseline and follow-up at 12 months measured by IDQoL and CDLQI
Currency base	EUR, currency year not reported	GBP, 2011	EUR, 2008
Time horizon[a]	9 months	3 months	1 year
Baseline cohort	Patients with chronic pruritic skin diseases aged 18 years or older, regardless of the underlying diagnosis, who visited dermatology outpatient departments	Eligible children were male and female, aged 3 months to 6 years, with mild to moderate atopic eczema; and using E45 cream (Reckitt Benkiser, Slough, UK) as their primary emollient	Patients aged ≤ 16 years with a diagnosis of eczema ('atopic dermatitis')
Funding source	Dutch College of Health Insurance (CVZ)	Reckitt Benkiser Healthcare	Health Care Efficiency Research Programme of the University Medical Centre Groningen, Groningen, the Netherlands

NP, nurse practitioner.
a Time horizons of the analyses across the three studies were similar to the trial durations.

Characteristics of the three included studies[107–109] are shown in *Table 23* and discussed in more detail subsequently. The identification process of the included studies is shown in a PRISMA flow chart presented in *Figure 2*. Full data extraction forms for the included studies are included in *Appendix 8*.

Critical appraisal of the studies

The included studies were assessed against a critical appraisal checklist (*Table 24*) to evaluate their quality and generalisability to the UK. The checklist was adapted by the review authors from a checklist by Drummond and colleagues.[110] More details of the studies are given below (see *Description and results of the published economic evaluations*).

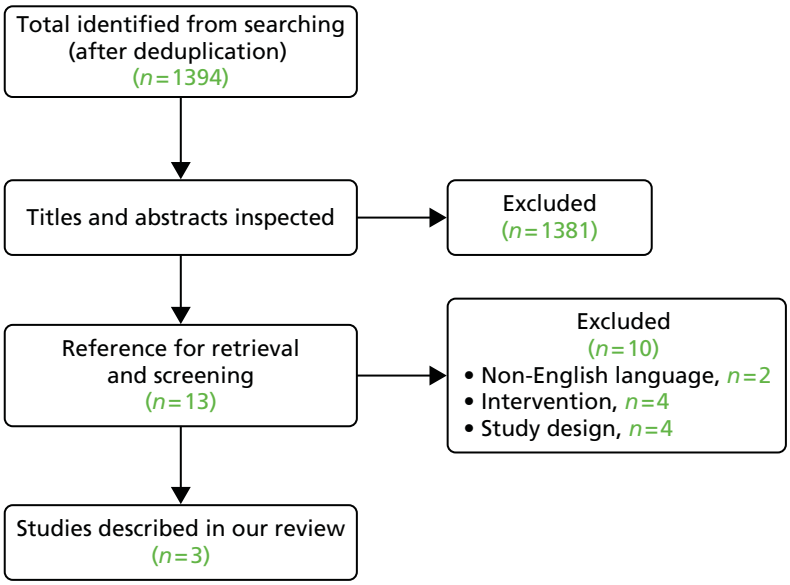

FIGURE 2 Flow chart of identification of studies for inclusion in the review of cost-effectiveness.

TABLE 24 Critical appraisal checklist for economic evaluations (based on Drummond *et al.*, 2005[110])

Item	van Os-Medendorp *et al.*, 2008[107]	Mason *et al.*, 2013[108]	Schuttelaar *et al.*, 2011[109]
1. Is the decision problem (including interventions compared and patient group) relevant to the UK?	Yes	Yes	Yes
2. Is the setting comparable to the UK?	No	Yes	No
3. Is the analytical and modelling methodology appropriate?	?	?	?
4. Are all the relevant costs and consequences for each alternative identified?	Yes	?	Yes
5. Are the data inputs for the model described and justified?	Yes	?	Yes
6. Are health outcomes measured in QALYs?	No	No	No
7. Is the time horizon considered appropriate?	No[a]	No[a]	No[a]
8. Are costs and outcomes discounted?	No[b]	No[b]	No[b]
9. Is an incremental analysis performed?	Yes	Yes	Yes
10. Is uncertainty assessed?	Yes	?	Yes

?, unclear.
a The time horizon considered is too short for a chronic disease.
b Discounting was not applicable as the time horizon was < 1 year.

All three studies clearly defined the decision problem and used a relevant intervention for the purpose of this review. The nature of the interventions and the comparators varied across the studies. The patient groups of interest were clearly stated in all the studies. Two studies[108,109] stated the perspectives adopted. However, there remained uncertainty in the adopted analytical methodologies.

The studies did not incorporate a cost–utility analysis; two studies conducted cost-effectiveness analyses[107,109] and the other performed a cost analysis.[108] This was considered as lacking usefulness from the UK NHS perspective, where a cost–utility analysis is generally deemed preferable for decision-making purposes.

Methods for estimating resource use and costs varied. van Os-Medendorp and colleagues[107] provided adequate details of all the relevant elements that contributed to the overall costs of both the intervention and comparator strategies. Schuttelaar and colleagues[109] described the resource used and costs in a detailed manner. Mason and colleagues,[108] however, did not present a detailed overview of all the relevant cost components needed for an accurate estimation of total programme costs.

The studies used different measures to assess outcome. None of the studies reported a preference-based measure of health to estimate effectiveness in terms of QALYs. This is a potential limitation, as having a common numeraire such as QALYs would have facilitated comparison of the effectiveness across different interventions. The quality of the methodology adopted to estimate effectiveness was mixed. Within the two cost-effectiveness analyses conducted in the Netherlands,[107,109] effectiveness in terms of HRQoL was assessed through condition-specific measures such as IDQoL and CDLQI[109] and disease severity was measured by SCORAD.[109] Clinical outcomes such as frequency of itching and scratching were also estimated[107] along with patient satisfaction. The UK-based cost-analysis,[108] by contrast, used emollient use, severity of eczema, use of concurrent medication, parent measures and health-care contacts by patients to measure outcomes in the before-and-after study periods.

The economic evaluations conducted within the included studies did not involve extrapolating data beyond study durations. As a result, none of the studies applied discounting as the time horizons were 1 year or less.

Incremental analyses were conducted in all three studies. Uncertainties were assessed by bootstrapping methods in two studies;[107,109] it is unclear if these analyses were conducted by Mason and colleagues.[108] Bootstrapping is a technique of resampling statistical data to derive estimates of summary statistics such as CIs and standard errors. The technique makes very limited assumptions about the probability distributions of the data, thereby limiting the introduction of data uncertainty, unlike in probabilistic sensitivity analysis (PSA) as PSA imposes additional assumptions on the real distribution of the data.[111,112] Therefore, even though the studies did not conduct the standard practice of PSA to assess uncertainty, the methods were still considered to be appropriate.

In summary, the included studies lacked detail on some aspects of methodology, making it difficult to assess the validity of the results. Therefore, there is uncertainty on the credibility of the study findings given the limitations outlined above. The study by Mason and colleagues[108] is of most relevance to the UK as the health-care system in the study was the NHS.

Description and results of the published economic evaluations

van Os-Medendorp and colleagues

van Os-Medendorp and colleagues[107] performed an economic evaluation based on a RCT conducted in the Netherlands that assessed the clinical effectiveness of the nursing programme 'Coping with itch' in patients aged ≥ 18 years with chronic pruritic skin diseases (also included in the clinical systematic review; see *Clinical effectiveness, Results*).

Analytical approach
Statistical analysis was conducted on trial-based outcomes to analyse cost-effectiveness of the intervention over a period of 9 months for 120 patients.

Assumptions
To estimate costs associated with days off work, the same value based on an overall mean hourly productivity cost for both men and women was applied. With respect to the frequency of itching and scratching measured through patient diaries, the authors converted the frequency of itching/scratching to a dichotomous measure where a high frequency was classed as > 4 and a low frequency as ≤ 4. The cut off score of 4 was used to discern a clinically relevant decrease after the intervention.

Estimation of effectiveness
Health benefits were expressed in terms of days with a low frequency of itching and scratching. These outcomes differed from those in the clinical effectiveness review as described in *Clinical effectiveness, Results*. Linear interpolation for the period between the measurements at baseline and 3 months and between baseline and 9 months was used to compute the number of days with a low frequency of itching and scratching. Data for HRQoL were not presented.

The mean scores of the frequency of itching and scratching declined in the intervention and control groups after 9 months [5.16 (SD 3.87) and 4.70 (SD 3.53), respectively].

Estimation of costs
Detailed information on the units of resource use across the different cost components was reported. The authors followed the guidelines for cost studies of the Dutch College of Health Insurance to assess the costs of visits to health-care workers, days off work and hospitalisations. Medication costs were listed from a Dutch website[113] which represented the market price. The costing year was not reported.

Data on medical consumption were also collected; these included information on:

- visits to the GP
- visits to the dermatology outpatient department
- visits to the other HCPs in or outside the hospital
- days off work
- hospitalisations; and
- medication use.

Intervention costs comprised:

- costs at the dermatology outpatient department, which included the costs associated with:
    - visits to the dermatologist
    - visits to the dermatologist nurse
    - ultraviolet therapy
    - visits to the medical social worker
- costs of visits to the GP
- costs of visits to other health-care providers
- costs of medication
- costs of hospitalisation; and
- costs of days off work.

The study reported total costs for two time periods: 1–3 months and 1–9 months. The analysis indicated significantly higher costs associated with the visits to the dermatology nurse compared with usual care in the first 3 months (mean difference €107, 95% CI €77 to €137), whereas in the total study period of 9 months the mean difference was €198 (95% CI €131 to €265). This could potentially be due to a significantly larger number of consultations with the dermatology nurse by the intervention group during the first 3 months compared with the control group because of the nursing programme. No other differences were found between the two groups of patients.

Cost-effectiveness results

The cost-effectiveness results are presented in *Table 25*. The bootstrapped mean differences in total costs between the two groups were €794 (95% CI –€970 to €2693) and €582 (95% CI –€2730 to €3877) at 3 and 9 months, respectively. For the first 3 months, the incremental cost per day gained with a low frequency of itch was estimated at €129.91, which decreased to €16.60 after 9 months, thereby indicating that the benefits of the intervention in terms of days with little itch increased. The analysis showed that the intervention group experienced better outcomes in the longer term.

Sensitivity analysis

The bootstrap analysis indicated that patients in the intervention group might expect to gain 6 days (95% CI –16 to 28 days) with a low frequency of itching and scratching compared with the control group in the first 3 months and 35 days (95% CI –33 to 96 days) for the entire 9-month period. The authors concluded that there was 70% certainty that patients experienced benefits from the intervention, whereby in 14% of the simulations lower costs and favourable effects were observed. Furthermore, there was an 87% certainty of favourable results for the 'Coping with itch' intervention, with lower costs being observed in 31% of simulations. Scenario analysis was conducted to see the impact of a cut-off score of 3 or 5 for the frequency of itching and scratching on the overall cost-effectiveness results, which was found to be limited on the overall results.

Relevance in the context of economic modelling

Despite the limitations outlined above, the study was considered to be relevant to informing model parameters, should a de novo model be developed.

Mason and colleagues

Mason and colleagues[108] reported on an educational support programme (ESP) that was provided for parents or carers of children aged 3 months to 6 years with mild to moderate atopic eczema in the UK. The programme included an educational DVD, diaries to record eczema condition, daily use of emollients,

TABLE 25 Cost-effectiveness results for 'Coping with itch'

Costs			Benefits (days with a low frequency of itching and scratching)			
Intervention	Control	Difference after bootstrap analyses (95% CI)	Intervention	Control	Difference after bootstrap analyses (95% CI)	ICER
Months 1–3[a]						
€2602.60	€1808.00	€793.80 (–€970.30 to €2692.70)	34.3	28.4	6.1 (–15.7 to 27.8)	€129.90
Months 1–9[b]						
€5040.60	€4476.70	€582.00 (–€2730.00 to €3877.00)	123.0	87.6	35.0 (–33.0 to 96.0)	€16.60

ICER, incremental cost-effectiveness ratio.
a Intervention group $n = 25$; control group $n = 31$.
b intervention group $n = 22$; control group $n = 27$.

and telephone contact with dermatology nurses for regular and on-demand support. The study assessed the effectiveness of the ESP in increasing emollient use and reduction of atopic eczema symptoms in the children. The perspective adopted was that of the UK NHS.

Analytical approach

The study performed a before-and-after incremental within-study cost-analysis over a 12-week period on 135 British children.

Estimation of effectiveness

The support components within the intervention arm aimed to increase the use of emollient with a target of 250 g per week use per child. Over the study duration, emollient use increased by 87.6 g (95% CI 81.9 g to 119.5 g) on average, with 8.9% children receiving 250 g/week and 61.5% receiving 125 g/week at 12 weeks. In addition, there was also an increase in prescription of corticosteroids by 20.8% (95% CI 8.9% to 32.1%), although this was not planned as part of the educational support provided.

The POEM and Patient Eczema Severity Time (PEST) measured severity of eczema. Higher POEM and PEST scores indicate a negative impact from high disease severity. PEST scores are designed for parents to assess severity in young children who cannot vocalise for themselves.[108] The POEM score reduced significantly over the 3 months, on average by 5.38 (95% CI 4.36 to 6.41). This was a 47% reduction from the baseline score. The PEST also reduced on average by 0.61 (95% CI 0.47 to 0.75), with a reduction of 48% from the baseline score. These findings indicate a positive impact of the intervention. Furthermore, the number of nights per week on which family members experienced sleep disturbance was reduced during the study period by 1.27 nights (95% CI 0.85 nights to 1.68 nights). This was half the baseline level of disturbance. In addition, there was an improvement by 1.32 points (95% CI 1.16 to 1.48) in parental feelings of control of their child's eczema, with 91.5% of parents reporting the highest level of control. Although the study outlined the statistical outcomes in detail, there was no indication if the results were clinically significant.

The evidence of effectiveness from the ESP should be treated with caution as it was not based on the evidence from a RCT or a study with a concurrent control group.

Estimation of costs

The cost analysis of the ESP was performed using nationally reported unit costs for 2011. The cost associated with the emollient [E45 cream (Reckitt Benkiser, Slough, UK) prescription-only medicine (POM) 500 g] was estimated at an average English Prescription Pricing Authority-reimbursement rate of £4.89; the cost associated with a GP visit was estimated at £36 per visit; and the cost of providing the ESP was estimated at £32 per child. The study did not report any details of the units of resource use. Owing to this lack of transparency, the results of the cost analysis should be interpreted with caution.

Cost analysis results

The overall cost of care was estimated as the sum total of costs associated with emollient use and GP visits.

Two methods were applied to estimate emollient use: 'time-in-use' (estimated time taken to use a 500-g pot of emollient) and diary method (programme diaries completed by the participating children). A statistically significant increase in the cost of emollient by £10 was observed using the diary method and £13 using the 'time-in-use' method. There was also a fall in GP visits by about 1 visit per child, on average, resulting in no overall or significant change in net cost, as the cost per GP visit was £36 compared with the cost of ESP, which was £32 per child. The results were found to be similar regardless of the method of estimating emollient use.

The mean cost of GP visits decreased from £68.53 in the pre-programme phase to £30.40 in the post-programme phase. The cost of emollient use, as well as that of care, estimated by the daily diary and 'time-in-use' methods increased in the post-programme phase. However, these increased costs were not significant, and, as a result, the authors concluded that the current programme, delivered at a distance using a specialised nurse, might be cost-neutral from a NHS perspective.

Sensitivity analysis

The study performed subgroup analysis in 117 patients by excluding those children who had visited an eczema specialist in the 3 months prior to joining the programme. The results of the analysis were similar to the base case.

Relevance in the context of economic modelling

Despite being based in the UK, the review team did not consider the study to provide any useful information in informing the development of an economic model, either structurally or in terms of model parameterisation. This conclusion was mainly driven by the limitations in non-reporting of disease progression, HRQoL parameters and very limited information on costs.

Schuttelaar and colleagues

Schuttelaar and colleagues[109] reported a cost-effectiveness analysis based on a randomised, parallel-group study for patients aged ≤ 16 years with a diagnosis of eczema, described elsewhere.[11] The patients received either conventional care by a dermatologist or care by a nurse practitioner (NP). The study, based in the Netherlands, adopted a societal perspective. Care provided by the NP was considered as an educational intervention by the reviewers, because education and coaching by the NP was a part of the overall treatment.

Analytical approach

Statistical analysis was performed to assess cost-effectiveness of providing care by a NP compared with conventional care by a dermatologist for a 1-year period. Details of the design, inclusion criteria and sample size of the RCT were published elsewhere, reference provided.[11] Briefly, 160 participants were stratified by age and randomised to receive either conventional care from a dermatologist or care from a NP. The economic analysis was conducted on 147 patients.

Assumptions

Travel costs were estimated based on mean distance to hospital and cost per kilometre travelled. Costs associated with productivity losses were based on an overall mean hour productivity cost for both men and women.

Estimation of effectiveness

The HRQoL was assessed by the IDQoL and CDLQI (for descriptions of these measures, see *Appendix 1*). The IDQoL was completed by parents for children aged < 4 years. Those aged 4–16 years completed the illustrated version of the CDLQI. There were improvements in the mean changes of IDQoL scores in both the intervention and comparator groups from baseline to 12 months. The between-groups difference was –1.7 (95% CI –4.6 to 1.2; *p*-value = 0.26), which was not statistically significant. Similarly, there were significant improvements in the mean CDLQI scores in the two groups from baseline to 12 months. However, the between-group difference was not statistically significant at –0.7 (95% CI –3.3 to 1.7; *p*-value = 0.55).

The Client Satisfaction Questionnaire-8 (CSQ-8) was used to measure patient satisfaction at 12 months; this was completed by parents. The mean scores were higher in the NP group than the dermatologist group, with scores being 26.9 (95% CI 25.5 to 28.2) and 24.8 (95% CI 23.6 to 26.0), respectively. There was a significant difference in scores between groups, with a difference of –2.1 (95% CI –3.0 to –0.3; *p*-value < 0.02) favouring the NP group.

Estimation of costs

The study estimated societal costs by aggregating health-care costs (hospital costs and community costs), family costs and costs in other sectors. Resource-use data relating to visits to dermatologists and NPs, phone consultations, group education sessions, admission days and laboratory tests were collected at 4, 8 and 12 months. Other resource use relating to absence from work for visits to a dermatologist or NP, travelling expenses, out-of-pocket expenses, professional help at home and visits to the GP were registered in cost-diaries completed by parents. Volumes of medication used and refilled prescriptions were obtained

from registration forms and medical records. Both hospital and community costs were reported. Resources were measured in natural units and valued using unit costs. The analysis did not include eczema-related costs, such as costs of visits to the allergologist or dietician.

The estimates for the units' costs were based on the Dutch guideline process and prices were expressed for the year 2008. The study reported the methods applied to estimate costs associated with group education sessions, laboratory costs, medication costs, travel costs including that of parking, and costs attributable to productivity losses of parents as a result of visits to health-care providers. The mean annual societal cost per patient in the dermatological group was €1409 and in the NP group was €981, with a mean difference of –€428 (95% CI –€910 to €197). In children aged < 4 years, the annual societal cost was €1791 and €1186 in the dermatologist and NP groups, respectively. For those aged 4–16 years, the costs were €1039 and €778 in the dermatologist and NP groups, respectively.

The mean annual health-care costs were higher in children in the dermatologist group (€801) than those in the NP group (€658) with a mean difference of –€143 (95% CI –€544 to €299). Other costs, such as costs of community care, hospitalisation, outpatient visits, laboratory tests and medication, were higher in the dermatologist group than the NP group; however, costs associated with phone consultations and protective dressings were higher in the NP group. The mean annual family costs were twice as high in the dermatologist group (€608) than the NP group (€302) with a mean difference of –€306 (95% CI –€475 to –€16). Time costs and out-of-pocket expenses were also higher in the dermatologist group (€415 and €134, respectively) than the NP group (€178 and €83, respectively). By contrast, the mean annual costs for home help visits paid by the state in the Netherlands were higher in the NP group (€21) than the dermatologist group (€0.93).

Overall, the study presented comprehensive information on the costs and resource use during the study period in both the dermatologist and the NP groups. Detailed cost composition by disease severity levels was also presented. However, there appeared to be miscalculations of the aggregate costs by types, as the sum total of the individual costs within each of the different types of costs did not match the reported aggregate costs by a significant margin. Therefore, caution must be assumed when interpreting the cost analysis by disease severity level.

Cost-effectiveness results

The incremental cost-effectiveness ratios (ICERs) for IDQoL and CDLQI in the NP group compared with the dermatologist group were €925 and €751, respectively, which lies in the south-west quadrant of the cost-effectiveness plane, indicating lower costs and lower benefits. For the CSQ-8, the ICER was €251, which lies in the south-east quadrant, indicating lower costs and more effectiveness in the NP group. The results of the base-case analyses favoured care provided by an NP over that provided by a dermatologist in treating young children with eczema.

Sensitivity analysis

For the ICER based on IDQoL score, the cost-effectiveness plane showed that 51% of the cost–effect pairs were plotted in the south-west quadrant, indicating lower costs and less effectiveness in the NP group. For the ICER based on CDLQI, the cost-effectiveness plane showed that 59% of the cost–effect pairs were plotted in the south-west quadrant, indicating lower costs and less effectiveness in the NP group. For the ICER based on CSQ-8, 92% of the plots fell in the south-east quadrant, which meant that the NP care dominated the dermatologist group as it was more effective and less expensive. Therefore, the authors concluded that NP-led care is a cost-effective option when compared with care provided by the dermatologists, as the associated costs were lower than those provided by the dermatologists with comparable effectiveness.

Relevance in the context of economic modelling

With regard to model parameterisation, the study provides detailed information on condition-specific HRQoL as well as resource use and costs, which could be used to inform an economic model.

Summary of the published cost-effectiveness studies

- Two cost-effectiveness studies based in the Netherlands and one cost-analysis conducted in the UK were described in our review of cost-effectiveness studies.
- The nature of the interventions and comparators varied in each of the three included studies.
- Statistical analyses were performed on study data in all three studies and bootstrapping was conducted in two studies to check robustness of the base-case results. None of the studies extrapolated data beyond study durations and there was no information on disease progression. Omission of long-term results from extrapolation makes it difficult to draw conclusions from the reported results.
- Although the included interventions measured the impact on the QoL of patients with chronic inflammatory skin diseases, none reported HRQoL in terms of QALYs. The study by Schuttelaar and colleagues[109] used IDQoL and CDLQI to measure HRQoL.
- The studies, in general, provided detailed information on the resources used and unit costs. Two of the three included studies could be used to inform model parameters in a de novo cost-effectiveness model.
- The populations of interest across the included studies were children and adolescents in two studies and in adults in one study.
- The time horizon of the analyses ranged from 3 months to 1 year, which is considered inadequate for an analysis of chronic inflammatory skin conditions.
- The cost analysis by Mason and colleagues[108] is of most relevance to the UK as the health-care system in the study was the NHS and the study was conducted from UK perspective. However, omission of reporting details of data inputs in terms of QALYs and costs reduced transparency, thereby making it difficult to draw conclusions from the results of the analysis.

Owing to limitations in the evidence base, a de novo economic model was not developed as part of this project. Instead, we discuss recommendations for data that could aid the development of any future economic evaluation in this area.

Future health economic evaluations

This section aims to identify, discuss and address the issues in the current evidence base for educational interventions in chronic skin inflammatory diseases that have emerged in the systematic review of cost-effectiveness studies discussed (see *Systematic review of existing cost-effectiveness evidence*). The limitations of the current evidence base are discussed first, followed by a list of recommendations and reporting guidelines to be considered for future health-economic analyses of educational interventions in such conditions.

Limitation of current evidence base

The systematic review highlighted the following gaps in existing evidence of literature.

Limited information on educational intervention

The literature identified in the systematic review indicates that there is no clear definition of an educational intervention. The scope of such an intervention could vary considerably with respect to the type and level of the intervention needed at different points in a clinical pathway to have an impact on overall QoL. The broad and diverse nature of such an intervention, reflected in the studies included in the review, means that it is difficult to compare the findings of the studies owing to their wide variability. In addition, limited literature in this domain further confines the comparison and interpretation of the study findings.

Poor effectiveness data and lack of relevant health-related quality-of life measures

As observed in the systematic review, no consistent measure was used to estimate effectiveness of educational interventions. Only one study[109] used validated condition-specific measures to estimate effectiveness data. None of the included studies reported any information on HRQoL measure to express

outcome in terms of QALYs, which is the main outcome measure in the decision-making context of the UK NHS.

The primary outcome measures reported in the three included studies were discussed above (see *Systematic review of existing cost-effectiveness evidence*) and the tools used to measure these outcomes are presented in *Table 26*. The studies reported a number of outcomes, including frequency of itching and scratching, emollient use, disease severity, use of concurrent medication, condition-specific health outcomes and patient satisfaction. The tools used to measure and report the health outcomes varied, with variations in the dimensions of health accounted for in each of the instruments. This heterogeneity in the reported outcomes and the tools used to measure health benefits has restricted the degree of comparability of the results across the studies. In addition, this also raises questions relating to the clinically relevant differences across different instruments.

Lack of information on relevant costs and resource use

In general terms, all three studies included in the review provided a detailed overview of the resources used and/or the cost components. However, the nature of the resource use/costs varied. This was potentially driven by the difference in the nature and settings of the intervention.

The resources used and/or costs reported across the three included studies were reviewed to explore the breadth of the various costs and resource utilisation covered in the economic evaluations in chronic inflammatory skin diseases. Studies that did not meet one or more of the inclusion criteria in the screening stage were also reviewed to provide a broad overview of the range of resources and/or costs used in the economic evaluation of such interventions (see *Other studies*). *Table 27* reports the resources used and/or costs reported within each of the studies.

The studies reported a range of resources used. Except for Schuttelaar and colleagues,[109] none of the studies provided any information on resource use associated with the intervention. Only two studies[107,109] presented detailed information regarding service use and only van Os-Medendorp and colleagues[107] provided information on the types ands physical units of resources used. This was considered a limitation, as the studies did not meet the requirement of reporting both physical units, as well as costs, as advocated by Drummond and colleagues.[110]

Limited information on disease pathway

Across all the three studies included in the systematic review (see *Systematic review of existing cost-effectiveness evidence*), statistical analyses were conducted based on trial data where the time-period of the analyses ranged from 3 months to 1 year. There was no information about patient progression

TABLE 26 Instruments used to measure health outcomes

Study	Instrument used to measure health outcomes
Mason *et al.*, 2013[108]	• Patient diaries (itching and scratching measure)
Schuttelaar *et al.*, 2011[109]	• IDQoL (health outcome measure) • CDLQI (health outcome measure) • SCORAD (severity measure) • CSQ-8 (patient satisfaction measure)
van Os-Medendorp *et al.*, 2008[107]	• Patient Oriented Eczema Measure (POEM) (severity measure) • Patient Eczema Severity Time (PEST) (severity measure) No single instrument was used to measure health benefits; different aspects of health benefits were measured separately

TABLE 27 Resources used in the seven relevant economic studies

Resource use	Study						
	Mason *et al.*, 2013[108]	van Os-Medendorp *et al.*, 2008[107]	Schuttelaar *et al.*, 2011[109]	Hartman *et al.*, 2002[99]	Parsi *et al.*, 2012[101]	Kernick *et al.*, 2000[100]	van Gils *et al.*, 2013[102]
Interventional							
Programme							
Raising awareness							
Improving knowledge			✓ group education was provided				
Impacting behavioural change							
Guidance on use of treatments							
Equipment							
Using booklets							
Face-to-face sessions							
Lectures							
Workshop							
Online [including audiovisual slideshows delivered through, e.g. Microsoft PowerPoint (Microsoft Corporation, Redmond, WA, USA]							
Electronic media (such as computer, laptop, CD, DVD)					✓		

Resource use	Study						
	Mason *et al.*, 2013[108]	van Os-Medendorp *et al.*, 2008[107]	Schuttelaar *et al.*, 2011[109]	Hartman *et al.*, 2002[99]	Parsi *et al.*, 2012[101]	Kernick *et al.*, 2000[100]	van Gils *et al.*, 2013[102]
Programme training provided to							
Staff						✓ nurse training; hospital dermatology	
Patient group							
Carer							
Follow-up services							
Comment	Reported an overall programme cost but no information on resources used for the programme implementation						
Service use							
Primary care							
GP			✓ reported only total mean costs				
Number of outpatient-visits		✓		✓			✓
Phone consultations/ assistance							
Number of home-visits	✓						
Nurse							
Number of outpatient-visits			✓				
Phone consultations/ assistance			✓				
Number of home-visits		✓					

continued

TABLE 27 Resources used in the seven relevant economic studies (*continued*)

Resource use	Study						
	Mason *et al.*, 2013[108]	van Os-Medendorp *et al.*, 2008[107]	Schuttelaar *et al.*, 2011[109]	Hartman *et al.*, 2002[99]	Parsi *et al.*, 2012[101]	Kernick *et al.*, 2000[100]	van Gils *et al.*, 2013[102]
Medication							
Oral medication			✓ provided by nurse				
Prescription pharmaceuticals	✓	✓ this includes repeat prescription by GPs, dermatologists and other HCPs	✓ provided by nurse				
Visits to alternative medicine provider		✓					
Comment	It was not clearly stated if GP visits were home-based or outpatient. Depending on the nature of the programme, it was assumed that the visits were home-based					Reported annual cost of dermatology clinic and annual potential in GP consultations	
Secondary care							
Hospitalisation							
Number of outpatient-visits							
Number of hospital admission days		✓	✓	✓			
A&E care							
Number of day care				✓			
Nursing time				✓			

Resource use	Study						
	Mason *et al.*, 2013[108]	van Os-Medendorp *et al.*, 2008[107]	Schuttelaar *et al.*, 2011[109]	Hartman *et al.*, 2002[99]	Parsi *et al.*, 2012[101]	Kernick *et al.*, 2000[100]	van Gils *et al.*, 2013[102]
Equipment							
Hospital equipment fee (computer, camera, etc.)							
Clinic fee					✓		
Facility fee					✓		
Laboratory tests			✓				
Other			✓ includes emollients, bandages, dressings				
Community set-up							
Number of visits by community worker							
Number of training sessions (if applicable)							
Comment		Reported number of visits to the hospital (physician, nurse emergency room, laboratory, transport ambulance				Reported annual cost of dermatology clinic	

continued

TABLE 27 Resources used in the seven relevant economic studies (*continued*)

Resource use	Study						
	Mason *et al.*, 2013[108]	van Os-Medendorp *et al.*, 2008[107]	Schuttelaar *et al.*, 2011[109]	Hartman *et al.*, 2002[99]	Parsi *et al.*, 2012[101]	Kernick *et al.*, 2000[100]	van Gils *et al.*, 2013[102]
Tertiary care							
Consultations				✓ did not provide the type of consultations			
Number of specialist consultations				✓ did not provide the type of consultations			✓
Number of physiotherapy consultations							
Number of visits to dermatologist		✓ also reported number of telephonic consultations with the dermatologists		✓			✓
Number of visits to dermatology nurse		✓					
Number of visit to medical social worker		✓					
Number of visit to other health-care provider							
Number of visits to occupational physician							✓
Number of visits to homeopath							✓
Number of visits to clinical occupational physician							✓
Number of visits to paramedical services		✓					

Resource use	Study						
	Mason *et al.*, 2013[108]	van Os-Medendorp *et al.*, 2008[107]	Schuttelaar *et al.*, 2011[109]	Hartman *et al.*, 2002[99]	Parsi *et al.*, 2012[101]	Kernick *et al.*, 2000[100]	van Gils *et al.*, 2013[102]
Number of visits to psychosocial worker (psychologist or psychiatrist, social worker, ambulatory psychosocial treatment)		✓					✓
Alternative therapies							
Number of acupuncture sessions							✓
Number of light therapy sessions		✓					✓
Number of ultraviolet therapy sessions							
Comment							In addition, reported cost of Internist and insurance physician

continued

TABLE 27 Resources used in the seven relevant economic studies (*continued*)

Resource use	Study						
	Mason *et al.*, 2013[108]	van Os-Medendorp *et al.*, 2008[107]	Schuttelaar *et al.*, 2011[109]	Hartman *et al.*, 2002[99]	Parsi *et al.*, 2012[101]	Kernick *et al.*, 2000[100]	van Gils *et al.*, 2013[102]
Non-service use							
Patient and/or family time			✓	✓ includes both professional and family/spouse home help	✓		
Days off work/productivity loss		✓		✓ includes absenteeism	✓		✓
Travel expenses			✓	✓			
Other family costs			✓ includes bath oil, out of pocket costs, home help visits				
Comment							
Overall comments			The study did not report resources used but mean costs		The study reported costs; not resources used	The study reported costs; not resources used	The study reported costs; not resources used

A&E, accident and emergency.

through disease pathways among those suffering from different chronic inflammatory conditions. As a result, it is difficult to conceptualise a comprehensive disease progression encompassing all the pathways associated with different chronic inflammatory skin conditions as a whole.

