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Health literacy interventions for reducing the use of primary and emergency services for minor health problems: a systematic review

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Abstract

Health literacy interventions for reducing the use of primary and emergency services for minor health problems: a systematic review

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Background: Health literacy is the ability to find information, understand information, know how to act on information and know which services to use. Having higher levels of health literacy may help patients to look after minor problems themselves (self-care). It may also help to reduce patients' perceived need for contacting health services for minor health problems, to reduce the perceived urgency of problems or to improve patients' ability to identify and choose from the range of available services. Interventions to improve health literacy for minor health problems have been evaluated, but their effectiveness at reducing use of primary care and emergency services has not been synthesised.

Objectives: The key objectives were as follows: (1) to construct a typology of interventions that aim to reduce primary or emergency care use, (2) to synthesise evidence of the effectiveness of different types of health literacy interventions and (3) to consider how stakeholders in the UK could operationalise the evidence.

Interventions: The interventions being reviewed were initiatives that help members of the population to self-care or make decisions about whether or not and where to seek health care for minor health problems.

Design: This study was a systematic review with stakeholder involvement.

Data sources and review methods: A meeting was held with 14 stakeholders (including patients, carers and the public) to guide the systematic review. This was followed by a multicomponent review of quantitative and qualitative research. Database literature searches were undertaken in Ovid MEDLINE, The Cochrane Library (via Wiley Interscience), EMBASE (via OVID), the Cumulative Index to Nursing and Allied Health Literature (via EBSCO), PsycINFO (via OVID), Web of Science and Sociological Abstracts. The search was limited to English-language publications from 1990–2020. To assess study quality, the Cochrane Risk of Bias tool was used for randomised controlled trials and the Newcastle–Ottawa Scale was used for non-randomised studies. A narrative synthesis was undertaken. The review was followed by a meeting with 16 stakeholders to interpret the results.

Results: A total of 67 articles (64 studies) were included: 37 from the USA, 16 from the UK, 12 from the rest of Europe and two from the rest of the world. There were seven intervention types: navigation tools directing people to the range of services available ($n = 7$); written education about managing minor health problems in booklet or website format ($n = 17$); person-delivered education ($n = 5$);

written education with person-delivered education ($n = 17$); multicomponent of written education, person-delivered education and mass media campaign ($n = 5$); self-triage ($n = 9$); and other ($n = 7$). Our team assessed the readability and user-friendliness of interventions, and found that these varied widely. When assessed, most studies measuring satisfaction with the intervention, enablement and perceived changes to behaviour showed positive results. Of 30 articles reporting impact on emergency department attendances, 19 (63%) showed a reduction, and 16/27 (59%) articles measuring impact on general practice consultations showed a reduction. Variation in the evidence base was not explained by any research, context or intervention characteristics. Only eight articles measured safety: these identified no problems.

Limitations: There was inconsistency in how the outcomes were measured, so a meta-analysis was not possible.

Conclusions: Health literacy interventions have potential to affect emergency and primary care use, but the evidence base is inconsistent.

Future research: It is important to continue to evaluate these types of initiatives.

Study registration: This study is registered as PROSPERO CRD42020214206.

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Supplementary material has been provided by the authors to support the report and any files provided at submission will have been seen by peer reviewers, but not extensively reviewed. Any supplementary material provided at a later stage in the process may not have been peer reviewed.

Glossary

Digital health literacy or e-health literacy 'the ability to seek, find, understand, and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem.' (Norman CD, Skinner HA. eHealth literacy: essential skills for consumer health in a networked world. *J Med Internet Res* 2006;**8**:e9).

Health literacy Health literacy is defined by the World Health Organization as the resources needed for people to access, understand and use information and services to make decisions about their health [www.england.nhs.uk/ourwork/patient-participation/health-decisions/ (accessed 26 October 2021)]. There are different types of health literacy: functional or basic health literacy (reading and writing skills); communicative health literacy (cognitive and social skills to extract information and apply it); and critical health literacy, which requires more advanced cognitive and social skills to analyse information (Nutbeam D. Defining and measuring health literacy: what can we learn from literacy studies? *Int J Public Health* 2009;**54**:303–5).

List of abbreviations

CASP	Critical Appraisal Skills Programme
CCG	Clinical Commissioning Group
ED	emergency department
FKGL	Flesch–Kincaid Grade Level
FRE	Flesch Reading Ease
GP	general practitioner
GRIPP2	Guidance for Reporting Involvement of Patients and the Public 2
MMAT	Mixed Methods Appraisal Tool
PPI	patient and public involvement
RCT	randomised controlled trial
ScHARR	School of Health and Related Research
SORT	Strategy for Off-site Rapid Triage
SWiM	synthesis without meta-analysis
TIDieR	Template for Intervention Description and Replication
UFAT	User-Friendliness Assessment Tool

Plain English summary

What was the question?

Some people struggle to find information about their health and understand it. This is known as having a low level of 'health literacy'.

People with a low level of health literacy are more likely to go to an accident and emergency department or seek an appointment with their doctor when they have minor health problems such as stomach upsets or coughs/colds.

This study looked for research on how to improve people's health literacy so they can (1) look after minor health problems and (2) know how to access the right services.

What did we do?

We undertook a systematic review. This means bringing together previous research to learn about what works.

We held meetings with patients, carers, doctors and NHS managers to plan the review and talk about the findings.

What did we find?

We found 67 research papers. These tested booklets, leaflets and websites about how to look after minor health problems. They also tested websites that ask questions about symptoms and then offer a solution (digital self-triage). People found these things helpful. Two out of every three research papers showed that fewer people went to accident and emergency or a doctor after using a booklet or website. We could not work out why only some studies showed changes in service use. This meant that we were not certain that these initiatives worked, but felt that they had potential. There was no sign that the initiatives were unsafe in terms of people not accessing services when they needed to.

What does this mean?

Similar initiatives are being used in the NHS now. They have the potential to stop people going to accident and emergency and their doctor with minor health problems. But they need to be tested further to make sure they are working and to understand why they are working.

Scientific summary

Background

Health literacy is the ability to find information, understand information, know how to act on information, and know which services to use and when. Having higher levels of health literacy may help patients to look after minor problems themselves (self-care). It may also reduce patients' perceived need for contacting health services, reduce the perceived urgency of problems, or improve patients' ability to identify and choose from the range of available services. By improving health literacy, it may be possible to reduce people's need to seek advice and care from primary care and emergency services for minor health problems.

Objectives

The key objectives were (1) to construct a typology of health literacy interventions that aim to reduce primary care or emergency care service use, (2) to synthesise evidence of the effectiveness of different types of interventions and (3) to consider how stakeholders in the UK could operationalise the evidence.

Design

This study was designed as a multicomponent systematic review to identify and synthesise the evidence concerning relevant interventions and outcomes, with stakeholder input. The first stakeholder event guided the systematic review. The second stakeholder event considered how to interpret the findings.

Methods

A meeting with 14 stakeholders (including patients, carers and members of the public) was conducted to guide the systematic review. A multicomponent systematic review of quantitative and qualitative research was then undertaken. The systematic review was conducted and reported according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. The review included studies of any design, published in English between 1990 and 2020, that evaluated health literacy interventions aimed at reducing health-care service use. Database literature searches were undertaken in MEDLINE, The Cochrane Library, EMBASE, Cumulative Index to Nursing and Allied Health Literature, PsycINFO, Web of Science and Sociological Abstracts. Grey literature sources were also searched. The risk of bias and risk to rigour in the evidence base were assessed using appropriate, design-specific tools, and a narrative synthesis was performed. The review findings were then considered in a second meeting with 16 stakeholders, and the implications of the evidence base were explored with reference to existing and potential health literacy interventions. A patient and public involvement (PPI) panel met throughout the review.

Results

Characteristics of studies

Sixty-seven articles (reporting 64 studies) were included: 37 from the USA, 16 from the UK, 12 from the rest of Europe and two from the rest of the world. The 67 articles were published between 1990 and 2020, with almost half published in 2010 or later ($n = 32$). The interventions were delivered in

primary care ($n = 35$ articles), emergency care ($n = 12$ articles) or the community/other (e.g. workplace) ($n = 20$ articles). Around half were aimed at parents of young children ($n = 32$), and half at adults/the general population ($n = 35$). Most of the interventions delivered in emergency care (11/12) and community/other settings (15/20) were from North America.

The authors used a range of study design. 30 of the articles reported randomised controlled trials (RCTs) and 33 articles reported single-arm or controlled cohort studies. Four articles reported qualitative or mixed methods research. Quality assessment determined that the quantitative evidence base was generally at high risk of bias: 20 out of 30 RCTs were judged to have a high risk of bias and 17 out of 33 cohort studies were assessed as weak.

The interventions

The interventions were described using Template for Intervention Description and Replication guidelines. The team identified multiple mechanisms for each intervention: education about managing minor health problems ($n = 53$ articles), raising awareness about the range of services available to people ($n = 23$), tailoring to individuals' contexts ($n = 21$), empowerment to make decisions and manage health problems ($n = 15$), persuasion to use or not use a specific service ($n = 12$) and anxiety reduction ($n = 8$). Each intervention was either targeted at a specific group of people who had used emergency or primary care for a minor health problem ($n = 26$) or made available to the general population ($n = 40$); one qualitative study of five interventions did not fit this classification.

The team constructed a novel typology of interventions based on the aim of the intervention (navigation, education or self-triage), delivery format (e.g. written, person, digital) and when it was delivered (when a patient had used a service for a minor health problem, or offered to everyone). The team allocated articles to this typology. There were seven common intervention types: navigation tools to guide people to different services ($n = 7$ articles); written education about managing minor health problems, in paper or website format ($n = 17$); person-delivered education ($n = 5$); written education with a person delivering part of the intervention ($n = 17$); multicomponent interventions of written education, person-delivered education and mass media campaign ($n = 5$); self-triage tools ($n = 9$); and other ($n = 7$).

When copies of the materials were available (for 13 interventions used in 20 articles), an assessment was made of the readability (ease of reading and required reading age) of interventions. Eight out of 13 were assessed as having been written in plain English. Two of the website interventions had the worst scores. The team developed a supplementary User-Friendliness Assessment Tool with PPI colleagues to assess aspects such as formatting and trustworthiness. Scores ranged from 10 to 37 out of a maximum of 42, where a higher score indicated better user-friendliness. Some interventions aimed at parents of young children were scored as having the best user-friendliness.

Impact on service use overall

Nineteen out of 30 (63%) articles reporting impact on emergency department (ED) attendances showed a reduction in the number of attendances; 16/27 (59%) articles reporting impact on general practice consultations showed a reduction in the number of consultations.

Impact on service use by intervention type

Navigation tools

Seven articles reported eight interventions. These interventions tended to use the mechanisms of 'raising awareness' and 'persuasion'. Five of the six studies measuring impact on EDs reported a reduction in use: people could be persuaded to use their primary care provider rather than EDs. However, the quality of the studies was not high and the evidence base was context specific (all the studies were based in the USA, which has an insurance-based health-care system).

Written education type

Seventeen articles focused on written education in paper or website format. The common mechanism was 'education'. Leaflets or booklets varied in size and in the range of minor conditions addressed. There is a reasonable evidence base for booklets or leaflets, but limited evidence for digitally available written information. Fourteen articles reported impact on service use. Six of the nine articles reporting impact of written interventions on general practice consultation rates reported a reduction, but the two good-quality UK RCTs had conflicting results. Five articles of written education interventions measured impact on ED attendances, with two reporting a reduction. Overall, there was a reasonable amount of evidence from the UK and Europe, but some inconsistency in findings, and the overall quality of studies was not high.

Person-delivered education

Five interventions focused on this approach. The mechanisms included both 'education' and 'empowerment' because patients were trained in self-care by a health professional. Of the three articles measuring impact on ED attendances, two found a reduction. The evidence base was small, of poor quality and context specific (USA only). Few conclusions could be drawn.

Written education with a person-delivered component

Seventeen articles assessed leaflets/booklets delivered during an interactive session with a person, most often a health professional, seven at a specific time in a patient's care (during or after an episode of care for a minor health problem) and seven at a non-specific time (e.g. during prearranged well-child visits). The evidence base for interventions given at a specific time was largely from Europe, whereas interventions offered at a non-specific time were mainly from the USA. The mechanisms of 'tailoring', 'anxiety reduction' and 'empowerment' were common. Five of eight studies measuring impact on ED attendances reported a reduction; and 7 of 11 studies measuring impact on general practice consultations found a reduction. Even though this type of intervention had additional mechanisms to the written education type, the conclusions from the evidence base were similar.

Multicomponent

Five articles reported interventions involving more than written information and training components, such as the addition of mass media advertising and patient navigation. The mass media components included public education campaigns within a specific geographical area, or the use of posters to promote training workshops. The mechanisms tended to include 'empowerment' and 'tailoring', as well as 'education'. Three out of three articles measuring impact on ED attendances reported a reduction; one of the two studies measuring impact on general practice attendances also reported a reduction. The cohort studies in this type were generally of moderate quality, but the RCTs were assessed as being at high risk of bias. The findings for this type of intervention were essentially the same as for the combination of written information and person-delivered training.

Self-triage

Nine articles reported self-triage-type interventions; seven were digital self-triage interventions. The paper-based self-triage evidence base was small and limited to a scoring system for very young children. For digital self-triage, three studies were conducted in the UK and four in the Netherlands. The common mechanisms were 'education' and 'tailoring', with some interventions also offering attention to 'anxiety reduction'. Only four studies presented sufficiently robust findings for analysis, all of which assessed general practice consultations. The trend was for a reduction in general practice use, but this was rarely statistically significant.

Other types

Seven articles did not fit the types of interventions described previously. Each study measured the impact of the intervention on ED and/or general practice use. Two of the five studies showed a reduction in ED use. The single study that measured general practice use showed a reduction. The quality of the included studies was judged to be moderate or weak.

Multivariate regression

Variation in outcomes was not explained by characteristics of the study (e.g. the quality of research), context (e.g. whether or not the intervention was targeted at people in poverty/with a low level of health literacy) or intervention (e.g. type of intervention).

Other outcomes and processes

Users found the interventions helpful (18/20 articles), had improved knowledge (7/8 articles), felt enabled to look after themselves (6/7 articles) and perceived that the interventions changed their behaviour (16/16 articles). Qualitative research about facilitators and barriers to implementing interventions was limited to mainly digital interventions.

Cost-effectiveness

Fifteen of the articles reported cost data in the results, 11 of which conducted a formal analysis. Of the 11 with formal analysis, 10 studies reported cost savings from the interventions and one reported a substantial return on investment. The studies were too heterogeneous to synthesise as planned. We had concerns about this aspect of the review because the quality of the studies for measuring effectiveness was not high.

Safety

Only eight of the included studies assessed safety as an explicit outcome or compared surrogate outcomes, such as hospitalisation, across study arms. The explicit safety assessments included instances when patients should have accessed a service but did not do so on account of the intervention. Where assessed, no safety problems were identified. On the whole, any reduction in service use was perceived to be a success; there was usually no subanalysis to determine if some of that reduction was not appropriate.

Displacement of service use

The studies did not tend to measure whether or not reductions in general practice use were due to increased use of EDs, or whether or not people went to other EDs rather than the one where the intervention was delivered and where changes in service use were being measured.

Stakeholder events

At the first event, stakeholders identified issues that were important to consider when undertaking and reporting the review, for example being clear that health literacy was not the only issue and that sometimes patients had difficulty accessing their general practitioner or NHS 111. At the second event, stakeholders identified a range of issues about interpreting the results of the review. For example, they identified the need to have health literacy interventions in different formats and languages.

Relevance of evidence

Although half of the studies were undertaken in the USA, half of them were undertaken in the UK or Europe, with high relevance to the UK context. Almost all of the intervention types have equivalents currently in use in the NHS, such as educational booklets aimed at parents of young children and the self-triage service NHS 111 Online.

Limitations of evidence

The evidence base was extremely diverse, preventing statistical pooling of outcome data. Although the evidence base was generally recent, and approximately one-quarter of studies were conducted in the UK (16/67), a considerable proportion was generated in North America, where the health systems are different from that of the UK. Furthermore, the evidence was generally assessed as being of low quality.

There was an insufficient number of studies to determine why similar studies showed reduction in service use or no change in service use. Formal cost analyses were reported by only 11 studies.

Patient and public involvement

Members of the PPI panel raised pertinent issues about the evidence base and findings. These included the need to publicise the similar interventions currently in use in the NHS. They wanted interventions used in the NHS to be accessible in terms of being easy to read, easy to use, and available in different languages and formats. PPI members highlighted that digital literacy and access to technology are poor in some groups of society, so interventions still need to be available in paper format.

Conclusions

Health literacy interventions have potential to reduce emergency and primary care use. They need further rigorous evaluation to determine which work best and for whom.

Implications for health care

A number of health literacy interventions are used in the NHS currently, for example booklets and websites to help people manage minor health problems and decide where is best to go for care, and NHS 111 Online for self-triage. Rather than develop more interventions, assessing the quality of existing interventions and making good-quality ones more accessible to the general population might benefit people's ability to care for minor problems and seek health care from the most appropriate place. It is important to assess the readability and user-friendliness of these interventions, including websites, so they can be improved if necessary. It is also important to evaluate interventions currently in use in the NHS in terms of measuring impact on service use, safety and cost-effectiveness.

Recommendations for research (numbered in priority order)

1. Focus on understanding how to improve access to existing interventions (particularly those currently used in the NHS) rather than develop new interventions.
2. Continue to evaluate the effectiveness and cost-effectiveness of these types of interventions.
3. Measure the safety of these interventions.
4. Focus on understanding why an intervention did or did not work, rather than measuring only impact on service use, that is use mixed-methods evaluations of RCTs/quasi-experimental designs and process evaluations/qualitative research.

Study registration

This study is registered as PROSPERO CRD42020214206.

Funding

This project was funded by the National Institute for Health and Care Research (NIHR) Health and Social Care Delivery Research programme and will be published in full in *Health and Social Care Delivery Research*; Vol. 10, No. 38. See the NIHR Journals Library website for further project information.

Chapter 1 Background

Demand for primary and emergency care in the UK

There is considerable pressure on general practices, emergency departments (EDs) and emergency ambulances in the UK. In 2019, the Royal College of General Practitioners highlighted intense resource and workforce pressure on general practice out-of-hours services and expressed concerns about decreases in the number of general practitioners (GPs) per head of population, despite rising demand for general practice. In 2021, the Royal College of General Practitioners highlighted the lack of GPs to meet demand.[1] In 2019, policy-makers reported on the NHS England website that there were 110 million urgent patient contacts in England each year, with around 85 million being same-day GP appointments, and the rest attendances at EDs and minor injury units. NHS England estimated that between 1.5 million and 3 million attendances at EDs could be managed by other parts of the urgent care system. Emergency ambulance services deal with around 11 million calls annually, and around one in eight are dealt with through advice from a clinician by telephone.[2] Patients having these 'hear-and-treat' calls, that is calls that do not result in an ambulance being despatched, are offered self-care advice or are recommended to contact lower-acuity services. NHS England is currently encouraging people to use NHS 111 to help them make decisions about which service, if any, to use, including self-care and pharmacy. Demand for NHS 111 also outstrips supply, and policy-makers have attempted to ease demand for this service by encouraging people to use NHS 111 Online to help them make decisions about where in the NHS to seek care.[3]

There is a need to consider ways of reducing pressure on emergency and primary care services. Although primary care is a setting that provides a first point of contact in the NHS for patients, and includes general practices, community pharmacies and dentists, a focus on general practice is important because of the current pressure on this service.