Other studies

This section summarises four additional studies that were identified through the systematic searches. These studies were excluded from the review at the full paper screening stage because they did not meet the inclusion criteria owing to the nature of the interventions (for details, see *Appendix 7*). Nonetheless, they report useful information with respect to resource utilisation and QoL measures that could be used to inform the list of recommendations to aid the development of future economic analysis. A brief overview of these studies is outlined below for context.

Hartman and colleagues[99]

This study conducted a cost-effectiveness analysis of moderate to severe psoriasis patients receiving dithranol short contact therapy in a care instruction programme (short contact therapy) with ultraviolet B phototherapy (UVB) and inpatient dithranol treatment (inpatient treatment). The study was based in the Netherlands and the analysis was conducted from a societal perspective. Both medical and non-medical costs were included. Disease severity was quantified with the PASI and the area of involved skin. Clinical effectiveness was measured in terms of the clinical response rate and the number of clearance days. The study concluded that short contact treatment with dithranol in a care instruction programme was an attractive alternative. However, given the associated higher costs this strategy was not a first choice when compared with UVB.

Parsi and colleagues[101]

A cost-effectiveness analysis was conducted to assess conventional in-office care with a patient-centred, online model for follow-up treatment of patients with psoriasis. The setting of the analysis was the USA and the analysis adopted a societal perspective. The study accounted for both medical and non-medical costs. The DLQI was used to measure outcome and the scores were mapped to the EQ-5D to obtain utility-based HRQoL scores. The results of the study indicated no significant difference in the mean change in DLQI scores between the two strategies, or the mean improvement in quality-adjusted life expectancy. However, costs associated with online visits during follow-up psoriasis care were 1.7 times lower than the cost associated with in-office visits. Based on their findings, the authors concluded the patient-centred online care model to be cost-saving, as both the strategies were similar in terms of effectiveness.

Kernick and colleagues[100]

Kernick and colleagues[100] conducted a cost–consequence analysis on patients with psoriasis or eczema to assess whether a primary care dermatology liaison nurse should be introduced by the NHS in the UK. The analysis was conducted based on a limited economic perspective and, therefore, included the costs associated with nurse and GP care only. DLQI was the primary outcome measure. There was no significant improvement in DLQI scores between the intervention and control groups. The authors concluded that there were difficulties involved in attaining relevant information necessary to assist decisions on resource allocation in primary care. It was acknowledged that large multicentred trials could not answer all the questions and, therefore, the authors concluded that local resource decisions should be based on satisfactory partial evidence-yielding solutions rather than optimum decisions taken on the basis of no evidence.

van Gils and colleagues[102]

This analysis, based on a Dutch setting, was conducted to examine the cost-effectiveness of an integrated care (IC) programme compared with a usual care programme for patients with moderate to severe chronic hand dermatitis. A societal perspective was adopted in collecting cost data. The difference in clinical severity of hand dermatitis, measured with the Hand Eczema Severity Index (HECSI), was the primary outcome measure. The EQ-5D measure was used to estimate QALYs. On the basis of the findings, the study found the IC programme to be neither cost-effective nor clinically effective compared with usual care after a follow-up of 12 months.

Recommendations for the future

As has already been outlined, with the complexity involved in defining and implementing educational interventions, there has been considerable variation in the nature and type of services provided by them. Although some guidelines exist on the management of inflammatory skin diseases in the UK, no guideline has specified best practice for implementing educational interventions. In light of this wide heterogeneity and evidence gap, we list the following recommendations to address the limitations discussed earlier (see *Limitation of current evidence base*).

Characteristics of the intervention

One of the fundamental bases for developing an economic model is to have clear boundaries for the characteristics of the intervention in question. This would facilitate two objectives: first, to follow a systematic approach in understanding the key components of the intervention and, second, to enable feasibility to compare and contrast the findings of different studies for the same intervention. It is, therefore, important to understand the components of the intervention, its target at-risk groups; the characteristics of the target population with respect to their physical and/or emotional needs, age, sex and ethnicity, and the characteristics of the settings of the intervention, such as where and how it is delivered and if the programme is delivered as a single initiative or incorporated within the existing health and social services.[114,115]

The nature and setting of the educational interventions can vary widely and can be categorised in a number of ways according to: (1) the theoretical approach employed including educational, behavioural, and/or psychological; (2) who provides the education (e.g. self-help, nurse, dermatologist, multiprofessional group, support group); (3) to whom it is delivered (e.g. patient or carer; individual or group); (4) where the education takes place (e.g. at home or in a clinic); (5) how the education is delivered (e.g. using booklets, face-to-face sessions, lectures, workshops, or the internet); (6) the intensity of education (number, duration and frequency of sessions); and (7) the duration of follow-up.[2,36,55,70] It is important to consider these different aspects when defining an educational intervention.

Methodological approach

One of the key features of the existing evidence that has come to light through the findings of the systematic review is the methodological approaches adopted to assess the cost-effectiveness of educational interventions. Statistical analyses conducted over time, ranging from 3 months to 1 year were performed in the three studies included in the systematic review (see *Systematic review of existing cost-effectiveness evidence*). However, it is unclear what evidence is needed to account for behaviour change in primary studies in order to assess the persistence of effect of an intervention beyond the trial duration.

Resource use/cost

The Drummond checklist for economic evaluation[110] points out that all the important and relevant costs of each alternative in question should be identified and measured in appropriate physical units. To do so in educational interventions for chronic inflammatory skin diseases, the resources used can be grouped under three categories for providing a comprehensive resource use framework:

- interventional
- service use
- non-service use.

Interventional and service use groups include resources that have a direct impact on government budget or decision-making bodies. For example, decisions regarding allocation of resources used in the programme delivery, the budget for equipment used to deliver the programme, such as books, online tools, resources required during follow-up services, staff training along with services received in the primary, secondary and tertiary care from the health-care providers are directly influenced by government budgets or that of the health service provider. The primary care setting includes use of outpatient services by the GPs, nurses and alternative medical provider, whereas secondary care includes resources used in inpatient settings. Tertiary care, however, includes all resource use associated with specialised consultations.

Resources within non-service use that mainly consists of indirect costs have a wider societal impact. Within this category, costs associated with productivity loss, travel expenses, family costs, costs associated with patient and/or family time can be included. Such classifications aim to provide a reference base of the resources that should ideally be considered and reported in economic evaluations of such complex multidimensional educational interventions.

Table 28 outlines the items of resource use that should be considered while conducting economic evaluations of educational interventions in chronic inflammatory skin diseases. *Table 27* presents a detailed overview of the resource use items from the three included and four additional studies and shows the variability in reporting and gaps in resource coverage. Of the seven studies tabulated, five included information on non-service use.[99,101,102,107,109] These findings indicate that there is no clear pattern of the resources accounted for in the economic analyses. Such inconsistencies in accounting and reporting of key input parameters across the studies limit their comparability.[114]

Health outcomes

Preference-based generic measures of health include multidimensional questionnaires that include questions on a person's mental, physical, social and functional dimensions to assess overall QoL which enable comparisons across different health conditions. Disease-specific measures of health, however, are more sensitive to change in QoL specific to the conditions.[116] Because of the advantages of both disease-specific and generic HRQoL measures, the majority of current research endorse the combined use of the two measures to assess QoL.[116]

The findings of the systematic review (see *Systematic review of existing cost-effectiveness evidence*) have indicated wide variability in reported health outcomes. To address this issue, the common health outcome measure of QALYs could be obtained from the reported health outcomes in the primary studies through process mapping the reported outcomes to the associated dimensions of a preference-based measure of health, such as EQ-5D. The process mapping would need to relate the outcomes to both direct and indirect effects that a reported health condition might impact upon, as the two effects might not be mutually exclusive.[114] For example, a person experiencing itching and scratching might, in turn, suffer from psychological symptoms (such as depression) and difficulties in mobility as a result of pain and/or discomfort. In this case, if the outcome measure considers only pain and/or discomfort, and does not account for the person's mental state, then such a measure will reflect only a partial effect on the overall health state of the individual.[114] Another way is to conduct mapping from condition-specific measures of health in skin diseases such as IDQoL to preference-based measures, as done by Parsi and colleagues.[101]

None of the three studies included in the review assessed causal questions such as why and how educational interventions could be expected to positively influence the overall health of the patients with chronic inflammatory skin diseases.[114,117] One way to explore this could be by segregating the contribution of each element in the educational intervention to the overall health outcome. This, however, could be challenging given the complex nature of such an intervention by definition and the possibility of intricate

TABLE 28 Items for resource use

Interventional	Service use	Non-service use
• Delivery of the programme/intervention • Equipment used • Training provided • Follow-up services	• Primary care • Secondary care • Tertiary care	• Patient and/or family time • Days off work/productivity loss • Travel expenses • Other family costs

links between direct and indirect impacts of the health conditions with the dimensions of a preference-based measure of health.[114] The studies included in the review used condition-specific instruments which could possibly be explained by the assumption that generic measures may be insensitive. One disadvantage of this approach, as has been implicit in the discussion above, is that these instruments limit the generalisability and comparability of the study findings. Therefore, future studies should:

- use a generic, preference-based measure to assess QoL; or
- choose a condition-specific measure that can map to a preference-based measure; or
- use both, test the sensitivity of the preference-based measure and develop (then publish) the mapping as a basis for future research.

Summary

- There are a number of gaps in the current economic evidence of educational interventions in improving QoL of patients with chronic inflammatory skin conditions, as identified through the systematic review. These include limited information on the type of intervention and clinical pathways of the different conditions and poor-quality data on economic costs and QoL.
- Based on the gaps identified, it is recommended that future studies consider a wide range of aspects (see *Recommendations for the future*) to define an educational intervention, use appropriate methodological approaches, consider a broad range of intersectoral costs and resource use, and use either a generic preference-based measure of QoL to assess effectiveness or condition-specific measures that could be used to map to a preference-based measure to assess cost-effectiveness in the UK context.

Chapter 5 Discussion

Statement of principal findings

Clinical effectiveness

Seven RCTs[74,76,85–89] met the inclusion criteria for the systematic review of the clinical effectiveness of educational interventions that aim to, or could, improve HRQoL in people with chronic inflammatory skin conditions. Of these, two focused on adult patients with psoriasis,[85,86] two focused on children (and adolescents in one study[87]) with eczema or atopic dermatitis and their carers,[74,87] and one focused on women with acne aged over 16 years.[88] The remaining two included adult patients with mixed skin conditions, with one focusing on patients with atopic dermatitis or psoriasis[76] and reporting subgroup results for each condition, and the other focusing on adults with chronic pruritic skin diseases.[89] In six RCTs,[74,76,85,86,88,89] the educational interventions were delivered as an adjunct to usual care, and it was unclear if this was the case in the remaining trial of group education for children with atopic dermatitis and their carers.[87] The quality of the reporting and methodology of the included trials was judged to be generally poor. The studies were considered to have some generalisability to UK clinical practice, including both studies of education for children with atopic dermatitis and/or their carers.[74,87] Overall, there was heterogeneity in the types of interventions evaluated and patient populations included, precluding meta-analysis and allowing for a narrative synthesis of findings only.

Three of the seven included RCTs found statistically significant greater improvements in HRQoL among patients taking part in the educational interventions than patients in the control group comparisons following the interventions.[76,85,87] Of these, two studies[76,85] found evidence of efficacy among adults with psoriasis and one study[87] found evidence of efficacy among the carers of children with atopic dermatitis. Among adults with psoriasis, once-daily educational text messages delivered over 12 weeks[85] and an intensive group-based educational programme delivered by a multidisciplinary team twice a week over 3 months[76] significantly improved HRQoL by the end of the interventions in comparison to an unspecified control condition and medical therapy alone, respectively. Of these psoriasis studies, the one study utilising a longer-term follow-up period[76] found that improvements in one of the two HRQoL measures used were maintained 6 months after the intensive educational programme. Among parents of children with atopic dermatitis taking part in a group-based education programme delivered by a multidisciplinary team over 6 weeks,[87] there were significant improvements in their HRQoL at 12 months (it was unclear if this was from baseline or the intervention end) compared with a no education control. In the three studies, greater improvements in patients' disease severity in the educational intervention groups compared with the control groups were also found at these time points, with the exception that the patients with psoriasis who took part in the intensive educational programme[76] did not maintain the improvements seen at the end of the intervention by 6 months post intervention.

Only the authors of the study of the educational intervention for children with atopic dermatitis and their parents[87] suggested that a clinically meaningful improvement in disease severity had occurred at 12 months. The authors of the other studies finding statistically significant effects did not measure or discuss how clinically meaningful changes in outcomes were. The reviewers note that the minimally clinically important difference has been defined for some of the measures used in the three trials finding statistically significant effects (e.g. the DLQI, PASI and SCORAD – see *Appendix 1*), and recommend that future trials report how clinically meaningful changes in outcomes are (see *Suggested research priorities*).

No effects of education on HRQoL or disease severity in comparison with usual care were found in studies of a one-off nurse-delivered educational session in primary care for adults with psoriasis (a pilot study),[86] instructions on skin care and make-up use provided by a dermatologist to women with acne,[88] the SPaCE website (with or without HCP support) for carers of children with eczema (a pilot study)[74] or in a 'Coping with

itch' programme, incorporating educational and cognitive behavioural interventions, for adults with chronic pruritic skin diseases.[89] Overall, no effective interventions were found for acne or atopic dermatitis in adults.

Commonalities between the effective interventions were delivery by a multidisciplinary team and delivery over a longer period (ranging from 6 weeks to 3 months) than the non-effective interventions. However, this was inferred by the reviewers and not tested in any way and it is not possible to say with confidence from the current evidence whether particular elements of educational interventions and how they are delivered may be associated with improvement in HRQoL.

Cost-effectiveness

Three studies were included in the cost-effectiveness review. Two of these were economic evaluations based on controlled trials conducted in the Netherlands and the remaining study was a cost-effectiveness analysis conducted in the UK. The study populations in two of the three included studies had atopic eczema. One of these studies[108] included children with the condition and their carers, whereas the other study[109] focused on children alone. Adults with chronic pruritic skin diseases, including a range of skin conditions, were studied in the remaining study, which was the only trial meeting the inclusion criteria for the cost-effectiveness review that was also included in the review of clinical effectiveness. The nature of the interventions and comparators varied in each of the three included studies. The interventions provided nursing care consisting of educational and cognitive behavioural interventions carried out in a specialised itch clinic (the 'Coping with itch' programme), an educational support programme for parents and carers, and support in terms of education and coaching by a HCP. None of the studies reported HRQoL in terms of QALYs and only one study measured HRQoL, using the IDQoL and CDLQI. Omission of reporting such a QoL measure limits study comparability. Furthermore, none of the studies reported any adverse events or comorbidities. None of the studies conducted their analyses beyond 1 year. As a result, it is difficult to draw conclusions on the long-term effects from the reported results. Overall, based on the findings of the review of the cost-effectiveness studies, it is unclear if educational interventions are cost-effective in the treatment of patients of chronic inflammatory skin diseases from the perspective of the UK NHS.

Other relevant factors

Gaps in the clinical effectiveness evidence base

The findings of this review highlight a number of gaps in the current clinical effectiveness evidence base. Given how few studies were identified, there is, overall, a lack of evidence for the effectiveness of educational interventions that aim to or could improve HRQoL across all chronic inflammatory skin conditions, although there are some indications of promise of effectiveness in adults with psoriasis and children with atopic dermatitis and their carers. In particular, no studies focused on some of the rarer chronic inflammatory skin conditions, such as lichen planus, lichen sclerosus and hidradenitis suppurativa, so the effectiveness of educational interventions aimed at HRQoL in these populations is unknown. Only two studies[74,87] of children (one of which also included adolescents[87]) were included in the review, and both focused on atopic dermatitis and eczema, with one providing education to older children, in addition to their carers, and adolescents. It may be important for future studies to focus on age-appropriate education for children and young people themselves, particularly as children grow older and transition to taking on more responsibility for disease management from their carers. Such early intervention, for example in eczema or atopic dermatitis, may help improve prognosis and prevent further damage to the skin. There were no studies including children or adolescents affected by other conditions, including acne, which is common in adolescents, with around 50% of 14- to 16-year-olds being affected.[25] However, this may be a hard-to-reach group, as acne may commonly be treated with OTC medications.

Part of the remit of this review was to include studies focusing on carers of people with chronic inflammatory skin conditions. Two of the included studies[74,87] assessed education for carers of children with atopic dermatitis or eczema. However, we identified no studies that considered carers of adults with disabilities or other conditions who may also be involved in supporting patients' self-care.

None of the included studies focused exclusively on patients newly diagnosed with a chronic inflammatory skin condition, which may be a group with particular needs. Indeed, the process evaluation included in the trial by Santer and colleagues,[74] which examined the SPaCE website for carers of children with eczema, found a minority of carers did not perceive value from education at this stage in their child's disease and commented that it had previously been more of a need than it was at the time of the intervention.

In terms of study design and outcome measurement, only the acne trial of instructions in make-up use and skin care[88] measured adverse events, and this showed no negative impact of the intervention in a small sample of 25 participants in intervention arm. It may be desirable for studies to include measures of adverse effects or any undesirable or unintended effects of treatment, both of the education and any medical therapy included in either the intervention or comparator arms. There was also a lack of longer-term follow-up data, with only three of the seven trials[76,87,89] measuring outcomes at or beyond 3 months post intervention (the review Advisory Group suggested ≥ 3 months would be the minimum follow-up time necessary in studies to measure the effect and durability of patient benefits from an intervention). Only one study compared two different kinds of educational intervention (the SPaCE website with or without HCP support for carers of children with eczema).[74] Comparisons of different approaches would be useful for identifying which intervention factors may be associated with effectiveness.

Target groups for education

It is not clear from the studies included in this review or the NICE guidance[5,7] which groups of patients may particularly benefit from education and, more specifically, education aimed at improving HRQoL. NICE guidance[5,7] suggests education should be provided at all stages of care and be reiterated in each medical consultation, and from this point of view it could be considered an ongoing need for all patients. However, the place for more structured and planned education in the clinical pathway, such as the more intensive group-based education delivered in some of the studies included in this review, is not clear. These interventions are likely to be costly in terms of resource use and may therefore need to be targeted at particular groups. In all the effective interventions found in this review, the patients targeted and included had more severe psoriasis and atopic dermatitis at baseline than those who took part in the non-effective interventions, providing some indication that those with more severe disease may benefit the most; however, owing to the low number of studies included and their poor quality, this conclusion is tentative. However, HRQoL has not always been found to correlate with disease severity,[41–43] so other factors could be considered in how interventions are targeted. For example, the literature has identified that experiencing psychological distress (e.g. depression)[38,44] is associated with poor HRQoL, and a subgroup of patients with psoriasis who experience a high psychosocial burden from their disease and who may require additional support has been identified.[86] One consideration is whether patients experiencing psychological distress may particularly benefit from educational interventions aimed at improving HRQoL and which include elements that help patients cope with and address these feelings. Another consideration is whether education may be best targeted at patients who have recently been diagnosed with a condition (when HRQoL scores may not necessarily show a negative impact of the condition) to help patients develop effective self-care behaviours and strategies for enhancing their HRQoL which they can then endeavour to maintain in the future. As well as benefiting patients, this may help prevent costly referrals to secondary care and decrease health-care resource costs for these conditions.

A related issue is whether education should be targeted generically, that is, the same intervention should be used for patients with a range of skin conditions or whether it should be targeted at particular conditions. The studies included in this review indicate that a 'one-size-fits-all' model may not be the best approach. Two studies included patients with a mixture of skin conditions and one of these found no benefits for a 'Coping with itch' programme for patients with pruritic skin diseases,[89] whereas the other found that an intensive group-based programme delivered over 3 months was effective in improving HRQoL in patients with psoriasis, but not those with atopic dermatitis.[76] Given that conditions differ in their disease processes and, potentially the factors that may negatively affect HRQoL, it may be better to target specific conditions, although more generic approaches that focus on particular symptoms or issues common to a range of conditions could be considered.

Quality of reporting and methodology

Generally, the quality of reporting and methodology of the included RCTs was judged to be poor. Three studies (reported in four publications[78,91–93]), around one-third of the relevant evidence base, met our initial inclusion criteria for the review, but at data extraction it was found that the studies did not provide sufficient adequate information about the results to be included in the review and they were, therefore, excluded. This, along with the poor quality of the included studies, indicates a need for better reporting in this research area.

Reporting of the interventions was generally good, but reporting of the intervention aims, theoretical basis, where the intervention was delivered, any tailoring to participants' needs, sensitivity to participants' characteristics, and any ongoing support provided post intervention could be improved, as these elements were less commonly reported in the included studies. Overall, this suggests that more attention needs to be given to reporting and theorising about intervention aims, underpinning theories and hypothesised mechanisms of change, and ensuring (and reporting) that interventions are sensitive to the target groups' needs and characteristics.

Most of the analyses, with the exception of those of the 3 month to 7 years age group in the trial by Staab and colleagues of group education for children and their carers,[87] were potentially underpowered. However, three of these included studies were pilot studies,[74,85,86] and, therefore, it is not essential that they are adequately powered, as they will provide information that can inform a power calculation for a larger, more rigorous trial and, as outlined in the MRC guidance on the development and evaluation of complex interventions,[65] such pilot studies are an important part of intervention development in offering insight into the feasibility and patient acceptability of an intervention.

Intervention development

As outlined in the *Background* section of this report, the MRC guidance on the development and evaluation of complex interventions[65] underscores that intervention development work is crucial. In line with the MRC guidance, three of the seven included studies reported the underpinning rationales and theoretical bases to the interventions,[74,86,87] with two of these, both UK studies,[74,86] additionally using qualitative research with patients and/or HCPs to develop the intervention. Two of these studies, both investigating eczema or atopic dermatitis in children, aimed to improve HRQoL through promoting better disease management by the use of behaviour-change techniques in the intervention.[74,87] The other study aimed to improve patients' self-management through incorporation of techniques addressing constructs from social cognitive theory (e.g. self-efficacy).[86] There is a need for studies to specify more carefully how the interventions may bring about changes in HRQoL and other outcomes, and to make the aims of, and rationale behind, the intervention explicit when reporting findings. Overall, there is a need to clarify in the literature what factors may need to be targeted in an educational intervention to improve HRQoL. Although improving self-management of disease has been put forward as a hypothesised mechanism and may give patients or carers a greater sense of control over the disease (which in itself could be beneficial for HRQoL[33]), as mentioned above, HRQoL does not always correlate with disease severity. This suggests that target factors other than disease severity that are associated with poor HRQoL in chronic inflammatory skin conditions, such as psychological distress[33,39] or feelings of stigmatisation owing to changes in skin appearance,[39] may need to be considered as possible mechanisms of change. Intervention developers and investigators could also give consideration to how more informal aspects of educational intervention, such as social contact with other people with or caring for someone with the same condition during educational sessions, may also enhance HRQoL.

There were some reported attempts in the interventions in the included studies to tailor interventions to individual needs and design interventions to be sensitive to participants' characteristics. However, more attention could be given to these aspects of intervention. Ensuring that interventions are sensitive to participants' needs may be particularly important when interventions include participants with English as an additional language or people with low levels of literacy. Little consideration seemed to be given in the interventions to the characteristics of the intervention provider, in terms of ensuring they had adequate training for the role or how similar they were in characteristics such as social and ethnic background to the participants, which are also important considerations in intervention delivery.[66,67,69]

The MRC guidance on the development and evaluation of complex interventions[65] recommends that pilot studies are undertaken to inform further development and evaluation. Three of the seven included studies were pilot studies,[85–87] and provided some information on possible effectiveness and the feasibility and acceptability of the interventions. For example, one indicated that daily text message education over 12 weeks reminding patients with psoriasis to use their medications and providing them with general educational statements, used as an adjunct to usual medical care, may result in improvements in HRQoL and disease severity at the end of the intervention compared with an unspecified control condition.[85] The remaining pilot studies, both including patients with more mild eczema[74] and psoriasis[86] recruited from primary care in the UK, did not find evidence of effectiveness. However, both found that, on the whole, the interventions (a one-off nurse-delivered educational session for patients with psoriasis, supplemented by a follow-up phone call,[86] and the SPaCE website for carers of children with eczema[74]) were feasible and generally perceived as useful by the patients, although a DVD and HCP support provided in each of these interventions, respectively, were perceived as less useful than other aspects, suggesting that inclusion of these approaches may not be needed in follow-on RCTs.

Three studies – all the pilot studies[74,85,86] – included process measures. There is a need for more studies to include process evaluations, as recommended by the MRC guidance on complex interventions,[65] to identify the contextual factors in intervention delivery which may help explain why an intervention is found to be effective or not. Such process evaluations may offer insight into the best way such interventions could be delivered to patients and carers. For example, if evening meetings may be more suitable for those who work, if allowing patients to bring along relatives or friends for support might encourage better attendance or impact effectiveness, if having easily accessible additional support outside the sessions (e.g. from a specialist nurse) to ask questions patients or carers forgot to ask or were reluctant to ask in the more formal educational session or medical consultation may be beneficial, and the best location for the intervention to be delivered (e.g. at local hospital venues).

Intervention developers could also draw on evidence about what has worked in educational interventions for other long-term conditions that require long-term self-management, such as diabetes, when designing interventions. For example, the Diabetes Education and Self Management for ONgoing and Diagnosed (DESMOND) programme and the Diabetes X-PERT programme for people with diabetes in the UK have been criticised for not adequately addressing the needs of people in particular communities,[118] and this points to the need for programmes to be sensitive to the local context. Involvement of patients, family members or carers, general practitioners and Clinical Commissioning Groups could be useful for determining these needs. Additionally, involvement of a lay educator in delivering the DESMOND programme alongside a HCP has been found to be successful,[119] and this is an approach that could be considered in educational interventions for chronic inflammatory skin conditions (e.g. patients, family members or carers could be involved as educators). This may also have implications for the cost-effectiveness of interventions, as those delivered with lay person involvement may be less costly than those delivered solely by HCPs.

Educational intervention studies that did not measure health-related quality of life

At the full-text screening stage of the review, we excluded 28 references because the studies either did not report a HRQoL outcome or use a validated HRQoL measure. This was the first criterion studies were screened against at this stage and so not all of the references excluded for this reason were studies of educational interventions (as it was not always clear at the title and abstract screening stage that the studies were about education). Of the 28 references excluded for this reason, 18 were studies of educational interventions for chronic inflammatory skin conditions. It is a notable finding that so many of these studies either did not measure HRQoL or did not use a validated measure. This suggests that studies of educational interventions for these conditions in general may need to give more attention to HRQoL outcomes and, when HRQoL is measured, ensure that validated measures are used.

Strengths and limitations of the assessment

Strengths

- Thorough searches of a range of literature databases were conducted for both the clinical and cost-effectiveness reviews, including the Global Resource for Eczema Trials (GREAT) database which contains all atopic dermatitis RCTs and systematic reviews. Additionally, the reference lists of included studies and relevant systematic reviews were searched and experts were asked about studies of which they were aware. This means that the review is unlikely to have missed relevant studies.
- The systematic reviews were conducted in line with good practice principles of conducting systematic reviews in health care.[120]
- The review methods were set out in a protocol prior to the start of the review and published on the PROSPERO website (PROSPERO reference number: CRD42014007426).
- Both the development of the protocol and the project were informed by an Advisory Group including clinicians, researchers in the field and patient representatives.
- The use of a taxonomy of intervention elements[69] during data extraction to ensure that detailed information about the content and characteristics of the educational interventions was included in the review and to help evaluate the completeness of reporting of the intervention characteristics in the included studies.
- The systematic reviews of both the clinical effectiveness and cost-effectiveness studies have been carried out independently of any vested interest and the results of both the reviews are presented in a consistent and transparent manner.