Minor health problems

Some people need to use emergency and urgent care, and it is important to maintain access to services to meet their needs. However, some people do not need the clinical resources or acuity level of primary or emergency care services. Some patients could contact their GP instead of calling for an emergency ambulance or attending an ED. Other patients could self-care or seek advice from a pharmacist instead of contacting general practice, the ED or the ambulance service. A variety of terms are used to describe this type of service use, such as 'clinically unnecessary',[4] 'primary care sensitive problems' in emergency care,[5] non-urgent or low acuity. The prevalence of this type of use varies depending on the definition used, but it is likely to be high. For example, 15% of attendances were classed as non-urgent in an analysis of routine data from EDs in the UK.[6]

Some of these contacts in primary and emergency care are for minor health problems, injuries or ailments that could be managed through self-care or contact with a pharmacist. Examples of minor health problems include raised temperature in a child, musculoskeletal pain, eye discomfort, gastrointestinal disturbance and upper respiratory tract-related symptoms.[7] Research has shown that people attend EDs, general practice or a pharmacy with these minor health problems. When contacts with different services for similar minor health problems are compared, they have similar resolution rates, but the cost per consultation is higher for EDs and GPs than for pharmacy: £147 and £82, compared with £29, respectively.[7] People may also attend general practice out-of-hours services, as well as daytime general practice, for minor health problems.[8]

Reasons why people attend primary and emergency care with minor health problems

There are a wide range of reasons why people contact services for minor health problems. A recent study of ‘clinically unnecessary’ use of ambulance services, EDs and GPs in the UK explored this issue using a realist review, qualitative interviews with patients and a national population survey.[4] Ten reasons were identified in the realist review[9] and qualitative interviews:[10]

1. uncertainty about symptoms, causing anxiety
2. heightened awareness of risk as a result of experience or knowledge of traumatic health events, leading to anxiety
3. fear of consequences when responsible for others such as children or elderly people
4. inability to get on with daily life, such as going to work or looking after children
5. need for immediate pain relief
6. waited long enough for things to improve
7. stressful lives so cannot cope with any health problem
8. following advice of trusted others from NHS staff, family, friends, colleagues
9. perceptions or prior experiences of services, for example positive experiences of EDs lead to further use of EDs
10. perceived poor access to a GP in the time frame wanted.

These issues were measured in a national population survey of the tendency to contact primary and emergency care for minor health problems. Other issues that were less commonly identified in the literature were also measured, including awareness of alternative services, beliefs about how busy emergency and primary care services are and health literacy levels. The effect of people’s health literacy levels on their decision-making was measured because researchers in the USA found that people who attended EDs with non-urgent problems had lower levels of health literacy.[11] It was also possible that poor health literacy might underlie some of the reasons for using primary and emergency care for minor health problems. For example, people with low levels of health literacy might be more anxious about minor health problems because they do not understand what symptoms are associated with serious problems, they may be less likely to know how to manage pain, they may be more likely to look to others for advice, they may not know how long it takes for some minor problems to resolve and they may be unaware of alternative services. When a range of variables were tested in a population survey to explain tendency to contact primary and emergency care for minor health problems, lower health literacy levels were associated with this use of emergency ambulances and general practice, even when all other variables were controlled for.[9,12]

The importance of health literacy

Given the role of health literacy in explaining the tendency to use emergency ambulances and general practice, and its relationship with the use of EDs for non-urgent problems, it is important to understand what it is, how it is measured, its relationship with use of primary and emergency care, and how it can be addressed to reduce the use of primary and emergency care for minor health problems.

What is health literacy?

Health literacy is defined by the World Health Organization as the resources needed for people to access, understand and use information and services to make decisions about their health.[13] There are different types of health literacy: functional or basic health literacy (reading and writing skills); communicative health literacy (cognitive and social skills to extract information and apply it); and critical health literacy, which requires more advanced cognitive and social skills to analyse information.[14]

People with limited health literacy struggle with:

- finding information
- reading and understanding information
- knowing how to act on information
- knowing how to communicate with health professionals
- knowing which services to use and when.[15]

Aligned with health literacy is digital or e-health literacy, which has been defined as 'the ability to seek, find, understand, and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem'.[16]

Health literacy may be viewed as an individual skill, but an individual's social support system (e.g. partner, family, community) and the context in which they live (e.g. the health-care system available) are also likely to be relevant.[17]

How is health literacy measured?

There are a number of validated measures of health literacy that either test health literacy (one might call these 'objective measures') or measure people's perceptions of their health literacy (one might call these 'subjective measures'). Examples include the objective measure Newest Vital Sign, used in a study of health literacy among parents attending a paediatric ED for non-urgent problems;[11] the subjective measure the Health Literacy Questionnaire, which measures multiple domains of health literacy;[15] and the subjective measure the European Health Literacy Survey Questionnaire, which is available in multiple European languages.[18]

Policy initiatives on health literacy in the UK

Improving health literacy is important to policy-makers in the UK. National policy in England currently focuses on improving health literacy in the management of chronic conditions and health improvement, and on improving health literacy awareness among the health-care, social care and third-sector workforces. NHS England has a health literacy lead and multiagency initiatives to improve health literacy.[13] NHS Scotland has a long-term plan to improve health literacy.[19] Health Education England generates tools and leads initiatives to improve health literacy.[20]

The relationship between health literacy and demand for primary care and emergency services for minor health problems

Primary care

There is evidence that a lower level of health literacy is related to greater use of primary care, including contacting a GP,[21] frequency of doctor visits[22] and use of out-of-hours primary care services.[23] There is also evidence that it is related to greater demand for general practice for minor health problems. A recent British population survey of the demand for same-day general practice for minor health problems identified that people with a lower level of health literacy had a greater tendency to contact their GP in a multivariable analysis testing a wide range of variables.[12]

Emergency care

There is systematic review evidence from 2011 that a lower level of health literacy is associated with greater use of emergency services.[24] More recent studies support this conclusion. Examples include unnecessary use of the ambulance service in Japan,[25] ED use for minor or non-urgent problems in the USA,[26] ED return rates[27] and use of EDs by first-generation Chinese immigrants in Australia.[28] A 2020 British population survey of demand for emergency ambulances and EDs for minor health problems identified that people with a lower level of health literacy had a greater tendency to contact emergency ambulances.[4]

Reasons for the relationship

The relationship between health literacy and the use of primary and emergency care for minor health problems could be explained simply by the educational status of patients. There is a correlation between health literacy and educational attainment, but educational attainment does not explain all of the variation in health literacy levels. For example, 29% of people attending EDs for non-urgent issues were found to have a college education and a low level of health literacy.[11]

There is evidence that people with a lower level of health literacy may overestimate the severity of an illness and seek care sooner than people with a higher level of health literacy.[29] They may also be harder to reassure when a symptom is not serious. A study[30] of factors determining parental reassurance for a child with fever in rural general practice showed that parents who lacked knowledge about complications of fever had higher levels of concern before consulting a doctor and were less likely to be reassured after consultation with a doctor, leading to a recommendation that further education of parents is required.

Research that does not support this relationship

Not all studies have found a relationship between use of health services for minor health problems and health literacy. For example, health literacy was found not to be associated with GP consultations, only with home consultations.[31] A survey of the British population found no relationship between health literacy and tendency to use EDs for minor health problems when other variables were adjusted for.[4]

Need for interventions to address health literacy in this context

Research exploring help-seeking behaviour for minor health problems sometimes concludes that patient education is needed. Physicians and nurses cite lack of education and self-care when exploring the related area of frequent attendance,[32,33] and a lack of awareness of the availability and capability of alternative services to EDs.[10] When GPs in the UK were interviewed about strategies for coping with increasing workload, they identified the need to educate patients about self-care, stating that they preferred that the government rather than GPs to be responsible for this education.[34]

Improving health literacy is one of many solutions needed

This review focuses on health literacy because it is an important factor affecting demand for primary and emergency care for minor health problems. However, it is one of many factors; as a 2020 study concluded, 'There is unlikely to be a single solution to these multiple, inter-related reasons for "clinically unnecessary" use of services. Rather, a series of solutions, undertaken concurrently, may be necessary'.[4] It is important to keep in mind that service-related issues are important, as well as health literacy; for example, some people may have tried to get an appointment with their GP before going to an ED, but have been unable to get one in the time frame they wanted. Addressing health literacy is a potential solution to consider, complementary to other initiatives.

NHS initiatives to address demand for primary and emergency care

Given that there is a need for multiple interventions to address demand for primary and emergency care for minor health problems, it is useful to consider the range of interventions that policy-makers, commissioners and service providers have introduced. They tend to focus largely on service and workforce reconfigurations that offer alternatives to the three pressurised services of general practice, EDs and emergency ambulances, or on initiatives to manage minor problems efficiently within each of these three services. Examples of these initiatives include provision of a Community Pharmacy Minor Ailment Service, the provision of walk-in centres, the extension of the role of pharmacists, GPs working in EDs, paramedics working in general practices and redirection of people attending EDs. Initiatives also include the national telephone helpline NHS 111 for urgent care whereby non-clinical call-takers direct people to the most appropriate service for their need, or pass callers to clinicians who assess more difficult cases and offer self-care advice or referral to services.

Intervention further back in the pathway of help-seeking behaviour may offer a complementary approach to these initiatives. That is, it may be possible to reduce population need to seek advice from health professionals in pharmacy or NHS 111 for minor health problems and thereby reduce demand for pressurised services. This will be useful at any time, and especially during pandemics, when some people stop attending primary care and emergency services for minor health problems and need to self-care or be able to distinguish between minor and serious problems.

Reviews in related areas

Prior to applying for funding for this systematic review, we undertook a scoping exercise and found no similar systematic reviews. We continued to search for other reviews during the study. We found a number of reviews in related areas, but no review of the same territory.

Reviews of interventions to improve health literacy

There are numerous systematic reviews of interventions to improve health literacy,[24,35,36] including for enhancing digital health literacy.[37,38] These reviews tended to focus on interventions with the intention of improving health literacy as their primary outcome, and often did not go beyond this point in the pathway to consider the impact of this improved health literacy on service use. When the reviews did go beyond this point, they considered improvement in health and changes in service use for self-management of chronic conditions, rather than for minor health problems.

Reviews of behaviour change

A review focusing on health behaviours[39] looked relevant to our work because health literacy interventions can aim to change behaviour regarding service use. This review did not include the types of interventions of interest in our review. It concluded that interventions could improve health literacy and result in lifestyle changes.

Reviews of self-management of chronic conditions

Some reviews focused on self-management interventions for chronic conditions, with the aim of reducing ED attendances and hospital admissions.[35] These interventions aimed to educate patients on how to prevent serious exacerbations that necessitate an emergency response. That is, they aimed to reduce ED attendance for serious problems, rather than minor problems. It is possible that they also reduced ED attendance for minor problems, but this was not the primary purpose of the intervention and so these reviews did not include interventions relevant to our review. The term ‘self-management’ rather than ‘self-care’ is usually used in the context of chronic conditions such as asthma and diabetes, whereby the aim is to prevent exacerbations using self-management.

Reviews of patient-focused interventions

A review of patient-focused interventions included one type aiming to improve health literacy.[40] Again, the focus was on health literacy rather than changing service use.

Reviews of health literacy interventions to reduce use of primary or emergency care

Prior to seeking funding for this study, we found a review that focused on parental health literacy and paediatric ED attendance, in which seven out of eight studies showed that interventions reduced ED use.[26] This review considered one specific patient group (parents of young children), so we still believed that it was important to undertake our review. We intended to include the papers from this review in our review, but found that most of them focused on the chronic condition of asthma and the prevention of serious problems, rather than the management of minor health problems.

Andrews *et al.*[41] reviewed the specific area of respiratory illness among children. Part of the focus was on primary care consultations, for which they found nine papers about eight interventions aiming to increase health literacy. Six studies measured reductions in the number of consultations, with these reducing by 13–40% in three studies, although some studies relied on self-report of service use. They authors concluded that interventions were best if they occurred prior to an illness episode, highlighting the importance of the timing of an intervention. Again, this review focused on a specific illness in a specific age group, so there was still a need to undertake our review, and to ensure that we included relevant papers from this review.

Paudyal *et al.*[42] undertook a systematic review of pharmacy-based minor illness schemes aiming to reduce use of other services. Although pharmacy use can be viewed as 'supported self-care', this review was not relevant because interventions did not focus on improving health literacy, but instead on offering an alternative health professional for advice.

Reviews of digital health literacy interventions

Some of the interventions in our systematic review are likely to be delivered digitally. Of interest was a 2011 systematic review that concluded that there were not enough studies to identify effective interventions for enhancing digital health literacy.[38] A more recent (2020) systematic review of digital interventions for the specific area of parents of acutely ill children in primary care found three studies.[43] Interventions were applications (hereafter referred to as 'apps') or a website offering self-triage or advice. Parents did not find two of the interventions easy to use. None of these interventions demonstrated reduced use of services for minor health problems. One study showed no difference in non-urgent ED attendances; one did not measure this outcome; and one measured intended, rather than actual, service use. Donovan *et al.*[43] proposed that the way in which interventions were developed could affect their usability and their effectiveness, and that co-design with patients was important.

Reviews of self-care for minor health problems

Richardson *et al.*[44] undertook three systematic reviews of qualitative and quantitative research on self-care for minor ailments. One review focused on evaluation of services/interventions and their impact on reduction of use of GPs and EDs. The focus of this review was much wider than that of our review, looking beyond health literacy and including interventions such as the use of NHS 111, pharmacies and walk-in centres. In addition, it focused only on the UK, rather than international literature. Richardson *et al.*[44] found that interventions using education only did not work and proposed that this was because a range of issues affected patient decision-making. They highlighted that people can be overwhelmed by anxiety. We included their education-based interventions in our review where relevant.

Reviews of self-triage/symptom checkers

An audit of self-triage interventions showed that most were risk averse and encouraged people to contact services when, in fact, self-care was reasonable.[45] This audit did not measure impact on service use.

The need for this review

Although a number of reviews have been undertaken in related areas, and some reviews addressed parts of the territory covered in this review, there was a research gap for a review of health literacy interventions aiming to reduce the use of primary and emergency care for minor health problems.

Chapter 2 Research aim, design, and patient and public involvement

Aim and objectives

The aim was to identify interventions that reduce the use of primary and emergency care for minor health problems by improving health literacy.

The objectives were to:

- identify the effectiveness, cost-effectiveness and safety of interventions
- identify the contexts in which different types of interventions are effective
- describe interventions
- identify the mechanisms of action of interventions
- construct a typology of interventions relevant to service use reduction
- describe the development process and its impact on effectiveness
- describe the literacy levels of information-based interventions and their impact on effectiveness
- identify patient, carer and staff views on the feasibility and acceptability of interventions
- consider how UK stakeholders could operationalise the evidence in terms of identifying a set of interventions that they would find feasible, appropriate, meaningful and effective within their localities.

These objectives are slightly different from those in the proposal. For example, we originally intended to consider the literacy levels of effective interventions only, but we subsequently decided to do this for all the interventions we could find because we were interested in whether or not the readability or ease of use of an intervention had an impact on its effectiveness.

Design

We undertook a systematic review with stakeholder involvement. First we held a stakeholder event to inform the systematic review, then we conducted a systematic review to identify and synthesise the evidence and, finally, we held another stakeholder event to consider how to implement the evidence. We attended to guidance on good practice when involving stakeholders in systematic reviews. We drew on the Guidance for Reporting Involvement of Patients and the Public 2 (GRIPP2) framework to reflect on our patient and public involvement (PPI).[46] See *Report Supplementary Material 1* for the GRIPP2 reporting guidance checklist.

Ethics approval

Some researchers may use research methods for stakeholder involvement, such as Delphi exercises,[47] and this requires research ethics approval. Our stakeholder involvement was akin to PPI in that we held workshops to encourage research users to shape and interpret the systematic review. We did not require ethics approval for the stakeholder involvement or for the systematic review.

Patient and public involvement

Aim

We aimed to have patients and members of the public providing input to the development, conduct and dissemination of the review to ensure that the findings would be relevant and useful in supporting people making decisions about self-care or accessing health care.

What we proposed in the funding application

Margaret Ogden (a member of the Sheffield Evidence Synthesis Centre PPI group when we applied for funding) supported development of the funding application and was a co-applicant. We planned that Margaret would be part of the project management team, attending team meetings every couple of months and inputting into decision-making throughout the study.

We proposed that four members of the School of Health and Related Research (ScHARR) Evidence Synthesis Centre PPI group would be involved in different parts of the review process, including attending the two stakeholder events and supporting the development of the protocol (e.g. ensuring the salience of the search strategy, supporting the development of a dissemination strategy and providing feedback on the plain English summary included in the final report). We promised that we would keep the group informed throughout the project.

We proposed that we would also take our early findings to the Yorkshire and Humber Deep End Patient Panel. This is a panel of 10–15 people living in the most socioeconomically deprived areas in Sheffield, established by a local GP. We would also invite them to the second stakeholder event, expecting a maximum of five to attend.

What we did

Although our activities were in keeping with what we proposed, we had to respond to COVID-19 restrictions by quickly amending our plans to meet virtually, rather than face to face. This provided an opportunity to involve people from a wider geographical area while keeping within allocated costs. We also involved members of the Deep End Patient Panel from the start of the systematic review, rather than only at the findings stage. We involved PPI members in all stages of the review, including developing the funding application, deciding the scope of the review, designing the user-friendliness assessment and considering the implications of the findings.

Who was involved

We aimed to work with people representing the general public, rather than seeking out people with lower levels of health literacy or a history of using primary or emergency care for minor health problems.

Margaret Ogden was actively involved in the review. She supported the development of the funding application and was a co-applicant. She was a member of the project team, attending team meetings and supporting the development of the stakeholder events. She co-led the PPI group with Alexis Foster, seeking out new members to ensure diversity. She helped with developing the User-Friendliness Assessment Tool (UFAT) and undertaking assessments of the user-friendliness of included interventions (see *Chapter 3*). She commented on and edited the plain English summary in the final report. Using Pollock *et al.*'s[48] involvement framework, Margret Ogden's involvement was categorised as both 'controlling and influencing': she was part of the research team, contributed to decision-making and undertook review activities by assessing the user-friendliness of interventions.

In the application for funding, we said that we would work with the Sheffield Evidence Synthesis Centre PPI group, but this ceased to exist by the start of the review. Instead we developed a new PPI group for the review, with membership expanding over time. We invited some members of the disbanded Sheffield Evidence Synthesis Centre PPI group to be involved; in addition to Margaret Ogden, one person agreed to be involved. As some of the potential interventions included in the review were aimed at parents of young children, we wanted to have representation from this demographic. Through our networks, we identified two people to be involved who had young children, one of whom had not undertaken PPI work before. We also invited members of the Deep End Patient Panel to join our PPI group. We did this because the Deep End Patient Panel was not meeting at the time because of COVID-19. A member of our team (AF) had links with several of the members, and so was able to support them to become involved in our group. As the review progressed, Margaret Ogden recruited three more experienced PPI members who were based in different parts of country, two of whom were carers. We took an open, flexible approach to PPI,[48] recruiting people throughout the review and involving them in the review in different ways.

Although not all PPI members attended all the events, throughout the review 14 different people were involved and 10 people attended (or provided input into) each of the four PPI meetings. The PPI members were relatively diverse. Although the majority of people were based in Sheffield, we also had people based in the north-east of England, London and Gloucestershire. People were at different stages of their lives: some were retired whereas others had young children. We had a mix of males and females. People had different life experiences including being carers, being a refugee, being community activists and living in socioeconomically deprived areas. The involvement was categorised as 'contributing': PPI members influenced the review, for example by contributing to the scope of the review and interpretation of the findings.[48]

Patient and public involvement meetings

We held four events attended by PPI members. Ten PPI members contributed to each of the two stakeholder events either by attending or offering insights after the event. In between the two stakeholder events, there was a PPI meeting to develop the UFAT and a meeting to discuss the preliminary findings of the review. After each meeting, we wrote up notes that documented points made and the actions the team would take based on these points.