Limitations

- Owing to the nature of the intervention and to many of the studies retrieved for full-text screening not explicitly reporting the aims of the interventions, the reviewers found it challenging to infer if the interventions were aimed at improving HRQoL or could improve HRQoL, in accordance with the review inclusion criteria. Therefore, this was sometimes a judgement call and there was some disagreement between pairs of reviewers, which was resolved through arbitration by a third reviewer. To resolve these disagreements, reviewers considered whether the interventions included elements that targeted compliance with therapy or patients' ability to cope with the negative effects of the chronic skin disease, as per the examples given in our a priori inclusion criteria. As mentioned above, this highlights that what defines such interventions generally needs more consideration and theorising in the literature. We consider our approach satisfactory, given that intervention aims were not well reported and given the lack of definition of these kinds of interventions in the literature.
- Meta-analysis could not be conducted owing to heterogeneity of studies and interventions and the limited evidence-base for each skin condition.
- The review was limited to English-language studies only.
- When determining if a HRQoL or patient-reported outcome measure was validated, the reviewers relied on statements in the included publications that these were validated and, if this was not reported, they then checked the general literature to see if a measure met at least one validation criteria. Therefore, some measures included were more validated than others. However, the studies used a range of commonly used and well validated measures in this area, such as the DLQI and PASI, so this is likely to be only a minor issue in the review.
- Outcomes for the end of intervention and longest follow-up period only were data extracted in this review, owing to limited resources and time and consideration that the longest follow-up time point would be the most informative. Given the episodic nature of skin diseases and impact of seasonal changes, however, it may have been useful to data extract interim time points too.

- The main focus of this review was on the effect of educational interventions that aim to, or could, improve HRQoL. As such, the data presented on other outcomes from education, such as improved disease severity, are drawn only from studies of this particular type of education and, therefore, do not represent all data on how these outcomes may change following patient education in general for chronic inflammatory skin conditions.
- Three studies of educational interventions that aimed to or could improve HRQoL were excluded from the review for not reporting results in sufficient detail to be informative. Owing to time and resource limitations for the review, we were unable to contact study authors to request them to provide the missing information.
- Length of follow-up of the studies included in the cost-effectiveness review was inadequate to assess the long-term costs and outcomes of educational interventions in patients with chronic inflammatory skin diseases.
- There were a number of limitations in the evidence base for the cost-effectiveness of educational interventions, including limited information, lack of relevant HRQoL measures and information on costs and resources and, as such, we were able only to make recommendations for future economic evaluations rather than undertake a de novo economic model.

This review builds on previous systematic reviews of RCTs of educational interventions for chronic inflammatory skin conditions[55,71,121] through its focus on those interventions that specifically aim to improve HRQoL or those that include aspects which could improve HRQoL. In line with the other reviews of educational interventions in general, we found that some studies showed statistically significant positive impacts on HRQoL and other outcomes, whereas some did not. Therefore, even when considering only interventions that focus on some way on HRQoL, it is still uncertain from the evidence if educational interventions for people with chronic inflammatory skin conditions can improve HRQoL. Ersser and colleagues[71] suggested from a review of educational interventions in children with atopic dermatitis that nurse-led or multidisciplinary interventions may be the most effective in improving outcomes. In our review, we similarly found that delivery by a multidisciplinary team was a commonality between the effective interventions in comparison with those that were not effective.

Uncertainties

There is overall uncertainty about the effectiveness of educational interventions aimed at improving HRQoL in all chronic inflammatory skin conditions, particularly over whether beneficial effects are maintained in the longer term. This is due to the limitations of the evidence base (i.e. studies are generally small, of a poor quality, likely to be underpowered, lack long-term follow-up and there is a lack of consistent evidence for a positive effect on HRQoL). The characteristics and content of educational interventions that may be associated with improvements in HRQoL remain uncertain. The effectiveness of such interventions in rarer chronic inflammatory skin diseases, such as lichen planus, lichen sclerosus and hidradenitis suppurativa, is unknown, as no evidence is available. There are no indications from the evidence reviewed or current clinical guidelines about the best place for such interventions in the clinical pathways for chronic inflammatory skin conditions, about which patients may benefit the most from such interventions, or the settings in which they should be implemented.

Chapter 6 Conclusions

Implications for service provision

There is overall uncertainty over whether educational interventions that include components that could improve HRQoL are effective in improving HRQoL and other outcomes among people with chronic inflammatory skin conditions. However, there are some indications of effectiveness in patients with psoriasis and children and adolescents with atopic dermatitis and their carers. Among patients with psoriasis, when used as an adjunct to usual care, text message education improved patients' HRQoL in the short term at the intervention end compared with an unspecified control condition (based on one RCT), and intensive group-based education delivered over 3 months by a multidisciplinary team improved HRQoL at the intervention end and possibly up to 6 months post intervention compared with medical therapy alone (based on one RCT). Among carers of children with moderate to severe atopic dermatitis, a 6-week, group-based, education programme delivered by a multidisciplinary team may improve their HRQoL in the long term (i.e. up to 12 months), in comparison with no education (based on one large RCT). These interventions also had positive impacts on patients' disease severity, compared with usual care or the control conditions, with the authors of the trial of education for atopic dermatitis in children suggesting that the average improvements in disease severity found were clinically significant. Other than in this trial, it is unclear how clinically meaningful these improvements are, as authors of these trials did not comment on this. No effective interventions have yet been evaluated for adults with atopic dermatitis or acne, and no evidence exists for rarer conditions or acne in young people.

The best approach to delivering these kinds of interventions is yet to be established and there is much uncertainty around this, but face-to-face, group, sessions or delivery by text messages may be effective. There are some early indications that delivery over a long period (ranging from 6 weeks to 3 months) and delivery by a multidisciplinary team may be associated with positive outcomes. Other than these structural elements, it is not clear what intervention content may be associated with improvements in HRQoL.

Owing to the limitations of the included studies, there is uncertainty over whether educational interventions aimed at improving QoL are cost-effective in the treatment of chronic inflammatory skin diseases.

Suggested research priorities

There is a need for high-quality, adequately powered RCTs in all chronic inflammatory skin conditions, including rarer conditions, in adults, children and adolescents and carers. These should evaluate theory-based interventions that are sensitive to patients' needs and characteristics, measure adverse events or undesirable effects of both the educational intervention and treatment it is supplementing, and include an adequate long-term follow-up (of at least 3 months post intervention – as recommended by the review Advisory Group – but preferably 12 months or more as these are long-term conditions which require the maintenance of self-care behaviours, disease control and positive HRQoL over time). Ideally, such RCTs should include an economic evaluation, ITT analyses and a process evaluation, define and measure clinically meaningful changes in outcomes, and follow good reporting standards (e.g. the Consolidated Standards of Reporting Trials statement). Ideally, process evaluations should be included and it would be useful to include measures of hypothesised mechanisms and carry out mediation analyses to explore theoretical explanations about how such interventions may work.

Prior to carrying out rigorous RCTs, in line with the MRC guidance on complex intervention development and evaluation, careful intervention development work should be carried out. This could include reviews of existing evidence and theory to define more accurately the theoretical basis of such interventions and what content should be included to help improve HRQoL in chronic inflammatory skin conditions, supplemented by qualitative work with relevant stakeholders, such as patients and HCPs, where needed. For example, investigators could carry out reviews of the factors associated with HRQoL in specific skin conditions to help inform the factors that could be targeted in the intervention to improve HRQoL. Our brief literature review (see *Impact of the disease*) suggests that psychological distress and stress, along with symptoms, such as itch, and concerns about appearance may negatively impact patients' HRQoL.[33,39,40] Additionally, the authors of some of the included studies hypothesised that the effects of education on HRQoL may be mediated by improved disease self-management. It could be argued that improved patient activation from education might also increase HRQoL, as it has been found to be associated with improvements in HRQoL in patients in general.[64] These are among the target factors that could be identified in reviews, qualitative work and in consultation with stakeholders, and which then could be considered in the design of future interventions. In particular, our review suggests that there is a paucity of studies of educational interventions that include components addressing the psychosocial issues experienced by people with chronic inflammatory skin conditions, so this may be a useful focus in future educational interventions. Given the paucity of current evidence for this kind of intervention in chronic inflammatory skin diseases, investigators could also draw on evidence about what has been successful in educational interventions for improving HRQoL in other long-term conditions where patients need to self-manage their condition (e.g. diabetes and asthma) when designing interventions. Pilot studies should also be conducted to inform the development of the intervention, its feasibility and acceptability to patients.

RCTs examining the effectiveness of different approaches to intervention delivery would be useful, such as comparing face-to-face sessions or online interventions, or comparing the effectiveness of shorter educational sessions with more intensive programmes or comparing delivery by a multidisciplinary team with delivery by other kinds of intervention providers (e.g. a specialist nurse).

Future studies of educational interventions aimed at improving HRQoL could include measurements of, and clearly report the resources and costs used to deliver, the intervention, to help inform future economic evaluations. It would also be ideal if future economic evaluations used a generic, preference-based measure to assess HRQoL or a disease-specific one that could then be mapped to a preference-based measure.

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Contribution of authors

Karen Pickett (Research Fellow) developed the research protocol, contributed to the background section, assessed studies for inclusion, extracted data from and quality assessed included studies, synthesised evidence, drafted and edited the final report.

Emma Loveman (Senior Research Fellow) developed the research protocol, contributed to the background section, assisted in the development of the search strategy, assessed studies for inclusion, extracted data from and quality assessed included studies, synthesised evidence, drafted and edited the final report, project managed the study and acted as guarantor for the project.

Neelam Kalita (Research Fellow) contributed to the background section, assessed studies for inclusion, extracted data from and quality assessed included studies, synthesised evidence and drafted the report.

Geoff K Frampton (Senior Research Fellow) developed the research protocol, assessed studies for inclusion, extracted data from and quality assessed included studies, synthesised evidence and drafted the report.

Jeremy Jones (Principal Research Fellow) assessed studies for inclusion, extracted data from and quality assessed included studies, synthesised evidence and drafted the report.

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Data sharing statement

All available data are included in the appendices to this report.

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Appendix 1 Common health-related quality-of-life and disease severity measures

Health-related quality-of-life measures

Dermatological Life Quality Index

The DLQI was developed as a dermatology-specific QoL measure because generic HRQoL instruments, for example the SF-36, were not specific enough to capture aspects of QoL related to dermatological conditions. The DLQI is widely used in clinical practice and clinical trials across the world, and has been particularly used in psoriasis, atopic dermatitis and acne.[122,123]

The questionnaire is used in adults aged over 16 years. The DLQI consists of 10 questions and provides a total HRQoL score, as well as scores for six aspects of QOL: symptoms and feelings; daily activities; leisure; work and school; personal relationships; and treatment. Question responses range from 'not at all', 'a little', 'a lot' to 'very much'. The DLQI score is calculated by adding the scores together, with a maximum score of 30 and a minimum score of 0. A higher score reflects a worse HRQoL. A minimally clinically important difference on the DLQI is generally defined as a score change of at least four points, with studies estimating that this ranges from 2.2 to 6.9 across specific inflammatory skin conditions.[49] The time frame of DLQI is one week (i.e. it focuses on the QoL in the previous week because it is easy to recall accurately).[49] Lewis and Finlay[123] reported that DLQI has been validated against a number of other dermatology and health measures.

An advantage of the DLQI is that it is simple and quick to complete. Furthermore, there is a very high success rate of accurate completion of the measure.[123] The DLQI is accepted by dermatology professionals, researchers and regulatory authorities as a standard by which HRQoL can be reliably measured. Despite being a valid and reliable measure, there are a few limitations. There is a focus on physical limitations as a result of the skin condition and few items address the possible implications to psychological health. Evidence suggests that the measure is, therefore, most valid in assessing HRQoL in those with more severe disease.[124] The DLQI is also affected by some bias in terms of factors such as age, sex, diagnosis and nationality ,which can affect responses on more than half of the questions. Therefore, caution in the interpretation is recommended when using the measure in a heterogeneous patient population, for example in international studies, as these factors may impact on the scores seen across patients.[124]

The Infants' Dermatitis Quality of Life Index

The IDQoL Index questionnaire is designed to assess QoL in infants with atopic dermatitis aged between 0 and 3 years. This widely used questionnaire is completed by the children's parents or their carers. It has wide international use, having been translated into 21 languages.[125]

The questionnaire consists of two main domains: dermatitis severity and life quality index. Within the life quality index, there are 10 questions relating to: itching and scratching; mood of the child; how long it takes for the child to sleep; has the eczema interfered with their playing; swimming or participation in other family activities; problems during meal times; problems caused by treatment; level of comfort while dressing or undressing the child; and problems during bath times. Each question is scored between 0 and 3 and these are then totalled to generate the IDQoL score, which therefore ranges from 0 to 30. Higher scores reflect greater impact.[125]

Basra and colleagues reported that, despite available evidence across 11 countries on IDQoL sensitivity to change, there is currently no means by which to estimate what score change is clinically meaningful.[125]

The IDQoL measure has several positive aspects of psychometric performance. The measure has shown high specificity, thereby indicating that it can distinguish between infants with disease and infants without disease well. As it is simple to use it has been considered to be the 'gold standard' to measure HRQoL in infants with atopic dermatitis. Some validation factors have not been fully researched however, such as factor analysis, and the test–retest reliability and internal consistency across the different adaptations of the measure.[125]

Children's Dermatology Life Quality Index

The CDLQI questionnaire was designed as a tool to allow assessment of QoL in children aged 4 to 16 years with skin conditions.[126,127] It is a simple questionnaire, which is self-explanatory and very quick to complete in 1 or 2 minutes. Children are asked to fill it with the help of their parents or guardian.[126] This questionnaire has been a widely used tool and is available in 44 languages. It has been applied in a range of different skin conditions. It is available in two versions: text only and text with cartoons.[127]

There are six headings in CDLQI covering 10 questions.[126] These are:

- symptoms and feelings (Questions 1 and 2)
- leisure (Questions 4, 5 and 6)
- school or holidays (Question 7)
- personal relationships (Questions 3 and 8)
- sleep (Question 9)
- treatment (Question 10).

Each question is scored on a scale of 0–3, which ranges from 'Very much'; 'Quite a lot'; 'Only a little'; 'Not at all'; 'Question unanswered'; and 'Prevented school' for Question 7. A score of 3 is assigned to a question if it is scored 'very much' or 'prevented school' for Question 7. 'Quite a lot' is assigned a score of 2; 'Only a little' is assigned a score of 1; and for questions answered as 'not at all' or unanswered is given a score of 0.[126]

The CDLQI score is calculated when each score is added together, with a range of 0 to 30. Higher scores represent greater impairment with suggested severity bandings as follows:[126]

- Score 0–1: No effect on child's life.
- Score 2–6: Small effect.
- Score 7–12: Moderate effect.
- Score 13–18: Very large effect.
- Score 19–30: Extremely large effect.

In addition, the overall CDLQI score can be expressed as a percentage of the maximum possible score.[126]

Holme and colleagues[128] conducted a study to validate the cartoon-based questionnaire and suggested that it was equivalent to the written questionnaire (which was previously validated). The authors point out that the cartoon version was beneficial because it was easier for children to use and both the children and their parents felt that it was the preferred method.

Salek and colleagues[127] tested internal consistency, test–retest reliability and responsiveness to change and concluded that the measure met these criteria well. The minimally clinically important difference in those with psoriasis has been suggested to be 2.5; however, this was based on results of one study only and the authors suggest that further research is warranted. The CDLQI is for use in children aged from 4 to 16 years, which may limit the validity of the measure, as it is likely that adolescents' responses to the disease will differ from those of very young children.[127]

Quality of life in Primary Caregivers of children with Atopic Dermatitis

The QPCAD is a self-reported questionnaire developed to evaluate the QoL of primary caregivers of a child with atopic dermatitis. The questionnaire was developed in Japan.[129]

The QPCAD includes 19 items within the following four categories: 'exhaustion' (seven items), 'worry about atopic dermatitis' (six items), 'family cooperation' (three items), and 'achievement' (three items). Responses to these items are made on a five-point scale. The overall score is calculated by summing all scores, with a higher score indicating a worse health state. The questionnaire only takes into account the QoL of the carer(s) in the past week.[129]

The QPCAD is simple and quick to complete and it addresses both positive and negative aspects of life in children with atopic dermatitis (there are six items relating to positive influences out of the total of 19 items).[129] Kondo-Endo and colleagues[129] reported that the QPCAD is internally consistent, has good retest reliability and also has reasonable validity. With respect to responsiveness, the study stated that QPCAD was better in detecting severity change compared with the other well-being instruments. However, it was pointed out that there was a need for further study to examine the responsiveness of the subscales to improvements in disease severity over longer periods.[129] Some limitations to this study are that it was based in a Japanese setting, data were based on caregivers of patients with mild to modest disease, and participants were a relatively homogenous group.[129]

Skindex

Skindex is a self-report questionnaire with 61 items in eight scales: cognitive effects; social effects; depression; fear; embarrassment; anger; physical discomfort; and physical limitations. The item responses range from 0 to 100, with 0 indicating no effect and 100 indicating maximum effect.[130]

Skindex scales have been shown to have good internal reliability, to be reproducible and to be valid.[130] In the analysis by Chren and colleagues,[130] the measure also demonstrated responsiveness to clinical change and demonstrated both content validity and construct validity. However, the scores were found to be inconsistent with judgements made by physicians about the severity of the condition.

The earlier version of Skindex was refined into a 29-item Skindex-29, which comprised three domains, namely: symptoms (constituting 7 items), emotions (constituting 10 items) and functioning (constituting 12 items). Like the previous version, all the item responses were converted to a linear scale, ranging from 0 to 100.[131] This version was further refined to develop a shorter version comprising 16 items (Skindex-16) across three domains: symptoms (4 items), emotions (7 items) and functioning (5 items). Like the two parent measures, in this version, responses are summed across the three domains and scores range from 0 (for no effect) to 100 (maximum effect). Based on analyses performed over 500 patients, the authors assessed Skindex-16 to be reliable, valid and responsive to clinical change.[131]

Both Skindex-29 and Skindex-16 have advantages and the choice between the two instruments depends on the nature of the research question.[131] For instance, Skindex-26 could be better suited to examine and understand the impacts of a condition on QoL owing to its comprehensive nature, whereas Skindex-16 addresses many other relevant aspects of skin diseases that are not covered by Skindex-29. Despite the advantages, there is room for further exploration and interpretation in future research.[131]

Other measures

The studies included in the review of clinical effectiveness also included other HRQoL measures, apart from the ones discussed above. These are:

- ACS, reported by van Os-Medendorp and colleagues,[89] using one sub-scale
- German questionnaire 'Quality of life in parents of children with atopic dermatitis', reported by Staab and colleagues[87]
- PDI, reported by Bostoen and colleagues[76]
- QoLIAD, reported by Bostoen and colleagues[76]
- WHOQOL-26, reported by Matsuoka and colleagues.[88]

Disease severity measures

Psoriasis

Psoriasis Area Severity Index

The PASI is the gold-standard measure used by doctors and nurses to assess the severity of psoriasis or the progress of patients receiving treatment for the condition. It is a measure of the average redness, thickness and scaliness of the lesions. Each criterion is graded 0–4, and weighted by the area of involvement.[132]

The questionnaire consists of four sections, covering the head, arms, trunk and legs. Within each of these four areas, the percentage of area of skin involved is estimated and then transformed into a grade from 0 to 6:[132]

- grade: 0; 0% of involved area
- grade: 1; < 10% of involved area
- grade: 2; 10–29% of involved area
- grade: 3; 30–49% of involved area
- grade: 4; 50–69% of involved area
- grade: 5; 70–89% of involved area
- grade: 6; 90–100% of involved area.

Disease severity is assessed by three clinical signs: erythema (redness), induration (thickness) and desquamation (scaling). Each of these signs is graded on a scale of 0–4, where 0 represents none; 1 represents mild; 2 represents moderate; 3 represents severe and 4 represents maximum severity.[133]

Psoriasis Area Severity Index is measured by adding the three severity parameters weighted by the area of involvement. It provides a total score of disease severity, taking into account both coverage and intensity.[134] A clinically meaningful change in clinical trials is a 75% improvement, although there is also evidence of a 50% improvement being clinically meaningful.[132]

One of the key advantages of PASI is that it is widely used and has been shown to correlate with QoL. It has been accepted as a valid measure of disease severity by approving agencies. However, it has a few limitations: it has poor sensitivity to change when there is only a small area of involvement, despite being the most widely used instrument for assessing severe psoriasis; there have been a few validation studies; and the construct validity, face validity and sensitivity to change are not well characterised.[132]

Self-Administered Psoriasis Area Severity Index

The SAPASI is a structured instrument that allows patients to assess accurately the severity of their psoriasis. As a patient-administered measure, the SAPASI requires the patient to shade on an anatomic sketch, which is then assigned values from an investigator, with a value of 0–6. The scoring is similar to that used in the PASI as described above. When used as a measure of treatment effectiveness, the patient is required to grade a sketch of a typical psoriasis plaque and grade the colour, thickness and scaling. There tool also uses visual analogue scales (VASs) which describe the strength of colour, thickness and scaling. The scoring range of SAPASI is 0–72.[134]

Two studies tested the validity of SAPASI.[132,134] In their comparison study, Henseler and colleagues[134] found a good correlation between the PASI and the SAPASI. This could be a potential advantage of the instrument in research, as the SAPASI can be used in situations where the investigator is unable to see the patient. The study also noted that there was good regression between the two instruments, which suggests that there is equivalent value between both tools.[134] However, one limitation of SAPASI as outlined by Feldman and Krueger[132] was that, despite the high correlation between the PASI and SAPASI across a broad range of severity tested, for any given PASI score there was a wide range of corresponding SAPASI scores. This indicates that the SAPASI score may not accurately determine the severity of psoriasis in some individual patients.[132]

SCORing Atopic Dermatitis

The SCORAD can be used to assess the extent and severity of eczema or atopic dermatitis and can be used as a marker of treatment effectiveness. The extent of the disease is estimated as a percentage of the whole body by applying the proportions shown below for different sections of the body affected in an individual and these are then summed up to a maximum of 100 (classed as 'A'):[135]

- head and neck: 9%
- upper limbs: 9% each
- lower limbs: 18% each
- anterior trunk: 18%
- back: 18%
- genitals: 1%.

Intensity of the disease is assessed based on redness, swelling, oozing/crusting, scratch marks, skin thickening and dryness. These are rated as: none (0); mild (1); moderate (2); or severe (3) and, when added, give a maximum score of 18 to give 'B'.[135]

Finally, patients or representatives are asked to rate on a VAS their subjective symptoms, such as itch and sleeplessness, using a score of 0 to 10 (where 0 means none and 10 is the worst imaginable symptom). The scores are summed to give 'C' (maximum 20).[135]

Total SCORAD for that individual is then estimated as: $A/5 + 7B/2 + C$.

The SCORAD combines objective assessments of the extent and intensity of disease made by investigators with subjective patient or carer ratings of severity (subjective ratings are specifically made for pruritus and sleep loss over the past 3 days). The objective SCORAD is also available, which does not include the subjective ratings. On the SCORAD, a higher score indicates more severe disease.[136] A minimal clinically important difference on the SCORAD is defined as a score change of 8.7 points (8.2 points for the objective SCORAD).[137]

Appendix 2 Search strategy

MEDLINE search strategies for clinical effectiveness are shown here. These were adapted for other databases and the cost effectiveness searches (and are available on request).

1. exp acneiform eruptions/ or exp dermatitis/ or exp dermatomyositis/ or exp facial dermatoses/ or hand dermatoses/ or leg dermatoses/ or exp lupus erythematosus, cutaneous/ or nephrogenic fibrosing dermopathy/ or prurigo/ or exp pruritus/ or exp rosacea/ or exp skin diseases, eczematous/ or psoriasis/ or exp skin diseases, bacterial/ (159,684)
2. (eczema* or dermatitis or dermato* or acne or psoriasis or pruritus or prurigo or erythem* or rosacea or rozacea or "cutaneous lupus erythematosus" or "lichen sclerosus" or "lichen planus" or "hidradenitis suppurativa").tw. (214,088)
3. (chronic* and inflam* and skin).tw. (5447)
4. 1 or 2 or 3 (289,612)
5. Patient Education as Topic/ (68,477)
6. exp Health Education/ (132,310)
7. Health Promotion/ (50,756)
8. Health Behavior/ (31,842)
9. Life Style/ (41,162)
10. Health Knowledge, Attitudes, Practice/ (68,962)
11. Self Care/ (22,573)
12. "Continuity of Patient Care"/ (13,997)
13. consumer participation/ or patient participation/ (30,827)
14. Telemedicine/ or Teledermatology/ (10,676)
15. Webcasts/ (291)
16. Internet/ (46,581)
17. Cellular Phone/ or Telephone/ (12,862)
18. Counseling/ (27,044)
19. Behavior Therapy/ (22,902)
20. Physician-Patient Relations/ or Nurse-Patient Relations/ (87,702)
21. exp Mind-Body Therapies/ (40,139)
22. ((educat* or train or learn* or teach* or instruct* or knowledge or support*) adj3 (patient* or self* or program* or model* or system*1 or intervention*)).tw. (158,193)
23. (patient* adj3 information*).tw. (23,746)
24. ((program* or intervention* or instruction* or teach* or learn* or educat* or plan* or strategy or strategies) adj10 (literature or handout* or leaflet* or inform* or video* or audiovisual or "AV" or internet or web or website* or telecare or telemedicine or teledermatology or telephone or phone or mobile or teleconferenc* or telehealth or transtelephonic* or podcast or broadcast*)).tw. (106,105)
25. (self* adj3 (care or monitor* or help or management)).tw. (25,940)
26. exp Psychotherapy/ (146,141)
27. psychotherap*.tw. (29,205)
28. (psychosomatic and therap*).tw. (1513)
29. Cognitive Therapy/ (14,733)
30. Family Therapy/ (7499)
31. ("health promotion" or "health education" or "patient education" or "patient information").tw. (49,573)
32. (educat* and intervention*).tw. (41,292)
33. (intervention* adj3 (group* or study or studies or trial*)).tw. (50,074)
34. ("e-consult*" or "e-health" or "e-learn*").tw. (1790)
35. ("patient teaching" or "patient training" or "patient learning").tw. (862)
36. or/5-35 (873,959)
37. 4 and 36 (6230)

38. (psychosocial* and (intervention* or educat*)).tw. (16,709)
39. (psychological* and (intervention* or educat*)).tw. (23,824)
40. (psychosomatic* and (intervention* or educat*)).tw. (821)
41. Stress, Psychological/ed, pc, th [Education, Prevention & Control, Therapy] (9164)
42. or/38-41 (46,080)
43. 4 and 42 (428)
44. 37 or 43 (6430)
45. exp Randomized Controlled Trial/ (359,500)
46. Randomized Controlled Trials as Topic/ (88,564)
47. randomized controlled trial.pt. (359,493)
48. controlled clinical trial.pt. (86,909)
49. Controlled Clinical Trial/ (86,909)
50. placebos/ (31,924)
51. random allocation/ (78,664)
52. Double-Blind Method/ (122,243)
53. Single-Blind Method/ (18,296)
54. (random* adj2 allocat*).tw. (19,059)
55. placebo*.tw. (145,886)
56. ((singl* or doubl* or trebl* or tripl*) adj (blind* or mask*)).tw. (119,800)
57. crossover studies/ (32,896)
58. (crossover* or (cross adj over*)).tw. (54,490)
59. Research Design/ (75,676)
60. ((random* or control* or compar*) adj5 (trial* or stud*)).tw. (750,980)
61. Clinical Trials as Topic/ (166,646)
62. Comparative Study/ (1,647,117)
63. or/45-62 (2,601,095)
64. 44 and 63 (1222)
65. limit 64 to english language (1116)

Appendix 3 Quality assessment criteria

TABLE 29 Cochrane 'risk of bias' tool

Criteria	Judgement of risk of bias[a]	Support for judgement
Random sequence generation (selection bias)		
Allocation concealment (selection bias)		
Blinding of participants and personnel (performance bias)		
Blinding of outcome assessment (detection bias)		
Incomplete outcome data (attrition bias)		
Selective reporting (reporting bias)		
Other bias		

a High risk, unclear risk, low risk.