Owing to COVID-19, all meetings were held virtually. The advantage was that it enabled people to participate from across the country. Furthermore, it meant that we were able to involve a larger number of PPI members because the budget could be used for remuneration rather than for travel and refreshment costs. The disadvantage was that some people found the technological aspect of virtual meetings difficult. For these people, a team member (AF) held discussions with some PPI members outside the meetings to enable them to share their views and/or supported them with using the technology such as having trial sessions on the technology. Over time, members became more confident at participating virtually. For example, one person went from having to speak outside the meeting by telephone to actively engaging in later PPI events virtually. Having 'break-out rooms' in the first stakeholder event helped to give an opportunity for everyone to participate. We did not do this in the second stakeholder event, which may have reduced participation from less confident members.

Keeping people informed between meetings

The team wanted to ensure that PPI members (and other stakeholders) were kept informed of the progress of the review between meetings. We did this through producing newsletters periodically throughout the project. These were written in plain English by a team member (AF) and Margaret Ogden reviewed them to ensure that they were easy to understand. Margaret Ogden also wrote part of one of the newsletters. We received positive feedback about the newsletter and intend to do this in future studies.

Remuneration and skills development

Patient and public involvement members were remunerated by direct transfer to their bank accounts. We generally paid £50 per attendance at a 2-hour meeting. People were also remunerated for supporting the UFAT work (explained in *Chapter 4*). To support skills development, we delivered training on using social media at the request of some PPI members. They wanted to learn how to use Twitter (Twitter, Inc., San Francisco, CA, USA) to support their PPI work and promote the findings from the review. We delivered this training to five people. The technological support and trial sessions for using technology for virtual meetings are likely to increase people's skills and confidence in participating in future virtual meetings.

Chapter 3 First stakeholder event

Background

In the first month of the study (November 2020), we held a virtual stakeholder event. It had to be virtual because of COVID-19. We aimed to involve representatives from the following groups: patients, carers and members of the public; Clinical Commissioning Groups (CCGs); NHS England Emergency and Urgent Care directorate; the NHS England Health Literacy Lead; general practice; EDs; and emergency ambulance services. The aim was to elicit stakeholders' perceptions of key issues that might further shape the review, such as suggestions about the key types of interventions to include. The virtual format facilitated people from different parts of the UK to attend the event.

Stakeholders attending the event

Fourteen stakeholders attended the event, along with research team members:

- seven PPI representatives (three others provided input outside the event)
- one urgent care commissioner from a CCG
- one representative from NHS England
- one ED consultant
- one GP
- one academic pharmacist
- one representative from NHS Digital
- one representative from the third sector.

We designed the event with our PPI co-applicant Margaret Ogden to ensure that PPI representatives were supported to engage in the event. Our stakeholder lead on the team (AF) contacted all of the PPI representatives by telephone or e-mail before the stakeholder event to discuss the review and to support people to attend by explaining how the virtual platform worked. Alexis Foster also facilitated input from three PPI representatives who could not attend the event. Two did not feel confident with the technology and one person could not make the date. Alexis Foster sent them the notes from the event and then had a telephone call with each of them to discuss the event and get their input. We ensured that we included their viewpoints in the write-up of the event. This additional involvement was important because we did not want to exclude people from the event because of lack of technical skills.

The event

The event was held on 10 November 2020 and lasted 2 hours. It was a mixture of presentations and discussions. Alicia O'Cathain delivered two short presentations (each < 10 minutes) to explain the review, to justify why the research was needed and to discuss how the research fits within research on help-seeking behaviour in emergency and primary care. Jonathan Berry, the health literacy lead from NHS England, also presented on initiatives being delivered within the NHS to increase health literacy.

The group was split into two smaller groups to facilitate discussion, with each small group facilitated by a member of the research team and including a mix of stakeholders. In the discussion we focused on potential factors we needed to consider in the review. We also discussed potentially relevant interventions.

Attendees gave us potential sources of grey literature such as work undertaken by the World Health Organization Healthy Cities initiatives, and by specific CCGs in England.

The issues raised and actions taken

After the event we recorded the points made by stakeholders and our comments on how we would address each point in the review (*Table 1*). We circulated our write-up to the stakeholders so they could add to the document. Comments from people who had been unable to attend the meeting were added at this stage (this is indicated by 'post meeting' in *Table 1*).

Ongoing communication

Following the event, we circulated newsletters to keep stakeholders informed about the progress of the review and to give people the opportunity to provide further feedback.

TABLE 1 Issues raised in the first stakeholder event and the actions we planned in response

Issue	Detail	Action
Making connections with others doing similar work	People are doing a lot of work related to this area	We need to talk to people who may be doing work on this issue such as the Scottish Government and NHS Sheffield CCG
Type of literature	Initiatives will be happening in the real world so search websites (e.g. World Health Organization reports) and speak to people rather than just searching research published in academic journals	We are already planning to do this but we have made it more central to our search now and intend to start this early in our study, for example search websites of NHS Scotland and the World Health Organization Healthy Cities initiative
Focus of our review	Are we including in our review: • Navigation and self-care • Children's health literacy • Mental health • Digital interventions and digital inclusion • Use of medicines and medication leaflets • Empowerment as well as education • Use of multiple platforms, i.e. leaflets, digital, human communication together • It's about more than leaflets – human kindness, small things in communication can be important • The role of pharmacies • Decision support for health professionals • Access to medical records • Carers as well as patients • Making decisions for other people – children, dementia, etc.	We are focusing on interventions that improve health literacy for minor problems and, by doing this, reduce the need for people to use urgent general practice services, A&E and ambulance for minor problems A lot of this list is relevant to our work. Some of the list is not relevant to our specific study, but is important to the wider topic of health literacy It is useful to have this list so that when we identify interventions we can think about what we have not found information on, as well as what we have found

TABLE 1 Issues raised in the first stakeholder event and the actions we planned in response (*continued*)

Issue	Detail	Action
International literature	Focus beyond high-income countries	We are already planning to look at all countries. We did not make this clear in our meeting. We agree that some health literacy interventions will be used in low- and middle-income countries, so will make sure we search for and value those
Framework of types of interventions	Level of interventions: focus on individuals or systems? (e.g. school curriculum would be a systems approach)	This helped us to think about our framework for interpreting findings. We are going to be focusing on both individual- and system-level interventions
	Timing of intervention and relevance to people's lives: makes more of an impact if given at the right time so people are receptive and interested?	We will include 'timing/relevance' in our framework now
Language used in interventions	Simple 'living-room speak' is needed in any intervention	We are planning to assess the literacy levels of information-based interventions in our review. Some may not have been effective because they required people to have high levels of literacy or knowledge
When are people receptive to interventions	We spoke about when people are most receptive to interventions. For example, we wondered whether or not it is when someone is feeling ill and accessing services, rather than when they are well	We will check when the studies provide the intervention to people. For example, is the intervention provided to people when they access health-care service or to children at school?
	People felt that school children and people moving into an area (e.g. students) need to be taught health literacy and also taught about local services as each area is different (systems approach)	
Level of trust in who is giving the information	The success of interventions may depend on how much people trust the source/person delivering the intervention. For example, people may trust community workers they have an established relationship with more than doctors	We will explore whether or not any of the studies we find consider the influence of trust on the results of their research
	People have a lot of trust in urgent care services (e.g. A&E). They are consistent throughout the country and people know a doctor will see them, even if they have to wait	
	People are increasingly getting information from social media and may get lots of opinions on, for example, 'what is this rash?'. They may choose to believe those with similar health beliefs	
Who people are making the decision for	People may be more likely to access urgent care for minor problems because they are worried about their child or someone they care for more than if it had been for themselves	We will consider who the interventions are aimed at, for example patients directly, parents, informal carers. We will reflect on how this may influence a study's findings
COVID-19	How and when people access services may not return to normal after the COVID-19 pandemic	We will need to reflect on the UK context when we meet in the second stakeholder event to consider which interventions are relevant

continued

TABLE 1 Issues raised in the first stakeholder event and the actions we planned in response (*continued*)

Issue	Detail	Action
It is about more than health literacy	People struggle to get GP appointments and other types of services, and so may access urgent care services because they cannot get help from other sources There are logistical challenges to accessing some services, such as public transport People are becoming increasingly used to 24/7 access to things (e.g. online shopping), and so may expect this in terms of accessing support for their health Some people are more pessimistic/worriers by nature and may worry that a symptom is serious, which influences how they access services It was suggested that people may access urgent care services because of previous experiences. For example, someone may have tried to access a pharmacist before about a condition but been directed to urgent care, so they feel they might as well go straight to urgent care. Likewise, if someone has a positive experience of accessing other services, this may give them the confidence to do this again	We totally agree that other things are important. Health literacy is only one piece of a bigger picture. We will make sure that this is explained when reporting our findings and also reflect on whether or not studies have considered these issues within their research
Training and knowledge of health professionals	It is not just about individual patients/carers, but also the role of health professionals to support people to have conversations, signposting to services, etc.	We are looking at interventions aimed at patients, not health professionals. (Originally our response to this issue was to say we would include these interventions. We changed this response after reflecting that we needed to stay focused on our plan)
Post meeting: studies not written up in the English language	There may be research on the topic that has been published in languages other than English	Unfortunately, for this study we do not have the resources to translate articles not written in English. However, we will be recording how many studies we have not included because of this and if there are some, then we will recommend that further research is needed that does consider these studies We will also feed back to reviewers more generally about the need to have the resources to translate studies in future reviews
Post meeting: how was the intervention designed?	It will be important to consider how the intervention was designed, especially in terms of whether or not people who may receive the intervention were involved in the design process. For example, who are the authors of the paper?	We will consider within the review how the interventions are designed, especially in terms of involving people who may receive the support

A&E, accident and emergency.

Chapter 4 Systematic review methods and results

Design

We undertook a multicomponent review[49] of quantitative and qualitative research. We registered the review on PROSPERO (registration number CRD42020214206). The funders played no role in the review.

Methods

Searches

We searched the following databases from inception to 11 January 2021: Ovid MEDLINE, The Cochrane Library (via Wiley Interscience), EMBASE (via Ovid), Cumulative Index to Nursing and Allied Health Literature (via EBSCO), PsycINFO (via Ovid), Web of Science and Sociological Abstracts. We also searched for evidence in other sources including Google (Google Inc., Mountain View, CA, USA) and web-based review databases, such as Epistemonikos, PROSPERO and the Joanna Briggs Institute database.

We undertook a structured grey literature search by searching websites including Social Care Online, Health Literacy UK (https://healthliteracy.org.uk/), Public Health England, NHS England, NHS Scotland, The Kings' Fund and the Royal College of Nursing. We also undertook targeted Google searches of domains including '.gov.uk' and '.org.uk' (and their international counterparts). In addition, we searched the websites of specific organisations known to have run local initiatives (e.g. Sheffield CCG, Stoke CCG) and the websites of international projects, including Optimising Health Literacy and Access (OPHELIA) (Australia) and the World Health Organization Healthy Cities initiative. Finally, we compiled a list of known authors on the topic of health literacy and searched for their conference papers, reports and papers, as well as researchers citing their work on Google Scholar (Google Inc.).

Given that this review was multicomponent, we had proposed, if needed, to undertake supplementary searches after our initial search to ensure that we met the aims and objectives of the review. As the initial search progressed and synthesis began, we did not need to undertake further searches for different components. We did however undertake one further search in August 2021 to identify additional studies reporting evaluations of navigation tools because we had identified tools only from the USA in our original search.

Search terms

A professional information specialist within the information resources team in the ScHARR (MC) developed the search strategy using the standard search strategy of population, intervention, comparator, outcomes and setting/context.

- Population. No search terms in relation to population were used because we wanted to include all populations.
- Intervention. Interventions with the primary purpose of reducing primary or emergency service use for minor health problems by improving health literacy. 'Minor health problems' was not used to limit the initial search because researchers may not use this term (or similar terms), or explicitly articulate a focus on minor health problems. Instead we searched widely and then screened for interventions to reduce service use for minor health problems. We were not interested in

interventions to improve health literacy for chronic conditions, where the aim is to reduce use of emergency care and hospitalisation through prevention of health problems. These chronic condition interventions tend to focus on self-management to prevent serious exacerbations, hence the interest in hospitalisation. We removed these at the screening stage. Nor were we interested in interventions in which health professionals made decisions about whether or not, or where, to seek health care and gave self-care advice as part of this (e.g. NHS 111).
- Comparator. A range of study designs. When a design was a randomised controlled trial (RCT), the comparator could be usual care or a control assumed not to have the active intervention being tested.
- Outcomes. (1) Changes in use of general practice, GP out-of-hours services, emergency ambulance, EDs, paediatric EDs (using a range of international terms for these services). (2) Changes in use of services overall or specifically for minor health problems. (3) Rate of adverse events, that is missed serious health problems for which people would otherwise have sought care. (4) Patient acceptability and health-care feasibility. (5) Changes in other outcomes, for example knowledge, health literacy, confidence.
- Setting/context. We were interested in interventions that might work in the UK context. We searched for evidence without limiting the country/setting.

See *Appendix 1* for search terms used on 11 January 2021.

Further inclusion/exclusion criteria

We limited the search to English-language literature. We limited the search to articles published between 1990 and 2020 to ensure relevance to the current health-care system.

Screening

We downloaded references into EndNote [Clarivate Analytics (formerly Thomson Reuters), Philadelphia, PA, USA]. We piloted the screening process by having three reviewers (AOC, AF and CC) independently screen the titles and abstracts (when available) of the same 100 records retrieved from the searches to determine whether or not a study met the predefined inclusion criteria and whether or not the criteria were being interpreted by all reviewers in the same way. We discussed and clarified any differences of interpretation and then one reviewer (CC) screened all the titles and abstracts, tagging each as ‘include,’ ‘exclude’ or ‘unclear’. We retrieved the full texts of all ‘include’ or ‘unclear’ articles and classified them as ‘include’, ‘exclude’ or ‘unclear’ (CC and AOC), with differences resolved through discussion. When this discussion did not lead to resolution, we consulted a fourth reviewer (LP). One reviewer (LP) screened the reference lists of relevant systematic reviews for further primary research studies. One reviewer (CC) checked the references of included studies to identify additional relevant studies.

Data extraction

Louise Preston developed a data extraction form to meet the study objectives. Four reviewers (CC, AOC, AF and LP) independently extracted data from three studies and discussed the process to ensure that we were clear about what we needed to extract and the level of detail required. Then one reviewer (CC) independently extracted data from each included study. The data extracted included the following.

- General description (author, year of publication).
- Study design.
- Context. Although this was not a realist review, we were interested in characteristics of context that might contribute to reductions in use of primary care and emergency services. Contexts included the country where the research was conducted and the target population.
- Delivery setting (emergency care, primary care, community, workplace, other).
- Headline message.
- Description of the intervention using the Template for Intervention Description and Replication (TIDieR) framework.[50]

- How the intervention was developed. Given that patient involvement in the development of interventions is noted as good practice to create usable and helpful interventions,[51] we documented how authors of papers described the intervention development process. We did not search beyond the included papers.
- Mechanisms of action of the intervention (see the next section about how we identified these).
- Changes in service use: ED, general practice and emergency ambulance overall or for minor health problems. We also extracted how they were measured (actual use from patient records or patient-reported use) and time period of measurement (e.g. 6 months).
- Costs and cost-effectiveness (see *Costs and cost-effectiveness* for explanation).
- Safety or adverse events.
- Displacement. We documented whether or not studies of interventions to reduce the use of primary care also measured any effect on EDs to ensure that we considered displacement of service contacts to higher-acuity services.
- Any other outcomes measured, for example change in health literacy levels or knowledge of minor illness management.
- Patient/carer and staff views on the feasibility or acceptability of the intervention.
- Copy of written components of the intervention.

A second reviewer (LP) independently extracted data from 10% of the included studies and resolved differences by discussion with Christopher Carroll and Alicia O'Cathain. Discrepancies were related to the level of detail of extraction, rather than the accuracy of extraction.

Mechanisms of action

We began the review with three potential mechanisms in mind (information, education and empowerment), identified from reading background literature and some of the included intervention studies. An information mechanism might include 'take your temperature', education might include 'this is how you take your temperature' and empowerment might include 'engendering confidence in making decisions based on a temperature reading'. One reviewer (CC) extracted authors' stated mechanisms or assigned mechanisms based on this list of three mechanisms and the description of the interventions.

As we read existing reviews on self-care and health literacy, and read more of the included studies, we reconsidered the list of mechanisms. Richardson *et al.*[44] was particularly helpful in this endeavour. In their systematic review of self-care for minor ailments, they explored mechanisms using the theoretical domains framework.[52] They described the need to affect people's willingness to self-care, which might be compromised by a lack of knowledge and skills to manage self-care. They identified the need to address people's capability (knowledge, skills, beliefs about capabilities, decision-making processes) and motivation (beliefs about consequences, e.g. persuasion that EDs are overcrowded or that pharmacists are competent). Some authors of the included studies explicitly discussed the need for an intervention to address people's anxiety about a specific symptom as a barrier to self-care.[53] Some interventions in the included studies also tailored the intervention to individuals' symptoms and situations, rather than offering the same advice to all. We constructed an extended set of mechanisms and one reviewer (AOC) extracted these when the basic data extraction had been completed by Christopher Carroll. Authors of papers were rarely explicit about mechanisms; we identified them by interpreting text from the description of the intervention, or the background or discussion sections of a paper in which authors discussed the intervention aims, rationale or development. The six mechanisms are listed and described in *Results*.

Constructing a typology of interventions

We expected to see different types of interventions for improving health literacy with the aim of reducing the use of primary and emergency care. We planned to synthesise the evidence by type. We could find no existing framework of types of interventions, so we read a selection of included papers and papers in the wider health literacy literature. We inductively constructed a typology.

We have used this inductive approach to developing taxonomies and frameworks successfully in other reviews.[54,55] We drew on Coulter and Ellins,[40] who identified different types of health literacy interventions as written health information, alternative format resources, low literacy initiatives and targeted mass media campaigns. When we read a selection of included papers, we identified the following types: written information to navigate the health-care system, written information on managing illness, educational workshops, one-to-one health coaching and digital self-triage. These interventions came in different formats (paper; digital, including mobile phones; human; or mixed). They were also delivered at different times [to people who had used emergency or primary care for a minor health problem ('specific') or made available to the people at any time ('general')]. Although we had a number of other intervention characteristics to choose from, and we discussed the potential to use these (e.g. setting of delivery, target population aimed at, group vs. one-to-one delivery, tailored vs. not), we wanted to keep the typology simple. We constructed a typology of interventions based on the aim of the intervention (navigation, education or self-triage), how the intervention was delivered (e.g. written, person, digital) and when it was delivered (when a patient had used a service for a minor health problem, or it was offered to everyone). We selected timing of the intervention because a related review drew attention to its importance,[41] and this was also raised in our first stakeholder event. We discussed the typology as a team and tested it on a range of included studies. When we were happy with the typology, one reviewer (AOC) coded each included study to it. A second reviewer (CC) checked the application of this typology and highlighted a few discrepancies. Alicia O'Cathain returned to the highlighted papers to double-check the coding of each study (see *Results* for the typology).

Quality assessment: risk of bias and risk to rigour

Given the wide variety of study types included in this review, we used a hybrid approach to risk-of-bias assessments. For RCTs, we used the Cochrane Risk of Bias tool.[56] For non-randomised studies, we used the Newcastle–Ottawa Scale (case–control and cohort studies).[57] For qualitative studies, we assessed risk to rigour using the Critical Appraisal Skills Programme (CASP) tool,[58] and for mixed-methods studies we used the Mixed Methods Appraisal Tool (MMAT).[59] We did not use our assessment of risk of bias or of risk to rigour to exclude evidence from the review, but to assess the overall evidence base and the confidence with which we could use the evidence. One reviewer (CC) undertook the quality assessment. Another reviewer (LP) undertook an independent assessment of 10% of studies and identified minor differences, which were resolved via discussion with Christopher Carroll.

Assessment of readability and user-friendliness of written components of interventions

An important concern arising from the first stakeholder event was that interventions aimed at improving health literacy needed to be written in plain English and designed in a way that made it easy for the reader to comprehend what was written. For example, interventions using medicalised language or with long chunks of condensed text would be difficult for people to understand and act on. At least 43% of written materials containing health information are too complex for most adults to understand.[60] We decided to assess both the readability and the user-friendliness of the written components of included interventions.

Readability

The Flesch Reading Ease (FRE) and Flesch–Kincaid Grade Level (FKGL) are established approaches to readability assessment.[61] Readability is about the complexity of language being used, and thus the level of literacy someone may need to have to understand a document.[62] We used the FRE and the FKGL because they have been used in previous studies that consider health literacy and are the most commonly used assessments because they can be measured using Microsoft Word (Microsoft Corporation, Redmond, WA, USA).[63] Both the FRE and the FKGL consider the number of syllables in words and the average number of words per sentence. They differ in terms of the weightings they give to different parts of the formula. Therefore, there may be some differences in how an intervention is scored on the two assessments.[63]

The readability assessments are automatically calculated using Microsoft Word. We needed to type the interventions into Microsoft Word. Rather than typing in the whole document, we followed an established procedure of choosing a selection of text from each intervention.[62] The selection was drawn from the first 100 words (excluding title/headings), 100 words from the middle and the last 100 words of a written component of an intervention. It is possible that an intervention may have been scored differently had the full text been assessed.

The FRE score ranges between 100 and 0, where 90–100 = very easy, 80–89 = easy, 70–79 = fairly easy, 60–69 = standard, 50–59 = fairly difficult, 30–49 = difficult and 0–29 = very confusing. A document scoring ≥ 70 is considered suitable for most adult readers. A score of 30–69 is considered somewhat difficult and suitable for only some adults. Anything scoring < 30 is considered difficult and inappropriate because it is written at a university graduate level.[64] More generally, documents are considered to be written in plain English if they have scores of at least 60.[65]

The FKGL relates to the USA education grade a document is suitable for. The score ideally needs to be grade 8 or lower, as this reflects the reading level of most adults. Scores are categorised as follows: ≤ 8 (suitable for most adults), 9–12 (fairly difficult because it is written at a level suitable for high school students aged 14–18 years) and > 12 (difficult because it is written at a level suitable for university students).

Development of a User-Friendliness Assessment Tool

At the first stakeholder event, people raised the issue that interventions need to be user-friendly so that people feel able to understand and act on the information they contain. Stakeholders gave examples of text-heavy leaflets full of jargon, which would be barriers to people understanding and acting on the information provided. This would then have implications on the effectiveness of those leaflets. Consequently, as a research team, we wanted to assess the 'user-friendliness' of interventions, focusing on medicalised language/jargon, font and text style; whether or not content was broken down into short paragraphs/bullet points; and whether or not the intervention was written by someone patients trusted. We had to develop our own UFAT because we could not identify an existing tool. We found guidance from credible sources that recommended good practice for health literacy interventions. These were from the NHS in the UK[66] and the Centers for Disease Control and Prevention in the USA.[67] We drafted a tool and shared this with our PPI members for feedback. Some PPI members also tested the UFAT on two interventions. We held a meeting in June 2021 with PPI members to discuss their feedback, and revised the tool substantially based on their feedback. Key changes included ensuring that at least two people assessed an intervention because of the divergence in views about the interventions, having four response options per item so that the tool was more sensitive, and adding additional questions on trustworthiness and confidence in the information provided. We also agreed that PPI members would be involved in assessing the user-friendliness of interventions. The UFAT is in *Appendix 2*. The tool consists of 14 items, each of which produces a score of 0–3. The scores from each question are combined to produce a maximum overall score of 42. Interestingly, Rughani *et al.*[63] published a paper assessing GP websites during our review and included a similar 'design factors' assessment tool in their work.

Process of assessment

Health literacy interventions can come in a range of formats including person-delivered, leaflets, websites and posters. The readability and user-friendliness assessments could be undertaken only on interventions that included a written component. Furthermore, we could only assess interventions that were in English and publicly available. For example, some of the websites were subscription only or in Dutch. Some papers showed an extract from the intervention rather than a link to, or copy of, the whole intervention; therefore, we used this extract. We were able to locate 13 interventions related to 20 articles included in the review; some interventions were reported in a number of papers. Some of the interventions were impossible to find because they were more than 20 years old, for example leaflets developed in 1991.

In addition to assessing the interventions in the review, we also assessed an intervention identified by PPI members and stakeholders that is currently in use in the NHS: *The Little Orange Book*.[68] This is an information resource aimed at parents of young children in the north-east of England to support them with understanding common childhood illnesses.

We calculated the FRE and the FKGL for each intervention. At least two people applied the UFAT to each intervention, typically two PPI members and one researcher (LP). The scores of the different assessors were combined and a mean calculated. We compared scores on readability and user-friendliness to assess their relationship. Very high levels of correlation would suggest that only the readability scores were necessary for use in our synthesis.

Synthesis

Presentation of the studies

One reviewer (CC) reported the included studies in alphabetical order in four tables: (1) context/characteristics, (2) description of the intervention (including mechanisms and typology), (3) service use outcomes and (4) other outcomes. A second reviewer (AOC) read the papers independently and checked the presentation of each study.

Synthesis of outcomes

We used the typology of interventions to identify common types and then we presented a narrative synthesis of service use outcomes for each common type, with data summarised in tables. We ordered studies in these tables in alphabetical order, or, if there was a subset of the type, we ordered by this subset and then alphabetically.

We could not use meta-analysis because of the heterogeneity in how service use outcomes were measured. We did not measure heterogeneity in reported effects because it was clear from the data extraction that there was considerable variation in the way the outcomes were measured and the time periods over which they were measured. We planned to use the typology to synthesise other outcomes and processes, but numbers were too small. Instead we undertook a narrative synthesis of all the studies for each outcome or process. We followed the synthesis without meta-analysis (SWiM) reporting guidelines.[69] The SWiM checklist can be found in *Report Supplementary Material 2*. When drawing conclusions from the synthesis, we gave weight to studies that used RCTs in preference to other designs, measured the impact on service use using routine data/records rather than self-reported service use, were assessed as being of higher quality, and had greater relevance to the UK because the research was undertaken in the UK or a country with a similar health-care system to that of the UK.

Costs and cost-effectiveness

We knew from scoping the evidence base that there would be few economic evaluations for synthesis. We intended to follow the 'brief economic commentary' for synthesis, rather than the 'integrated full systematic review of economic evidence' as set out in the Cochrane Handbook.[70] We planned to follow methods used by Angus *et al.*[71] to summarise any directly reported costs associated with interventions as reported in the literature and convert them to Great British pounds for a specific year. We planned to aggregate these data across intervention types to report costs for comparison and narratively synthesise cost-effectiveness and report the relationship between cost-effectiveness and context. Unfortunately, the cost data and cost-effectiveness analyses were often poorly undertaken or reported. Instead we undertook a simple narrative synthesis.

Qualitative research

We intended to analyse qualitative research using qualitative synthesis methods.[72] There were only four articles reporting qualitative research, focused mainly on digital interventions, so synthesis was limited.

Explaining variation in impact on service use

Ideally we would have identified size of effect of each intervention within a meta-analysis, but, as explained previously, this was not possible because of heterogeneity in outcome measurement. We might also have considered a meta-regression to explain size of effect.[73] Instead, we identified whether or not studies that measured service use in a full evaluation (as opposed to pilot studies, which are underpowered statistically) had statistically significant reductions for impact on use of different services. Then we used IBM SPSS Statistics 27 (IBM Corporation, Armonk, NY, USA) to test whether or not different characteristics of the study, context and intervention explained reductions in service use.

An alternative way of explaining variation in an outcome is to consider the relationship between context, mechanisms and outcomes by identifying context–mechanism–outcome chains associated with understanding messy complex interventions.[74] We did this by considering mechanisms within the narrative synthesis by type of intervention.

Articulating a programme theory

We constructed a logic model to present a programme theory of how characteristics and mechanisms of interventions might produce short- and intermediate-term outcomes that lead to long-term outcomes. We did this to facilitate interpretation of the synthesis (*Figure 1*).

Results

Included articles

We identified 67 articles that met our inclusion criteria (*Figure 2*). The decision about inclusion was challenging when studies met some, but not all, of the inclusion criteria. We excluded 38 articles at the full-text stage (see *Appendix 3*). Articles about frequent users of EDs tended to be excluded at the full-text stage because these studies focused on a population of people identified as having serious problems such as homelessness and substance abuse, rather than minor health problems. Articles about self-management of chronic conditions such as asthma were excluded when they were about prevention of

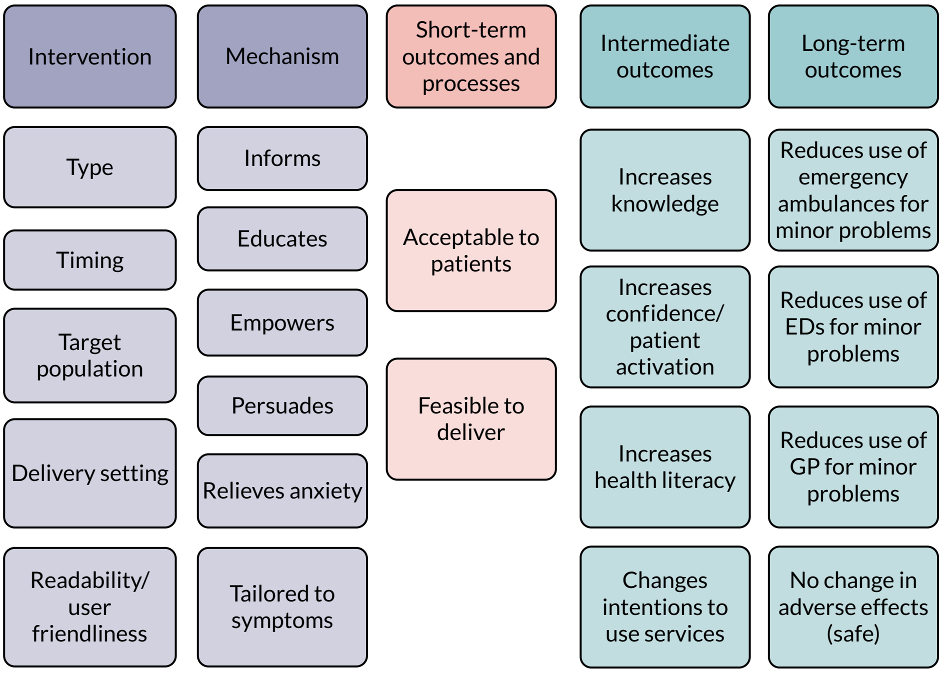


FIGURE 1 Logic model of health literacy interventions to reduce use of primary and emergency care.

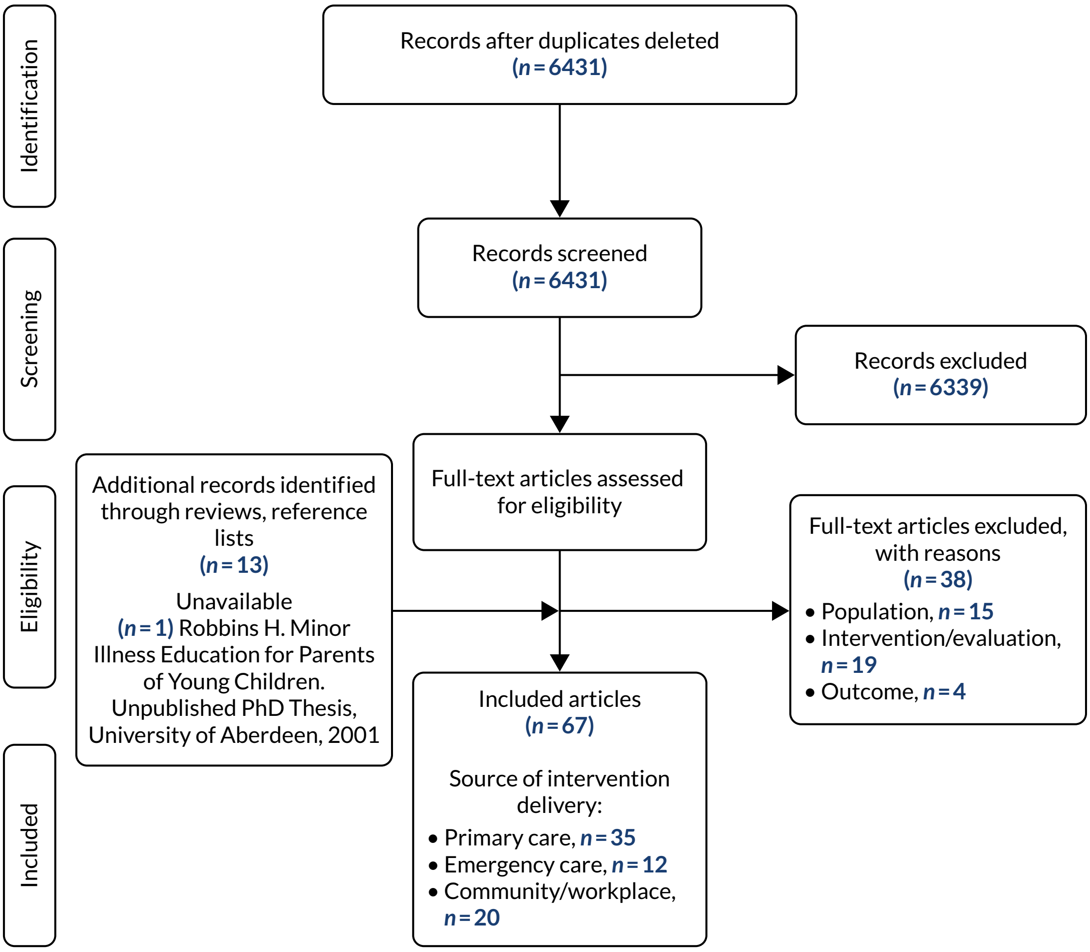


FIGURE 2 The Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram.

acute severe problems, rather than management of minor health problems. Case management interventions tended to be excluded because they did not focus on minor health problems, but on serious problems that resulted in hospitalisations.

Characteristics or context of articles

The characteristics of each study are presented in *Appendix 4*. We describe each characteristic in the following sections.

Time of publication

The 67 articles were published over the three decades between 1990 and 2020, with half of articles published in 2010 or later ($n = 32$). In particular, interventions delivered in emergency care and community/other settings were undertaken more recently (e.g. 8/12 emergency care articles were published after 2010). This indicates the ongoing interest in this issue over time, and the more recent interest in interventions delivered in emergency care or community/other settings.

Country

The articles reported studies undertaken largely in North America ($n = 37$), the UK ($n = 16$) and the rest of Europe ($n = 12$). The Netherlands featured highly in the European group, specifically for interventions delivered in primary care. Only two articles were from the rest of the world (Taiwan and Australia). Most of the interventions delivered in emergency care were from North America (11/12), as were most of the community/other setting articles (15/20). This raises a potential concern about transferability of parts of the evidence base to the UK because of the role of payment and insurance for services in North American health-care systems, particularly in the USA.

Place of delivery of the intervention

The articles reported interventions delivered to users of primary care ($n = 35$), users of EDs ($n = 12$) and within community/other settings ($n = 20$). No intervention was delivered to ambulance service users.

Target population

Around half the articles were aimed at parents of young children ($n = 32$), some of which were aimed at parents of children aged < 5 years (14/32). Most articles about interventions delivered in EDs were aimed at parents of young children (9/12), demonstrating a paucity of evidence about interventions aimed at adults attending EDs. Some articles specified that the population aimed at, or the sample included in the study, was (1) socially deprived and/or (2) mainly from an ethnic minority group associated with poverty in that country and/or (3) had low health literacy levels (21/67).

Articles reporting the same study

Some articles reported different aspects of the same study or data set: Plass *et al.*,[75,76] Rutten *et al.*,[77,78] and Hibberd *et al.*[79] and Wagner *et al.*[80] There were 64 studies in total. Other articles were written by the same author, testing the same intervention in different ways on different populations,[81–83] with Herman and Mayer[82] undertaken as a pilot for Herman and Jackson.[81] Yardley *et al.*[53] was an exploratory RCT for Little *et al.*'s[84] full RCT.

Study design

The authors used a range of designs in the articles, mainly RCTs ($n = 30$), and single-arm or controlled cohort studies ($n = 33$). A few articles reported qualitative or mixed-methods research ($n = 4$). The cohort studies included controlled before-and-after studies ($n = 11$), before-and-after studies ($n = 8$) and non-RCTs ($n = 4$).

Description of interventions

The interventions reported in the 67 articles were described using TIDieR guidelines (see *Appendix 5*). This description included the rationale for the intervention; what was delivered and by whom, how, where, when and how much; and any tailoring/personalisation. The items of 'modifications' and 'fidelity' were also extracted, but were rarely reported and so are not presented in *Appendix 5*. Instead, these items are described in narrative form in the following sections *Modifications* and *Fidelity*. *Appendix 5* also includes a summary of how the interventions were developed, their proposed mechanisms of action (subjective assessment by our team) and their type according to our typology.