Appendix 4 Data extraction tables: clinical effectiveness

Reference and design	Intervention	Participants	Outcome measures
Author and year: Balato *et al.*, 2013[85] Study ID: 51 Source: published Country/location: Italy Setting: home Trial design: RCT Includes process evaluation: yes Number of study centres: 1 (assumed) Funding: none Conflicts of interest: none Trial/study number: not reported Study dates: September 2011–not stated Was the educational intervention an adjunct to standard medical care? Yes	**Treatment intervention** Overview: text message education Intervention aims: not stated explicitly but implicit from the paper that aim was to use text messaging to improve treatment adherence and patient outcomes including HRQoL Where delivered: via mobile phone Self-help, individual- and/or group-based? (state group size): individual-based intervention Mode: text messaging Materials: text messages Provider: not stated who the 'investigators' were but physicians enrolled participants Duration and intensity: 1 text message per day for a period of 12 weeks Scripting (level of detail guiding interaction between interventionist and participants): general educational statements and reminders sent in a random order with four educational and three reminders sent each week. Details of the types of information provided in the paper but no details of the coverage of these (i.e. if all were eventually sent to each participant) Sensitivity to participant characteristics: text messages were created using simple language	Skin condition: plaque psoriasis Diagnostic criteria: not reported Specify if patients, parents and/or carers: patients Patient general age group (specify if children, young adults and/or adults): adults Stated target group: no details How recruited: consecutive patients Eligibility criteria: aged between 18 and 65 years, current systemic and topical treatment, PASI between 5 and 15, owner of a mobile phone capable of receiving text messages and the ability to use it. The presence of comorbidities was not an exclusion criteria Numbers involved (randomised/allocated): *total* 40; *intervention*: 20; *control*: 20 Numbers (%) completing, attrition and reasons: *attrition:* intervention group = 0; control group = 0 *Reasons*: not applicable *Completing*: 100% Sample cross-overs: none **Baseline characteristics** Comorbidities, *n* (%) as reported in paper is percentage of those with any comorbidity, reviewer also calculated % of total group [%]: Hypertension *Intervention:* 3/6 (50) [15]; *Control*: 4/7 (57) [20]	Primary outcomes: not reported as primary or secondary outcomes. PASI, PGA, BSA, SAPASI; HRQoL (DLQI) Other outcomes: evaluation of patient–physician relationship; treatment adherence Secondary outcomes: adverse events: not reported Process evaluation measures: usability and satisfaction with the text messaging education Individual preferred learning style addressed? No Any sub groups: none reported How outcomes assessed? DLQI, SAPASI and adherence are self-report; PASI, BSA and PGA are clinician reported but not clear who assessed. Unclear for the patient–physician relationship. DLQI, PASI and SAPASI details of measure not stated; patient–physician relationship was a scale of 0–10; treatment adherence through a multiple-choice question about how often they forgot to use products/medications in days per week in the past week. Also a 7-day calendar marking days when they were adherent as outlined in a cited reference. States the PASI, BSA and PGA were used to support the results of the self-reported adherence Normal range(s) for outcomes/clinically meaningful improvement defined: not reported

Reference and design	Intervention	Participants	Outcome measures
	Interventionist characteristics and training: no details Content and topics: summary – covered frequently asked questions about psoriasis drugs (e.g. administration and adverse effects) and general recommendations to take care of overall health. All text messages between one and three sentences. Educational topics included daily care statements (e.g. use moisturisers, wear light clothes), healthy lifestyle statements (e.g. avoid smoking, pay attention to your diet), prompts about the use of treatments (e.g. do not abuse steroids, common side effects of certain drugs) and one statement about the psychosocial effects of psoriasis (e.g. do not feel ashamed or guilty, psoriasis is not contagious). Reminders reinforced many of the same principles Tailoring: does not appear to be tailored Ongoing support: none reported Theory: none reported **Control intervention:** Description: no details of the control intervention Duration and intensity: not reported	Dysplipidemia *Intervention:* 2/6 (33) [10]; *Control:* 2/7 (28.5) [10] Type 2 diabetes *Intervention:* 1/6 (17) [5]; *Control*: 1/7 (14.5) [5] Co-medications/interventions: Intervention group: acitretin 2 (10%); biologics 10 (50%); ciclosporin 3 (15%); methotrexate 5 (25%) Control group: acitretin 3 (15%); biologics 11 (55%); ciclosporin 2 (10%); methotrexate 4 (20%) Duration of disease, mean (SD): Intervention 10.7 (5.3) years Control 12.1 (5.8) years Sex (M/F) *n*/*N*: Intervention 10/10 Control 12/8 Average age: mean (SD) age, years Intervention 38.4 (9.5); Control 39.3 (10.2) Ethnic groups: not reported Socioeconomic characteristics: Education, *n* (%) Intervention: middle school 5 (25); high school 12 (60); college graduate 3 (15) Control: middle school 6 (30); high school 10 (50); some college 1 (5); college graduate 3 (15) Currently employed, *n* (%) Intervention: 16 (80) Control 15 (75)	Validated? Yes for all measures except patient–physician relationship and adherence (therefore not data extracted) Timing of outcomes same for both groups: yes Length of follow-up: 12 weeks

Methods

Statistical analysis, including how missing data dealt with: minimal details about statistical approaches used, data presented as means (SDs). No missing data

Power calculation: not reported. Described as a pilot study

Study adequately powered? Unclear

ITT used? No missing data or drop outs so ITT (although not described as such by authors)

Groups comparable at baseline? Yes

Subgroup analyses: none reported

Process evaluation methods (if relevant): in the treatment group only, usability and satisfaction with the text messaging intervention were assessed using a series of questions

Outcome evaluation results

HRQoL Outcomes	Intervention ($n = 20$)	Control ($n = 20$)	p-value/CIs
DLQI, mean (SD) baseline	7.9 (3.2)	7 (3)	
DLQI, mean 12 weeks	4.2	5.8	$p < 0.05$

Comments: 12 weeks scores estimated from figure by reviewer

Other relevant outcomes	Intervention ($n = 20$)	Control ($n = 20$)	p-value/CIs
PASI, mean (SD) baseline	10.64 (4.2)	10.13 (4.7)	
PASI, mean 12 weeks	5.8	6.8	$p < 0.05$
SAPASI, mean (SD) baseline	11 (6.6)	10.90 (5.9)	
SAPASI, mean, 12 weeks	5.9	8	$p < 0.05$
BSA, mean (SD) baseline	16 (7.5)	14.2 (8)	
BSA, mean 12 weeks	5.8	8	$p < 0.05$
PGA, mean (SD) baseline	2.6 (1.04)	2.3 (1.3)	
PGA score	0.7	1.5	$p < 0.05$

Comments: all 12 weeks' data estimated from figure by reviewer

Treatment adherence scores and patient–physician relationship scores not data extracted as not validated measures

Adverse events	Intervention	Control	p-value/CIs

Comments:

Subgroup analysis results

Comments: no subgroups reported

Outcome	Intervention	Control	p-value/CI

Comments:

Process evaluation results

Usability and satisfaction with the text messaging education:

85% found text messaging useful

75% would recommend to a friend

75% would like to continue using the text messaging

15% would be willing to pay a small fee for the service

Comments:

Outcome	Intervention	Control	*p*-value/CI
Generalisability: Italian population all with plaque psoriasis of moderate-to-large effect based on baseline PASI scores (reviewer observation). Participants on a range of different treatments, unclear how generalisable these are to UK standards of care			
Other: no details of the control group so unclear whether they were seen as usual care or not seen at all			

Quality criteria (Cochrane 'risk of bias' tool) randomised controlled trials

Criteria	Judgement of risk of bias[a]	Support for judgement
Random sequence generation (selection bias)	Low risk	Allocation by a computer-generated random number list
Allocation concealment (selection bias)	Unclear risk	States group assignment was stored electronically and that investigators performing randomisation had no contact with participants, but no other details
Blinding of participants and personnel (performance bias)	High risk	Physicians were blinded to group assignment until the end of the study. No details of blinding of participants, which would be difficult to do
Blinding of outcome assessment (detection bias)	Unclear risk	No details
Incomplete outcome data (attrition bias)	Low risk	No attrition
Selective reporting (reporting bias)	Low risk	All outcomes stated were reported
Other bias	Low risk	

a High risk, unclear risk, low risk.

Reference and design	Intervention	Participants	Outcome measures
Author and year: Bostoen *et al.*, 2012[76] Study ID: 84 Country/location: Belgium Setting: unclear, assume outpatient Trial design: RCT Includes process evaluation: no Number of study centres: unclear, assume one	**Treatment intervention** Overview: educational programme for patients with psoriasis and atopic dermatitis Intervention aim(s): not explicitly stated. Study aimed to examine if the educational intervention 'added value to medical therapy' (p. 1025) and examine the effects on disease severity and QoL Where delivered: not reported Self-help, individual- and/or group-based? (State group size): group-based intervention. Group sizes differed and were 14, 23 and 13	Skin condition: psoriasis or atopic dermatitis Diagnostic criteria: not reported except that diagnosis was checked by a dermatologist at study entry Specify if patients, parents and/or carers: patients Patient general age group (specify if children, young adults and/or adults): adults Stated target group: adults with psoriasis or atopic dermatitis	Primary outcomes: disease severity (PASI; SCORAD, EASI). HRQoL (DLQI; Skindex-29; PDI; QoLIAD) Secondary outcomes: depression (BDI); lifestyle (set of questions un-validated) Stress (EPC) Medical consumption Cost-effectiveness (states used costs of medical consumption and EQ-5D for health outcomes to assess cost per EQ-5D gain in Euros)

Reference and design	Intervention	Participants	Outcome measures
Funding: grants from various pharmaceutical companies Conflicts of interest: states none Trial/study number: NCT01077882 Study dates: February 2010–11 Was the educational intervention an adjunct to standard medical care? Yes	Mode: face-to-face workshop Materials: secondary publication[99] of a before-and-after study. Used the same intervention notes as the syllabus that was offered to participants Provider: dermatologist, dermatology nurse, pharmacists, dietician, training expert, psychiatrist, psychologist, philosopher, and a sports, yoga and mindfulness teacher Duration and intensity: 3-month programme, with two, 2-hour sessions a week Scripting (level of detail guiding interaction between interventionist and participants): secondary publication[99] refers to a syllabus Sensitivity to participant characteristics: not reported Interventionist characteristics and training: none reported apart from job title noted above Content and topics: information on specific skin disease, and skin care sessions, healthy lifestyle (diet, sleep hygiene, smoking, substance abuse) and stress-reducing techniques (physical training, psychodermatology, practical philosophy and mindfulness), feedback sessions. Further details of the intervention provided in a separate publication[99] Tailoring: not reported Ongoing support: not reported Theory: not reported All patients continued with medical therapy	How recruited: recruited from Ghent University Hospital, patient advocacy groups and dermatologists Eligibility criteria: aged 18 years or older, psoriasis or atopic dermatitis Excluded if other severe illnesses, psychiatric disorders or cognitive disorders Numbers involved (randomised/allocated): *Total:* 50 (29 psoriasis; 21 AD) *Intervention (intervention):* 25 (15 (60%) psoriasis, 10 (40%) AD) *Control (control):* 25 (14 (56%) psoriasis, 11 (44%) AD) Numbers (%) completing, attrition and reasons (by study end, reports rates for each follow-up period but not data extracted): *Attrition: N* (%) 13 (26%) [intervention 8 (32%); control 4 (16%)] In addition, one participant in the intervention group was excluded from the analysis *Reasons:* range of reasons provided but not linked to number of individuals dropping out for each reason. These included lack of time, too intensive programme and moving house in the intervention group and worsening of disease and loss of motivation in the control group *Completers: N* (%) [intervention: 16 (64%); control 21 (84%)] Sample cross-overs: none reported **Baseline characteristics** Co-morbidities: not reported	Adverse events: not reported Process evaluation measures: none reported Individual preferred learning style addressed? No How outcomes assessed?: Severity measures assessed by two clinicians, having been trained at the start of the trial, level of agreement was good (intraclass correlation coefficient 0.86 (95% CI 0.72 to 0.94) for PASI, 0.89 (95% CI 0.74 to 0.96) for SCORAD, 0.92 (95% CI 0.82 to 0.97) for EASI) Normal range(s) for outcomes/ clinically meaningful improvement defined: yes for BDI and EPC and DLQI Validated? Severity, HRQoL measures, BDI and EPC validated Lifestyle questionnaire not validated and not data extracted Timing of outcomes same for both groups: yes Length of follow-up: 9 months

Reference and design	Intervention	Participants	Outcome measures
	Control intervention Description: received medical therapy alone Duration and intensity: no details	Co-medications/interventions, *n*: *Topical therapies* Intervention: 17 (psoriasis 9, AD 8); control: 21 (psoriasis 12, AD 9) *Systemic therapies* Intervention: 0; control: 1 (psoriasis 1) *Combination* Intervention: 4 (psoriasis 2, AD 2); control: 3 (psoriasis 1, AD 2) *None* Intervention: 4 (psoriasis 4); control: 0 *Total* Intervention: 25 (psoriasis 15, AD 10); control: 25 (psoriasis 14, AD 11) Duration of disease, mean (SD) years: Intervention: 18.9 (11.0); control: 20.1 (11.4) Disease severity: see below Sex (M/F),%: Intervention: 48/52; control: 48/52 Average age, mean (SD) years: Intervention: 38.5 (12.3); control: 40.6 (12.2) Ethnic groups: not reported Socioeconomic characteristics: Education: low/medium/high (%) Intervention: 4/22/74; control: 4/52/44	

AD, atopic dermatitis; EPC, Everyday Problem Checklist.

Methods

Statistical analysis, including how missing data dealt with: reports how data were analysed including mixed modelling to identify differences in time between the intervention and control groups for each outcome variable

Power calculation: power calculation showed that 34 patients were required. There was an 80% probability that the study would detect a treatment difference at a two-sided 0.05 significance level if the mean difference between treatments is 2 with a SD of 2

Study adequately powered? Yes for total sample; however, analyses presented are essentially subgroup analyses and unclear if the sample is adequately powered

ITT used? No details reported; paper does suggest that those dropping out were included in the analysis with the exception of one participant in the intervention group who was excluded from the analysis (p. 1027). However, the reporting of the results suggests that different numbers may have been analysed at each follow-up point because the baseline scores are different in each case

Groups comparable at baseline? Not reported but appear to be well matched

Subgroups analyses: all analyses were subgroup analyses of psoriasis and atopic dermatitis patients

Process evaluation methods (if relevant): none reported

Outcome evaluation results

Total group, psoriasis and AD combined

HRQoL outcomes	Intervention ($n = 25$)	Control ($n = 25$)	p-value/CI
DLQI, mean (SD) baseline	9.7 (6.0)	7.5 (5.0)	
Skindex-29 total, mean (SD) baseline	45.5 (16.1)	43.3 (17.7)	
Skindex-29 symptoms, mean (SD) baseline	58.1 (15.4)	55.8 (18.4)	
Skindex-29 emotions, mean (SD) baseline	48.9 (19.6)	49.0 (22.7)	
Skindex-29 functioning, mean (SD) baseline	35.2 (20.4)	30.8 (21.4)	
BDI, mean (SD) baseline	11.3 (8.2)	8.4 (6.5)	
PDI, mean (SD) baseline	9.0 (6.8)	7.6 (7.8)	

Comments: paper does not specify which outcomes were reported for the total group and which for the two subgroups, so reviewer has assumed generic instruments at baseline are reporting the total group. However, these measures are also presented for baselines within the two disease subgroups (see below) and there are no end-point measurements for these in the total group

DLQI, Skindex-29, PDI, QoLIAD: higher scores indicate a greater negative impact of the skin disease on QoL. In another publication, the same authors state that the minimal clinical important difference of the DLQI is reported to be between 2.2 and 6.9 depending on the skin disease

BDI: self-administered questionnaire with 21 questions. Patients categorised as minimal (score 0–9), mild (score 10–18), moderate (score 19–29) or severe (score 30–36) depression

Paper states the EPC was applied to 27 participants but it is not clear which group these participants were allocated to. Reports that there were no significant differences between groups during the study, no further details

Paper states EQ-5D values were not significantly better than in the control group at 6 months. Cost–utility analysis taking into account programme cost per patient and medical resource use per individual patient did not show cost-effectiveness at 6 months

Psoriasis subgroup			
Other relevant outcomes	**Intervention (*n* = unclear)**	**Control (*n* = unclear)**	***p*-value/CI**
DLQI, mean (95% CI) baseline	8.4 (5.6 to 11.2)[a]	6.6 (3.9 to 9.3)[b]	
DLQI, mean (95% CI) 3 months	4.4 (1.3 to 7.4)	6.4 (3.6 to 9.2)	*p*-value = 0.019
DLQI, mean (95% CI) 9 months	4.0 (0.6 to 7.4)	5.8 (2.9 to 8.8)	*p*-value = 1.00
PASI, mean (SD) baseline	8.4 (CI 6.0 to 10.8)[c]	7.1 (CI 4.8 to 9.4)[d]	
PASI, mean (95% CI) 3 months	6.8 (4.3 to 9.3) or	8.1 (5.8 to 10.4) or	*p*-value = 0.036
	6.5 (3.6 to 9.4) or	8.1 (5.6 to 10.7) or	
	6.5 (3.3 to 9.8)	8.1 (5.3 to 10.9)	
PASI, mean (95% CI) 9 months	7.0 (3.8 to 10.3)	7.0 (3.8 to 10.3)	*p*-value = 0.116
PDI, mean (SD) [95% CI] baseline	9.0 (6.8) [5.0 to 13.0][e]	7.6 (7.8) [3.8 to 11.5][f]	
PDI, mean (95% CI) 3 months	4.3 (0.1 to 8.4) or	6.7 (2.9 to 10.6) or	*p*-value = 0.015
	4.5 (0.1 to 9.0) or	6.7 (2.7 to 10.7) or	
	4.5 (–0.1 to 9.1)	6.7 (2.6 to 10.8)	
PDI, mean (95% CI) 9 months	4.9 (0.3 to 9.5)	7.4 (3.3 to 11.6)	*p*-value = 0.021
Skindex-29[g]	No data	No data	Not significant
BDI, mean (95% CI) baseline	12.3 (8.3 to 16.4)	7.4 (3.5 to 11.3)	
BDI, mean (95% CI) 3 months	10.5 (6.1 to 14.9)	6.3 (2.3 to 10.3)	*p*-value < 0.05
BDI, mean (95% CI) 9 months	6.1 (1.7 to 10.5)	7.3 (3.2 to 11.3)	*p*-value = 0.029
Comments: 3-month and 9-month outcomes extracted – 3 month relates to the end of the intervention, 9 months was the longest period of follow-up. Also reports 6-month data, not extracted			

a In the reporting of the results the baseline DLQI was also reported to be 8.0 (CI 5.0 to 11.0) and 8.0 (CI 4.9 to 11.1) with no explanation. This suggests that the numbers analysed differed at different time points and the baselines were recalculated on the basis of different participant numbers.
b In the reporting of the results the baseline DLQI was also reported to be 6.6 (CI 3.8 to 9.4) and 6.6 (CI 3.7 to 9.5) with no explanation, see above.
c In the reporting of the results the baseline PASI was also reported to be 8.9 (SD 4.3) or 8.4 (CI 5.6 to 11.6) or 8.6 (CI 5.8 to 11.4) which is not explained, see above.
d In the reporting of the results the baseline PASI was also reported to be 7.1 (SD 3.8) or 7.1 (CI 4.6 to 9.7) or 7.1 (CI 4.3 to 9.9) which is not explained, see above.
e In the reporting of the results the baseline PDI was also reported to be 8.8 (CI 4.5 to 13.0)/CI 4.3 to 13.2), see above.
f In the reporting of the results the baseline PDI was also reported to be 7.6 (CI 3.7 to 11.6)/(CI 3.6 to 11.7), see above.
g Paper reports no significant differences between groups but no data presented.
EPC categorised as having a low (score for men of ≤ 6, for women of ≤ 4), normal (score for men of 7–36, for women of 5–33) or high (score for men of ≥ 37, for women of ≥ 34) stress level. No data reported for EPC, states not significant across groups during the study.
Paper reports different mean scores and 95% CI for 6-month outcomes in different places.

Medical therapy use	Intervention ($n = 14$)	Control ($n = 14$)
At 3 months		
Topical	5	12
Systemic	–	–
Combination	2	–
None	2	1
Total	9	13
At 9 months		
Topical	3	10
Systemic	–	1
Combination	2	1
None	3	1
Total	8	13

Comments: paper states no major differences between groups (could not test for significant differences)

AD subgroup		
HRQoL	**Intervention ($n = 10$)**	**Control ($n = 11$)**
QoLIAD, mean (SD) baseline	9.1 (5.6)	9.6 (6.1)
Disease severity		
SCORAD, mean (SD) baseline	38.9 (18.0)	38.8 (15.5)
EASI, mean (SD) baseline	11.9 (10.9)	10.4 (8.1)

Comments: paper states no significant differences between intervention and control groups for EASI, SCORAD, DLQI, Skindex-29 or QoLIAD. No data presented

Paper also reports no statistically significant differences on the BDI but no data presented

Medical therapy use	Intervention ($n = 10$)	Control ($n = 11$)
For baseline see above		
At 3 months		
Topical	7	8
Systemic	–	–
Combination	1	2
None	1	–
Total	9	10
At 9 months		
Topical	7	7
Systemic	–	–
Combination	1	1

Medical therapy use	Intervention ($n = 10$)	Control ($n = 11$)
None	–	–
Total	8	8

Comments:

Paper states no significant differences between groups

Adverse events	Intervention	Control	*p*-value/CI

Comments:

Process evaluation results

Not reported

Comments:

General comments

Generalisability: psoriasis patients classified on average as mild at baseline, atopic dermatitis moderate

Other: patients recruited from three different sources, a university hospital, patient advocacy groups and peripheral dermatologists. There were three runs of the educational programme, one in spring 2010, one in autumn 2010 and one in spring 2011 – unclear how uniform the delivery of these was between the three groups

Quality criteria (Cochrane 'risk of bias' tool) randomised controlled trials

Criteria	Judgement of risk of bias[a]	Support for judgement
Random sequence generation (selection bias)	Low	Randomised on 1 : 1 basis using computer-generated randomisation list, allocation was indicated and stratified by diagnosis using a block size of two
Allocation concealment (selection bias)	Unclear	Sequentially numbered envelopes were used to assign patients to the two study groups, does not state is opaque envelopes
Blinding of participants and personnel (performance bias)	Unclear	Not reported
Blinding of outcome assessment (detection bias)	Unclear	Clinicians performing the assessments of disease severity were blinded to randomisation, unclear who assessed other outcomes
Incomplete outcome data (attrition bias)	High risk	Numbers and general reasons provided but high drop-out in intervention group, no ITT analysis and there are different data reported for many outcomes for the same time points. Also one in intervention group excluded from analysis owing to extreme stress at work
Selective reporting (reporting bias)	Unclear risk	Paper appears to report all outcomes but in many cases no data were presented and the reviewer has to rely on statements which state there were no significant differences
Other bias	Unclear	All results are essentially subgroup analyses and unclear if powered adequately

a High risk, unclear risk, low risk.

Reference and design	Intervention	Participants	Outcome measures
Author and year: Ersser *et al.*, 2011[86] Study ID: 135 Country/location: UK Setting: primary care Trial design: cluster RCT (pilot) Includes process evaluation: yes Number of study centres: 8 (health centres) Funding: Psoriasis Association, UK Conflicts of interest: none Trial/study number: not reported Study dates: June–September 2009 Was the educational intervention an adjunct to standard medical care? Yes	**Treatment intervention** Overview: a theory-based self-management educational intervention for individuals with psoriasis. Patients also received usual care (only mentioned in abstract) Intervention aim(s): to support self-management in psoriasis Where delivered: not reported Self-help, individual- and/or group-based? (State group size): group-based face-to-face session (maximum of 9 participants), with supporting information and follow-up telephone consultation Mode: face to face, written and audio-visual materials, individual telephone consultation Materials: supporting written and audio-visual materials provided; DVD and workbook, including relaxation material Provider: nurse-led group sessions, with supporting materials provided (see *Materials*) Duration and intensity: group session: one-off 2-hour session Telephone consultation: one-off 20-minute session Scripting (level of detail guiding interaction between interventionist and participants): in delivering the intervention, the nurse was expected to follow the intervention protocol, but with flexibility for individualisation. Outline script was used for follow-up telephone consultation Sensitivity to participant characteristics: not reported, but intervention allowed flexibility for individualisation	Skin condition: psoriasis Diagnostic criteria: not reported Specify if patients, parents and/or carers: patients Patient general age group (specify if children, young adults and/or adults): adults Stated target group: individuals with mild-to-moderate plaque psoriasis How recruited: from primary care, with CLNR support Eligibility criteria: aged ≥ 18 years; mild to moderate plaque psoriasis (defined as patients using only topical therapies and having had no secondary care contact in preceding 3 months) Numbers involved (randomised/allocated): *total:* 64 *Intervention:* 28; *control (control):* 36 Numbers (%) completing, attrition and reasons: *Attrition:* 5 (8%) [intervention 2 (7%); control (8%)] *Reasons:* all lost to follow-up *Completers:* 59 (92%) [intervention 26 (93%); control 33 (92%)] (All percentages calculated by reviewer.) Sample cross-overs: none **Baseline characteristics** Comorbidities: not reported Comedications/interventions (*n*): Current topical therapies: *None:* intervention 2; control 2	Primary outcomes: HRQoL (DLQI) Secondary outcomes: disease severity (PASI) Adverse events: not reported Process evaluation measures: participant questionnaire assessing perceived value, accessibility and extent to which intervention met individual needs (operationalised as a single rating of usefulness for each intervention delivery mode) (see *Methods* and *Results* below) Individual preferred learning style addressed? No How outcomes assessed? DLQI (designed as self-report; not reported if used as a self-report measure in this study). PASI (unclear if self-report or scored by assessors) Normal range(s) for outcomes/ clinically meaningful improvement defined: yes (in discussion) *PASI* score ranges: < 7 mild 7–12 moderate > 12 severe Clinically meaningful improvement: Typically defined as PASI 75 if used as a primary outcome in a trial (defined as a 75% reduction in PASI at the end of the intervention), but some also regard PASI 50 (i.e. 50% reduction) to be a clinically meaningful improvement (though this is opinion and has not been formally defined)

Reference and design	Intervention	Participants	Outcome measures
	Interventionist characteristics and training: nurse attended training on self-efficacy-based education Content and topics: practical element (no details provided), individual action planning, stress reduction (through provision of relaxation materials), feedback on action plans (through telephone consultation) Tailoring: intervention included individual action planning Ongoing support: nurse provided one 20 minute follow-up telephone consultation one month after the group session (based on outline script) Theory: based on social learning theory – specifically self-efficacy theory. Intervention incorporated elements designed to address the four sources of self-efficacy (mastery, verbal persuasion, vicarious experience, emotional regulation). Intervention was also informed by the findings of previous qualitative research into the self-management needs of individuals with psoriasis **Control intervention** Description: continued with their usual treatment (topical therapies only), with access to primary care as needed Duration and intensity: not reported	*Emollients only:* intervention 6; control 2 *GP prescribed active therapies:* intervention 20; control 32 Mean duration of disease: Intervention 22.68 (SD 17.99) years; control 24.17 (SD 18.63) years Disease severity: Described as mild-moderate Sex (M/F): Intervention 8 (29%)/20 (71%); control 20 (55%)/16 (45%) Mean age: Intervention 56.86 (SD 12.67) years; control 59.03 (SD 13.53) years Ethnic groups: not reported Socioeconomic characteristics: not reported	Validated? Yes (for both DLQI and PASI) Timing of outcomes same for both groups: yes Length of follow-up: 6 weeks

CLNR, Comprehensive Local Research Networks.

Methods

Statistical analysis, including how missing data dealt with: unpaired *t*-tests used to assess differences in changes from pre–post intervention scores between the intervention and control groups. Multilevel modelling also used to take into account the cluster RCT design, but not reported as results were similar to those of the *t*-test. No imputation of missing data for those lost to follow-up – those lost to follow-up were excluded from the analysis as they had incomplete information

Power calculation: not reported

Study adequately powered? Pilot study to test feasibility of intervention, not expected to have enough power to detect statistically significant differences

ITT used? No, completers only

Groups comparable at baseline? Yes, on all baseline characteristics reported (only sex, age, duration and current topical therapies reported), except sex (proportionally more women in the intervention than the control group; p-value = 0.031)

Subgroups analyses: post hoc subgroup analyses conducted for both outcomes for patients with more severe disease and worse HRQoL at baseline (participants with DLQI or PASI scores of > 6) – not data extracted

Process evaluation methods (if relevant): assessment of the feasibility of the intervention (participant feedback); participant completion of a questionnaire post intervention assessing perceived value, accessibility and extent to which intervention met individual needs (rated on a scale of 1 (not useful at all) to 10 (very useful); score interpretation: 1–3 = not useful, 4–7 = moderately useful, 8–10 = very useful); participants' views of the intervention obtained through written feedback at their 6-week follow-up visit; research team also assessed intervention practicality and value. Feedback analysed through qualitative data analysis and descriptive statistics

Outcome evaluation results

HRQoL Outcomes	Intervention (n = 26)	Control (n = 33)	p-value/CI
DLQI, mean (SD)			
baseline	4.86 (5.14)	4.18 (3.19)	
at 6 weeks	4.58 (5.05)	3.70 (3.71)	
change from baseline	0.28 (2.16)[a]	0.48 (3.02)[a]	p = 0.772 (95% CI: –1.20 to 1.61)

Comments: DLQI scores can range from 0–30, a higher score indicates worse HRQoL

Other relevant outcomes	Intervention (n = 26)	Control (n = 33)	p-value (95% CI)
PASI, mean (SD)			
baseline	2.34 (2.66)	3.22 (2.26)	
at 6 weeks	1.78 (1.62)	2.82 (2.20)	
change from baseline	0.56 (1.42)[b]	0.40 (1.06)[b]	0.619 (–0.81 to 0.49)

Comments: PASI scores can range from 0–72, a higher score indicates more severe disease

Adverse events	Intervention	Control	p-value/CI
Not reported			

Comments:

Subgroup analysis results:

Subgroup: no pre-specified subgroup analyses reported

Outcome	Intervention	Control	p-value/CI

Comments:

Process evaluation results

Patient perspective:

Qualitative data – participant feedback:

Participants found the intervention practical (not too time-consuming), convenient (because it was partly home-based), and felt it provided follow-up care

Qualitative data on how useful participants found each intervention component and their perceptions on the difference it has made to how they manage their psoriasis are presented (not data extracted; see *Table 4*)

Quantitative data:

Rated usefulness of intervention components, % ($n = 26$)

(Data were derived from the questionnaire where participants rated the usefulness of the intervention)

Group learning: 3.8 not useful; 30.8 moderately useful; 65.4 very useful; 0 no response

DVD: 3.8 not useful; 26.9 moderately useful; 26.9 very useful; 42.3 no response

Workbook: 3.8 not useful; 38.5 moderately useful; 57.7 very useful; 0 no response

Telephone consultation: 7.7 not useful; 30.8 moderately useful; 53.8 very useful; 7.7 no response

Educational intervention attendance (*n*/*N*):

Group-learning session: 26/28

Watched DVD: 15/28 (others had technical difficulties, did not like DVD format and/or found workbook more convenient to intermittently consult)

Research team perspective: noted that smaller group learning sessions resulted in more interaction between participants

Comments:

General comments

Generalisability: patients' baseline HRQoL and disease severity scores were very low, suggesting many participants had only mild disease and that their HRQoL had not been extensively affected by their disease. This may have impacted outcomes, e.g. less room for improvement, participants' need for support and education may have been less than for people more severely affected by their disease

a Change (reduction) from baseline; a reduction shows that HRQoL improved.
b Change (reduction) from baseline; a reduction shows that disease severity improved.

Quality criteria (Cochrane 'risk of bias' tool) randomised controlled trials

Criteria	Judgement of risk of bias[a]	Support for judgement
Random sequence generation (selection bias)	Low risk	'Randomisation was performed by the flip of a coin by a colleague independent of the study' (p. 740)
Allocation concealment (selection bias)	Unclear risk	Randomisation of clusters performed independently of the study team, but unclear how allocation of clusters to intervention or control group was concealed from participants
Blinding of participants and personnel (performance bias)	Unclear risk	No information about blinding provided
Blinding of outcome assessment (detection bias)	Unclear risk	No information about blinding or who conducted the PASI assessment provided
Incomplete outcome data (attrition bias)	Low risk	Missing outcome data balanced in numbers across intervention and control groups, with similar reasons for missing data across groups
Selective reporting (reporting bias)	Low risk	All outcomes specified in the methods section of the paper were reported. Paper does not report if a protocol is available
Other bias	Unclear risk	A statistically significant higher proportion of participants in the intervention than control group were women; unclear whether this might bias outcomes

a High risk, unclear risk, low risk.

Reference and design	Intervention	Participants	Outcome measures
Author and year: Matsuoka *et al.*, 2006[88] Study ID: 543 Country/location: Kagawa, Japan Setting: Outpatient clinic Trial design: RCT Includes process evaluation: no Number of study centres: 1 Funding: not reported, but sample cosmetics prescriptions provided by a pharmaceutical company Conflicts of interest: stated no relevant financial interests	**Treatment intervention** Overview: women with acne vulgaris were instructed on skin care and how to use make-up by a dermatologist. The women also received acne treatment (topical therapy and/or oral medication) Intervention aim(s): not explicitly stated, but part of the aim of the study was to examine if instructions in make-up use from a dermatologist could affect female acne patients' QoL Where delivered: outpatient clinic based in a university dermatology department Self-help, individual- and/or group-based? (State group size): not reported Mode: face to face, with supporting videotape instructions and detailed leaflets/prescriptions	Skin condition: acne vulgaris Diagnostic criteria: not reported Specify if patients, parents and/or carers: patients Patient general age group (specify if children, young adults and/or adults): adults (age > 16 years) Stated target group: women How recruited: not reported Eligibility criteria: pregnant or lactating women were excluded Numbers involved (randomised/allocated): *Total:* 50 *Intervention (intervention):* 25 *Control (control):* 25	Primary outcomes: outcomes not specified as either primary or secondary Outcomes measured: acne severity (Plewig and Kligman's grade method) HRQoL (WHOQOL-26 and DLQI) Secondary outcomes: see above Adverse events: dermatologists evaluated safety in both groups Process evaluation measures: not applicable Individual preferred learning style addressed? No How outcomes assessed? WHOQOL-26 and DLQI both self-report

Reference and design	Intervention	Participants	Outcome measures
Trial/study number: not reported Study dates: April 2004–November 2005 Was the educational intervention an adjunct to standard medical care? Yes	Materials: videotaped instructions; leaflets and make-up prescriptions with more detailed instructions; sample cosmetics provided Provider: dermatologist Duration and intensity: not reported Scripting (level of detail guiding interaction between interventionist and participants): not reported Sensitivity to participant characteristics: not reported Interventionist characteristics and training: not reported Content and topics: summary – patients received instructions on use of skin care and make-up products. Instructions included general skin care and how to use 'point make-up' (e.g. eyeliner and lipstick) Tailoring: not reported Ongoing support: not reported Theory: not reported **Control intervention** Description: acne treatment (topical and/or oral medication), with no specific instructions from a dermatologist. Patients were told to use cosmetics in the same way they usually do Duration and intensity: not reported	Numbers (%) completing, attrition and reasons: *Attrition:* none *Reasons:* not applicable *Completers:* 50 (100%) [intervention 25 (100%); control 25 (100%)] Sample cross-overs: not reported **Baseline characteristics** Comorbidities: *Complications (%):* Intervention: yes/no: 28/72 Control: yes/no: 24/76 Comedications/interventions: not reported. Study is Japanese; assumed predominantly Japanese patients Duration of disease: intervention 7 (SD 4) years; control 4 (SD 4) years Disease severity: data provided on number and proportion of patients in each of eight different severity categories for both right and left side of face; not data extracted Sex (M/F) (*n*): 0/50 Average age: intervention 24 years (SD 3 years) years; control 25 years (SD 5 years) Ethnic groups: not reported Socioeconomic characteristics: not reported	Dermatologist rated disease severity using the Plewig and Kligman's grade method although reference provided Normal range(s) for outcomes/clinically meaningful improvement defined: WHOQOL-26: Authors cite a normative total mean score of 3.33 (SD 0.49) in healthy Japanese women aged 20–29 (based on Nakane *et al.*, 1999) Validated? Yes (for WHOQOL-26 and DLQI) Unclear for Plewig and Kligman's grade method Timing of outcomes same for both groups: yes Length of follow-up: 4 weeks

Methods

Statistical analysis, including how missing data dealt with: authors detail statistical tests used to analyse HRQoL data. Alpha level was not adjusted for multiple comparisons. A p-value of < 0.05 was considered to be statistically significant

Power calculation: not reported

Study adequately powered? Unclear

ITT used? Yes – not explicitly stated, but all randomised patients were included in the analyses

Groups comparable at baseline? Yes – no statistically significant differences between groups on age, duration of disease, complications, severity of disease, HRQoL or medication use (although data not reported)

Subgroups analyses: none reported

Process evaluation methods (if relevant): no process evaluation

Outcome evaluation results

HRQoL outcomes	Cosmetic instructions ($n = 25$)	No instructions control ($n = 25$)	p-value/CI
WHOQOL-26, mean (SD)			
Physical domain			
Baseline	3.23 (0.62)	3.45 (0.55)	Not reported
4 weeks after	3.35 (0.46)	3.54 (0.45)	Not reported
Psychological domain			
Baseline	3.09 (0.69)	3.21 (0.62)	Not reported
4 weeks after	3.26 (0.59)*	3.29 (0.60)	Not reported
Social relationships			
Baseline	3.65 (0.55)	3.68 (0.50)	Not reported
4 weeks after	3.65 (0.49)	3.64 (0.61)	Not reported
Environment domain			
Baseline	3.35 (0.53)	3.42 (0.49)	Not reported
4 weeks after	3.42 (0.51)	3.45 (0.49)	Not reported
Overall QoL			
Baseline	3.04 (0.88)	2.78 (0.76)	NS
4 weeks after	3.38 (0.77)**	3.18 (0.72)**	NS
Total mean score			
Baseline	3.27 (0.54)	3.36 (0.44)	Not reported
4 weeks after	3.39 (0.45)	3.44 (0.46)	Not reported
DLQI, mean (SD)			
Symptoms, feelings			
Baseline	3.16 (1.49)	2.60 (1.58)	NS
4 weeks after	1.52 (1.08)***	1.52 (1.16)***	NS
Daily activities			
Baseline	1.76 (1.81)	1.20 (1.73)	NS
4 weeks after	0.56 (0.77)**	0.64 (1.25)**	NS

Outcome evaluation results			
HRQoL outcomes	**Cosmetic instructions ($n = 25$)**	**No instructions control ($n = 25$)**	***p*-value/CI**
Leisure			
Baseline	1.20 (0.96)	1.12 (1.48)	NS
4 weeks after	0.72 (0.84)*	0.52 (1.08)**	NS
Work/school			
Baseline	0.68 (0.69)	0.48 (0.67)	NS
4 weeks after	0.48 (0.51)	0.20 (0.65)**	Statistically significant difference
Personal relationships			
Baseline	0.68 (0.90)	0.48 (1.19)	NS
4 weeks after	0.24 (0.44)**	0.16 (0.55)*	NS
Discomfort of treatment			
Baseline	0.76 (0.83)	0.40 (0.65)	NS
4 weeks after	0.36 (0.49)**	0.20 (0.50)	NS
Total mean score			
Baseline	8.24 (5.06)	6.24 (6.06)	NS
4 weeks after	3.88 (2.79)***	3.24 (4.36)***	NS

Comments: *p*-values only reported for within-group changes from baseline. WHOQOL-26 analyses: no between-group *p*-values reported, except that it is stated that the QOL score was not statistically significant between groups either before or after the intervention. DLQI analyses: statistically significant differences between-groups reported narratively only; *p*-values not provided

Statistically significant within-group changes: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Interpretation of WHOQOL-26 score: a lower score indicates more disability. Interpretation of DLQI: a higher score indicates more disability

Other relevant outcomes	**Cosmetic instructions ($n = 25$)**	**No instructions control ($n = 25$)**	***p*-value (CI)**
Degree of improvement in acne severity on right side of face at 4 weeks,* n *(%)			
Markedly improved	5 (20)	8 (32)	0.62
Improved	10 (40)	8 (32)	
Unchanged	10 (40)	9 (36)	
Exacerbated	0 (0)	0 (0)	
Degree of improvement in acne severity on left side of face at 4 weeks,* n *(%)			
Markedly improved	9 (36)	7 (28)	0.83
Improved	8 (32)	9 (36)	
Unchanged	8 (32)	9 (36)	
Exacerbated	0 (0)	0 (0)	
Comments:			

Adverse events	Cosmetic instructions ($n = 25$)	No instructions control ($n = 25$)	p-value/CI
Reported side effects of cosmetic and conventional medicine use	None	None	
Comments:			
Subgroup analysis results:			
Comments: no subgroups reported			
Outcome	**Cosmetic instructions**	**No instructions control**	**p-value/CI**
None			
Comments:			
Process evaluation results			
No process evaluation			
Comments:			
General comments			
Generalisability: small-scale study conducted in one study centre in Japan examining the impact of instructions in make-up and cosmetic use in women, so results are likely to be of limited generalisability			
Other: none			

NS, not statistically significant.

Quality criteria (Cochrane 'risk of bias' tool) randomised controlled trials

Criteria	Judgement of risk of bias[a]	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No details provided
Allocation concealment (selection bias)	Unclear risk	No details provided
Blinding of participants and personnel (performance bias)	Unclear risk	No details provided
Blinding of outcome assessment (detection bias)	Unclear risk	No details provided
Incomplete outcome data (attrition bias)	Low risk	All randomised patients were included in the analyses
Selective reporting (reporting bias)	Unclear risk	All outcomes specified in the methods section of the paper are reported in the results, but p-values for between-group differences are only reported for one domain of the WHOQOL-26 measure
Other bias	Low risk	

a High risk, unclear risk, low risk.

Reference and design	Intervention	Participants	Outcome measures
First author and Year: Santer *et al.*, 2014[74] Study ID: 42 (update searches) Country/location: UK (South West England) Setting: participants recruited from primary care and intervention delivered online Trial design: RCT (pilot) Includes process evaluation: yes (includes measures that could be regarded as a process evaluation; not described as a process evaluation by authors) Number of study centres: recruitment from 31 general practices, but one centre for evaluation Funding: National Institute for Health research (NIHR) Research for Patient Benefit programme (ref. number PB-PG-0110–20243) Conflicts of interest: none declared Trial/study number: ISRCTN 98560867 Study dates: not reported Was the educational intervention an adjunct to standard medical care? Yes	**Treatment intervention 1: website only + usual care** Overview: online intervention delivered through the SPaCE website (see 'usual care alone' description below for what usual care consisted of) Intervention aim(s): aimed to improve carers' management of their child's eczema by increasing regular use of emollients. Ultimate aim of intervention was to improve HRQoL through enhancing carers' management of the condition Where delivered: internet (website) Self-help, individual- and/or group-based? (State group size): individual-based Mode: online intervention Materials: delivered through a website. Some modules on the website contained videos (e.g. demonstrating techniques for emollient application) and print sheets of information. Both of these could also be accessed from a menu bar at the bottom of the website. 2-week challenge involved SMS text alerts Provider: medical experts developed the website; website delivered through LifeGuide software. HCPs (practice nurses, a health-care assistant and a GP) provided support to participants in one group Duration and intensity: two 20-minute compulsory modules, and then participants could complete other modules of their choice from a selection of 14, watch videos, download print sheets and take part in a 2-week challenge (see below) involving SMS alerts Scripting (level of detail guiding interaction between interventionist and participants): delivery of website intervention the same for all participants, except that participants could choose optional modules after completing the compulsory ones	Skin condition: eczema Diagnostic criteria: GP diagnosis of eczema Specify if patients, parents and/or carers: parents/carers and patients Patient general age group (specify if children, young adults and/or adults): children (aged ≤ 5 years) Stated target group: carers of children aged ≤ 5 years with mild to moderate eczema How recruited: primary care (31 general practices) Eligibility criteria *Inclusion criteria:* Parent/carer of child aged ≤ 5 years with GP diagnosis of eczema and who had received a prescription for eczema in past year *Exclusion criteria:* child aged older than 5 years, severe mental distress, experienced recent bereavement, unwillingness to be involved in research, parent could not give informed consent, English language skills not advanced enough to use website or complete study measures Numbers involved (randomised/allocated): *Total:* 148 (with useable data; 1 additional participant was randomised but technical difficulties meant no useable baseline data, no details about which condition they were randomised to) *Intervention 1 (intervention 1 – website):* 46 *Intervention 2 (intervention 2 – website + HCP):* 51 *Control (control – usual care):* 51	Primary outcomes: disease severity (POEM; measures eczema symptoms over past week) Secondary outcomes: HRQoL (DFI, measures impact on family's QoL) Other outcomes (not specified if primary or secondary): HRQoL (IDQoL, measures HRQoL in children aged ≤ 4 years; CDLQI, measures HRQoL in children aged ≥ 5 years) Adherence (self-report measure of emollient use) Adherence to intervention (PETS) Attitudes (measure not stated) Participants' perceptions about if they understand and can manage treatment better (Patient Enablement Instrument) Adverse events: not reported Process evaluation measures: interviews with/feedback from participants and HCP (see *Methods* below) Intervention use (amount of time website used; completion of core modules; website visits; video use, took part in 2-week challenge SMS text alerts; uptake of HCP appointment) Individual preferred learning style addressed? No How outcomes assessed? POEM, use emollients (adherence) and Patient Enablement Instrument: self-reported, completed by carers online. No details in publication about who completed the DFI, IDQoL, CDLQI, PETS and attitudes measure

Reference and design	Intervention	Participants	Outcome measures
	Sensitivity to participant characteristics: not reported Interventionist characteristics and training: HCPs received minimal training (one hour to familiarise themselves with the website) Content and topics: first stage of intervention: participants completed two compulsory modules: 'What is eczema?' and 'Emollient moisturisers'. Then 14 other modules were available to complete, which covered 'common concerns of carers of children with eczema' (p. 3) including: diet and allergy; topical steroids, talking to your GP, starting school, sleep problems, bath time, washing clothes, eczema in the winter, eczema in the summer, swimming, going on holiday, avoiding stress for parents, involving your child in treatment, managing scratching (extracted from screenshot of SPaCE website in publication). Participants could access videos and print sheets on website, covering, for example, use of emollients, how to bath their child, action plan to use during GP consultation, and details on how to manage eczema to pass to relatives, school or nursery. Intervention strategies used are detailed in table 1 of the publication, but not data extracted. Participants could take part in a 2-week challenge involving SMS text alerts for setting goals, monitoring and rehearsing behaviours Tailoring: intervention was partly tailored – after completing the two compulsory modules, participants could choose to complete other optional modules that they were interested in (from a menu of 14 modules) Ongoing support: not reported (assume none)	Numbers (%) completing, attrition and reasons: *Attrition:* 5 (3%) [website: 2 (4%); website + HCP: 1 (2%); usual care: 2 (4%)]. (*N*s and %s calculated by reviewer) *Reasons:* not reported (but states that these participants did not complete primary outcome measures) *Completers:* 143 (97%) [website: 44 (96%); website + HCP: 50 (98%); usual care: 49 (96%)] (Total *N* and all % calculated by reviewer) Sample cross-overs: not reported **Baseline characteristics** Comorbidities: not reported Comedications/interventions: not reported Duration of disease: not reported Disease severity: see 'results' below for continuous POEM score at baseline Sex (M/F) of carer, *n* (%): *Website:* 2 (4)/44 (96) *Website + HCP:* 1 (2)/50 (98) *Usual care:* 1 (2)/50 (98) Average age: age of carer: detailed information provided across six categories for each of the three groups; not data extracted. The majority of participants (72–84%) across each arm were aged between 26 and 40 Age of child: detailed	Normal range(s) for outcomes/clinically meaningful improvement defined: yes, for POEM: authors state change in score of ≥ 2 in primary care is clinically significant. Authors also provide score classifications: 0–2 = clear/almost clear, 3–7 = mild, 8–16 = moderate, 17–24 = severe, 25–28 = very severe Validated? POEM, DFI, IDQoL and CDLQI: yes, authors provide evidence of validation/state measures are validated PETS and Patient Enablement Instrument: yes, wider literature confirms these are validated measures No details provided in publication about if the measures of self-reported emollient use and attitudes were validated Timing of outcomes same for both groups: yes Length of follow-up: 3 months (from baseline)

Reference and design	Intervention	Participants	Outcome measures
	Theory: theory-based: used PRECEDE–PROCEED model to develop the intervention. The intervention incorporated 20 of the 26 behaviour-change techniques listed in Abraham and Michie's taxonomy of behaviour-change techniques.[83] Full list of exact intervention techniques used is provided in table 1 of the publication, but not data extracted. The development of the modules about 'common concerns of carers of children with eczema' (p. 3) were informed by qualitative interviews and input from patient support groups. Intervention also informed by 'evidence-based patient information leaflets' (p. 1), think-aloud interviews with users of a draft version of the website and feedback from other parents and HCPs **Treatment intervention 2: website + plus HCP support + usual care** Website intervention: same as above HCP support: one-off 20-minute appointment with HCP to promote engagement with the website intervention and to go through the 2 compulsory modules and 2-week challenge with participants if they had not already completed them/if participants had completed them, HCP helped them choose other modules to work through together. HCP varied across the general practices taking part: practice nurse in 11 practices, health-care assistant in 1 practice and GP in 1 practice. HCPs were not dermatology trained, except for one. All spent one hour familiarising themselves with the website (see 'usual care alone' description below for what usual care consisted of) **Control intervention: usual care alone** Description: usual care alone – participants consulted with GPs or attended secondary care dermatology appointments as needed. Most participants were being managed in primary care Duration and intensity: N/A	information provided across six categories for each of the three groups; not data extracted Ethnic groups: not reported Socioeconomic characteristics: age carer left education: detailed information provided across four categories for each of the three groups; not data extracted. Across study arms, between 12–16% left school between the ages of 15 and 16	

Methods

Statistical analysis, including how missing data dealt with: methods of statistical analysis reported

Power calculation: none reported, but study was intended to be a pilot RCT

Study adequately powered? Unclear

ITT used? States yes – but no details provided about how missing data were imputed. States that 'follow-up questions not asked by phone received response rates below 60%; therefore they will not be presented here' (p. 5); it is unclear to which questions this relates. Also, Ns reported for outcomes are not the ITT population

Groups comparable at baseline? No comment provided on this by authors. Reviewer notes that POEM baseline scores were slightly higher in the website and website + HCP groups than the usual care group

Subgroups analyses: subgroup analysis conducted of participants with a higher baseline eczema severity score (≥ 5), but not clear if pre-specified or post-hoc, so results are not data extracted below

Process evaluation methods (if relevant): interviews with HCPs, covering their experiences of the study and details about the appointments they had with carers (e.g. use of the website during the appointment, any difficulties, perceived usefulness of the appointments with carers). Feedback interviews with 26 carers (plus e-mail feedback from one carer). Qualitative data were analysed thematically. Quantitative data: see 'Process evaluation methods' above for details about quantitative measures used

Outcome evaluation results				
HRQoL outcomes	Website ($n = 44$)	Website + HCP ($n = 50$)	Usual care alone ($n = 49$)	*p*-value/CI
DFI score, mean (SD)				
Baseline	5.3 (5.3)	6.4 (5.6)	5.2 (5.9)	Not reported
3 months	4.0 (4.2)	5.9 (5.3)	4.4 (5.5)	Not reported

Comments: DFI total score can range from 0–30, with a higher score showing worse HRQoL. Authors suggest that because baseline scores were low, follow-up scores represent floor effects. Results for IDQoL and CDLQI measures not reported

Other relevant outcomes	Website ($n = 44$)	Website + HCP ($n = 50$)	Usual care alone ($n = 49$)	*p*-value/CI
POEM score (disease severity), mean (SD)				
Baseline	10.3 (7.0)	9.4 (6.2)	7.47 (6.2)	Not reported
3 months	7.6 (6.1)	8.7 (7.0)	7.1 (6.6)	Not reported
Clinically significant change in POEM score between baseline and 3 months, *n*/*N* (%)	23/42 (55)	18/47 (38)	16/49 (33)	*p*-value = 0.09

Comments: POEM score can range from 0–28, with a higher score representing more severe disease. Clinically significant change in POEM score in a primary care context is a change of ≥ 2. Mean change in POEM score between baseline and 3 months and associated mean difference and 95% CIs also reported for the website groups combined and compared with usual care, but not data extracted

Adverse events	Intervention	Control	*p*-value/CI
Not reported			

Subgroup analysis results:			

Comments: no subgroups reported

Outcome	Intervention	Control	*p*-value/CI
No pre-specified analyses reported			

Process evaluation results

Quantitative data

Parents/carers

Intervention use, measured by time spent on website (minutes), median (IQR):

Website only: 34 (20–50)

Website + HCP: 45 (26–70)

Completion of core modules, *n/N* (%):

Website only: 38/44 (86)

Website + HCP: 37/49 (76)

Three or more website visits, *n/N* (%):

Website only: 16/44 (36)

Website + HCP: 29/49 (59)

Watched ≥ one video, *n/N* (%):

Website only: 16/44 (36)

Website + HCP: 17/49 (35)

Took part in 2-week challenge SMS text alerts, *n/N* (%):

Website only: 18/44 (41)

Website + HCP: 18/49 (37)

Notes: not the ITT populations. Results also reported for website groups combined, but not data extracted

Authors report that there were no differences between web and web + HCP group in any aspect of intervention use (does not appear to have been statistically tested)

Uptake of HCP appointment (in web + HCP group), *n/N* (%): 23/50 (46). Reasons for non-uptake, *n*: 12 declined appointment; 9 could not be contacted; 6 did not attend

Qualitative data

HCP

Feedback from interviews: feedback included being pleased to provide a self-care support role, but apprehensions because they did not view themselves as eczema specialists. There were some concerns that they had received only minimal training for the role. On the whole, reported that the consultations were useful and worked well. Perceived that some carers found the intervention more useful than others and that some did not need the support of the HCP

Carers

Feedback on website: most feedback that the website was useful and easy to use. Only five of the 26 participants interviewed reported that they did not find it useful (reasons: had previously more need for such support than now, and child's eczema was mild)

Feedback on HCP support: variation in the perceived value of this. Reasons for perceiving it as not useful: did not feel they needed help in looking after their child's eczema and confidence in ability to source information from the internet. Reasons for finding it useful: helped them engage more with the website, increased confidence for consulting with HCPs in the future, used it as an opportunity to discuss other health problems, had opportunity to obtain emollient samples (not part of the intervention) and felt more comfortable consulting with HCP than using website

Comments:

General comments

Generalisability: good generalisability to patients managed in primary care the UK, as participants were recruited from 31 general and authors ensured that participants were recruited from a range of socioeconomic areas

Other: authors do not provide details about any inter-centre variability in the HCP support component of the intervention

Quality criteria (Cochrane 'risk of bias' tool) randomised controlled trials

Criteria	Judgement of risk of bias[a]	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer randomisation carried out via LifeGuide software, allocating 1 : 1 : 1
Allocation concealment (selection bias)	Low risk	Central (web-based) allocation used
Blinding of participants and personnel (performance bias)	Unclear risk	No details provided
Blinding of outcome assessment (detection bias)	Unclear risk	No details provided
Incomplete outcome data (attrition bias)	Unclear risk	States ITT analysis used, but Ns reported for outcomes are not the ITT population. Attrition rates are small and similar across groups, but reasons for attrition are unclear. Additionally, one participant was randomised, but due to technical difficulties did not provide useable baseline data and thus was not included in the analysis, and it is unclear which group they were randomised to and whether they took part in the intervention
Selective reporting (reporting bias)	High risk	Results for IDQoL and CDLQI measures of HRQoL not reported. Results are also not reported for a number of other measures used (specifically: self-report measure of emollient use; PETS, attitudes measure, Patient Enablement Instrument)
Other bias	Unclear risk	Baseline imbalances in disease severity across groups, with both website groups having slightly more severe disease at baseline. Unclear if this is accounted for in the results. Also reports statistical analyses inconsistently (e.g. combined website groups versus usual care, not individual website groups versus usual care for mean change in the POEM score, which has therefore not been data extracted)

a High risk, unclear risk, low risk.

Reference and design	Intervention	Participants	Outcome measures
First author and Year: Staab *et al.*, 2006[87] Study ID: 575 Country/location: Germany Setting: not reported Trial design: RCT Includes process evaluation: no Number of study centres: seven hospitals Funding: German Federal Ministry of Health and Social Services (grant Number 01GL0010) Conflicts of interest: none Trial/study number: not reported Study dates: not reported Was the educational intervention an adjunct to standard medical care? Unclear – treatment with topical therapy or special diets was not included in the intervention and remained the responsibility of the patients' doctor	**Treatment intervention** Overview: group-based educational programme, with different educational sessions for a) parents of children aged 3 months to 7 years, b) children aged 8–12 years and their parents and c) adolescents with atopic dermatitis aged 13–18 years (parents optional for selected sessions) Intervention aim(s): not reported in primary publication, but the intervention for children aged 3 months to 7 years was based on one reported in Staab *et al.*[93] and Wenninger *et al.*,[78] the aim of which was improve parents' ability to manage their child's disease and thus improve disease course and the family's HRQoL Where delivered: not reported Self-help, individual- and/or group-based? (State group size): group-based (5–8 participants) Mode: face-to-face group sessions Materials: handouts for participants with summary points and timetable for the sessions Provider: multiprofessional team of dermatologists or paediatricians, psychologists or dieticians Duration and intensity: six weekly 2-hour sessions Scripting (level of detail guiding interaction between interventionist and participants): a manual specified content Sensitivity to participant characteristics: Different groups for parents and children of different age groups	Skin condition: atopic dermatitis Diagnostic criteria: diagnosis of atopic dermatitis was made by dermatologists or paediatricians Specify if patients, parents and/or carers: Patients and parents Patient general age group (specify if children, young adults and/or adults): Children and adolescents Stated target group: parents of children aged 3 months to 7 years or 8–12 years, children aged 8–12 years and adolescents aged 13–18 years (parents of adolescents optional for selected sessions) with moderate to severe atopic dermatitis How recruited: recruited consecutively from three children's hospitals, three specialist dermatology hospitals and one department of psychosomatic medicine Eligibility criteria: *Inclusion criteria:* atopic dermatitis diagnosis based on criteria of Hanifin and Rajka; eczema for ≥ 3 months; eczema severity of ≥ 20 points on the atopic dermatitis scale. *Exclusion criteria:* presence of any other physical or psychiatric conditions that require treatment Numbers involved (randomised/allocated): *Total:* 992 *Intervention:* 496 *Control:* 496 Numbers (%) completing, attrition and reasons: *Attrition:* 169 (17%) [intervention 50 (10%); control 119 (24%)] *Reasons* (n): Died: intervention 0; control 1	Primary outcomes: eczema severity (SCORAD index) Parents' QoL – parents of children aged ≤ 13 years (German questionnaire: 'Quality of life in parents of children with atopic dermatitis') Secondary outcomes: subjective severity score ('skin detective') Itching behaviour (JUCKKI for 8–12 year olds and JUCKKU for 13- to 18-year-olds) Adverse events: not reported Process evaluation measures: not applicable Individual preferred learning style addressed? No How outcomes assessed? The SCORAD was scored by study investigators Normal range(s) for outcomes/clinically meaningful improvement defined: no Validated? Yes – all validated Timing of outcomes same for both groups: yes Length of follow-up: 12 months

Reference and design	Intervention	Participants	Outcome measures
	Interventionist characteristics and training: all professionals had undergone a 40-hour training programme to qualify as trainers Content and topics: summary – intervention for parents of 3-month to 7-year-olds was based on the one reported in Staab *et al.*[93] and Wenninger *et al.*[78] Across the three groups, the educational sessions covered the following issues: medical (information about atopic dermatitis, understanding triggers, skin care, symptom treatment, unconventional therapies), nutritional (general child nutrition, food allergies, types of diet) and psychological (relaxation techniques, managing scratching and itching, sleep, coping, self-management plan, difficulties encountered in transferring skills to participants' lives). Participants were encouraged to share experiences and to put new skills into practice Tailoring: not reported Ongoing support: not reported Theory: social cognitive theory – see Staab 801 and Wenniger 2863 data extraction **Control intervention** Description: no education control Duration and intensity: not reported	Lost interest: intervention 7; control 45 No sufficient response: intervention 34; control 51 Other reasons: intervention 9; control 22 Discontinued intervention: intervention 0; control 0 *Completers* (n): 823 (intervention 446; control 377) Sample cross-overs: none **Baseline characteristics** Comorbidities: not reported Comedications/interventions: not reported Duration of disease: not reported Disease severity: (see baseline values in results) Sex (M/F), %: 3 months to 7 years age group: intervention 52/48; control 52/48 8–12 years age group: intervention 40/60; control 48/52 13–18 years age group: intervention 41/59; control 36/64 Mean age (SD), years: 3 months to 7 years age group: intervention 2.4 (1.8); control 2.4 (1.9) 8–12 years age group: intervention 9.5 (1.6); 9.5 (1.5) 13–18 years age group: intervention 14.9 (1.7); 14.8 (1.7) Ethnic groups: not reported Socioeconomic characteristics: not reported	

Methods

Statistical analysis, including how missing data dealt with: authors report how data were statistically analysed. Covariance analysis used for patient reported outcomes, but not stated what the covariates were (i.e. whether adjusted for some or all baseline variables)

Power calculation: yes – power calculation was based on the eczema severity outcome (atopic dermatitis total score) (the primary outcome). Based on an anticipated effect size was d = 0.40 with an alpha level of 0.05 and assuming a 20% loss to follow-up, it was estimated that 125 participants would be needed per group to provide a power of 80%

Study adequately powered? Adequately powered for the 3 months to 7 years age group; may not be adequately powered for the 8–12 years and 13–18 years age groups (sample sizes smaller than the 125 participants needed per group)

ITT used? Number Only completers included in analysis

Groups comparable at baseline? Yes – no statistically significant differences in eczema severity or any other outcome measures at baseline. Mean age and sex similar between groups

Subgroups analyses: none, but data were analysed separately for the 3 months to 7 years, 8–12 years and 13–18 years age groups. So essentially all were subgroups