Rationale for the intervention

The reported rationale for many interventions, whether delivered in primary or emergency care, was to reduce emergency care use for non-urgent complaints, including directing patients to primary care,[83,85–95] and to reduce any and all health service use.[96–98] Some interventions were specifically designed to reduce reconsultation for a similar minor health problem, especially in primary care,[99–101] and, in some cases, the interventions sought to modify patients' and carers' consultation behaviour related to specific minor problems, such as childhood fever,[102,103] respiratory tract infections[84] and cough.[77,78]

Other primary and emergency care-delivered interventions were explicitly designed to improve patients' and carers' knowledge and confidence sufficiently to enable minor problems to be self-managed[96,102,104–109] and/or to enable the selection of the appropriate service, for example primary instead of emergency care.[108–112] Many such interventions reported the corollary rationale of reducing unnecessary primary or emergency care use as a result of improved knowledge.[53,75,76,103,113,114]

Unlike the primary and emergency care interventions, the majority of community and workplace-based interventions had the specific aim of improving self-care and participants' knowledge, both of illnesses (including some specific minor problems such as childhood fever or cough)[79–82,115–121] and when to access what service.[122,123] A smaller number of such studies explicitly reported that the aim of an intervention was to reduce use of primary care,[124] emergency care[125,126] or health services generally.[127–129]

What was delivered and by whom, how, where, when and how much

The interventions were delivered either by a specific individual or designated team of health-care staff, (e.g. a GP, paediatric ED physician or nurse),[75–78,88,99–102,107,109,112,130,131] a service generally (e.g. the primary care practice)[84,86,92,106,132,133] or, in the case of some workplace or community interventions, an employer or an external organisation.[79,80,120,121,127,128] In some cases, the interventions were delivered by the researchers only.[83,85,89,94,110,134]

Some interventions were delivered face to face to target groups of patients or carers at pre-set time points, in particular regular monitoring visits for babies and infants (e.g. Well Child Visits).[90,111,119,134,135] However, the majority of interventions directed at specific groups of patients or carers were delivered in direct response to a potentially unnecessary primary care or emergency care consultation and with the explicit purpose of preventing future, similar consultations. Such interventions were delivered principally at the time of the index consultation,[75–78,83,85,94,95,99–103,109,130,131,136] but could also be delivered a little time later.[88,89,92,108,112,137]

Another large group of interventions, principally in the community group, were delivered to people for consideration in the home setting. This might consist of written materials or information resources (e.g. websites) for specific patient groups,[81,82,98,115,116,118,123,126,132,133] for all patients in a particular primary care practice[96,104,105,138] or for all patients in a particular area or region.[53,79,80,117,122,124,125,129,139,140]

Tailoring/personalisation

Many interventions do not appear to have involved any element of personalisation for the intended audience, carer or patient. When personalisation was undertaken, it most often involved one of the following approaches: most frequently, an interactive discussion between staff and the patient or carer concerning the content of the intervention (a leaflet, video, written material or workshop);[85,99,102,103,108,112,115,120,128,130,136] individual case management or patient navigation services;[87,91,93] the use of personalised data in automated systems;[89,98,111,123] directing patients specifically to their own local services;[94] and the use of the most appropriate language to communicate with patients and carers, for example English or Spanish.[95,125,126]

Modifications

Reported modifications to an intervention during its implementation or delivery were rare. Only one study reported modifying a primary care-delivered intervention, by adding a social worker-delivered intervention to the original nurse-delivered intervention to see if this improved access to primary care among patients who had an unnecessary ED attendance (it did not).[137]

Fidelity

Implementation fidelity was also considered infrequently. This consideration took two forms: (1) strategies to facilitate fidelity of implementation and (2) actual evaluations of implementation fidelity. The former included prompts built into systems to remind staff to do things with the intervention or to remind patients that the intervention existed and was available for them,[102,107,117] staff training to facilitate implementation and regular monitoring to check that the intervention was being delivered properly.[79–81,94,139] The latter included quantitative evaluations of whether or not patients had received all of the intervention that they should have received[90,92,108,121,126,139] and qualitative evaluations of what worked well and what did not work well.[104,112]

How the interventions were developed

Eight approaches to intervention development were previously identified in a taxonomy: partnership, target population centred, evidence and theory based, implementation based, efficiency based, stepped or phased, intervention specific, and combination.[54] In the 67 articles in our review, there was often little description of the intervention development process in the article or its references (see *Table 3* and *Appendix 5*). Twenty-two articles provided no details, and the description, if any, was brief. Sometimes authors reported using two approaches in combination, for example 'target population centred' and 'evidence based'. The most common approach used was target population-based, where the intervention development involved surveys, interviews or focus groups with patients (*n* = 15). Authors were often vague about the focus of this work, and in some cases reported that it involved understanding the needs or problems of the patients, or assessing the acceptability of a developed intervention. Authors also reported using evidence-based (*n* = 8) or theory-based (*n* = 4) approaches. The theories used included the information, motivation, behavioural skills model;[111] the common-sense model of self-regulation of illness and social cognitive theory to build self-confidence[53,84] as part of the same programme of research; and Green and Kreuter's predisposing, reinforcing and enabling constructs in educational diagnosis and evaluation–policy, regulatory and organisational constructs in educational and environmental development (PRECEDE–PROCEED) model.[130] Only one article reported a partnership approach whereby a primary care-based intervention for parents of young children was developed in collaboration with a Latino family advisory board.[111] One article reported using a stepped approach, but did not name it.[99] The authors of 19 articles described other ways of developing interventions, usually working with health professionals or their governance bodies.

Owing to the paucity of information about intervention development, we did not synthesise the outcomes of studies by the approach to intervention development.

Mechanisms of action

We identified mechanisms of action based on the text in the articles because authors were not always explicit about the intervention mechanisms or they used different language to describe similar mechanisms. The range of mechanisms we looked for are described in *Table 2*. Each intervention

TABLE 2 Mechanisms of action in the 67 included articles (assessed by the research team)

Mechanism (shorthand)	Description	Frequency in 67 articles[a]
1. Service awareness and knowledge to help navigate a complex system (service awareness and knowledge)	Informing people about services available, opening times, how to access them, types of treatments offered, when/in what circumstances to access pharmacy, GP, ED or ambulance	23
2. Education in understanding symptoms and self-care techniques (education)	Informing and educating people about how to identify and diagnose symptoms, how to distinguish between minor and more severe symptoms, and how to self-manage and alleviate symptoms	53
3. Empowerment by increasing confidence and self-efficacy (empowerment)	Empowering people to communicate with health professionals or have confidence in their decision-making abilities by increasing patient activation, resulting in reduced anxiety	15
4. Addresses barrier of anxiety to help self-care (anxiety)	Explicitly help people to address anxiety levels so this, in turn, reduces the perceived need for contacting a health service or the perceived urgency of the problem	8
5. Persuasion, towards or away from a service (persuasion)	Towards supported self-management at pharmacy or against inappropriate use/misuse of GP, ED or ambulance, including informing people about pressure services are under. May show advantages or disadvantages of going to a particular service	12
6. Tailored, personalised to individual's symptoms (tailored)	Speaks specifically to an individual and their situation, rather than offer the same information to everyone	21

a Adds up to more than 67 because some articles report more than one mechanism.

could have multiple mechanisms. When the different mechanisms were counted, educating people to understand symptoms and self-care techniques was the most common mechanism, present in most of the interventions (see *Table 2*). Where education was not present, awareness of services to help people navigate health care was present. The least common mechanism was explicitly addressing people's anxiety about the seriousness of a symptom to allow them to self-care if appropriate.

Typology of interventions

The final typology of interventions developed by the team is shown in *Table 3*. We assigned each study to a type. Members of the team disagreed over the categorisation of some papers. For example, Platts *et al.*[107] was considered typology A.II by one reviewer and as A.II and B.II by another. Although the doctor issued the booklets and encouraged their use, there was no discussion with the patient beyond this, so we finally categorised it as A.II.

TABLE 3 Typology of interventions in the 67 included articles[a]

Mode and aim/timing	Given at the time of contacting a service for a minor illness (specific)	Available at any time (general)
A. Paper or video information		
I. Navigation tool	• Adesara *et al.*[110] • [b]Patel *et al.*[91]	
II. Educational self-care tool	• Holden[89] • MacFarlane *et al.*[100,101] • Platts *et al.*[107] • Steelman *et al.*[119] • Wood *et al.*[109]	• Elsenhans *et al.*[138] • Hansen[105] • Heaney *et al.*[96] • Little *et al.*[106] • Mullett and Hills[117] Usherwood[97] • Yoffe *et al.*[95]
III. Self-triage tool		• Thomson *et al.*[132] • Thornton *et al.*[133]
B. Person delivered		
I. Navigation tool	• Chande and Kimes[130] • Enard and Ganelin[87] • [b]Patel *et al.*[91] • Racine *et al.*[92]	
II. Educational self-care tool	O'Neill-Murphy *et al.*[103]	• Fieldston *et al.*[88] • Stockwell *et al.*[126]
C. Digital		
I. Navigation tool		Anhang Price *et al.*[123]
II. Educational self-care tool on a website, an app or mobile phone text	Lepley *et al.*[136]	• Ladley *et al.*[90] • Murray *et al.*[124] • Spoelman *et al.*[129]
III. Self-triage software including app (includes self-care education C.II)	Not possible	• Cowie *et al.*[104] • Little *et al.*[84] • Yardley *et al.*[53] • Nijland *et al.*[113,114] • van der Gugten *et al.*[98] • Verzantvoort *et al.*[140]
D. Mass media public education		
Posters/television/radio/newspapers/website	Not possible	Hou *et al.*[122]

TABLE 3 Typology of interventions in the 67 included articles[a] (*continued*)

Mode and aim/timing	Given at the time of contacting a service for a minor illness (specific)	Available at any time (general)
E. Multicomponent		
A.I and B.I		Davis *et al.*[86]
A.II and B.II	• Chande *et al.*[85] • de Bont *et al.*[102] • Francis *et al.*[99] • Herman *et al.*[83] • Huyer *et al.*[112] • Plass *et al.*[75,76] • Rutten *et al.*[77,78] • Sustersic *et al.*[131]	• Bertakis[134] • Herman and Jackson[81] • Herman and Mayer[82] • McWilliams *et al.*[135] • Powell[127] • Steinweg *et al.*[120] • White *et al.*[121]
B.I and B.II	• DeSalvo *et al.*[137] • Shnowske *et al.*[93]	
A.I, A.II, B.I and B.II	Sturm *et al.*[94]	Robbins *et al.*[108]
A.I and C.II		DeCamp *et al.*[111]
A.I and A.II		Rector *et al.*[125]
A.I and A.II and C.I		Beal *et al.*[116]
A.II and B.II and D		• Barr *et al.*[115] • Chiu *et al.*[139] • Hibbard *et al.*[79] • Wagner *et al.*[80] • Powell *et al.*[128]

a Does not include Ohns[118] because it is a qualitative study of five interventions.
b Patel *et al.*[91] appears twice because two types of interventions are compared with controls.

Selecting types for evidence synthesis

There were too few examples in some types to make synthesis meaningful. Because of this, we decided to synthesise interventions given at a specific or general time together, and combine similar types. We created six common types in the evidence base and an 'other' type, making seven types for synthesis.

1. Navigation types (A.I, B.I, C.I and multicomponent A.I and B.I) in seven articles.
2. Written education about managing minor health problems (A.II and C.II) in 17 articles.
3. Person-delivered education (B.II and multicomponent B.I and B.II) in five articles.
4. Written education with person-delivered education (multicomponent A.II and B.II) in 17 articles.
5. Multicomponent education (e.g. multicomponent A.II and B.II and D) in five articles.
6. Self-triage (C.III and A.III) in nine articles.
7. Other in seven articles: a few studies did not fit these types and are described separately as 'other'. Ohns[118] is also included here so that all of the 67 articles are described by type in the synthesis in later sections.

Readability and user-friendliness of written information components

The interventions varied considerably in their readability (*Table 4*). Eight of the 13 interventions were assessed as being written in plain English (interventions scoring ≥ 60 on the FRE). In contrast, the NHS Choices and Triple Zero websites were assessed as difficult to comprehend and suitable only for people with higher levels of education, for example university students. It was interesting that the two lowest-scoring interventions were both websites. This reflects a concern, raised by Rughani *et al.*,[63] that the required reading age of health-related websites is often too high for the general population.

TABLE 4 Readability and user-friendliness of interventions presented in order of Flesch scores

			FRE		FKGL		
Intervention	**Type of intervention**	**Paper**	**Score**	**Categorisation**	**Score**	**Categorisation**	**Mean user-friendliness score**[a]
Plass *et al.*[75]	Self-care booklet	Plass *et al.*[75,76]	93.4	Very easy	1.4	Suitable for most adults	17.3
Purple Crying	Leaflet	Barr *et al.*[115]	90.2	Very easy	3.2	Suitable for most adults	37.6
What to do if your child gets sick	Leaflet	• Herman and Mayer[82] • Herman *et al.*[83] • Herman and Jackson[81] • Lepley *et al.*[136]	81.5	Easy	3.7	Suitable for most adults	36.7
[b]Holden[89]	Booklet	Holden[89]	73.9	Fairly easy	5.0	Suitable for most adults	32
Internet Doctor	Screenshots from website	• Yardley *et al.*[53] • Little *et al.*[84]	73.1	Fairly easy	7	Suitable for most adults	27
Macfarlane *et al.*[101]	Letter	Macfarlane *et al.*[101]	68.1	Standard	9.1	Fairly difficult: high school students	10
Take care of yourself	Booklet	Steinweg *et al.*[120]	62.6	Standard	8.4	Suitable for most adults	21
Macfarlane *et al.*[100]	Leaflet	Macfarlane *et al.*[100]	61.3	Standard	8.6	Suitable for most adults	17
Sustersic *et al.*[131]	Leaflet	Sustersic *et al.*[131]	60.9	Standard	7.7	Suitable for most adults	26.7
Choosing Wisely	Leaflet	Huyer *et al.*[112]	59.5	Fairly difficult	7.9	Suitable for most adults	29.3
Healthwise Handbook	Leaflet	• Hibbard *et al.*[79] • Elsenhans *et al.*[138] • Wagner *et al.*[80]	55.2	Fairly difficult	9	Fairly difficult: high school students	28
Family Medical Centre	Poster	Adesara *et al.*[110]	52.5	Fairly difficult	7.7	Suitable for most adults	22.2
NHS Choices	Website	Murray *et al.*[124]	49.8	Difficult	9.9	Fairly difficult: high school students	27
Triple Zero	Website	Hou *et al.*[122]	23.6	Very confusing	14.6	Difficult: writing at university level	27.5

a The higher the score, the better the readability.
b Identified and added after the formal assessment of user-friendliness was completed, so assessed by only a single researcher.

The 13 interventions ranged considerably in their mean user-friendliness scores, from 10 to 37.6 out of 42 (see *Table 4*). Two of the interventions scored > 35, indicating that they had a high level of user-friendliness (i.e. 'what to do if your child gets sick' and Purple Crying). Both of these interventions were aimed at parents of young children. The Purple Crying leaflet was scored highly in terms of the trustworthiness of the source, layout of the intervention and clarity of language. Three of the interventions had a score < 21.[75,100,101] In Plass *et al.*,[75] the content was considered to be well ordered and the font appropriate, but it could have been better written and formatted using pictures to help explain the content. Interestingly, all three of these interventions scored well on the readability assessment. Interventions with a mean score in the middle of the range did not score '2' across all the items: they scored high on some items, but low on others. For example, assessors scored the Internet Doctor resource as appropriate in tone (scored 3), but there was no reference to the resource being available in alternative formats (scored 0). Interventions often included excessive use of medicalised terms or jargon without having accompanying explanations in plain English.

Readability and user-friendliness scores did not always correlate. Three interventions were assessed as being 'very easy' or 'easy' to read, but only two of these were assessed as being user-friendly. Similarly, the interventions with poor readability scores did not necessarily have the worst user-friendliness scores. This indicates that readability scores and user-friendliness scores were assessing different issues.

We hypothesised that more recent interventions would have better levels of readability, given an increasing awareness of this issue over time. However, we found that there was no correlation between the date of the paper and the readability scores or the user-friendliness scores.

We were interested in how interventions currently being used in the NHS might fare under a similar assessment. So we assessed *The Little Orange Book*,[141] which stakeholders identified early in our review. This is a web-based and paper-based booklet to educate people in how to self-care for minor health problems and look out for serious ones. It was developed and is used in the North-east of England. This intervention had a standard level of readability on the FRE score (66.6) and was suitable for most adults (FKGL score = 8.1). It was classed as being written in plain English. It was assessed as having a higher user-friendliness score than all the interventions in our review, with a mean score of 40 out of 42. Our assessors felt that it was well laid out, it used pictures to communicate messages, and the use of terminology and numbers was appropriate for readers.

Quality assessment

We identified an appropriate quality assessment tool for each study design and applied it to the 67 articles (see *Appendix 6*). The Cochrane Risk of Bias tool was used for RCTs, and it identified 20 out of 30 RCTs as having high risks of bias; only one RCT was deemed to be at low risk of bias.[90] The Newcastle–Ottawa Scale was used for cohort studies, identifying 17 out of 33 as weak. Only one study was identified as 'strong' (i.e. as having a low risk of bias).[87] Three of the remaining four studies were qualitative (for which the CASP tool was used), one of which was assessed as being a 'strong' study;[112] and the final study was mixed methods, assessed using the MMAT, and judged to be weak.[104] The lack of RCTs deemed to be at low risk of bias, and the paucity of strong studies, was disappointing because it suggests that the evidence base is generally of low quality. However, it is worth noting that these tools can lead to harsh judgements (a high risk of bias assigned to any one domain can result in an overall assessment of a high risk of bias).[56] Researchers had to undertake evaluations of health literacy interventions in complex real-world environments where, for example, attrition rates are often high. Because of this, we also assessed quality in a more subjective way, identifying only worrying flaws that might reduce the credibility of findings. This informal assessment is reported in the text in later sections of the findings.

Synthesis of all studies

Service use

Of the 67 articles, 54 measured change in service use. Authors measured impact on ED attendances ($n = 31$) and GP consultations ($n = 27$) rather than impact on ambulance services or other primary care consultations. Even though Hou *et al.*[122] was about a campaign to reduce the use of ambulances, the indicator measured the percentage of ED attendances arriving by ambulance. The 54 articles and impact on service use are presented in alphabetical order in *Appendix 7*. Five of these were pilot studies that were never intended to have statistical power to show change in service use.[53,82,88,103,136]

These are displayed in the type-specific tables (see *Tables 5–17*), but are not included in the narrative synthesis when considering the proportion of studies in each type showing a reduction in service use. Eight interventions aimed to increase the use of primary care because they persuaded patients to shift their focus from emergency to primary care.[91,93,94,116,125,130] Again we display these in our type-specific tables below, but exclude them when considering the proportion of studies in each type showing a reduction in GP use.

The way in which impact was measured varied across studies, and was measured over different time periods, so it was not possible to undertake a meta-analysis. Reporting of findings was so varied that it was not even possible to present similar indicators, such as percentage reduction in service use, and undertake a test of heterogeneity to check if these could be synthesised in a meta-analysis. As an alternative to a meta-analysis, we undertook a narrative synthesis. We also identified the proportion of studies that showed a statistically significant difference in each type of intervention, recognising that a lack of statistical power may have contributed to any null findings.

When we removed the five pilot studies and eight articles reporting interventions aiming to increase the use of primary care, around two-thirds of articles (31/50, 62%) measuring impact showed a statistically significant reduction in their selected measure of emergency or primary care use. Nineteen out of 30 (63%) showed a statistically significant reduction in ED attendances and 16 out of 27 (59%) showed a statistically significant reduction in GP consultations.

Health literacy

Only 9 out of 67 articles measured health literacy among participants either at baseline or as an outcome.[88,90,108,111,118,119,121,126,136] Seven of the nine articles were conducted in the USA, and two were conducted in the UK.[108,121] The most commonly used tool was the Newest Vital Sign,[142] which was used in five studies.[90,111,118,126,136] One of these studies also used the Short Test of Functional Health Literacy in Adults.[126,143] The remaining four studies developed their own health literacy questionnaires based on a variety of illness scenarios,[88,108] a single scenario (e.g. fever)[119] or specifically around service use.[121]

Six articles used the health literacy tool to assess baseline health literacy only (Ohns[118]), of which five used the tool to determine comparability between intervention and control groups.[90,111,119,126,136] Three studies tested participants before and after the intervention (including comparisons with controls), sometimes at multiple time points, and found improvements in participants' health literacy, knowledge or confidence regarding certain scenarios, although this improvement might not have been long term.[88,108,121]

Satisfaction or helpfulness

Twenty out of 67 articles measured satisfaction with the intervention, or views of how helpful users had found the intervention. Eighteen out of 20 articles found high levels of satisfaction, or higher levels than a control group. A qualitative study of a digital intervention, eConsult, showed that patients valued the flexibility gained from using the intervention because it allowed them to fit seeking health-care advice around their lives and lifestyle.[104] A quotation documented in this paper illustrates these views: 'As someone who works 9–5 it is very convenient service. It is trustworthy and reliable which makes it even better'. Patients also valued help with deciding how serious a symptom might be so they did not waste the time of pressurised services: 'It is a good service to have especially if you feel you don't want to waste time taking a valuable appointment when it may not be necessary to see someone face to face'. Another qualitative study asked people to select their preferred type of intervention.[118] People preferred the mobile app version rather than paper versions, and younger people were more likely to hold this preference. However, there was very little detail about why they held this preference. There was brief discussion about people liking the freedom of being able to check the mobile app no matter where they were.