Process evaluation methods (if relevant): no process evaluation

Outcome evaluation results

HRQoL outcomes: 3 months to 7 years age group	Educational programme ($n = 274$)	No education ($n = 244$)	Difference (95% CI; *p*-value) in change between baseline and 12 months between groups
Parental QoL			
Psychosomatic well-being			
Baseline, mean (SD)	29.3 (7.6)	29.1 (7.7)	
12 months, mean (SD)	33.7 (7.0)	32.1 (7.1)	
Mean difference/change in score (95% CI)	4.4 (3.6 to 5.2)	3.1 (2.2 to 3.9)	1.4 (0.2 to 2.5; 0.0040)
Effects on social life			
Baseline, mean (SD)	24.9 (4.0)	24.5 (4.4)	
12 months, mean (SD)	26.7 (3.4)	25.5 (4.1)	
Mean difference/change in score (95% CI)	1.8 (1.4 to 2.3)	1.0 (0.6 to 1.5)	0.8 (0.2 to 1.4; < 0.0001)
Confidence in medical treatment			
Baseline, mean (SD)	16.0 (4.0)	15.8 (4.4)	
12 months, mean (SD)	20.0 (3.5)	17.8 (4.2)	
Mean difference/change in score (95% CI)	4.0 (3.5 to 4.5)	1.9 (1.4 to 2.4)	2.1 (1.4 to 2.8; < 0.0001)
Emotional coping			
Baseline, mean (SD)	13.7 (3.2)	14.2 (3.4)	
12 months, mean (SD)	16.8 (2.9)	15.4 (3.2)	
Mean difference/change in score (95% CI)	3.1 (2.7 to 3.5)	1.1 (0.7 to 1.6)	1.9 (1.3 to 2.5; < 0.0001)
Acceptance of disease			
Baseline, mean (SD)	7.1 (1.9)	7.0 (1.9)	
12 months, mean (SD)	8.2 (1.7)	7.5 (1.8)	
Mean difference/change in score (95% CI)	1.1 (0.8 to 1.3)	0.5 (0.3 to 0.8)	0.6 (0.2 to 0.9; < 0.0001)

HRQoL outcomes – 8 – 12 years age group	Educational programme ($n = 102$)	No education ($n = 83$)	Difference (95% CI, p-value) in change between baseline and 12 months between groups
Parental QoL			
Psychosomatic well-being			
Baseline, mean (SD)	31.5 (7.9)	31.2 (6.1)	
12 months, mean (SD)	34.7 (6.0)	33.8 (7.0)	
Mean difference/change in score (95% CI)	3.2 (1.9 to 4.5)	2.6 (1.4 to 3.8)	0.6 (–1.2 to 2.4; 0.360)
Effects on social life			
Baseline, mean (SD)	25.8 (4.2)	26.3 (4.0)	
12 months, mean (SD)	27.0 (3.8)	27.2 (3.5)	
Mean difference/change in score (95% CI)	1.1 (0.4 to 1.8)	0.9 (0.2 to 1.6)	0.2 (–0.8 to 1.2; 0.940)
Confidence in medical treatment			
Baseline, mean (SD)	17.0 (4.0)	17.4 (3.9)	
12 months, mean (SD)	20.1 (3.2)	17.5 (4.4)	
Mean difference/change in score (95% CI)	3.1 (2.2 to 3.9)	0.1 (–0.7 to 1.0)	2.9 (1.7 to 4.1; < 0.0001)
Emotional coping			
Baseline, mean (SD)	13.7 (3.3)	14.7 (3.2)	
12 months, mean (SD)	16.4 (2.8)	15.6 (3.4)	
Mean difference/change in score (95% CI)	2.7 (2.0 to 3.4)	0.9 (0.2 to 1.6)	1.8 (0.9 to 2.8; 0.002)
Acceptance of disease			
Baseline, mean (SD)	7.3 (1.9)	7.4 (1.7)	
12 months, mean (SD)	8.1 (1.5)	7.7 (1.8)	
Mean difference/change in score (95% CI)	0.8 (0.4 to 1.2)	0.2 (–0.2 to 0.6)	0.6 (0 to 1.2; 0.031)

Comments: outcome data also collected at 6 months, but not reported in the paper

26 item questionnaire with five subscales as demonstrated above. No details of scoring provided, reference provided for validation is in German

Other relevant outcomes – 3 months to 7 years age group	Educational programme ($n = 274$)	No education ($n = 244$)	Difference (95% CI; p-value) in change between baseline and 12 months between groups
SCORAD: total severity score			
Baseline, mean (SD)	41.1 (16.6)	40.6 (15.2)	
12 months, mean (SD)	23.7 (16.7)	28.4 (16.5)	
Mean difference/change in score (95% CI)	–17.5 (–19.6 to –15.3)	–12.2 (–14.3 to –10.1)	–5.2 (–8.2 to –2.2; 0.0002)

Other relevant outcomes – 3 months to 7 years age group	Educational programme ($n = 274$)	No education ($n = 244$)	Difference (95% CI; p-value) in change between baseline and 12 months between groups
SCORAD: objective severity score			
Baseline, mean (SD)	32.5 (14.3)	31.4 (13.0)	
12 months, mean (SD)	19.5 (13.9)	22.6 (13.4)	
Mean difference/change in score (95% CI)	–13.0 (–14.8 to –11.2)	–8.7 (–10.5 to –7.0)	–4.2 (–6.8 to –1.7; 0.0009)
Subjective severity			
Baseline, mean (SD)	8.3 (3.8)	8.3 (3.8)	
12 months, mean (SD)	4.8 (3.4)	6.1 (3.6)	
Mean difference/change in score (95% CI)	–3.3 (–3.9 to –2.8)	–2.2 (–2.7 to –1.6)	–1.1 (–1.9 to –0.3; < 0.001)
Other relevant outcomes: 8- to 12-years age group	**Educational programme ($n = 102$)**	**No education ($n = 83$)**	**Difference (95% CI, p-value) in change between baseline and 12 months between groups**
SCORAD: total severity score			
Baseline, mean (SD)	41.8 (16.6)	40.4 (15.1)	
12 months, mean (SD)	25.8 (17.7)	32.6 (16.5)	
Mean difference/change in score (95% CI)	–16.0 (–20.0 to –12.0)	–7.8 (–11.4 to –4.3)	–8.2 (–13.6 to –2.8; 0.003)
SCORAD: objective severity score			
Baseline, mean (SD)	34.0 (14.1)	32.5 (13.1)	
12 months, mean (SD)	21.7 (15.1)	26.9 (14.2)	
Mean difference/change in score (95% CI)	–12.3 (–15.6 to –8.9)	–5.6 (–8.7 to –2.5)	–6.7 (–11.2 to –2.1; 0.005)
Subjective severity			
Baseline, mean (SD)	8.5 (3.9)	8.6 (3.5)	
12 months, mean (SD)	4.9 (2.9)	7.0 (3.8)	
Mean difference/change in score (95% CI)	–3.7 (–4.6 to –2.7)	–1.6 (–2.5 to –0.7)	–2.1 (–3.4 to –0.8; < 0.001)
Itching behaviour: catastrophisisation[a]			
Baseline, mean (SD)	13.6 (8.5)	13.6 (8.2)	
12 months, mean (SD)	6.6 (6.5)	11.8 (8.6)	
Mean difference/change in score (95% CI)	–7.0 (–8.9 to –5.1)	–1.8 (–3.5 to –0.2)	–5.2 (–7.7 to –2.7; < 0.0001)
Itching behaviour: coping			
Baseline, mean (SD)	7.7 (5.1)	7.6 (4.6)	
12 months, mean (SD)	8.8 (5.4)	7.2 (5.0)	
Mean difference/change in score (95% CI)	1.0 (–0.3 to 2.3)	–0.4 (–1.6 to 0.8)	1.5 (–0.3 to 3.2; 0.047)

Other relevant outcomes: 13–18 years age group	Educational programme ($n = 70$)	No education ($n = 50$)	Difference (95% CI, p-value) in change between baseline and 12 months between groups
SCORAD: total severity score			
Baseline, mean (SD)	43.1 (14.7)	40.4 (13.9)	
12 months, mean (SD)	23.4 (12.6)	35.2 (15.2)	
Mean difference/change in score (95% CI)	–19.7 (–23.7 to –15.7)	–5.2 (–10.5 to 0.1)	–14.5 (–21.2 to –7.9; < 0.0001)
SCORAD: objective severity score			
Baseline, mean (SD)	34.4 (12.4)	33.4 (12.0)	
12 months, mean (SD)	19.5 (11.1)	28.3 (12.0)	
Mean difference/change in score (95% CI)	–15.0 (–18.4 to –11.6)	–5.1 (–9.5 to –0.6)	–9.9 (–15.5 to –4.3; < 0.0001)
Subjective severity			
Baseline, mean (SD)	8.9 (3.2)	8.8 (3.5)	
12 months, mean (SD)	5.8 (3.4)	8.1 (4.0)	
Mean difference/change in score (95% CI)	–3.1 (–4.1 to –2.2)	–1.0 (–2.1 to 0.1)	–2.1 (–3.5 to –0.7; < 0.0002)
Itching behaviour: catastrophisisation[a]			
Baseline, mean (SD)	16.6 (7.9)	16.9 (8.6)	
12 months, mean (SD)	9.8 (8.1)	14.9 (9.0)	
Mean difference/change in score (95% CI)	–6.8 (–8.6 to –5.0)	–2.0 (–3.9 to –0.2)	–4.7 (–7.3 to –2.2; 0.0002)
Itching behaviour: coping			
Baseline, mean (SD)	15.4 (7.8)	14.0 (7.0)	
12 months, mean (SD)	15.2 (8.2)	14.5 (7.0)	
Mean difference/change in score (95% CI)	–0.2 (–1.9 to 1.5)	0.4 (–1.2 to 2.1)	–0.6 (–3.0 to 1.7; 0.875)
Comments: outcome data also collected at 6 months, but not reported in the paper			

Adverse events	Educational programme	No education	p-value/CI
Not reported			
Comments:			

Subgroup analysis results:			
Comments: no subgroups reported			
Outcome	**Educational programme**	**No education**	***p*-value/CI**
None			
Comments:			

a Defined as 'negative thoughts on pain that have got out of control' (p. 4) No information provided to interpret the measures.

Process evaluation results
No process evaluation
Comments:
General comments
Generalisability: large-scale study across seven study centres in Germany, conducted with a wide range of children age groups. Therefore the study is likely to have good generalisation to the German context. Atopic dermatitis was moderate to severe
Other: differences between groups on parental HRQoL appear to be small – unclear whether the statistically significant changes are clinically meaningful

Quality criteria (Cochrane 'risk of bias' tool) randomised controlled trials

Criteria	Judgement of risk of bias[a]	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated random numbers were used
Allocation concealment (selection bias)	Unclear risk	'The randomisation code was concealed in closed envelopes from those entering patients into the study.' Randomisation was carried out by an independent study centre, but unclear if the envelopes containing the randomisation code were opaque or sequentially numbered to adequately conceal allocation from those entering patients into the study
Blinding of participants and personnel (performance bias)	High risk	Participants and trainers were not blinded to treatment allocation
Blinding of outcome assessment (detection bias)	High risk	Participants were not blinded to treatment allocation. Unclear if the investigators who rated eczema severity were blinded to treatment allocation
Incomplete outcome data (attrition bias)	High risk	A higher proportion of patients in the no education group (24%) than in the education intervention group (10%) were lost to follow-up, mainly due to no response or lost interest, which may have impacted outcomes. Missing data were not imputed and ITT analysis was not conducted
Selective reporting (reporting bias)	Unclear risk	All outcomes were measured at 6 and 12 months, but only 12-month results are reported
Other bias	Low risk	

a High risk, unclear risk, low risk.

Reference and design	Intervention	Participants	Outcome measures
Author and year: van Os-Medendorp *et al.*, 2007[89] Study ID: 505 (some data from a secondary publication 466) Country/location: Netherlands Setting: secondary care Trial design: RCT Includes process evaluation: no Number of study centres: not reported (recruitment was from four centres) Funding: Dutch College of Health Insurance (CVZ) Conflicts of interest: stated none declared Trial/study number: not reported Study dates: not reported Was the educational intervention an adjunct to standard medical care? Yes	**Treatment intervention 'Coping with itch'** Overview: individual sessions with dermatology nurse, in addition to usual medical treatment by dermatologist. Includes educational and cognitive behavioural interventions such as individual patient education, awareness training and habit reversal, relaxation exercises and psychosocial support given according to a nursing care plan. Referral to other members of outpatient dermatology multidisciplinary team (social workers, psychologists and dermatologists) if needed Intervention aim(s): to reduce itch and to help patients cope with itch Where delivered: specialised itch clinic in dermatology outpatient department Self-help, individual- and/or group-based? (State group size): individual-based Mode: face to face Materials: not reported Provider: dermatology nurse Duration and intensity: patients visited the itch clinic a mean of 2.9 times (median 3, range 1–6); duration of sessions not reported Scripting (level of detail guiding interaction between interventionist and participants): not reported Sensitivity to participant characteristics: not reported Interventionist characteristics and training: not reported	Skin condition: chronic pruritic skin disease (regardless of specific diagnosis) Diagnostic criteria: not reported Specify if patients, parents and/or carers: patients Patient general age group (specify if children, young adults and/or adults): adults (aged 18 years or older) Stated target group: adults with chronic pruritic skin disease How recruited: by dermatologists from four dermatology outpatient departments (no further details reported) Eligibility criteria: not reported Numbers involved (stated as the numbers included – unclear if this means the number randomised): Total:120 Intervention (intervention): 63 Control: 57 Numbers (%) completing, attrition and reasons (percentages calculated by reviewer):[a] *Attrition:* 9 months: 69 (58) [intervention 40 (63); control 29 (51)] *Reasons:* did not return baseline and/or 3-month and/or 9-month follow-up patient-reported outcome measures; in control group 4 patients received the intervention and were excluded *Completers:* (9 months): 51 (43) [intervention 23 (37); control 28 (49)]	Primary outcomes: disease severity (patient-reported frequency and intensity of itching and scratching); itch-related coping (ICQ); skin-related psychosocial morbidity including QoL (ACS); general psychosocial morbidity (SCL-90) Secondary outcomes (assessed by monthly telephone interviews): Health resource use (number of dermatologist visits); medication and ointment use Adverse events: not reported Process evaluation measures: no process evaluation Individual preferred learning style addressed? No How outcomes assessed?: By patient self-report: • itch and scratch frequencies (weekly diaries) • itch-related coping (ICQ – Dutch version) • skin-related psycho-social morbidity (ACS – Dutch version) • general psychosocial morbidity (SCL-90 – Dutch version) • demographic data (general questionnaire) By monthly telephone interviews with patients: • medication use • dermatology visits • GP contact[c] • days off work[c] • hospitalisations[c] • costs[c] Normal range(s) for outcomes/clinically meaningful improvement defined: no

Reference and design	Intervention	Participants	Outcome measures
	Content and topics: education about: itch causes, consequences and treatment; patient advocacy groups; avoiding triggers; diet; interventions to relieve itching and scratching and their consequences. Cognitive behavioural therapy including diary-based awareness training, habit reversal to reduce scratching, and relaxation. Based on an initial itch medical history assessment taken by the nurse and structured according to an individual-based nursing care plan Tailoring: nursing care plan for intervention was structured according to patient's individual needs Ongoing support: individual counselling and 'support' (not defined) provided as required (no details given) Theory: not reported **Control intervention** Description: normal care, which consists of outpatient consultations with a dermatologist involving diagnosis and therapeutic intervention such as the use of emollients and topical steroids Duration and intensity: not reported	Sample cross-overs: four patients in control group received the intervention and were excluded from the analysis **Baseline characteristics**[b] Comorbidities: not reported Comedications/interventions: Not reported for baseline Duration of disease and itch, years, mean (SD):[d] Disease duration: intervention 14.6 (14.4); control 17.4 (18.3) Itch duration: intervention: 12.3 (13.8); control 12.3 (16.6) Disease severity: not reported, other than patients with high frequency or high intensity of itching/scratching (see outcomes section below) Diagnosis of skin disease, *n* (%)[d,e] Eczema: intervention 10 (34); control 10 (29) AD: intervention 5 (17); control 3 (9) Pruritus: intervention 4 (14); control 5 (15) Prurigo: intervention 1 (3); control 2 (6) Psoriasis: intervention 4 (14); control 3 (8) Chronic urticaria: intervention: 2 (7); control 2 (6) Other: intervention 2 (7); control 6 (18) Unknown: intervention 1 (3); control 1 (3) Non-skin disease: intervention 0 (0); control 2 (6)	Validated? Stated that the ICQ, ACS and SCL-90 are validated instruments. Self-reported itching and scratching also validated (internal consistency reported) Timing of outcomes same for both groups: yes Length of follow-up: longest follow-up time point: 9 months after start of programme (same as programme duration)

Reference and design	Intervention	Participants	Outcome measures
		Sex M/F, *n* (%):[d] intervention: 13 (45)/16 (55) control: 10 (28)/26 (72) Mean (SD) [range] age, years:[d] intervention: 57.0 (17.3) [25.5–86.8] control: 55.7 (17.2) [23.8–82.8] Ethnic groups: not reported Socioeconomic characteristics: Education level: low/medium/high, *n* (%)[d,f] intervention ($n = 28$): 13 (46)/6 (21)/9 (32) control ($n = 35$): 18 (51)/11 (31)/6 (17)	

a Different values for attrition and numbers completing follow-up are reported in the two publications.[89,107] The data extracted here are from the primary clinical publication.[89]
b Baseline characteristics are reported for the patients analysed, not the starting number randomised.
c Reported in secondary publication.[107]
d Different values for the baseline variables are reported in the two publications,[89,107] based on sample sizes of intervention $n = 29$ and control $n = 36$[89] or intervention $n = 25$ and control $n = 31$.[107] The data extracted here are from the primary clinical reference[89] which reports the larger sample sizes.
e Note that in the control group there were 36 patients[89] or 31 patients[107] who provided baseline data but diagnoses of skin conditions in the control group are given for 32 patients[89] or 27 patients.[107]
f Education levels not defined.

Methods

Statistical analysis, including how missing data dealt with: analysis methods are reported. Missing data were not included in analyses. Note that to analyse the use of medications and the number of visits to the dermatologist, data for months 1–3 of the study period were used in lieu of baseline data (no explanation reported) and data for months 7–9 were provided as the follow-up data. Reported results are those with a 'trend to significance', defined as p-value < 0.10

Power calculation: not reported

Study adequately powered? Not reported [note high rates of attrition (> 50%) at 9 months]

ITT used? No. Attrition was not accounted for in analyses

Groups comparable at baseline? Yes (stated that no significant differences were found between the characteristics of the intervention group and the control group)

Subgroups analyses: none reported

Process evaluation methods (if relevant): none reported

Outcome evaluation results

HRQoL outcomes, mean (SD) score (3-month outcomes also reported but not extracted here)	'Coping with itch' group Baseline $n = 29$ 9 months $n = 23$	Control group Baseline $n = 36$ 9 months $n = 30$ (unless stated)	p-value
ACS subscale: impact on QoL			
Baseline	12.08 (5.00)	12.56 (4.93)	Stated NS
9 months	13.10 (5.25)	12.68 (4.58)	Stated NS
Other outcomes, mean (SD) score (3-month outcomes also reported but not extracted here)			
ICQ subscale: catastrophising and helpless coping			
Baseline	22.47 (11.44)	23.06 (8.88)	Stated NS
9 months	17.23 (10.42)	20.19 (10.18) [$n = 28$]	Stated NS
ICQ subscale: problem-focused coping			
Baseline	18.95 (8.79)	21.24 (6.68)	Stated NS
9 months	19.39 (9.47)	20.79 (7.06) [$n = 28$]	Stated NS
ACS skin-related psychosocial morbidity			
Baseline	138.39 (38.00)	141.26 (37.60)	Stated NS
9 months	134.79 (42.69)	134.01 (40.85)	Stated NS
ACS subscale: social anxiety and avoidance			
Baseline	34.62 (14.49)	36.09 (14.19)	Stated NS
9 months	34.80 (15.99)	35.46 (13.97)	Stated NS
ACS subscale: vicious circle of itching and scratching			
Baseline	28.41 (7.61)	30.20 (7.07)	Stated NS
9 months	26.07 (8.17)	26.70 (8.00)	Stated NS

Outcome evaluation results			
HRQoL outcomes, mean (SD) score (3-month outcomes also reported but not extracted here)	'Coping with itch' group Baseline $n = 29$ 9 months $n = 23$	Control group Baseline $n = 36$ 9 months $n = 30$ (unless stated)	*p*-value
ACS subscale: helplessness			
Baseline	26.02 (8.29)	26.01 (7.19)	Stated NS
9 months	26.61 (7.87)	24.70 (8.27)	Stated NS
ACS subscale: anxious depressive mood			
Baseline	24.18 (8.74)	24.58 (8.67)	Stated NS
9 months	23.30 (8.79)	23.97 (8.89)	Stated NS
ACS subscale: deficit in active coping			
Baseline	13.07 (3.36)	11.82 (3.24)	Stated NS
9 months	10.91 (3.01)	10.50 (3.27)	Stated NS
SCL-90 general psychosocial morbidity			
Baseline	146.30 (60.02)	151.18 (52.60	Stated NS
9 months	134.41 (47.68)	159.81 (57.69)	Stated NS
Comments: lower ICQ scores reflect better itch-related coping (or less itch-related catastrophising); lower ACS scores reflect lower skin-related psychosocial morbidity; lower SCL-90 scores reflect lower general psychosocial morbidity burden			

Patients with high frequency or high intensity of itching and scratching, *n* (%)	'Coping with itch' group Baseline $n = 25$ 9 months $n = 24$	Control group Baseline $n = 32$ 9 months $n = 29$	*p*-value
High frequency			
Baseline	18 (72)	21 (66)	Stated NS
9 months	12 (50)	15 (52)	Stated NS[a]
High intensity			
Baseline	20 (80)	25 (78)	Stated NS
9 months	12 (50)	16 (55)	Stated NS
Comments: continuous scale for frequency and intensity of itching/scratching was validated (internal consistency reported) but authors subsequently converted it to a dichotomous measure with arbitrary cut-off (high frequency defined as > 4 and high intensity defined as > 3 based on average from an original continuous itching scale of 0 (none) to 10 (unbearable) and a continuous scratching scale of 0 (none) to 10 (bloody skin)			
Data for 3 months also reported but not extracted			

NS, not statistically significant.
a Stated that difference between groups at 3 months showed a 'trend to significance' [12 (48) vs. 23 (72); *p*-value = 0.07].

Medication use, *n* (%)	'Coping with itch' group Months 1–3 *n* = 29 Months 7–9 *n* = 27	Control group Months 1–3 *n* = 35 Months 7–9 *n* = 31	*p*-value
Topical corticosteroids: mild			
Months 1–3	3 (10)	0 (0)	$p = 0.053$
Months 7–9	2 (7)	2 (6)	Stated NS
Topical corticosteroids: moderately potent			
Months 1–3	5 (17)	12 (34)	Stated NS
Months 7–9	6 (22)	7 (23)	Stated NS
Topical corticosteroids: potent			
Months 1–3	9 (31)	11 (31)	Stated NS
Months 7–9	5 (18)	7 (23)	Stated NS
Topical corticosteroids: very potent			
Months 1–3	0 (0)	3 (9)	Stated NS
Months 7–9	3 (11)	2 (6)	Stated NS
Systemic medication (ciclosporin, acitretin, prednisone, etc.)			
Months 1–3	4 (14)	3 (9)	Stated NS
Months 7–9	4 (15)	3 (10)	Stated NS
Itch-relieving medication (hydroxyzine, cetirizine, etc.)			
Months 1–3	12 (41)	17 (49)	Stated NS
Months 7–9	13 (48)	13 (42)	Stated NS
Proportion of patients visiting the dermatologist, *n* (%)	**'Coping with itch' group Months 1–3 *n* = 29 Months 7–9 *n* = 27**	**Control group Months 1–3 *n* = 35 Months 7–9 *n* = 31**	***p*-value**
Months 1–3	17 (59)	30 (86)	$p = 0.015$
Months 7–9	17 (63)	18 (58)	Stated NS

Comments: cost-effectiveness paper[107] also reports the following outcomes as numbers of visits or events (mean and SD reported but not extracted here): phone and face-to-face visits to the dermatologist; dermatology repeat prescriptions; ultraviolet therapy visits; visits to the dermatology nurse; visits to the dermatology social worker; visits to the GP; repeat prescriptions from the GP; repeat prescriptions from other HCPs; visits to hospital (any department except dermatology); use of paramedical services; visits to a psychosocial worker; home visits by a nurse; visits to an alternative medicine provider; days off work; days of hospitalisation. At 9 months of follow-up the difference between 'Coping with itch' and control groups was not significant (at $\alpha = 0.05$) (95% CIs for the differences included zero). An exception is that there were significantly more visits to the dermatology nurse in the intervention group than the control group: intervention mean (SD) = 3.1 (2.0); control mean (SD) = 0.5 (0.7); difference = 2.7; 95% CI 1.8 to 3.6[107]

Adverse events	'Coping with itch' group	Control group	*p*-value
Comments: no adverse events reported			
Subgroup analysis results:			
Comments: no subgroups reported			
Process evaluation results			
Comments: no process evaluations reported			
General comments			
Generalisability: adult population, but generalisability unclear as ethnicity, body weight/BMI and comorbidities not reported; range of skin diseases covered in population so unclear whether results applicable to specific skin diseases			

NS, not statistically significant.

Quality criteria (Cochrane 'risk of bias' tool) randomised controlled trials

Criteria	Judgement of risk of bias[a]	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No information provided
Allocation concealment (selection bias)	Unclear risk	No information provided
Blinding of participants and personnel (performance bias)	Unclear risk	No information provided
Blinding of outcome assessment (detection bias)	Unclear risk	No information provided
Incomplete outcome data (attrition bias)	High risk	High rate of attrition in both study groups, with attrition excluded from analyses (non-ITT). Slightly higher attrition rate in control than intervention, especially early in period (9% difference after 3 months). Partly accounted for by four patients in control group who elected to receive 'Coping with itch' intervention and were excluded from analyses. Primary reason for attrition was failure to provide patient-reported outcome measures for baseline and follow-up assessments. Sample sizes are difficult to follow and are different for patient-reported outcomes and medication use; and data on attrition were different in the publications[89,107]
Selective reporting (reporting bias)	Unclear risk	No protocol reported. All outcomes stated in the methods are reported in the results. However, arbitrary thresholds were used for defining high frequency and high intensity of itching and scratching (i.e. continuous measure converted to dichotomous with arbitrary cut-off). Outcome timing for medication use appears arbitrary without explanation (months 1–3 were used in lieu of baseline and months 7–9 in lieu of 9-month follow-up)
Other bias	Low risk	No additional risk identified

a High risk, Unclear risk, Low risk.

Appendix 5 List of excluded studies with rationale

Below is a list of the publications excluded at the full-text screening stage of the clinical effectiveness review and reasons for exclusion.

TABLE 30 List of publications excluded at the full-text screening stage

Publication	Exclusion reason
Armstrong AW, Kim RH, Idriss NZ, Larsen LN, Lio PA. Online video improves clinical outcomes in adults with atopic dermatitis: a randomized controlled trial. *J Am Acad Dermatol* 2011;**64**:502–7	Did not measure HRQoL, using a validated measure
Basak PY, Ozturk M, Baysal V. Assessment of information and education about topical corticosteroids in dermatology outpatient departments: experience from Turkey. *J Eur Acad Dermatol Venereol* 2003;**17**:652–8	Did not measure HRQoL, using a validated measure
Bauer A, Kelterer D, Bartsch R, Schlegel A, Pearson J, Stadeler M, *et al.* Prevention of hand dermatitis in bakers' apprentices: different efficacy of skin protection measures and UVB hardening. *Int Arch Occup Environ Health* 2002;**75**:491–9	Did not measure HRQoL, using a validated measure
Bauer A, Kelterer D, Bartsch R, Pearson J, Stadeler M, Kleesz P, *et al.* Skin protection in bakers' apprentices. *Contact Dermatitis* 2002;**46**:81–5	Did not measure HRQoL, using a validated measure
Bostoen J, Geusens B, Lambert J, Bracke S, Dekeyser S. An educational program for patients with psoriasis and atopic dermatitis: A prospective randomized, controlled trial. *J Am Acad Dermatol* 2012;**66**(Suppl. 1):AB84	Abstract or conference presentation with insufficient information
Bostoen J, Geusens B, Bracke S, Dekeyser S, Lambert J. Follow-up on the effect of a patient educational programme: Early results of a prospective randomized controlled trial in psoriasis and atopic dermatitis. *Br J Dermatol* 2011;**165**:e34–5	Abstract or conference presentation with insufficient information
Broberg A, Kalimo K, Lindblad B, Swanbeck G. Parental education in the treatment of childhood atopic eczema. *Acta Dermato-Venereologica* 1990;**70**:495–9	Did not measure HRQoL, using a validated measure
Chinn DJ, Poyner T, Sibley G. Randomized controlled trial of a single dermatology nurse consultation in primary care on the quality of life of children with atopic eczema. *Br J Dermatol* 2002;**146**:432–9	Not an educational intervention focused on improving HRQoL
Ehlers A, Stangier U, Gieler U. Treatment of atopic dermatitis: a comparison of psychological and dermatological approaches to relapse prevention. *J Consult Clin Psychol* 1995;**63**:624–35	Did not measure HRQoL, using a validated measure
Evers AWM, Duller P, de Jong EMGJ, Otero ME, Verhaak CM, Van Der Valk PGM, *et al.* Effectiveness of a multidisciplinary itch-coping training programme in adults with atopic dermatitis. *Acta Derm Venereol* 2009;**89**:57–63	Educational and other aspects inseparable
Feldman SR, Vanarthos J, Fleischer AB, Jr. The readability of patient education materials designed for patients with psoriasis. *J Am Acad Dermatol* 1994;**30**:284–6	Did not measure HRQoL, using a validated measure
Fisker MH, Agner T, Lindschou J, Bonde JP, Ibler KS, Gluud C, *et al.* Protocol for a randomised trial on the effect of group education on skin-protective behaviour versus treatment as usual among individuals with newly notified occupational hand eczema – the Prevention of Hand Eczema (PREVEX) Trial. *BMC Dermatol* 2013;**13**:16	Not a RCT or CCT
Flanders PA, McNamara JR. Enhancing acne medication compliance: a comparison of strategies. *Behav Res Ther* 1985;**23**:225–7	Did not measure HRQoL, using a validated measure
Flyvholm MA, Mygind K, Sell L, Jensen A, Jepsen KF. A randomised controlled intervention study on prevention of work related skin problems among gut cleaners in swine slaughterhouses. *Occup Environ Med* 2005;**62**:642–9	Did not measure HRQoL, using a validated measure

continued

TABLE 30 List of publications excluded at the full-text screening stage (*continued*)

Publication	Exclusion reason
Fortune DG, Richards HL, Kirby B, Bowcock S, Main CJ, Griffiths CE. A cognitive-behavioural symptom management programme as an adjunct in psoriasis therapy. *Br J Dermatol* 2002;**146**:458–65	Did not measure HRQoL, using a validated measure
Fortune DG, Richards HL, Griffiths CE, Main CJ. Targeting cognitive-behaviour therapy to patients' implicit model of psoriasis: results from a patient preference controlled trial. *Br J Clin Psychol* 2004;**43**:1–82	Did not measure HRQoL, using a validated measure
Fukuie T, Nomura I, Narita M, Suzuki T, Tajima I, Natsume O, *et al.* A randomized, open-label, parallel group study to evaluate the efficacy and safety of proactive management in pediatric subjects with moderate to severe atopic dermatitis. *J Allergy Clin Immunol* 2013;**131**:AB101	Did not measure HRQoL, using a validated measure
Futamura M, Masuko I, Hayashi K, Ohya Y, Ito K. Effects of a short-term parental education program on childhood atopic dermatitis: a randomized controlled trial. *Pediatr Dermatol* 2013;**30**:438–43	Not an educational intervention focused on improving HRQoL
Gradwell C, Thomas KS, English JS, Williams HC. A randomized controlled trial of nurse follow-up clinics: do they help patients and do they free up consultants' time? *Br J Dermatol* 2002;**147**:513–17	Not an educational intervention focused on improving HRQoL
Grillo M, Gassner L, Marshman G, Dunn S, Hudson P. Pediatric atopic eczema: the impact of an educational intervention. *Pediatr Dermatol* 2006;**23**:428–36	Not an educational intervention focused on improving HRQoL
Habib S, Morrissey S. Stress management for atopic dermatitis. *Behav Change* 1999;**16**:226–36	Did not measure HRQoL, using a validated measure
Hampel P, Rudolph H, Petermann F, Stachow R. Stress management training for children and adolescents with atopic dermatitis during inpatient rehabilitation. *Dermatol Psychosomat* 2001;**2**:116–22	Did not measure HRQoL, using a validated measure
Huang C, Yan S, Ren J, Xiang L, Hu Y, Kang K, *et al.* A quantitative assessment of the effects of formal sun protection education on photosensitive patients. *Photodermatol Photoimmunol Photomed* 2013;**29**:261–5	Not an educational intervention focused on improving HRQoL
Hudson P, Grillo M. Atopic eczema management: What do patients value in eczema education workshops? *Allergy* 2011;**66**(Suppl. 94):619–20	Did not measure HRQoL, using a validated measure
Ibler K, Agner T, Jemec G. Hand eczema in healthcare workers: Results of a randomised trial. *Contact Dermatitis* 2012;**66**(Suppl. s2):26	Abstract or conference presentation with insufficient information
Ibler KS, Jemec GB, Diepgen TL, Gluud C, Lindschou HJ, Winkel P, *et al.* Skin care education and individual counselling versus treatment as usual in healthcare workers with hand eczema: randomised clinical trial. *BMJ* 2012;**345**:e7822	Not an educational intervention focused on improving HRQoL and/or educational and other aspects inseparable
Ibler KS, Agner T, Hansen JL, Gluud C. The Hand Eczema Trial (HET): Design of a randomised clinical trial of the effect of classification and individual counselling versus no intervention among health-care workers with hand eczema. *BMC Dermatol* 2010;**10**:8	Not an educational intervention focused on improving HRQoL
Jaspers JP, Span L, Molier L, Coenraads PJ. A multimodal education and treatment program for young adults with atopic dermatitis: a randomized controlled trial. *Dermatol Psychosom* 2000;**1**:148–53	Insufficient reporting of results in paper
Koch PE, Ryder HF, Dziura J, Njike V, Antaya RJ. Educating adolescents about acne vulgaris: a comparison of written handouts with audio-visual computerized presentations. *Arch Dermatol* 2008;**144**:208–14	Did not measure HRQoL, using a validated measure
Kupfer J, Gieler U, Diepgen TL, Fartasch M, Lob-Corzilius T, Ring J, *et al.* Structured education program improves the coping with atopic dermatitis in children and their parents-a multicenter, randomized controlled trial. *J Psychosom Res* 2010;**68**:353–8	Did not measure HRQoL, using a validated measure
Lambert J, Bostoen J, Geusens B, Bourgois J, Boone J, De SD, *et al.* A novel multidisciplinary educational programme for patients with chronic skin diseases: Ghent pilot project and first results. *Arch Dermatolog Res* 2011;**303**:57–63	Not a RCT or CCT

TABLE 30 List of publications excluded at the full-text screening stage (*continued*)

Publication	Exclusion reason
Lora V, Gisondi P, Calza A, Zanoni M, Girolomoni G. Efficacy of a single educative intervention in patients with chronic plaque psoriasis. *Dermatology* 2009;**219**:316–21	Insufficient reporting of results in paper
Macedo O. 'Got sick, got a gift': A new tool for optimising adherence to acne therapy. *J Am Acad Dermatol* 2011;**64**(Suppl. 1):AB13	Did not measure HRQoL, using a validated measure
Masuko I, Futamura M, Hahashi K, Ito K, Ohya Y. A randomized evaluator-blinded trial of behavioral modification program for mothers of children with atopic dermatitis. *J Allergy Clin Immunol* 2009;**123**:S47	Abstract or conference presentation with insufficient information
Mollerup A, Veien NK, Johansen JD. The effectiveness of tailored nurse-led counselling in hand eczema. *Contact Dermatitis* 2014;Conference: **31**	Abstract or conference presentation with insufficient information
Moore EJ, Williams A, Manias E, Varigos G, Donath S. Eczema workshops reduce severity of childhood atopic eczema. *Australas J Dermatol* 2009;**50**:100–6	Did not measure HRQoL, using a validated measure
Mork NJ, Austad J, Brolund L. An open, parallel groups, study of the importance of thoroughness of application in the treatment of psoriasis with a dithranol cream (Micanol). *Acta Derm Venereol Suppl* 1992;**172**:23–4	Did not measure HRQoL, using a validated measure
Noren P, Melin L. The effect of combined topical steroids and habit-reversal treatment in patients with atopic dermatitis. *Br J Dermatol* 1989;**121**:359–66	Did not measure HRQoL, using a validated measure
Rosenkranz MA, Davidson RJ, Maccoon DG, Sheridan JF, Kalin NH, Lutz A. A comparison of mindfulness-based stress reduction and an active control in modulation of neurogenic inflammation. *Brain Behav Immun* 2013;**27**:174–84	Did not measure HRQoL, using a validated measure
Rothman AI, Byrne N, Schacter RK, Rosenberg L, Mitchell D. An educational program for psoriatics: an evaluation. *Eval Health Prof* 1980;**3**:191–203	Did not measure HRQoL, using a validated measure
Schulte MB, Cormane RH, van DE, Wuite J. Group therapy of psoriasis. Duo formula group treatment (DFGT) as an example. *J Am Acad Dermatol* 1985;**12**:61–6	Not a RCT or CCT
Schuttelaar ML, Vermeulen KM, Drukker N, Coenraads PJ. A randomized controlled trial in children with eczema: nurse practitioner vs. dermatologist. *Br J Dermatol* 2010;**1**:162–70	Educational and other aspects inseparable
Shaw M, Morrell DS, Goldsmith LA. A study of targeted enhanced patient care for pediatric atopic dermatitis (STEP PAD). *Pediatr Dermatol* 2008;**25**:19–24	Not an educational intervention focused on improving HRQoL
Shi VY, Nanda S, Lee K, Armstrong AW, Lio PA. Improving patient education with an eczema action plan: a randomized controlled trial. *JAMA Dermatol* 2013;**149**:481–3	Did not measure HRQoL, using a validated measure
Staab D, von RU, Kehrt R, Erhart M, Wenninger K, Kamtsiuris P, *et al.* Evaluation of a parental training program for the management of childhood atopic dermatitis. *Pediatr Allergy Immunol* 2002;**13**:84–90	Insufficient reporting of results in paper
Tabolli S, Pagliarello C, Sampogna F, di PC, Abeni D. Evaluation of the impact of writing exercises and educational interventions on quality of life in patients with psoriasis. *Value Health* 2011;**14**:A509–10	Educational and other aspects inseparable
Tabolli S, Naldi L, Pagliarello C, Sampogna F, di PC, Spagnoli A, *et al.* Evaluation of the impact of writing exercises interventions on quality of life in patients with psoriasis undergoing systemic treatments. *Br J Dermatol* 2012;**167**:1254–64	Educational and other aspects inseparable
van Os-Medendorp H, Guikers CL, Eland-de Kok PC, Ros WJ, Bruijnzeel-Koomen CA, Buskens E. Costs and cost-effectiveness of the nursing programme 'Coping with itch' for patients with chronic pruritic skin disease. *Br J Dermatol* 2008;**158**:1013–21	Did not measure HRQoL, using a validated measure
van Os-Medendorp H, Koffijberg H, Eland-de Kok PC, van der Zalm A, de Bruin-Weller MS, Pasmans SG, *et al.* E-health in caring for patients with atopic dermatitis: a randomized controlled cost-effectiveness study of internet-guided monitoring and online self-management training. *Br J Dermatol* 2012;**166**:1060–8	Not an educational intervention focused on improving HRQoL

continued

TABLE 30 List of publications excluded at the full-text screening stage (*continued*)

Publication	Exclusion reason
Wang A, Armstrong A, Schupp C, Wu J. Randomized controlled trial examining effectiveness of a novel personalized interactive health care education tool for acne patients (MyPACE). *J Am Acad Dermatol* 2013;**68**(Suppl. 1):AB18	Abstract or conference presentation with insufficient information
Wang AS, Wu J, Foolad N, Armstrong AW. Developing a novel personalized interactive health care education system (MyPACE) for acne patients. *J Invest Dermatol* 2012;**132**:S87	Did not measure HRQoL, using a validated measure
Weber MB, Fontes Neto PT, Prati C, Soirefman M, Mazzotti NG, Barzenski B, *et al.* Improvement of pruritus and quality of life of children with atopic dermatitis and their families after joining support groups. *J Eur Acad Dermatol Venereol* 2008;**22**:992–7	Not an educational intervention focused on improving HRQoL
Wenninger K, Kehrt R, den Uv, Lehmann C, Binder C, Wahn U, *et al.* Structured parent education in the management of childhood atopic dermatitis: The Berlin model. *Patient Educ Counsel* 2000;**40**:253–61.	Insufficient reporting of results in paper
West C, Narahari S, O'Neill J, Davis S, Huynh M, Clark A, *et al.* Adherence to adalimumab in patients with moderate to severe psoriasis. *Dermatol Online J* 2013;**19**:18182	Did not measure HRQoL, using a validated measure
Williams HC. Educational programmes for young people with eczema. *BMJ* 2006;**332**:923–4	Did not measure HRQoL, using a validated measure

Appendix 6 Full details of the structure and content of the educational interventions

TABLE 31 Full details of the structure and content of the educational interventions

Study	Balato *et al.*, 2013[85]	Ersser *et al.*, 2011[86]	Bostoen *et al.*, 2012[76]	Santer *et al.*, 2014[74]	Staab *et al.*, 2006[87] (further information provided by Wenninger *et al.*[78])	Matsuoka *et al.*, 2006[88]	van Os-Medendorp *et al.*, 2007[89]
Skin condition(s), population	Psoriasis, patients (adults)	Psoriasis, patients (adults)	Psoriasis or atopic dermatitis, patients (adults)	Eczema (children aged ≤ 5 years) and parents/carers	Atopic dermatitis, patients (children and adolescents) and parents	Acne, patients (adults; women aged > 16 years)	Chronic pruritic skin diseases, patients (adults)
Overview	Text message education	A theory-based self-management educational intervention for individuals with psoriasis. Patients also received usual care (only mentioned in abstract)	Educational programme for patients with psoriasis and atopic dermatitis. All patients continued with medical therapy	Two educational intervention groups: 1. online intervention for carers delivered through the SPaCE website 2. website + HCP support Both groups also received usual care. Carers took part in the intervention; outcomes were measured in carers and children	Group-based educational programme, with different educational sessions for (a) parents of children aged 3 months to 7 years, (b) children aged 8–12 years and their parents and (c) adolescents with atopic dermatitis aged 13–19 years (parents optional for selected sessions)	Women with acne vulgaris were instructed on skin care and how to use make-up by a dermatologist. The women also received acne treatment (topical therapy and/or oral medication)	Individual sessions with dermatology nurse, in addition to usual medical treatment by dermatologist. Includes educational and cognitive behavioural interventions such as individual patient education, awareness training and habit reversal, and relaxation exercises and psychosocial support given according to a nursing care plan. Referral to other members of outpatient dermatology multidisciplinary team (social workers, psychologists and dermatologists) if needed

Study	Balato *et al.*, 2013[85]	Ersser *et al.*, 2011[86]	Bostoen *et al.*, 2012[76]	Santer *et al.*, 2014[74]	Staab *et al.*, 2006[87] (further information provided by Wenninger *et al.*[78])	Matsuoka *et al.*, 2006[88]	van Os-Medendorp *et al.*, 2007[89]
Stated target group	No details	Individuals with mild-to-moderate plaque psoriasis	Adults with psoriasis or atopic dermatitis	Carers of children aged ≤ 5 years with mild to moderate eczema	Parents of children aged 3 months to 7 years or 8–12 years, children aged 8–12 years and adolescents aged 13–18 years (parents of adolescents optional for selected sessions) with moderate to severe atopic dermatitis	Women	Adults with chronic pruritic skin disease
Adjunct to standard medical care?	Yes	Yes	Yes	Yes	Unclear – treatment with topical therapy or special diets was not included in the intervention and remained the responsibility of the patients' doctor	Yes	Yes
Intervention aim(s)	Not stated explicitly but implicit from the paper that was to use text messaging to improve treatment adherence and patient outcomes including HRQoL	To support self-management in psoriasis	Not explicitly stated. Study aimed to examine if the educational intervention 'added value to medical therapy' (p. 1025) and examine the effects on disease severity and QoL	Aimed to improve carers' management of their child's eczema by increasing regular use of emollients. Ultimate aim of intervention was to improve HRQoL through enhancing carers' management of the condition	Not reported in primary publication, but the intervention for children aged 3 months to 7 years was based on one reported in Staab *et al.*[93] and Wenninger *et al.*,[78] the aim of which was improve parents' ability to manage their child's disease and thus improve disease course and families' QoL	Not explicitly stated, but part of the aim of the study was to examine if instructions in make-up use from a dermatologist could affect female acne patients' QoL	To reduce itch and to help patients cope with itch

continued

TABLE 31 Full details of the structure and content of the educational interventions (*continued*)

Study	Balato *et al.*, 2013[85]	Ersser *et al.*, 2011[86]	Bostoen *et al.*, 2012[76]	Santer *et al.*, 2014[74]	Staab *et al.*, 2006[87] (further information provided by Wenninger *et al.*[78])	Matsuoka *et al.*, 2006[88]	van Os-Medendorp *et al.*, 2007[89]
Where delivered	Via mobile phone	Not reported	Not reported	1. Internet (website) 2. Internet (website) and patients' general practice (HCP appointment)	Not reported	Outpatient clinic based in a university dermatology department	Specialised itch clinic in dermatology outpatient department
Self-help, individual- and/or group-based?	Individual-based	Group-based face-to-face session (maximum of nine participants), with supporting information and follow-up telephone consultation	Group-based intervention. Group sizes differed and were 14, 23 and 13	Individual-based	Group-based (5–8 participants)	Not reported	Individual-based
Mode	Text messaging	Face to face, written and audio-visual materials, individual telephone consultation	Face-to-face workshop	1. Online intervention 2. Online intervention, plus face-to-face appointment with HCP	Face-to-face group sessions	Face to face, with supporting videotape instructions and detailed leaflets/ prescriptions	Face to face
Materials	Text messaging	Supporting written and audio-visual materials provided; DVD and workbook, including relaxation material	Secondary publication[99] of a before-and-after study using the same intervention notes that the syllabus was offered to participants	Delivered through a website. Some modules on the website contained videos, e.g. demonstrating techniques for emollient application, and print sheets of information. Both of these could also be accessed from a menu bar at the bottom of the website. 2-week challenge involved SMS text alerts	Handouts for participants with summary points and timetable for the sessions	Videotaped instructions; leaflets and make-up prescriptions with more detailed instructions; sample cosmetics provided	Not reported

Study	Balato *et al.*, 2013[85]	Ersser *et al.*, 2011[86]	Bostoen *et al.*, 2012[76]	Santer *et al.*, 2014[74]	Staab *et al.*, 2006[87] (further information provided by Wenninger *et al.*[78])	Matsuoka *et al.*, 2006[88]	van Os-Medendorp *et al.*, 2007[89]
Provider	Not stated who the 'investigators' were but physicians enrolled participants	Nurse-led group sessions, with supporting materials provided (see Materials)	Dermatologist, dermatology nurse, pharmacists, dietician, training expert, psychiatrist, psychologist, philosopher, and a sports, yoga and mindfulness teacher	1. Medical experts developed the website; website delivered through LifeGuide software 2. In addition to 1. above, HCPs provided support to participants in one group. HCPs varied across the general practices taking part: practice nurse in 11 practices, health-care assistant in one practice and GP in one practice. HCPs were not dermatology trained, except for one	Multiprofessional team of dermatologists or paediatricians, psychologists or dieticians	Dermatologist	Dermatology nurse
Duration and intensity	1 text message per day for a period of 12 weeks	Group session: one-off 2-hour session Telephone consultation: one-off 20-minute session	3 months programme, with two, 2-hour sessions a week	1. Two 20-minute compulsory modules, and then participants could complete other modules of their choice from a selection of 14, watch videos, download print sheets and take part in a 2-week challenge (see below) involving SMS alerts 2. In addition to 1. above, one-off 20-minute appointment with HCP	Six weekly 2-hour sessions	Not reported	Patients visited the itch clinic a mean of 2.9 times (median 3 times, range 1–6 times); duration of sessions not reported

continued

TABLE 31 Full details of the structure and content of the educational interventions (*continued*)

Study	Balato *et al.*, 2013[85]	Ersser *et al.*, 2011[86]	Bostoen *et al.*, 2012[76]	Santer *et al.*, 2014[74]	Staab *et al.*, 2006[87] (further information provided by Wenninger *et al.*[78])	Matsuoka *et al.*, 2006[88]	van Os-Medendorp *et al.*, 2007[89]
Scripting (level of detail guiding interaction between interventionist and participants)	General educational statements and reminders sent in a random order with four educational and three reminders sent each week. Details of the types of information provided in the paper but no details of the coverage of these (i.e. if all were eventually sent to each participant)	In delivering the intervention, the nurse was expected to follow the intervention protocol, but with flexibility for individualisation. Outline script was used for follow-up telephone consultation	Secondary publication[99] refers to a syllabus	1. Delivery of website intervention the same for all participants, except that participants could choose optional modules after completing the compulsory ones 2. In addition to 1. above, HCP went through the 2 compulsory modules and 2-week challenge with participants if they had not already completed them/if participants had completed them, HCP helped them choose other modules to work through together	A manual specified content	Not reported	Not reported
Sensitivity to participant characteristics	Text messages were created using simple language	Not reported, but intervention allowed flexibility for individualisation	Not reported	Not reported	Different groups for parents and children of different age groups	Not reported	Not reported

Study	Balato *et al.*, 2013[85]	Ersser *et al.*, 2011[86]	Bostoen *et al.*, 2012[76]	Santer *et al.*, 2014[74]	Staab *et al.*, 2006[87] (further information provided by Wenninger *et al.*[78])	Matsuoka *et al.*, 2006[88]	van Os-Medendorp *et al.*, 2007[89]
Individual preferred learning style addressed?	No	No	No	No	No	No	No
Interventionist characteristics and training	No details	Nurse attended training on self-efficacy-based education	None reported apart from job title noted above	HCPs received minimal training (one hour to familiarise themselves with the website)	All professionals had undergone a 40-hour training programme to qualify as trainers	Not reported	Not reported
Content and topics	Summary: covered frequently asked questions about psoriasis drugs (e.g. administration and adverse effects) and general recommendations to take care of overall health. All text messages between 1 and 3 sentences. Educational topics included daily care statements (e.g. use moisturisers, wear light clothes), healthy lifestyle statements (e.g. avoid smoking, pay attention to your diet), prompts about the use of treatments (e.g. do not abuse steroids, common	Practical element (no details provided), individual action planning, stress reduction (through provision of relaxation materials), feedback on action plans (through telephone consultation)	Information on specific skin disease, and skin care sessions, healthy lifestyle (diet, sleep hygiene, smoking, substance abuse) and stress-reducing techniques (physical training, psychodermatology, practical philosophy and mindfulness), feedback sessions. Further details of the intervention provided in a separate publication[99]	1. First stage of intervention: participants completed two compulsory modules: 'What is eczema?' and 'Emollient moisturisers'. Then 14 other modules were available to complete, which covered 'common concerns of carers of children with eczema' (p. 3) including: diet and allergy; topical steroids, talking to your GP, starting school, sleep problems, bath time, washing clothes, eczema in the winter, eczema in the summer, swimming, going on	Summary: intervention for parents of 3-month to 7-year-olds was based on the one reported in Staab *et al.*[87] and Wenninger *et al.*[78] Across the three groups, the educational sessions covered the following issues: medical (information about atopic dermatitis, understanding triggers, skin care, symptom treatment, unconventional therapies), nutritional (general child nutrition, food allergies, types of diet) and psychological (relaxation techniques, managing scratching and itching, sleep, coping, self-management plan, difficulties encountered in transferring skills to participants' lives)	Summary: patients received instructions on use of skin care and make-up products. Instructions included general skin care and how to use 'point make-up' (e.g. eyeliner and lipstick)	Education about: itch causes, consequences and treatment; patient advocacy groups, avoiding triggers, diet; interventions to relieve itching and scratching and their consequences, cognitive behavioural therapy including diary-based awareness training, habit reversal to reduce scratching, and relaxation. Based on an initial itch medical history assessment taken by the nurse and structured according to an individual-based nursing care plan

continued

TABLE 31 Full details of the structure and content of the educational interventions (*continued*)

Study	Balato *et al.*, 2013[85]	Ersser *et al.*, 2011[86]	Bostoen *et al.*, 2012[76]	Santer *et al.*, 2014[74]	Staab *et al.*, 2006[87] (further information provided by Wenninger *et al.*[78])	Matsuoka *et al.*, 2006[88]	van Os-Medendorp *et al.*, 2007[89]
	side effects of certain drugs) and one statement about the psychosocial effects of psoriasis (e.g. do not feel ashamed or guilty, psoriasis is not contagious). Reminders reinforced many of the same principles			holiday, avoiding stress for parents, involving your child in treatment, managing scratching. Participants could access videos and print sheets on website, covering, for example, use of emollients, how to bath their child, action plan to use during GP consultation, and details on how to manage eczema to pass to relatives, school or nursery. Intervention strategies used are detailed in table 1 of the publication, but not data extracted. Participants could take part in a 2-week challenge involving SMS text alerts for setting goals, monitoring and rehearsing behaviours	Participants were encouraged to share experiences and to put new skills into practice		

Study	Balato *et al.*, 2013[85]	Ersser *et al.*, 2011[86]	Bostoen *et al.*, 2012[76]	Santer *et al.*, 2014[74]	Staab *et al.*, 2006[87] (further information provided by Wenninger *et al.*[78])	Matsuoka *et al.*, 2006[88]	van Os-Medendorp *et al.*, 2007[89]
				2. In addition to 1. above, HCP promotes engagement with the website intervention and to go through the 2 compulsory modules and 2-week challenge with participants if they had not already completed them/if participants had completed them, HCP helped them choose other modules to work through together			
Tailoring	Does not appear to be tailored	Intervention included individual action planning	Not reported	Intervention was partly tailored: after completing the two compulsory modules, participants could choose to complete other optional modules that they were interested in (from a menu of 14 modules)	Not reported	Not reported	Nursing care plan for intervention was structured according to patient's individual needs
Ongoing support	None reported	Nurse provided one 20-minute follow-up telephone consultation one month after the group session (based on outline script)	Not reported	Not reported	Not reported	Not reported	Individual counselling and 'support' (not defined) provided as required (no details given)

continued

TABLE 31 Full details of the structure and content of the educational interventions (*continued*)

Study	Balato *et al.*, 2013[85]	Ersser *et al.*, 2011[86]	Bostoen *et al.*, 2012[76]	Santer *et al.*, 2014[74]	Staab *et al.*, 2006[87] (further information provided by Wenninger *et al.*[78])	Matsuoka *et al.*, 2006[88]	van Os-Medendorp *et al.*, 2007[89]
Theory	None reported	Based on Social Learning Theory – specifically self-efficacy theory. Intervention incorporated elements designed to address the four sources of self-efficacy (mastery, verbal persuasion, vicarious experience, emotional regulation). Intervention was also informed by the findings of previous qualitative research into the self-management needs of individuals with psoriasis	Not reported	Theory-based: used PRECEDE–PROCEED model to develop the intervention. The intervention incorporated 20 of the 26 behaviour-change techniques listed in Abraham and Michie's taxonomy of behaviour change techniques.[82] Full list of exact intervention techniques used is provided in table 1 of the publication, but not data extracted. The development of the modules about 'common concerns of carers of children with eczema' (p. 3) were informed by qualitative interviews and input from patient support groups. Intervention also informed by 'evidence-based patient information leaflets' (Santer *et al.*, 2014,[74] p. 1), think-aloud interviews with users of a draft version of the website and feedback from other parents and HCPs	Social cognitive theory	Not reported	Not reported

Appendix 7 Excluded cost-effectiveness studies

TABLE 32 Excluded cost-effectiveness studies

Excluded study	Reason for exclusion
Beikert FC, Langenbruch AK, Radtke MA, Augustin M. Willingness to pay and quality of life in patients with rosacea. *J Eur Acad Dermatol Venereol* 2013;**27**:734–8	Inappropriate study design
van der Meer EW, Boot CR, Jungbauer FH, van der Klink JJ, Rustemeyer T, Coenraads PJ, *et al.* Hands4U: a multifaceted strategy to implement guideline-based recommendations to prevent hand eczema in health care workers: design of a randomised controlled trial and (cost) effectiveness evaluation. *BMC Public Health* 2011;**11**:669	Ongoing trial
Bathe A, Matterne U, Dewald M, Grande T, Weisshaar E. Educational multidisciplinary training programme for patients with chronic pruritus. *Acta Derm Venereol* 2009;**89**:498–501	Inappropriate study design
Hartman M, Prins M, Swinkels OQ, Severens JL, De BT, Van Der Wilt GJ, *et al.* Cost-effectiveness analysis of a psoriasis care instruction programme with dithranol compared with UVB phototherapy and inpatient dithranol treatment. *Br J Dermatol* 2002;**147**:538–44	Intervention was not educational
Staab D, von RU, Kehrt R, Erhart M, Wenninger K, Kamtsiuris P, *et al.* Evaluation of a parental training program for the management of childhood atopic dermatitis. *Pediatr Allergy Immunol* 2002;**13**:84–90	Inappropriate study design
van Gils RF, Bosmans JE, Boot CRL, Rustemeyer T, van MW, Van Der Valk PGM, *et al.* Economic evaluation of an integrated care programme for patients with hand dermatitis. *Contact Dermatitis* 2013;**69**:144–52	Not clear if the intervention was educational
Parsi K, Chambers CJ, Armstrong AW. Cost-effectiveness analysis of a patient-centered care model for management of psoriasis. *J Am Acad Dermatol* 2012;**66**:563–70	Intervention was not educational
Healthcare Insurance Board/College voor Zorgverzekeringen. *Evaluation of the Combination Day- and Home Treatment of Psoriasis – Primary Research*. Healthcare Insurance Board/College voor Zorgverzekeringen (CVZ); 2000	Not in the English language
The Netherlands Organisation for Health Research and Development. E-health in Caring for Patients With Atopic Dermatitis. *An Economic Evaluation Comparing Usual Care with Internet-Guided Monitoring and Self-Management Training by a Nurse Practitioner*. The Netherlands Organisation for Health Research and Development (ZonMw). 2000. URL: www.zonmw.nl (accessed 19 October 2015)	Not in the English language
Kernick D, Cox A, Powell R, Reinhold D, Sawkins J, Warin A. A cost consequence study of the impact of a dermatology-trained practice nurse on the quality of life of primary care patients with eczema and psoriasis. *Br J Gen Prac* 2000;**50**:555–8	Not clear if the intervention was educational

Appendix 8 Data extractions from systematic review of cost-effectiveness

1	Study	Mason, 2013[108]
2	**Research question**	To examine the effectiveness of a multifaceted educational support programme to increase emollient use and reduce atopic eczema symptoms in children
3	**Country/setting**	The UK
4	**Funding source**	Reckitt Benkiser Healthcare
5	**Analysis type**	Cost analysis
6	**Study type**	Before-and-after study
7	**Perspective**	NHS
8	**Time horizon**	Trial duration: 3 months
9	**Analysis method**	
	If estimations are based on a model, state the model assumptions where relevant	Not reported
10	**Discounting (rate)**	None
11	**Costing year, currency**	2011, £
12	**Population**	
	Definition of condition	Atopic eczema
	Characteristics of baseline cohort/risk factors	Eligible children were male and female aged 3 months to 6 years, with mild to moderate atopic eczema; and using E45 Cream as their primary emollient
13	**Intervention(s), comparator(s)**	A multifaceted educational support programme was evaluated as a method of increasing emollient use and reducing atopic eczema in children. Support provided for parents and carers included an educational DVD, online daily diary and telephone helpline with dermatology nurses
14	**Outcome measure**	
	(a) Primary outcome(s) used in the analysis (b) Source of evidence for the primary outcome (c) Summary measure of effect	• Emollient use (grams per week) • Severity of eczema • Health-care contacts by patients • Parent measures of perceived control in managing the child's eczema • Use of concurrent medication The outcomes were collected as part of the before-and-after study in which a purpose-designed multifaceted educational support programme (ESP) was provided Emollient use was estimated through telephonic questionnaire; severity of eczema was captured using the Patient-Oriented Eczema Measure (POEM) and Patient Eczema Severity Time (PEST). Health-care contacts were determined via recorded number of GP and dermatology specialist visits; parent measures were captured by telephone questionnaire and concurrent medication use was recorded through telephone surveys Not reported

1	Study	Mason, 2013[108]
15	**Health benefits**	
	(a) If relevant, specify the valuation approach (and source). (b) If relevant, state the instrument used to measure health benefits.	Not reported but appears to be based on improved emollient uptake, reduced eczema severity, reduced sleep disturbance and improved parent control Severity of eczema was captured using POEM and PEST. No single instrument was used to measure health benefits; different aspects of health benefits were measured separately
16	**Costs**	
	Intervention cost	The cost of providing the ESP programme was estimated to be £32 per child based on a resource analysis of providing the service
	Indirect Costs	Not stated
17	**Results**	

Health economic outcomes were expressed in terms of costs, presented in the table below

	Pre-programme[a]		Programme[b]		Change[c,d]			
Costs (£, 2011)	Mean	(SD)	Mean	(SD)	Mean	95% CI	*n*	*p*
Programme			32	–	32	–	–	–
Emollient[e]	9.29	(9.30)	19.57	(12.03)	10.28	(7.93 to 12.64)	132	0.001
Emollient[f]	9.72	(9.69)	22.64	(12.21)	12.91	(10.72 to 15.10)	115	0.001
GP visits	68.53	(76.70)	30.40	(31.67)	–38.13	(–52.58 to –23.68)	135	0.001
Overall cost[e]	78.29	(79.34)	82.66	(34.16)	4.37	(–10.55 to 19.30)	132	0.62
Overall costs[f]	80.32	(82.48)	84.37	(31.29)	4.06	(–12.00 to 20.11)	115	0.56

a Estimated for the 12 weeks preceding intervention, using 2-week baseline data and 12-week recall (GP visits).
b 12 weeks while receiving the patient support programme.
c Difference in costs in the two periods (negative denotes a reduction).
d Estimated by bootstrapping with 1000 replications.
e Emollient use costed using the daily diary method.
f Emollient use costed using the estimated time taken to use a 500-g pot of emollient.