Knowledge about minor health problems

Eight out of 67 articles measured a change in knowledge or understanding of minor health problems, or a change in knowledge compared with a control group. Seven out of eight articles showed positive results.

Enablement

Seven out of 67 articles measured enablement, confidence or locus of control in terms of people feeling able to take actions after being given the intervention. Six out of seven articles showed positive results.

Change in behaviour or intentions

Sixteen out of 67 articles measured whether or not users had changed their intentions around service use after using the intervention; 16/16 articles showed positive results.

Facilitators of and barriers to the interventions

The few articles with qualitative components described facilitators and barriers. These were often specific to the type of intervention. The interventions explored using qualitative research tended to be at the more complex end of interventions, with digital components and health professional engagement required.[112,114] Therefore, this section lacks transferability to the whole evidence base.

Literacy, digital literacy and equity

Nijland *et al.*[114] considered the feasibility of their digital intervention and the barriers affecting it. They identified that patients underused or misused their digital application because of a lack of education. Health professionals also had concerns about patient equity of access and the exclusion of those without access to new technology.

The fit with existing services

Interventions requiring interaction with health professionals could meet barriers related to this factor. When an intervention also included an e-mail consultation if required, health professionals were unclear about regulations and felt that there was insufficient reimbursement for it, and applications could not be integrated with existing patient information systems or medical records.[114] The wider organisation had to be behind any initiative, for example the hospitals in which the ED was situated, otherwise there might be conflicting systems for health professionals to follow.[112]

User-friendliness

Patients faced technical problems and unattractive web page layouts.[114] Health professionals also faced technical problems in terms of identifying software bugs and unclear features.[114]

Not meeting needs

Patients had problems with a digital intervention.[114] They found that the information offered was not always relevant; the information provided by the digital medical encyclopaedia was too general to be useful; information in other parts of the system was too limited to be useful; self-care advice was insufficiently tailored to their personal needs; they could not always understand the information; and they struggled to understand medical terms used or to describe their problem to enter into the system. Health professionals using this intervention felt that patients still required contact with them rather than the intervention facilitating self-care.[114] If health professionals had to respond to a patient and offer e-mail advice, they found this time-consuming because responses had to be worded with care to prevent legal problems.

Sign-up from health professionals

If health professionals had to hand out information or follow a script, they might have their own views about the appropriateness of this for some types of patients or more generally.[112] This could be overcome if health professionals were very concerned about overcrowding in their ED. Furthermore, health professionals could sympathise with the anxiety of patients even though the symptoms they came with were not serious, so they were concerned about judging people too harshly.

Cost and cost-effectiveness

Fifteen of the 67 articles reported cost data in the results sections of the papers.[79–82,86,87,95,104,120,124,127,128,135,138] Thirteen of these studies were conducted in the USA, and two in the UK.[104,124]

Eleven of these studies reported the results of formal analyses of the intervention: 10 studies reported findings in terms of cost savings[81,86,95,104,120,124,127,128,135] and one study reported on return on investment.[138] Nine of the 11 studies were from the USA, and two were from the UK;[104,124] five of the studies were conducted in primary care populations,[95,104,124,135,138] four in community/other settings[81,120,127,128] and two in emergency care.[86]

All 10 studies reporting economic data found that their interventions generated substantial cost savings.[81,86,95,104,120,124,127,128,135] In terms of intervention types, different types were found to be cost-effective: person-delivered navigation;[87] written and person-delivered navigation;[86] written education alone;[95] written and person-delivered education,[81,120,127,135] including with the support of mass media;[128] digital education alone;[124] and digital self-triage.[104] One study of a type of written education alone also reported that return on investment was estimated to be twice as much as the savings from avoided visits.[138]

Given the heterogeneity of settings, interventions and locations, it was not possible to perform any formal analysis of the cost data. It was also concerning that all the analyses showed cost savings. We were concerned about the desire of authors to promote their intervention as cost-saving. We were also concerned that these analyses did not always use credible effectiveness data, and we had rated many studies as having problems.

Another nine studies mentioned cost data in the papers' discussion or conclusion sections:[83,101,107,117,119,129,134,137,139] four studies were conducted in the USA;[83,119,134,137] two in the UK,[101,107] and one each in Canada,[117] the Netherlands[129] and Taiwan.[139] These calculations were not accompanied by methods and therefore are not considered in our synthesis.

Safety

Our PPI colleagues were concerned that promotion of patient decision-making about which symptoms were serious or not could lead to patients delaying help-seeking for serious health problems. Only eight of the included studies assessed safety as an explicit outcome or compared surrogate outcomes such as hospitalisation across study arms. The explicit safety assessments included instances when patients should have accessed a service, but did not do so on account of the intervention. For example, people may have believed incorrectly that their, or their child's, complaint was non-urgent and should be managed using self-care, thus resulting in higher numbers of urgent admissions or severe illness in an intervention group. When assessed, no safety problems were identified. Hospitalisation rates tended to be similar: 2.7% for the intervention group versus 2.6% for controls ($p = 0.96$);[92] 3.5% for the intervention group versus 6.2% for the usual care group ($p = 0.11$).[98] In a RCT of digital self-triage for respiratory problems, there was no difference in hospitalisation rates between the arms in the trial at 12 months; indeed, the intervention group had a lower level (not statistically significant).[84] Sometimes articles reported the numbers of hospitalisations or adverse events, rather than rates. Again these tended not to show problems: three participants in the intervention group and four in the control group were subsequently admitted to hospital or observed in a paediatric assessment unit.[99] No adverse events were associated with the intervention in a RCT of an educational booklet in EDs.[89] Sometimes the intervention group was followed up, and again no problems were identified: a 3-year medical record review of children in the intervention group showed no evidence of serious problems that might be associated with delaying seeking treatment;[135] there was no delay in seeking help for a cough that lasted more than3 weeks[78] and a reduction in GP consultations for non-serious coughs was accompanied by an increase in consultations for coughs with alarming symptoms.[77] Other measures of safety included premature death (there was no sign of a link between premature death at 6 months and the interventions[91]) and breaking the rules of engaging with the intervention (there was some violation of rules, but not enough for the authors to be worried about[139]).

On the whole, any reduction in service use was perceived to be a success; there was usually no subanalysis to determine if some of that reduction was not appropriate.

Displacement

When we planned the systematic review, we were mindful of what we called 'displacement'. This is when patients seek care at an alternative ED instead of self-caring. If use of that alternative service is not measured, it may look as if the intervention works when, in fact, it has merely replaced use of one ED with use of another. This is most relevant to interventions aiming to reduce the use of primary care, during which patients may attend the ED instead of the GP. It is also relevant to EDs when patients have access to a number of EDs but the intervention is used, and service use measured, in only one ED. This issue was rarely attended to in the 67 papers. The only attention paid to it was when researchers identified a limitation of their studies as measurement of ED use in a single hospital only.

Synthesis by type

Service use

We have summarised the proportions of articles showing a reduction in ED (*Figure 3*) or GP use (*Figure 4*) by type of intervention. The numbers in each intervention type are small, so it is not possible to say whether or not some types were more likely to show a reduction in service use. Although navigation tools look like they may be more likely to show reductions, there were a number of poor-quality studies in this type.

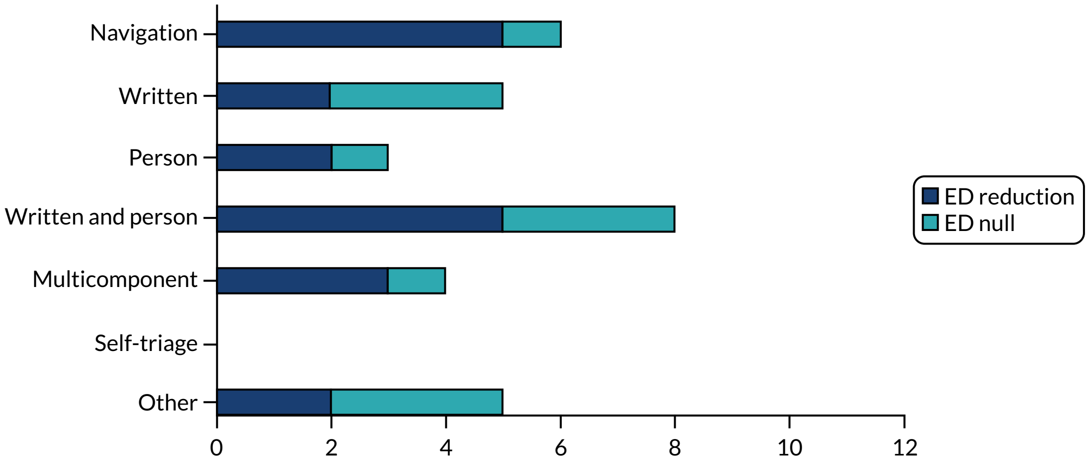


FIGURE 3 Numbers of studies showing a reduction or no change in ED attendances, by type.

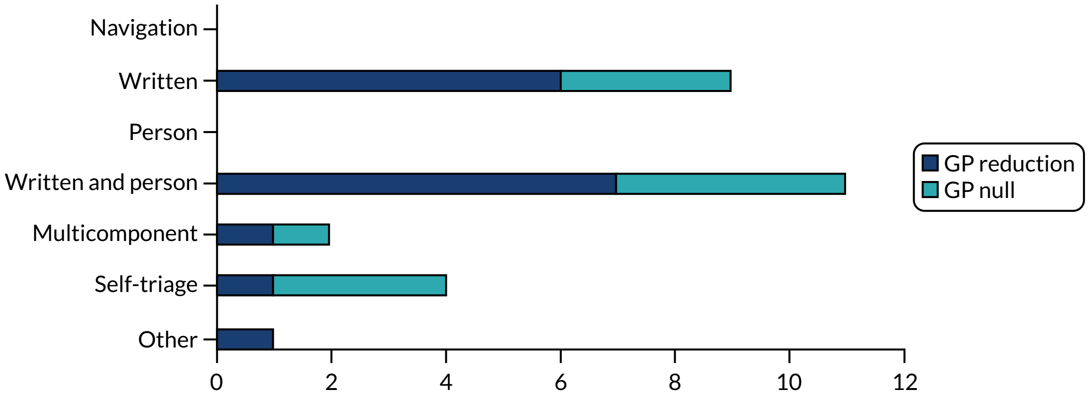


FIGURE 4 Numbers of studies showing a reduction or no change in GP consultations, by type.

1. Navigation types (A.I, B.I and C.I)

Size and quality of the evidence base

Seven studies testing eight interventions aimed to guide people to the most appropriate service (including self-care) for their minor health problem. They included written navigation tools (A.1),[91,110] person-delivered navigation tools (B.I),[87,91,92,130] digital navigation tools (C.I)[123] and a multicomponent written and person-delivered navigation tool (A.I and B.I).[86]

The studies focused on interventions that persuaded patients to use primary care rather than EDs. All the studies were undertaken in the USA, where funding systems for health care (e.g. an insurance system) can save money directly if their patients use primary care rather than EDs. The studies mainly used strong designs for testing impact: either RCTs or controlled before-and-after studies. Only one study[87] was rated as being of high quality using a formal assessment tool. We also had concerns about the quality of some studies in terms of the analyses undertaken,[92,130] clerical errors potentially affecting the data collection,[91] lack of intention-to-treat analyses[91] and the potential that patients attended a different ED from the one being measured.[87] On a positive note, the studies measured service use using routine records, although they used different time periods for measurement.

Intervention description and mechanisms

These interventions tended to use the mechanisms of ‘raising awareness’ and ‘persuasion’. The person-delivered interventions took an active and targeted approach by communicating the message via ‘patient navigators’[87] or health professionals[91,92,130] to people who had used an ED for a minor health problem.

Impact on service use

In *Table 5*, ‘+’ indicates a statistically significant reduction in service use, ‘–’ indicates a null result and ‘±’ indicates that results were mixed. Five of the six articles measuring impact on EDs showed a reduction, although, in two studies,[91,92] this was not a simple overall reduction. Racine *et al.*[92] showed no reduction overall in ED attendances, but then tested the data for types of service use, which showed a statistically significant reduction. Patel *et al.*[91] showed a reduction when they looked at subgroups, rather than for the sample overall. So strictly, a statistically significant reduction in ED attendances was found in three out of six studies. The studies that measured primary care use had an intention to increase use of this service because the aim of the intervention was to shift users from EDs to primary care. Given that increasing use of primary care was not a relevant aim of our study, we have not indicated that results were + or – in *Table 5*. There was some indication that different age groups might be persuaded using different delivery approaches: a postal approach for younger patients and a telephone approach for older patients.[91]

Other outcomes

Satisfaction or helpfulness Only one weak prospective cohort study of a navigation tool reported any findings on users’ satisfaction with the intervention: 90% of the respondents reported that they were satisfied with the triage website Strategy for Off-site Rapid Triage (SORT) for Kids.[123] The other six studies of this type reported no relevant outcome data on satisfaction.[86,87,91,92,110,130]

Current examples in the NHS

The NHS in England makes use of navigation tools routinely to make the general public aware of the range of services they can use, and in what circumstances, so that they use EDs only when they need to. An example of this is the *Choose Well* page on the Sheffield Children’s NHS Foundation Trust website: www.sheffieldchildrens.nhs.uk/patients-and-parents/choose-well/ (accessed 7 September 2021). This type of information is also disseminated by social media. For example, Sheffield Teaching Hospitals NHS Foundation Trust tweeted a navigation tool in July 2021 under the title of ‘Injured or unwell?’ (*Figure 5*). These navigation tools present different service options and when to use them.

TABLE 5 Impact of navigation tools on service use

Study	Design	Quality	Mechanisms	Time period of measurement	Data source	Impact on ED	Impact on GP consultations
A.I Written							
Adesara *et al.*,[110] USA	CBA study	Weak	Awareness, persuasion	6 months	Records	All: (+) ED visits attributable to intervention patients – pre = 6.83%; during = 6.22%; post = 6.15%. Approximately 40 ED visits saved per month. Internal medicine clinic: pre = 1.34%; during = 1.69% (difference pre–during vs. intervention $p < 0.001$); post = 1.43% (difference pre–post vs. intervention $p < 0.001$)	
Patel *et al.*,[91] USA	RCT with three arms	High risk of bias	Awareness, tailoring	6 months	Records	All: (±) no change in the whole sample, but change in ED use differed by age group and intervention type, with reductions for older people getting a telephone call and younger people being mailed information. Telephone intervention vs. matched control outcome (model): 0.92 (0.77–1.10); $p = 0.36$ [≥ 65 years: 0.78 (0.62–0.99); $p = 0.04$]. Mail intervention vs. matched control outcome: 1.07 (0.92–1.23); $p = 0.40$ [< 65 years: 0.73 (0.55–0.98); $p = 0.03$]	All: • PCP call for telephone intervention vs. matched control outcome (model): 0.93 (0.68–1.27); $p = 0.63$ • Mail intervention vs. matched control outcome: 0.83 (0.60–1.13); $p = 0.23$

continued

TABLE 5 Impact of navigation tools on service use (*continued*)

Study	Design	Quality	Mechanisms	Time period of measurement	Data source	Impact on ED	Impact on GP consultations
B.I Person-delivered							
Chande and Kimes,[130] USA	RCT	High bias	Awareness, education, persuasion and tailoring	12 months	Records, self-report	All: (–) ED – at study entry, 94 out of 102 in the intervention group and 87 out of 93 in the control group had made at least one visit to the ED ($p = 0.79$). At the 1-year follow-up, 84 out of 102 in the intervention group and 73 out of 93 in the control group had made at least one visit to the ED ($p = 0.59$). There was no significant difference in rates of use of the ED Minor: (–) at study entry, 55 out of 102 (54%) in the intervention group and 55 out of 93 (59%) in the control group had made two or more ED visits for minor illness in the preceding year. At the 1-year follow-up, 61 out of 102 (60%) in the intervention group and 57 out of 93 (61%) in the control group had made two or more ED visits for minor illness ($p = 0.95$)	All: at study entry, 95 out of 102 in the intervention group and 75 out of 93 in the control group had seen their PCP at least once ($p = 0.59$). At the 1-year follow-up, 81 out of 102 in the intervention group and 77 out of 93 in the control group made at least one visit to their PCP ($p = 0.59$); however, the total number of PCP visits by both groups increased by almost 50%. Although there was no difference between the control and intervention groups at the 1-year follow-up, the total increase in visits for both groups is significant ($p < 0.001$)
Enard and Ganelin,[87] USA	CBA study	Strong	Awareness, persuasion, tailoring	12 months and 24 months	Records	All: (+) for people who did not use the ED frequently in the previous year, the mean number of primary care-related ED visits declined significantly in the corresponding post-observation period, compared with controls. The OR was 0.83 (95% CI 0.71 to 0.98) for people who had a baseline attendance of one or more visits at 12 months. At 24 months, this was 0.55 (95% CI 0.47 to 0.63)	

Study	Design	Quality	Mechanisms	Time period of measurement	Data source	Impact on ED	Impact on GP consultations
Racine *et al.*,[92] USA	RCT	Some concerns	Awareness, persuasion	12 months	Records	All: (±) both intervention and control groups were as likely to return to the PED after their initial PED visit (intervention, 38%; control, 39%; $p = 0.26$). But, looking at visits, the adjusted odds of returning to a PED rather than another service was 0.88 (95% CI 0.82 to 0.94). PED, *n* (%): 2145 (17.7) vs. 2329 (20.4); $p < 0.001$. Hospitalisation, *n* (%): 325 (2.7) vs. 302 (2.6); $p = 0.96$. Subspecialty, *n* (%): 2744 (22.6) vs. 2220 (19.5); $p < 0.001$	• Primary care: 6905 (57.0) vs. 6546 (57.4); $p = 0.68$ • All: 12,119 vs. 11,397; $p < 0.001$. The adjusted OR of a follow-up visit being to the PED by an intervention subject, compared with a control subject, was 0.88
A.I and B.I							
Davis *et al.*,[86] USA	BA study	Moderate/weak	Awareness, persuasion	3 and 12 months	Records	All: (+) 62 fewer PED visits than the same 3 months the previous year. The numbers continued to decrease at 12 months: a decrease of 284 in the total number of PED visits (29.8%). In 2015, the clinic was at 71.5 visits per 100 persons per year. Following interventions, in 2017, the rate changed to 41.9 visits per 100 persons per year	All: the proportions of paediatric patients using the (GP) clinic instead of the ED also shifted from 2015 to 2017: 47.5% (64 patients) used the clinic for upper respiratory infections in 2015; in 2017, that number increased to 78.2% (97 patients) who were seen in the clinic as opposed to the ED ($p < 0.0001$)
						Minor: (±) 41.1% decrease (from $n = 82$ to $n = 48$) in level-3 (urgent) visits to the ED and a 16.7% decrease (from $n = 120$ to $n = 100$) in level-4 (less urgent) visits in the initial 3 months. These changes were maintained when examining the data 1 year later. The number of level-5 (not acute) visits remained unchanged	Minor: Walk-in clinic visits during this time continued to increase. Similar shifts were seen in fever and otitis media; however, the sample size was not great enough to draw significant conclusions

BA, before and after; CBA, controlled before and after; CI, confidence interval; OR, odds ratio; PCP, primary care provider; PED, paediatric emergency department.

Note

(+) indicates a statistically significant reduction in service use, (–) indicates a null result and (±) indicates that results were mixed.

FIGURE 5 Sheffield Teaching Hospitals NHS Foundation Trust 'navigation tool' tweet.