1	Study	Mason, 2013[108]

Clinical outcomes of relevance (as included within the sensitivity analysis) are extracted in the table below

	Baseline[a]		9–12 weeks		Mean change[b]			
Outcomes	Mean	SD	Mean	SD	Mean	95% CI[c]	*n*	*p*-value[3]
Emollient use (g/week)[d]								
Daily diary	–		167.8	109.5	87.6	81.9 to 119.5	132	0.001
Time to use	79.2	79.2	197.4	106.5	110.0	94.6 to 131.3	115	0.001
Severity scores								
POEM[e]	11.34	6.27	4.85	5.04	–5.38	–6.41 to –4.36	135	0.001
PEST[f]	2.26	0.81	1.53	0.68	–0.61	–0.75 to –0.47	135	0.001

a Weeks –2 to 0, except GP visits which included the previous 12 weeks to week 0.
b The mean change is the average of the programme period scores minus the baseline period score in subjects with complete data. It is to be noted that data for week 1–4 weeks and 5–8 weeks were not extracted.
c Estimated by bootstrapping with 1000 replications.
d Emollient use was estimated using 2 methods: time to use a reported weight of emollient (500 g) and a daily diary record of counts of pumps of emollient used by weight; the latter method was not available for the baseline period.
e POEM score from 0 to 28, including seven signs of eczema at four levels of frequency in the past week at the end of each period.
f PEST score, the child's unhappiness with eczema: score 1 (not at all) to 5 (very unhappy), daily diary score averaged over each period.

1	Study	Mason, 2013[108]

18 **Sensitivity analysis**

Bootstrapping method was adopted with 1000 replications. Analyses were repeated in 117 children, excluding 18 children who had visited an eczema specialist in the 3 months prior to joining the programme. Results of the analyses are presented in the table below

Sensitivity analysis: excluding children who had recently seen a specialist

	Pre-programme[a]		Programme[b]		Change[c,d]			
	Mean	SD	Mean	SD	Mean	95% CI	*n*	*p*-value
Emollient use (g/week)								
Daily diary	69.7	49.5	170.3	99.0	100.6	81.9 to 119.5	114	0.001
Time to use	72.2	49.6	184.3	97.6	112.2	94.6 to 131.3	99	0.001
Severity scores								
POEM	11.03	6.49	5.83	4.67	–5.20	–6.39 to –4.34	117	0.001
PEST	2.26	0.82	1.66	0.62	–0.60	–0.74 to –0.47	117	0.001
Costs (£, 2011)								
Programme			32	–	32	–	–	–
Emollient[e]	8.18	5.80	19.98	11.61	11.81	9.81 to 14.01	114	0.001
Emollient[f]	8.47	5.82	21.63	11.46	13.16	10.94 to 15.39	99	0.001
GP visits	63.23	63.80	30.46	30.86	–32.77	–45.77 to –19.77	117	0.001
Overall cost[e]	71.81	66.37	83.25	33.75	11.44	–1.99 to 24.86	114	0.123
Overall costs[f]	72.11	68.24	83.45	33.75	11.35	–3.14 to 25.83	99	0.239

a Estimated for the 12 weeks preceding intervention, using 2 week baseline data and 12 week recall (GP visits).
b 12 weeks while receiving the patient support programme.
c Difference in costs in the two periods (negative denotes a reduction).
d Estimated by bootstrapping with 1000 replications.
e Emollient use costed using the daily diary method.
f Emollient use costed using the estimated time taken to use a 500-g pot of emollient.

1	Study	Mason, 2013[108]
19	**Author's conclusions**	Based on their findings, the authors concluded that, although a community-based multi-faceted education support programme did not increase cost, it helped increase the use of emollient. This further helped in reducing symptoms associated with atopic eczema as well as contacts with the GPs. It was also observed that such a programme could benefit the families and carers of children with the condition as the children experienced improved sleep patterns which gave the parents and carers greater feeling of control. The authors, however, recommended further evaluation to assess the effectiveness of PEST in helping parents and children to monitor and manage eczema
20	**Reviewer's comments**	This study is relevant for the purpose of this review as it was based in the UK. However, from an economic perspective, there were a few limitations. First, a cost-effectiveness analysis was not conducted. Also, the sources of the cost inputs and detailed composition of costs parameters used in the analysis were not reported. Second, the analysis was not conducted over a long period of time but for 3 months as the duration of the trial. Although sensitivity analyses were conducted to check the robustness of the base case results, probabilistic distributions were not assigned to the parameters, rather bootstrapping method was adopted to avoid parametric assumptions

Systematic review quality-assessment checklist for economic evaluations and notes for completion

Critical appraisal checklist for economic evaluations (based on Drummond *et al.*, 2005[110])

Item	Y/N/?
1. Is the decision problem (including interventions compared and patient group) relevant to the UK?	Yes
2. Is the setting comparable to the UK?	Yes
3. Is the analytical and modelling methodology appropriate?	?
4. Are all the relevant costs and consequences for each alternative identified?	?
5. Are the data inputs for the model described and justified?	?
6. Are health outcomes measured in QALYs?	No
7. Is the time horizon considered appropriate?	No
8. Are costs and outcomes discounted?	No[a]
9. Is an incremental analysis performed?	Yes
10. Is uncertainty assessed?	?

a Discounting was not applicable as the time horizon was < 1 year.

1	Study	Schuttelaar, 2011[109]
2	**Research question**	To determine costs and cost-effectiveness of care provided by NPs vs. dermatologists and to compare the results with those in studies from other countries
3	**Country/setting**	The Netherlands
4	**Funding source**	Health Care Efficiency Research Programme of the University Medical Centre Groningen, Groningen, the Netherlands
5	**Analysis type**	CEA
6	**Study type**	Economic evaluation based on the results of a RCT
7	**Perspective**	Societal
8	**Time horizon**	Trial duration: 1 year
9	**Analysis method**	
	(a) If estimations are based on a model, state the model assumptions where relevant	Not reported
10	**Discounting (rate)**	None
11	**Costing year, currency**	2008, €
12	**Population**	
	(a) Definition of condition	Childhood eczema (mild, moderate and severe)
	(b) Characteristics of baseline cohort/ risk factors	Patients aged ≤ 16 years with a diagnosis of eczema ('atopic dermatitis')
13	**Intervention(s), comparator(s)**	Intervention: care by a NP Comparator: conventional care by a dermatologist
14	**Outcome measure**	
	(a) Primary outcome(s) used in the analysis	Between-group differences in the QoL of the child between baseline and follow-up at 12 months
	(b) Source of evidence for the primary outcome	The outcome measure were collected as primary end point of the RCT
	(c) Summary measure of effect	Mean difference
15	**Health benefits**	
	(a) If relevant, specify the valuation approach (and source).	Scores assigned to individual health dimensions as well as patient satisfaction within the instruments were added to obtain an overall score
	(b) If relevant, state the instrument used to measure health benefits.	For children aged < 4 years, IDQoL was completed by their parents. Those aged 4–16 years completed CDLQI. For the cost-effectiveness analysis, the severity of eczema was measured by the mean objective SCORAD Patient satisfaction at 12 months was measured by CSQ-8 which were completed by the parents

1	Study	Schuttelaar, 2011[109]

16 **Costs**

Intervention cost

Types of cost	Unit price (£)
Health-care costs hospital	
Visits dermatologist[a]	1.66 per minute
Visit NP[b]	0.52 per minute
Phone consultations dermatologist[c]	8.30 per minute
Phone consultations NP[d]	5.20 per minute
Prescriptions	Diverse
Laboratory tests	Diverse
Admission day	512 per day
Group education session by the NP	Diverse
Health-care costs community	
Visits GP	21.70 per visit
Prescriptions	Variable
Costs in other sectors	
Home help visits	32.97 per visit

a First visit 20 minutes, follow-up visits 10 minutes.
b First visit NP 30 minutes, follow-up visits 20 minutes.
c Phone consultations 5 minutes.
d Phone consultations NP 10 minutes.

Estimates of unit costs were based on the Dutch guideline prices. Costs of medications were based on the listed prices, including value added tax, obtained from the website of the Dutch Health Insurance Board (www.fk.cvz.nl)

Indirect costs

Indirect costs were not reported explicitly in the study but based on the types of costs included; the reviewer regarded family costs as indirect costs

Types of costs	Unit prices (£)
Family Costs	
Absence from work	37.23 per hour
Travelling expenses[a]	6.72/4.04 per visit
Out-of-pocket	Variable

a Travelling expenses determined as standard price for private car/public transport based on mean distance to hospital.

1	Study	Schuttelaar, 2011[109]

17 **Results**

Overall results

- At the baseline, the severity of the eczema (measured by the mean objective SCORAD (SD)) did not differ significantly between the treatment groups as shown below:

	Children aged < 4 years	Children aged 4–16 years
Dermatologist group	33.4 (19.3)	35.4 (17.3)
NP group	33.4 (15.6)	29.9 (16.0)

- The difference between the dermatologist and NP groups in the 4–16 years age group was not considered clinically relevant as the objective SCORAD ranged from 0 to 83

Clinical effectiveness

Measure		Baseline (SD) [95% CI]	12 months (SD) [95% CI]	Mean change (SD) [95% CI]
IDQOL	Dermatologist group	11.6 (SD 8.1) [9.0 to 14.2]	5.6 (SD 3.9) [4.3 to 7.0]	–6.5 (SD 6.6) [–14.2 to –8.9]
	NP group	10.7 (SD 4.9) [9.1 to 12.3]	5.7 (SD 5.4) [4.0 to 7.5]	–4.9 (SD 5.5) [–6.8 to –3.0]
CDLQI	Dermatologist group	12.1 (SD 6.3) [9.9 to 14.2]	5.6 (SD 4.2) [4.2 to 7.1]	–5.9 (SD 6.0) [–8.0 to –3.9]
	NP group	10.0 (SD 4.4) [8.5 to 11.4]	4.9 (SD 3.5) [3.7 to 6.1]	–5.2 (SD 4.0) [6.6 to –3.8]
CSQ-8	Dermatologist group	–	24.8 (SD 4.3) [23.6 to 26.0]	–
	NP group	–	26.9 (SD 4.9) [25.5 to 28.2]	–

Costs

- The mean (SD) total costs (expressed in €) and cost difference per child in the dermatologist and NP groups are outlined below:

	NP ($n = 76$)	Dermatologist ($n = 71$)	Difference (95% CI)[a]
Health-care costs hospital	632 (1198)	771 (1590)	–139 (–520 to 291)
Health-care costs community	26 (39)	30 (59)	–4 (–17 to 12)
Family costs	302 (511)	608 (1018)	–306 (–475 to –16)
Costs other sectors	21 (182)	0.93 (7.83)	20 (–3 to 59)
Total costs	981 (1339)	1409 (2289)	–428 (–910 to 197)

a Negative cost differences represent lower cost in the NP arm.

1 Study	Schuttelaar, 2011[109]

- The mean costs (SD), expressed in €, and cost difference per child per resource item is presented below:

	NP ($n = 76$)	Dermatologist ($n = 71$)	Difference (95% CI)[a]
Health-care costs hospital			
Outpatient visits	272 (143)	422 (238)	–150 (–194 to –75)
Phone consultations	7.22 (9.23)	3.63 (7.72)	3.59 (0.91 to 5.93)
Oral medication	14 (36)	19 (30)	–5 (–14 to 6)
Ointment active ingredients	69 (80)	87 (113)	–18 (–42 to 15)
Emollients	17 (19)	17 (22)	0 (–6.48 to 5.92)
Bandages, dressings	47 (69)	26 (60)	21 (2 to 40)
Laboratory tests	9 (33)	17 (40)	–8 (–17 to 4)
Hospital admission days	179 (1133)	163 (1376)	16 (–334 to 380)
Group education, NP	4.63 (7.91)	–	4.63 (2.65 to 5.89)
Health-care cost community			
General practitioner	10 (28)	18 (36)	–8 (–15 to 3)
Oral medication[b]	3.06 (13.42)	2.81 (10.30)	0.25 (–2.97 to 4.05)
Ointment with active ingredients[c]	6.54 (21.09)	7.14 (40.20)	–0.86 (–10.43 to 7.62)
Emollients	3.20 (5.79)	1.45 (3.93)	1.75 (0.28 to 3.08)
Protective dressings[d]	2.64 (11.07)	0 (0)	2.64 (0.48 to 4.88)
Total health-care costs	658 (1213)	801 (1607)	–143 (–544 to 299)
Family costs			
Time costs[e]	178 (357)	415 (735)	–237 (–360 to –37)
Travelling expenses	20 (18)	30 (26)	–10 (–13 to –1)
Bath oil	21 (20)	23 (26)	–2 (–8 to 6)
Out-of-pocket[f]	83 (370)	134 (684)	–51 (–221 to 97)
Costs other sectors			
Home-help visits	21 (182)	0.93 (7.83)	20 (–3 to 59)

a Negative cost differences represent lower costs in the NP arm.
b Antibiotics, antihistamines.
c Steroids, calcineurin inhibitors, tar.
d Bandages, garments and gloves.
e Time missed in paid work and days missed in non-working activities of the parents.
f Self-medication, alternative practitioner, carpet changes, nutrition.

1 Study Schuttelaar, 2011[109]

- The costs [expressed in €, mean (SD)] of dermatological care and NP care estimated for different eczema severity levels are shown below:

	NP			Dermatologist		
	Mild eczema (*n* = 12)	Moderate eczema (*n* = 44)	Severe eczema (*n* = 20)	Mild eczema (*n* = 13)	Moderate eczema (*n* = 31)	Severe eczema (*n* = 29)
Health-care costs hospital						
Outpatient visits	178 (85)	270 (147)	340 (143)	257 (152)	404 (206)	521 (260)
Phone consultations	1.21 (1.99)	6.55 (8.13)	13 (12)	3.93 (9.49)	2.04 (6.33)	5.17 (8.05)
Oral medication	0 (0)	15 (44)	20 (26)	16 (33)	12 (21)	28 (35)
Ointment active ingredients	35 (50)	71 (88)	85 (72)	26 (24)	83 (122)	118 (118)
Emollients	18 (18)	18 (21)	13 (17)	18 (12)	16 (17)	19 (30)
Bandages, dressings	15 (29)	45 (73)	73 (70)	16 (57)	17 (49)	40 (71)
Laboratory tests	11 (34)	12 (39)	0.45 (2.0)	7.62 (20.74)	19 (33)	19 (53)
Hospital admission days	0 (0)	0(0)	6.80 (2.71)	0 (0)	0 (0)	429 (2239)
Group education, NP	4.4 (9.52)	5.84 (8.48)	2.10 (4.61)	–	–	–
Total	287 (141)	450 (280)	1237 (2222)	386 (149)	567 (284)	1192 (2528)
Health-care cost community						
General practitioner	11 (25)	13 (33)	3.3 (10.6)	13 (24)	11 (22)	25 (47)
Oral medication[a]	0 (0)	4.9 (17)	0.9 (3.9)	8.90 (17.40)	1.69 (8.93)	1.27 (6.00)
Ointment with active ingredients[b]	1.23 (3.4)	3.16 (10.6)	17 (36)	8.30 (21.80)	2.20 (6.68)	12 (62)
Emollients	3.97 (6.5)	3.50 (6.3)	2.1 (3.89)	2.75 (6.25)	1.17 (2.76)	1.18 (3.72)
Protective dressings[c]	3.24 (8.60)	1.15 (7.74)	5.47 (16.90)	0 (0)	0 (0)	0 (0)
Total	19 (27)	26 (40)	30 (43)	35 (57)	17 (25)	42 (82)
Total health-care costs	307 (146)	476 (275)	1267 (2254)	420 (144)	584 (295)	1234 (2553)
Family costs						
Time costs[d]	31 (72)	153 (291)	320 (520)	315 (428)	256 (396)	645 (1048)
Travelling expenses	13 (16)	20 (17)	26 (20)	17 (13)	25 (20)	42 (32)
Bath oil	17 (63)	301 (560)	440 (516)	25 (50)	22 (17)	23 (22)
Out-of-pocket[e]	15 (28)	110 (432)	64 (113)	33 (37)	233 (1023)	69 (201)
Total	77 (63)	301 (560)	440 (516)	366 (440)	522 (1068)	761 (1141)
Costs other sectors						
Home-help visits	0(0)	36 (239)	0 (0)	0(0)	0 (0)	2.13
Total costs all categories	384 (128)	814 (707)	1707 (2256)	811 (518)	1128 (1100)	2022 (3452)

a Antibiotics, antihistamines.
b Steroids, calcineurin inhibitors, tar.
c Bandages, garments and gloves.
d Time missed in paid work and days missed in non-working activities of the parents.
e Self-medication alternative practitioner, carpet changes, nutrition.

1	Study	Schuttelaar, 2011[109]

Note: the individual costs within each sub-group do not add to the total costs reported

- Mean annual health-care costs were higher in the dermatologist group than the NP group. These were driven by higher costs for outpatient visits, laboratory tests and medication. The NP group had slightly higher costs for phone consultations and protective dressings
- The dermatologist group had twice the cost for mean annual family costs compared with the NP group
- The NP group also had higher mean annual costs for home-help visits than the dermatologist group

Cost-effectiveness

The point estimate for ICER was €925 implying that one point less improvement in IDQOL in the NP group compared to the dermatologist group at 1 year would save €925

Bootstrapping results showed a 95% CI of –€5748 to €6667 for the ICER

- For the IDQoL, the cost-effectiveness plane showed that the NP group incurred lower costs and less effect with 51% of the cost-effect pairs plotted in the south-west quadrant
- For the CDLQI, the cost-effectiveness plane showed similar results to the IDQoL, whereby the NP group incurred lower costs and less effect than the dermatologist group, with 59% of the cost-effect pairs in the south-west quadrant
- For the CSQ-8, NP dominated the dermatologist group as it was more effective and less expensive, with 92% of the cost-effect pairs in the south-east quadrant

18 **Sensitivity analysis**

- Scenario analysis was conducted when 60% of the children in the NP group participated in a 1-hour group education session with 5 children per group. The authors assumed an average decrease of 0.5 visits per child in the NP group
- In the NP group, the mean annual societal costs per patient were €944 and the ICER for the CSQ-8 was €270

19	**Author's conclusions**	The authors concluded that care by NPs was cost-saving as well as cost-effective compared with care by dermatologists
20	**Reviewer's comments**	The analysis was well-conducted; detailed descriptions of the model parameters were presented. Uncertainty was accounted for; but probabilistic sensitivity analysis was not conducted. However, the findings of the analyses did not match exactly with the study conclusion. This is considered to be a limitation of the study. Secondly, the different sub-group of costs reported across the different levels of disease severity did not match the sum total of the individual costs components within the sub group

Systematic review quality-assessment checklist for economic evaluations and notes for completion

Critical appraisal checklist for economic evaluations (based on Drummond *et al.*, 2005[110])

Item	Y/N?
1. Is the decision problem (including interventions compared and patient group) relevant to the UK?	Yes
2. Is the setting comparable to the UK?	No
3. Is the analytical and modelling methodology appropriate?	?
4. Are all the relevant costs and consequences for each alternative identified?	Yes
5. Are the data inputs for the model described and justified?	Yes
6. Are health outcomes measured in QALYs?	No
7. Is the time horizon considered appropriate?	No[a]
8. Are costs and outcomes discounted?	N/A[b]
9. Is an incremental analysis performed?	Yes
10. Is uncertainty assessed?	Yes

N/A, not applicable.
a 1 year is considered to be too short for a chronic disease.
b As the analysis was conducted for a time horizon of 1 year, discounting is not appropriate.

1	Study	van Os-Medendorp, 2008[107]
2	**Research question**	To assess medical consumption, health-care costs and costs due to loss of work in patients with chronic pruritic skin diseases enrolled in the nursing programme 'Coping with itch' compared with a control group of patients receiving the usual dermatological care
3	**Country/setting**	The Netherlands
4	**Funding source**	Dutch College of Health Insurance (CVZ)
5	**Analysis type**	CEA
6	**Study type**	Economic evaluation based on the results of a RCT
7	**Perspective**	Not reported
8	**Time horizon**	Trial duration: 9 months
9	**Analysis method**	
	(a) If estimations are based on a model, state the model assumptions where relevant	Not reported
10	**Discounting (rate)**	None
11	**Costing year, currency**	Not stated, €
12	**Population**	
	(a) Definition of condition	Patients with chronic pruritic skin diseases
	(b) Characteristics of baseline cohort/ risk factors	Patients with chronic pruritic skin diseases aged 18 years or older, regardless of the underlying diagnosis who visited dermatology outpatient department of the UMC of Utrecht, Leiden or Rotterdam or the dermatology outpatient department of the Meander Medical Centre in Amersfoort, the Netherlands

1	Study	van Os-Medendorp, 2008[107]
13	**Intervention(s), comparator(s)**	Intervention: usual medical care from a dermatologist as well as nursing care according to the programme 'Coping with itch'. The programme was carried out in a specialised itch clinic run by dermatology nurses who provided individual sessions at the dermatology outpatient department, while medical treatment by the dermatologists continued as usual. The programme consisted of educational and cognitive behavioural interventions, such as individual patient education, awareness training and habit reversal, and relaxation exercises Comparator: usual dermatologist care, comprising diagnostic tests and subsequent therapeutic intervention, such as the use of emollients and topical steroids
14	**Outcome measure**	
	(a) Primary outcome(s) used in the analysis	Frequency of itching and scratching
	(b) Source of evidence for the primary outcome	Data for the primary outcome was recorded in diaries by patients in the RCT that assessed the clinical effectiveness of the nursing programme 'Coping with itch'
	(c) Summary measure of effect	Mean difference collected from the RCT
15	**Health benefits**	
	(a) If relevant, specify the valuation approach (and source)	Factor analysis was applied to the data on the number of times patients felt itchy or scratched to reduce to one factor: the factor of itching/scratching which was converted to a dichotomous measure: high (>4) and low (≤ 4) frequency of itching/scratching
	(b) If relevant, state the instrument used to measure health benefits	Health benefits were expressed in terms of days with a low frequency of itching and scratching None used

1	Study	van Os-Medendorp, 2008[107]

16 **Costs**

Intervention cost

All the costs are expressed in €

	Months 1–3			Months 1–9		
	Intervention (*n* = 22)	Comparator (*n* = 26)	Difference (95% CI)	Intervention (*n* = 25)	Comparator (*n* = 31)	Difference (95% CI)
Costs at the dermatology outpatient department, mean (± SD)						
• Costs of visit to the dermatologist	212.7 (± 220.8)	303.7 (± 548.9)	–91.0 (–325.3 to 143.3)	742.0 (± 507.0)	770.7 (± 980.1)	–28.7 (–495.0 to 437.6)
• Costs of visit to the dermatology nurse	133.3 (± 64.2)	26.3 (± 40.8)	107.1 (77.2 to 137.0)	232.3 (± 145.1)	34.2 (± 52.3)	198.2 (131.1 to 265.2)
• Costs of ultraviolet therapy	47.2 (± 103.3)	22.4 (± 72.4)	24.8 (–24.5 to 74.1)	52.6 (± 106.6)	56.2 (± 122.7)	–3.7 (–71.1 to 63.7)
• Costs of visits to a medical social worker	9.2 (± 45.8)	2.5 (± 13.7)	6.7 (–10.6 to 24.0)	10.4 (± 48.8)	2.9 (± 14.6)	7.5 (–12.8 to 27.7)
• Total costs at the dermatology outpatient department	402.3 (± 263.3)	354.8 (± 554.6)	47.5 (–194.5 to 289.6)	1037.3 (± 614.9)	864.0 (± 1019.3)	173.2 (–327.4 to 673.9)
Costs of visits to the GP	40.0 (± 37.1)	42.1 (± 39.1)	–2.0 (–22.6 to 18.6)	72.1 (± 56.0)	119.9 (± 93.2)	–39.8 (–83.9 to 4.3)
Costs of visits to other HCPs	238.2 (± 252.9)	217.6 (± 296.5)	20.6 (–129.2 to 170.4)	668.1 (± 813.2)	521.0 (± 496.8)	147.1 (–237.9 to 532.1)
Costs of medication	243.5 (± 459.8)	129.4 (± 167.4)	114.1 (–64.3 to 292.5)	559.5 (± 630.3)	426.6 (± 486.9)	132.9 (–191.9 to 457.6)
Costs of days off work	1320.8 (± 3601.4)	343.0 (± 1271.6)	977.8 (–568.0 to 2523.6)	1946.2 (± 4852.0)	1302.3 (± 4285.1)	643.8 (–2010.8 to 3298.5)
Costs of hospitalisations	357.7 (± 1271.0)	721.2 (± 2585.3)	–363.5 (–1498.0 to 771.0)	757.6 (± 1866.2)	1250.8 (± 3617.5)	–493.2 (–2213.3 to 1226.9)
Total costs	2602.6 (± 3841.7)	1808.0 (± 2949.2)	794.5 (–1024.4 to 2603.5)	5040.6 (± 5442.4)	4476.7 (± 5822.9)	564.0 (–2731.9 to 3859.9)

Costs of visits to health-care workers, costs of days off work and hospitalisations were based on the guidelines for cost studies of the Dutch College of Health Insurance (CVZ), whereas medication costs were obtained from the Dutch website: www.medicijnkosten.nl

Indirect costs

To estimate the costs of days off work, an overall mean hourly productivity cost of €34.98 was applied for both men and women

1	Study	van Os-Medendorp, 2008[107]

17 **Results**

Costs			Benefits (days with a low frequency of itching and scratching)			
Intervention	Control	Difference after bootstrap analyses (95% CI)	Intervention	Control	Difference after bootstrap analyses (95% CI)	Cost-effectiveness ratio
Months 1–3[a]						
€2602.6	€1808.0	€793.8 (–970.3 to 2692.7)	34.3	28.4	6.1 (–15.7 to 27.8)	€129.9
Months 1–9[b]						
€5040.6	€4476.7	€582.0 (–2730.0 to 3877.0)	123.0	87.6	35.0 (–33.0 to 96.0)	€16.6

a Intervention group $n = 25$, control group $n = 31$.
b Intervention group $n = 22$, control group $n = 27$.

18 **Sensitivity analysis**

The authors assessed the implications of variation in cut-off score of the frequency of itching and scratching on the cost-effectiveness results. Using a cut-off score of 3 or 5, 61% of patients experienced benefits from the intervention, and 12% had lower costs after 3 months. After 9 months, 63% and 78% of patients experienced benefits using a cut-off score of 3 or 5, respectively and 22% and 28% of patients, respectively, had lower costs

19	**Author's conclusions**	It was observed that, although the first 3 months of the programme 'Coping with itch' incurred most of the expenses, the benefits (in terms of days with little itch) accrued from the programme persisted and increased beyond this period. Based on this observation, the authors concluded that the 'Coping with itch' programme led to a more favourable ICER
20	**Reviewer's comments**	Overall, the analysis was well conducted. The results of the analysis were in line with study conclusions. Sources of model parameters were well-defined. Price year was not reported. Although the study accounted for uncertainty through bootstrapping, probabilistic sensitivity analysis was not conducted. Only two sets of one-way sensitivity analyses were conducted. The analysis accounted for a time horizon of 9 months; however a longer time horizon would have been appropriate. Discounting of costs and benefits were not performed which was considered appropriate given the time horizon of the model was < 1 year

Systematic review quality-assessment checklist for economic evaluations and notes for completion

Critical appraisal checklist for economic evaluations (based on Drummond *et al.*, 2005[110])

Item	Y/N?
1. Is the decision problem (including interventions compared and patient group) relevant to the UK?	Yes
2. Is the setting comparable to the UK?	No
3. Is the analytical and modelling methodology appropriate?	?
4. Are all the relevant costs and consequences for each alternative identified?	Yes
5. Are the data inputs for the model described and justified?	Yes
6. Are health outcomes measured in QALYs?	No
7. Is the time horizon considered appropriate?	No
8. Are costs and outcomes discounted?	No[a]
9. Is an incremental analysis performed?	Yes
10. Is uncertainty assessed?	Yes[b]

a Discounting was not applicable as the time horizon was < 1 year.
b Uncertainty was assessed through bootstrapping; not via probabilistic sensitivity analysis. Also, a very limited sets of one-way sensitivity analyses was performed.

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