They can use the mechanism of 'positive persuasion' in terms of the promise of quicker advice if people use alternatives to EDs. We also found an example of a person-delivered navigation process (with a leaflet) to persuade users of an urgent care centre with minor problems to look for alternative sources of care in their future health-seeking.[144] There are also videos available through YouTube (YouTube, LLC, San Bruno, CA, USA) that make people aware of new services in primary care that might reduce demand for face-to-face care. An example is produced by West Yorkshire Health and Care Partnership,[145] which includes the use of British Sign Language and animation to facilitate accessibility.

Conclusion and relevance to English NHS

The evidence base identified that there was potential that people could be persuaded to use their primary care provider, rather than an ED. However, the quality of the studies was not high and the evidence base was likely to be context specific because it was generated in the USA where there are incentives to make cost savings within a health insurance agency context. In terms of relevance to England, the navigation tools in use in England are different from those used in the evidence base. Tools in England mainly attempt to disseminate information to potential service users, rather than actively communicate a message to a targeted group of recent ED users. The NHS tools use a light-touch persuasion technique, compared with the persuasive techniques used in the evidence base. So the evidence base is not relevant to the NHS tools in routine use. We would recommend that consideration is given to identifying how these NHS tools could be used in a more proactive and targeted way in England, and that this approach is evaluated.

Box 1 provides a plain English summary of this section.

2. Written information about how to care for minor ailments in leaflets, booklets, books and websites (A.II and C.II)

Size and quality of the evidence base

Seventeen articles focused on written education in paper format given at a specific time when patients sought care for a minor health problem,[89,100,101,107,109,119] paper format given at a general time[95–97,105,106,117,138] and a website given at a specific[136] or general time.[90,124,129] Fourteen of these measured impact on service use. These are presented in *Table 6* in the three groups of articles 'at a specific time', 'at a general time' and 'digital'. There was one pilot study so this was not powered to detect a difference. Of the articles measuring impact, seven were undertaken in the UK, five in the USA, one in Denmark and one in the Netherlands. The study designs were strong, mainly RCTs; in fact, all the studies used controls.

BOX 1 Plain English summary (Flesch Reading Ease: easy)

Some tools tried to persuade people to use their GP rather than go to A&E. Some of them worked. But the quality of the studies was not high. And the studies were done in the USA, where they have health insurance. This is different from the UK. The tools were different from ones used in the UK in other ways. They used nurses to persuade people who had gone to A&E with a small problem to go to their GP next time. In the UK we tend to have information on hospital websites and this is aimed at everyone. So the studies we found were not relevant to the NHS at the moment. We wonder what would happen if the NHS tried to target the information on their websites to the people who need it the most. Then we could test if this works.

A&E, accident and emergency.

All the studies used records rather than self-report. The formal quality assessment identified only one high-quality study. Our more informal assessment identified some concerns with papers: limited results available because yet to be formally published,[89] low statistical power,[119] or poor analysis or presentation of the findings.[95,97,105,107,138] We felt that, given the difficulties of undertaking research in this area, and the harshness of the formal quality assessment, we identified some good-quality studies with strong designs undertaken in the UK.[84,89,96,100,101] We also considered the controlled before-and-after study undertaken in the Netherlands, which made use of a national database on GP consultations to measure outcomes, to be highly relevant to the UK and of good quality.[129]

Intervention description and mechanisms

Leaflets or booklets varied in size and in the range of minor conditions addressed. They were sometimes endorsed by health professionals within a slide presentation,[119] a covering letter if a booklet was sent by post[105,106,138] or by personally handing the leaflet/booklet to the patient.[95,101,107] The role of the health professionals was different from the role taken for person-delivered education interventions (B.II, discussed in later section) in that there was no discussion with patients of the content of the booklet/leaflet. In one study, patients had the option of calling a doctor with questions, but we did not consider this to be person-delivered because it was optional.[119] In another study, the intervention was a leaflet and verbal advice from the doctor, compared with verbal advice as the control, so the intervention being tested was a leaflet.[100] The common mechanism was 'education'.

Impact on service use

In *Table 6*, (+) indicates a statistically significant reduction in service use, (–) indicates a null result and (±) indicates that results were mixed. Pilot studies are indicated by italics. Five articles of paper-based interventions measured the impact on Eds, and two of these identified a reduction.[90,95] We had concerns about the quality of one of these positive studies, and the formal quality assessment rated the other as having a low risk of bias, so results were not determined by the quality of the research. Of the null studies, one was very small[119] and one was a good-quality UK study (according to our informal assessment), involving posting a leaflet to ED non-urgent users and measuring further attendances.[89] Again, research quality did not explain null results.

Of the nine studies measuring impact of written interventions on GP consultation rates, six showed a reduction. The two good-quality UK RCTs (based on our informal assessment) had conflicting results.[96,106] One study's positive result relied on a subgroup analysis.[97] The single website intervention measuring GP consultations[129] identified a reduction in GP consultations in the population for symptoms that were frequently accessed on the website, compared with consultations for conditions not frequently accessed on the website.

TABLE 6 Impact of written education on self-care (e.g. leaflets, booklets, websites on service use)

Study	Design	Quality	Mechanisms	Time period of measurement	Data source	Impact on ED	Impact on GP consultations
Paper based, specific time							
Holden,[89] UK	RCT	Some concerns	Education	11 months	Records	Minor: (–) average number of non-urgent attendances (including reattendances):– intervention, mean 1.3 (SD 0.8); control, 1.3 (SD 0.7). Reattendance rate: intervention, 23.2%; control, 24.6%	
Macfarlane *et al.*,[101] UK	RCT	High risk of bias	Education	1 month	GP-recorded reconsultations		All: (+) for the whole group, patients who received the leaflet had significantly fewer reconsultations for the same symptoms over the following month (14.9%) than those who did not receive a leaflet (21.4%); (OR 1.56, 95% CI 1.11 to 2.19; $p = 0.007$). For the 723 patients who were treated with antibiotics, significantly fewer patients receiving a leaflet reconsulted (60/369, 16%), than those who did not receive the leaflet (81/354, 23%) (OR 1.53, 95% CI 1.03 to 2.26; $p = 0.02$)
Macfarlane *et al.*,[100] UK	RCT	High risk of bias	Education	1 month	Records		All: (–) the reconsultation rates were similar for all patients: leaflet, 11/104; no leaflet, 14/105

Study	Design	Quality	Mechanisms	Time period of measurement	Data source	Impact on ED	Impact on GP consultations
Platts *et al.*,[107] UK	RCT	High risk of bias	Education	12 months	Records	All: (–) the differences between the groups in the number of visits to EDs and in the numbers of telephone calls, home visits and nurse clinic visits were small and not statistically significant	All: (–) mean annual consultation rates, including routine GP consultations and emergency consultations with a GP or nurse practitioner, for the 12-month period of the study, classified by age group, sex and book group, did not, in general, differ between the three arms of the study. Use of NHS Direct telephone service: a total of 160 participants made an average of 1.19 calls to the NHS Direct telephone service. In a multivariable logistic regression model, the odds of calling NHS Direct were nearly doubled for being allocated to the NHS Direct group rather than to control or to the self-care book group ($p < 0.01$)
Steelman *et al.*,[119] USA	Non-RCT	Weak	Education	4 months	Records	Minor: (–) intervention vs. control: appropriate ED and clinic visits: 5 vs. 9; inappropriate visits: 6 vs. 8; $p > 0.99$	
Paper based, general time							
Elsenhans *et al.*,[138] USA	Non-RCT	Moderate/ weak	Education	4 months	Records		• All: (+) decrease in total visits: intervention, 21%; control, 8%. Decrease in total visits per member per month: intervention, 18%; control, 12% • Minor: (+) decrease in TLAS visits: intervention, 33%; control, 9%. Decrease in TLAS visits per member per month: intervention, 31%; control, 13%. Decrease in TLAS total visits per member per month: intervention, 5.3; control, 0.31; $p \leq 0.05$

continued

TABLE 6 Impact of written education on self-care (e.g. leaflets, booklets, websites on service use) (*continued*)

Study	Design	Quality	Mechanisms	Time period of measurement	Data source	Impact on ED	Impact on GP consultations
Hansen,[105] Denmark	RCT	High risk of bias	Education	6 months	Records		All: (+) families that received the booklet reported significantly more self-teatments, had significantly fewer consultations and had significantly fewer consultations in which worry was the main reason. Mean number of patient-initiated consultations: intervention 0.288 (2SD 0.3–0.2) vs. control 0.426 (2SD 0.5–0.4). For home visits: intervention 0.098 (2SD 0.1–0.7) vs. control 0.195 (2SD 0.2–0.2) (no *p*-values given). Worry was a reason for consultation: intervention 19% vs. control 31% ($p = 0.0075$). GP assessed appropriateness of consultation: intervention 88% vs. control 81%
Heaney *et al.*,[96] UK	RCT	High risk of bias	Education	1 year pre intervention, 1 year post intervention	Records		• All: (–) out-of-hours contacts: book – before vs. after: 0.13 vs. 0.11; Control – before vs. after: 0.11 vs. 0.13. Before–after difference –0.02 (95% CI –0.06 to 0.01); out-of-hours total contacts: book – before vs. after: 8.53 vs. 6.57; control – before vs. after: 9.02 vs. 6.65. Before – after difference 0.22 (95% CI –0.31 to 0.75) • Minor: (–) book – before vs. after: 1.13 vs. 1.09; control – before vs. after: 1.06 vs. 1.07. Before–after difference 0.03 (95% CI –0.17 to 0.10). Total contacts for minor illness: book – before vs. after: 2.24 vs. 1.74; control – before vs. after: 2.43 vs. 1.84. Before–after difference 0.02 (95% CI –0.25 to 0.29)

Study	Design	Quality	Mechanisms	Time period of measurement	Data source	Impact on ED	Impact on GP consultations
Little *et al.*,[106] UK	RCT	High risk of bias	Education	12 months	Records		Minor: (+) compared with the control group, fewer patients in the booklet and summary card groups attended frequently with minor illnesses – booklet: OR 0.81 (95% CI 0.67 to 0.99; $p = 0.043$); summary card: OR 0.83 (95% CI 0. 27 to 0.96; $p = 0.011$)
Usherwood,[97] UK	RCT	High risk of bias	Education	12 months	Contact record completed by practice staff		Minor: (±) although there was no significant difference between booklet and control groups for daytime health centre contacts, there were differences for daytime home visits and for contacts out of hours. For daytime home visits, the mean frequency of initial contacts was substantially lower in the booklet group than in the control group for households with one or two children. For out-of-hours contacts for booklet symptoms, the mean frequencies of initial contacts were higher in the booklet group than in the control group for all sizes of household
Yoffe *et al.*,[95] USA	CBA study	Weak/ moderate	• Education • Anxiety	18 months	Records	Minor: (+) there was a dramatic drop in ED use rates by children seen in the clinic in which the booklet was distributed. The reductions ranged from 55% to 81%, compared with the same month of the previous year and compared with other geographies. Compared with the control groups, the decline in use rates by intervention patients was statistically significant ($p < 0.001$)	

continued

TABLE 6 Impact of written education on self-care (e.g. leaflets, booklets, websites on service use) (*continued*)

Study	Design	Quality	Mechanisms	Time period of measurement	Data source	Impact on ED	Impact on GP consultations
Digital							
Ladley *et al.*,[90] USA	RCT	Low risk of bias	Education	12 months	Records	• All: (+) total number of visits – control 240 (mean 2.12, SD 2.26) vs. intervention 168 (mean 1.44, SD 1.65); $p < 0.05$. All ED visits: IRR 1.48 (95% CI 1.11 to 1.97; $p < 0.01$) Urgent ED visits: IRR 1.79 (95% CI 1.05 to 3.05; $p = 0.03$) • Minor: (+) non-urgent ED visits: IRR 1.43 (95% CI 1.06 to 1.94; $p = 0.02$)	
Lepley et al.,[136] *USA*	*RCT (pilot)*	*High risk of bias*	*Education*	*6 months*	*Records, self-report*	*All: (–) record review – no significant difference in rate of ED visits between the application group and the control group (14% more visits in the application group; IRR 1.14, 95% CI 0.56 to 2.34), between the book group and the control group (22% fewer visits in the application group; IRR 0.78, 95% CI 0.34 to 1.74) or between the book and application group and the control group (40% fewer visits in the application group; IRR 0.60, 95% CI 0.25 to 1.42)*	
Spoelman *et al.*,[129] the Netherlands	CBA study	Moderate	Education	3 years	Records		• All: (+) the consultation rate decreased by 6.2% in the first year and by 11.6% after 2 years. All consultations: 272.109/0.826 vs. –0.794/–1.620; $p < 0.001$; so the change in the slope of GP consultations before and after the website was introduced was –1.620 ($p < 0.0001$). The trend for the top 10 topics reduced whereas the rates for the reference group stayed the same • Minor: (+) the decline was most distinct for those telephone consultations that usually provided non-essential care

CBA, controlled before and after; CI, confidence interval; IRR, incidence rate ratio; OR, odds ratio; SD, standard deviation; TLAS, time-limited acute symptom.

Notes

(+) indicates a statistically significant reduction in service use, (–) indicates a null result and (±) indicates that results were mixed. Pilot studies are indicated by italics.

Other outcomes

Satisfaction or helpfulness Six articles reported no relevant outcome data on satisfaction.[89,95,96,100,101,129] Eleven of the 17 articles reported one or more relevant outcomes (*Table 7*). Seven of the 17 articles reported findings on users' satisfaction with the intervention. In all seven articles, users reported being satisfied or very satisfied with the intervention, regardless of whether the intervention was aimed at general populations,[97,106,138] aimed at a specific group[109] or was web based.[90,124,136] However, in some cases, participants might have been satisfied with the intervention, but also satisfied with the control intervention,[109] or expressed preferences for one format of the intervention over another.[136] Six of these seven articles were assessed either as being weak (two non-RCTs) or at high risk of bias (four RCTs); only one RCT was judged to be at low risk of bias.[90]

Knowledge about conditions or confidence in knowing what to do Three studies of paper-based formats reported improved knowledge and understanding among patients.[107,109,119] The same finding was reported in a study of an NHS website,[124] and improved confidence was found among users of a general paper-based intervention.[105]

Intentions People changed their minds about the actions they would take after using one of the interventions.[107]

Current examples in the NHS

The NHS in the UK has a number of sources of web-based educational materials about how to care for minor ailments and when to seek health care. The NHS website [www.nhs.uk (accessed 31 August 2022)] has a section titled 'Health A to Z' where a minor symptom such as 'sore throat' can be searched for and self-care advice is offered in writing and a short video, along with the role a pharmacist could play. *Figure 6* shows a screenshot of a page (accessed 7 September 2021). It is aimed at everyone. People find it by searching the internet.

There are also regional versions of web-based education to help parents of young children to self-care for minor ailments, advertised under the banner of 'Healthier Together'. For example, a version of Healthier Together[146] is available for people in the South Yorkshire and Bassetlaw area (*Figure 7*). The website link is emailed directly to parents and addresses common illnesses and conditions that affect children and young people aged 0–18 including rashes, fever, coughs, asthma, sickness, earache, conjunctivitis, head injuries, and limps. It offers a traffic light system of seriousness from 'minor' to 'urgent'. A Consultant Paediatrician from local highly regarded children's hospital signs the letter.

Another example of a regional resource for parents is *The Little Orange Book*[68] produced by Newcastle and Gateshead CCG for parents with young children (*Figure 8*).

Conclusions and relevance to the NHS

There is a reasonable size of evidence base about sending booklets or leaflets to patients, but limited evidence about digitally available written information. There is a reasonable amount of evidence from the UK and the rest of Europe. The outcome of interest measured was more likely to be impact on GP consultations than ED attendances. Unfortunately, the results of different studies were not consistent. There was no apparent reason why some good-quality studies showed reductions in service use and others not. However, there were enough positive studies to consider this type of intervention as having potential. Given the availability of digital educational information in the NHS currently, it may be beneficial to undertake a high-quality evaluation of such information, specifically considering how any information is disseminated to relevant people. Our PPI colleagues were keen that ways of educating people other than through digital means should also be used because of a lack of digital health literacy in the UK population and the lack of access to technology. Some regional educational information is also available in paper format, for example *The Little Orange Book*.[68]

TABLE 7 Other outcomes for written education

Study	Design	Quality	Mechanisms	Data collection time points	Data source	Impact on other outcomes
Paper based, specific						
Platts *et al.*,[107] UK	RCT	High risk of bias	Education	3 and 12 months	Questionnaire	• (+) Helpfulness: comprehensiveness – participants' perceptions of books: participants who had been allocated a book and had consulted it at least once were asked whether or not the book provided all of the information required. Responses were requested on a scale from 1 (all provided) to 5 (none provided). Those allocated the self-care book gave a mean response of 2.42 (SD 1.09), compared with 2.85 (SD 1.30) for those allocated the NHS Direct book ($p < 0.001$) • (+) Easy to understand: similarly, although both books were found to be easy to understand by most participants, the self-care book was seen as better for understanding ($p < 0.001$). Participants whose educational qualifications were below A Level were more likely to report that they found the information in the self-care book 'harder to understand' than those whose qualifications were at or above A Level, at both 3 months ($p = 0.004$) and 12 months ($p = 0.006$) • (+) Enablement: the self-care book was better for helping people know what to do ($p < 0.001$); the advice from the self-care book was followed more often ($p = 0.002$). Similarly, at 3 months, those whose educational qualifications were below A Level were more likely to report that they found the information in the NHS Direct book 'useful for knowing what to do' than those whose qualifications were at or above A Level (3 months, $p = 0.012$; 12 months, $p = 0.009$) • (+) Intentions: using the self-care book was more often likely to lead to a change of mind on what to do ($p = 0.003$)
Steelman *et al.*,[119] USA	Non-RCT	Weak	Education	Baseline and 2 and 4 months	Self-report instrument	(+) Knowledge: evaluation of knowledge on fever – average number of incorrect responses: • Baseline – intervention 11.5 vs. control 11.4; $p = 0.35$ • 2 months – intervention 10.4 vs. control 11.8; $p = 0.006$ • 4 months – intervention 8.5 vs. control 10.3; $p = 0.002$

Study	Design	Quality	Mechanisms	Data collection time points	Data source	Impact on other outcomes
Wood *et al.*,[109] USA	CBA study	Weak	Education	2 months	5-question survey	• (±) Knowledge: significant improvements in knowledge scores were observed after SDI or VDI were provided (65% pre instructions vs. 75% post instructions; $p < 0.001$). Knowledge significantly improved post instructions for gastroenteritis (73% post vs. 57% pre; $p = 0.005$), fever (76% post vs. 69% pre; $p < 0.001$) and bronchiolitis (64% post vs. 49% pre; $p = 0.025$). Post-instructions knowledge improvement was significantly greater in the VDI group for all diagnoses combined (pre–post difference: 13% VDI vs. 6% SDI; $p = 0.027$). Caregivers demonstrated significantly greater knowledge improvement for gastroenteritis (pre–post difference: 23% VDI vs. 0% SDI; $p = 0.027$). Similar knowledge improvement trends were noted for other diagnosis groups, but group differences did not achieve statistical significance (fever pre–post difference: 9% VDI vs. 7% SDI; $p = 0.47$; bronchiolitis: 23% VDI vs. 11% SDI; $p = 0.32$). Knowledge level (percentage correct) was significantly higher for caregivers in the VDI group than in the SDI group for all diagnoses combined (82% VDI vs. 67% SDI; $p < 0.001$). When stratified by diagnosis group, caregivers of children with fever and bronchiolitis demonstrated significantly greater knowledge after receiving VDI than after SDI (fever: 84% VDI vs. 70% SDI; $p < 0.001$; bronchiolitis: 83% VDI vs. 53% SDI; $p = 0.019$). A similar trend was observed in the gastroenteritis group, but the difference did not reach statistical significance (75% VDI vs. 68% SDI; $p = 0.41$). Evaluation of question types revealed that caregivers were least knowledgeable regarding duration of disease (mean post-instructions knowledge for all participants: 81% diagnosis, 81% treatment, 43% disease duration, 78% seek care; $p < 0.001$). This pattern was similar across all diagnosis groups ($p > 0.29$) • (±) Satisfaction/helpfulness: caregivers rated the discharge instructions favourably in the SDI group and in the VDI group. The highest VDI ratings were observed for the bronchiolitis discharge instructions (100% very/extremely helpful), and the lowest VDI ratings were for the fever instructions (63% very/extremely helpful). There were no significant differences in caregivers' perceived helpfulness of SDI when compared with VDI (all $p \geq 0.13$)

continued

TABLE 7 Other outcomes for written education (*continued*)

Study	Design	Quality	Mechanisms	Data collection time points	Data source	Impact on other outcomes
Paper based, general						
Elsenhans *et al.*,[138] USA	Non-RCT	Moderate/weak	Education	6 months	Telephone survey	(+) Satisfaction: there was general enthusiasm among members and staff and the majority recommended the continued use of self-care manual; no dissatisfaction was expressed
Hansen,[105] Denmark	RCT	High risk of bias	Education	6 months	Self-report instrument (survey and interview)	(+) Enablement: self-management of episodes of illness – 51% in the intervention group and 36% in the control group reported some kind of self-treatment. This difference was statistically significant
Little *et al.*,[106] UK	RCT	High risk of bias	Education	12 months	Survey	(+) Satisfaction: most respondents could remember receiving a leaflet or booklet (booklet 85%, card 70%, control 52%; $p < 0.001$) and found them useful (booklet 81%, card 78%, control 62%; $p < 0.001$)
Mullett and Hills,[117] Canada	Prospective cohort study	Weak	Education	12 months	Diary	Helpfulness: examples from patient diaries describing how the handbook helped them make decisions and self-care, and also what was missing from the handbook
Usherwood,[97] UK	RCT	High risk of bias	Education	12 months	Questionnaire	(+) Satisfaction: perceived usefulness of the booklet – frequency of response: • Has the advice in the booklet changed anything that you would do for your child when he or she is ill? Yes definitely, 21; yes probably, 47; not sure, 17; no, probably not, 15; no definitely not, 1 • Overall, has the booklet been useful to you? Yes definitely, 41; yes probably, 52; not sure, 7; no, probably not, 2; no definitely not, 0 • Do you think that other families in the practice would find the booklet useful? Yes definitely, 71; yes probably, 55; not sure, 8; no, probably not, 0; no definitely not, 0

Study	Design	Quality	Mechanisms	Data collection time points	Data source	Impact on other outcomes
Digital						
Ladley *et al.*,[90] USA	RCT	Low risk of bias	Education	12 months	Survey	(+) Enablement: high levels of satisfaction and engagement at 12-month survey in intervention group: 91% (75/79 who completed the survey) felt more comfortable making decisions about when to take their baby to the ED
Lepley *et al.*,[136] USA	RCT (pilot)	High risk of bias	Education	6 months	Telephone survey	(+) Satisfaction: modified intention to treat – combined app ($n = 37$) vs. combined book ($n = 37$) vs. control ($n = 23$): • Used intervention – 35.1% vs. 73.0%[a] vs. 78.3%[a] • Very/somewhat useful – 37.8% vs. 70.3%[a] vs. 78.3%[a] • Very/somewhat understandable – 46.0% vs. 94.6%[b] vs. 100.0%[b] • Recommend intervention to family or friends – 48.7% vs. 94.6%[b] vs. 100.0%[a] (–) Satisfaction: per-protocol analysis – combined app ($n = 20$), combined book ($n = 37$), combined control ($n = 23$): • Used intervention – 60.0% vs. 73.0% vs. 78.3% • Very/somewhat useful – 70.0% vs. 70.3% vs. 78.3% • Very/somewhat understandable – 85.0% vs. 94.5% vs. 100.0% • Would recommend to others – 90.0% vs. 94.5% vs. 100.0% In the per-protocol analysis, comparing groups of those who were followed up at least once, there was no difference in use ($p = 0.530$), understanding ($p = 0.222$), recommendations ($p = 0.517$), or usefulness ($p = 0.983$) between the app and the book. Of note, parents in the book + app group prefer the book over the app. When given a choice between the book and the app, the majority of parents would choose the book alone (61.1%) or both (27.8%); none of the parents would choose the app alone Authors note in the discussion that the mHealth app used a lot of medical jargon and was not good for people with lower health literacy levels

continued

TABLE 7 Other outcomes for written education (*continued*)

Study	Design	Quality	Mechanisms	Data collection time points	Data source	Impact on other outcomes
Murray *et al.*,[124] UK	Survey	Weak	Education	At the time of using the website or visiting the GP	Survey	(+) Satisfaction: • Online sample ($n = 1559$) – use of NHS Choices in relation to GP consultations: ○ Very satisfied – $n = 252$, 18.1%, 95% CI 14.4% to 18.1% ○ Satisfied – $n = 794$, 57.1%, 95% CI 48.4% to 53.4% ○ Neither satisfied nor dissatisfied – $n = 334$, 24%, 95% CI 19.4% to 23.5% ○ Dissatisfied – $n = 7$, 0.5%, 95% CI 0.2% to 0.9% ○ Very dissatisfied – $n = 4$, 0.3%, 95% CI 0.1% to 0.7% ○ Did not answer – $n = 168$, 10.8%, 95% CI 9.3% to 12.4% • GP sample ($n = 125$) – use of NHS Choices if have used the website in relation to GP consultations: ○ Very satisfied – $n = 7$, 5.6%, 95% CI 2.3% to 11.2% ○ Satisfied – $n = 39$, 31.2%, 95% CI 23.2% to 40.1% ○ Neither satisfied nor dissatisfied – $n = 14$, 11.2%, 95% CI 6.3% to 18.1% ○ Dissatisfied – $n = 0$, 0.0%, 95% CI 0.0% to 2.9% ○ Very dissatisfied – $n = 1$, 0.8%, 95% CI 0.0% to 4.4% ○ Has not used – $n = 34$, 27.2%, 95% CI 19.6% to 35.9% ○ Did not answer – $n = 30$, 24.0%, 95% CI 16.8% to 32.5% (+) Knowledge: online sample ($n = 1559$) – patients who agree/strongly agree that use of NHS Choices for their GP appointments means: • I know more about my condition/illness – $n = 1189$, 76.3%, 95% CI 74.1% to 78.4% • I know more about my treatment options – $n = 108$, 69.4%, 95% CI 67.0% to 71.7% • I am more confident to ask questions – $n = 984$, 63.1%, 95% CI 60.7% to 65.5% • I am confident to express my point of view – $n = 870$, 55.8%, 95% CI 53.3% to 58.3%

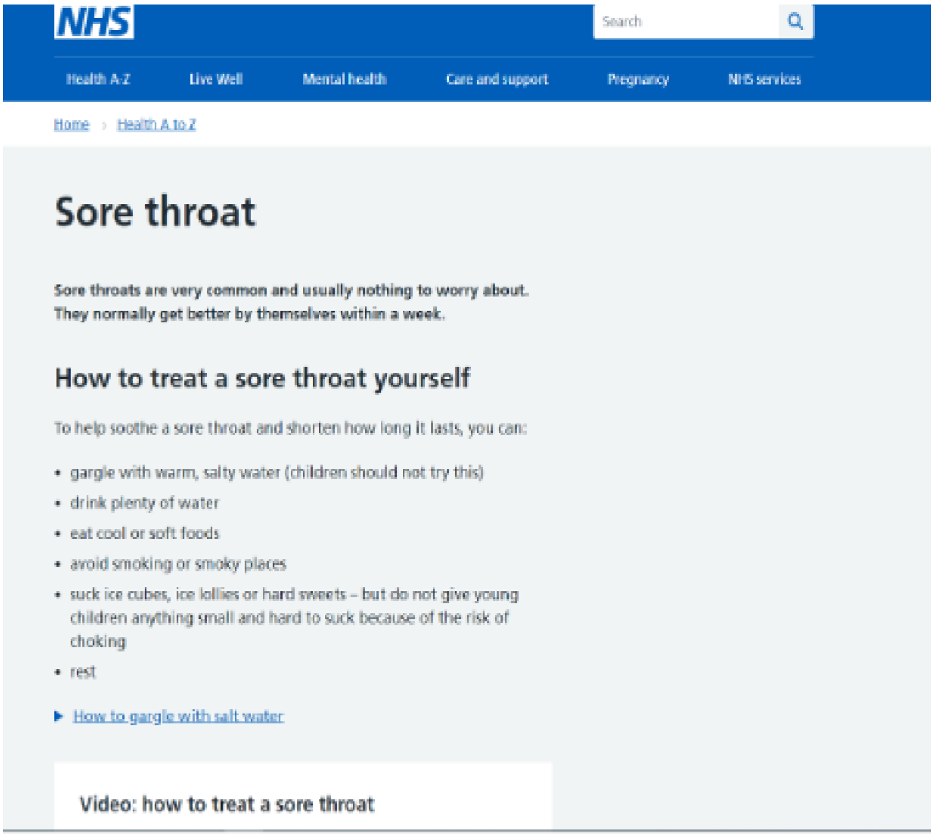
A Level, Advanced Level; CBA, controlled before and after; CI, confidence interval; mHealth, mobile health; SDI, standard discharge instructions; VDI, video discharge instructions.

[a] $p < 0.01$ for comparison with the app group.

[b] $p < 0.001$ for comparison with the app group.

Note

(+) indicates a statistically significant reduction in service use, (–) indicates a null result and (±) indicates that results were mixed.



Sore throat

Sore throats are very common and usually nothing to worry about. They normally get better by themselves within a week.

How to treat a sore throat yourself

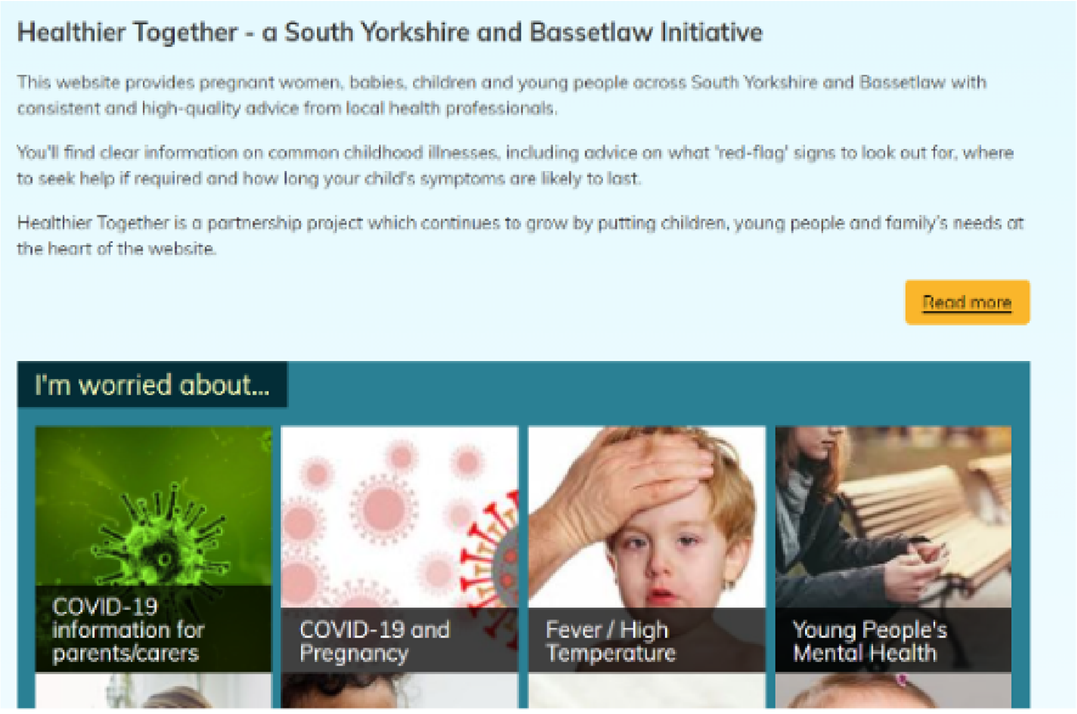
To help soothe a sore throat and shorten how long it lasts, you can:

- gargle with warm, salty water (children should not try this)
- drink plenty of water
- eat cool or soft foods
- avoid smoking or smoky places
- suck ice cubes, ice lollies or hard sweets – but do not give young children anything small and hard to suck because of the risk of choking
- rest

▶ How to gargle with salt water

Video: how to treat a sore throat

FIGURE 6 NHS website screenshot. Contains public sector information licensed under the Open Government Licence v3.0.



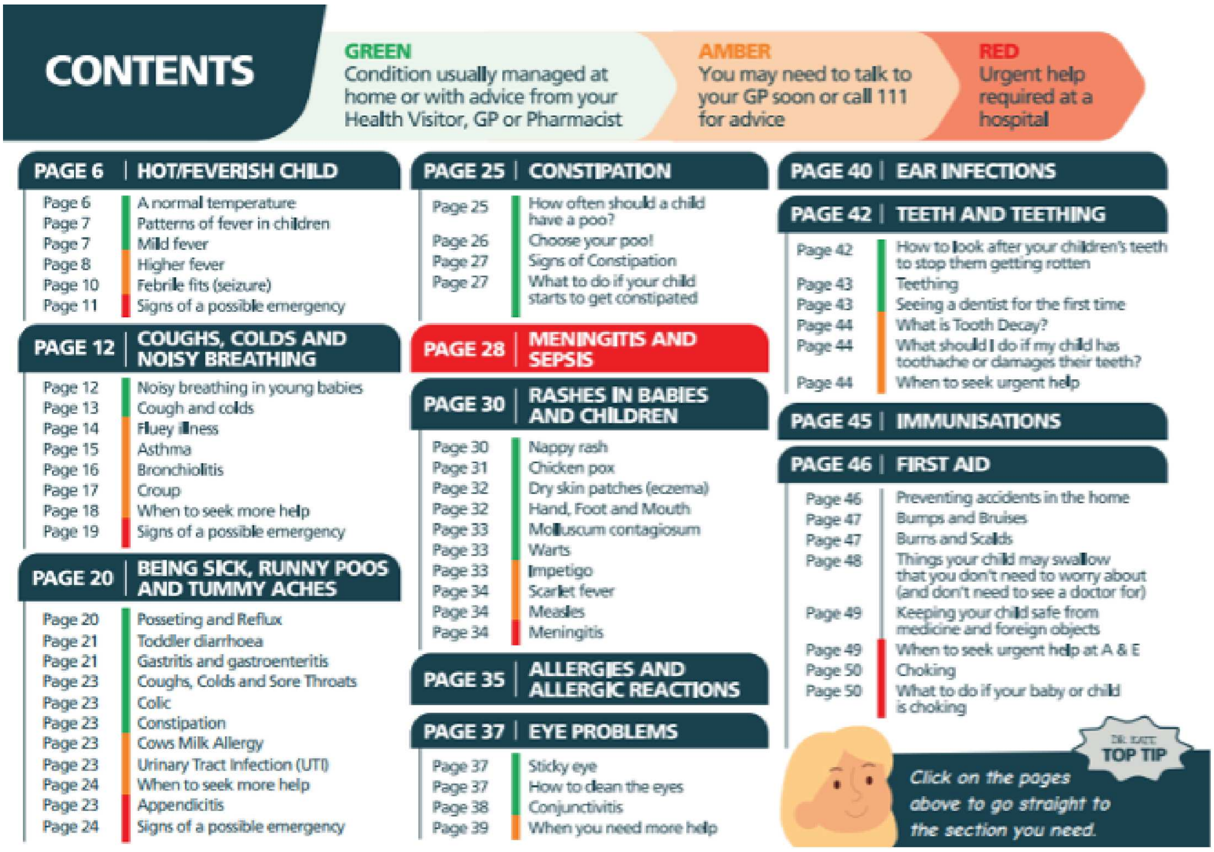
Healthier Together - a South Yorkshire and Bassetlaw Initiative

This website provides pregnant women, babies, children and young people across South Yorkshire and Bassetlaw with consistent and high-quality advice from local health professionals.

You'll find clear information on common childhood illnesses, including advice on what 'red-flag' signs to look out for, where to seek help if required and how long your child's symptoms are likely to last.

Healthier Together is a partnership project which continues to grow by putting children, young people and family's needs at the heart of the website.

FIGURE 7 Healthier Together screenshot.



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GREEN
Condition usually managed at home or with advice from your Health Visitor, GP or Pharmacist

AMBER
You may need to talk to your GP soon or call 111 for advice

RED
Urgent help required at a hospital

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DR KATE TOP TIP
Click on the pages above to go straight to the section you need.

FIGURE 8 *The Little Orange Book* screenshot.

Box 2 provides a plain English summary of this section.

3. Person-delivered education (B.II, and multicomponent B.I and B.II)

Size and quality of the evidence base

Three interventions focused on a person delivering education about managing minor health problems,[88,103,126] and two had an additional component of a navigation tool.[93,137] They are presented in *Table 8* in that order, alphabetically for each group. All the studies were undertaken in the USA. Only one study was a full RCT. Two studies were pilots, and so did not have statistical power to detect changes in service use.[88,103] None of the studies was assessed as being of good quality in the formal assessment. In addition, we were concerned about the analysis or presentation of results for one study,[137] and two studies relied on self-report.[103,126] So the evidence base was small and poor for this type of intervention.

BOX 2 Plain English summary 2

Booklets, leaflets and websites that tell people how to look after minor problems have been tested. People find them helpful and think that they know more about what to do when they are ill. But some research says they reduce the use of a GP or A&E and some research says they do not. They have potential, but need to be tested more.

A&E, accident and emergency.

TABLE 8 Impact of person-delivered education (with or without navigation tool) on service impact

Study	Design	Quality	Mechanisms	Time period of measurement	Data source	Impact on ED	Impact on GP consultations
B.II only							
Fieldston et al.,[88] *USA*	*BA pilot*	*Moderate/weak*	*Education, empowerment*	*6 months*	*Records*	*All: (–) the mean number of ED visits for the index child reduced following the intervention, although the difference was not significant: 0.67 mean ED visits before, and 0.58 after* (p = *NS)*	*All: (–) the mean number of ambulatory visits for the index child reduced following the intervention, although the difference was not significant: 2.7 before vs. 2.3 after (NS). After-hours telephone calls to the PCP rose significantly from 0.33 per patient to 1.46 per patient* (p = *0.047)*
O'Neill-Murphy et al.,[103] *USA*	*RCT pilot*	*High risk of bias*	*Education, empowerment*	*2 weeks and 8 weeks*	*Self-report*	*All: (–) only one child, in the control group, had visited the ED in the time period, even though 30%* (n = *11) of the control and 43%* (n = *10) of the intervention had a fever in the previous 2 weeks*	
Stockwell *et al.*,[126] USA	RCT	High risk of bias	Awareness, education, empowerment	5 months	Self-report	All: (+) children < 4 years of age in intervention families had fewer PED visits per illness episode than the standard curriculum group [18/205 (8.8%) vs. 29/191 (15.2%), respectively; *p* = 0.049]. The majority of this difference was for children aged 6–48 months [intervention families 16/194 (8.2%) vs. standard curriculum group 29/185 (15.7%) PED visits per illness episode; *p* = 0.025]. The relationship between intervention status and fewer PED visits was also significant on the family level (*p* = 0.03). For intervention families attending all three classes, 6.2% of illness episodes resulted in a PED visit for a child aged 6–48 months (5/80); for those attending two classes, this was 7.8% (8/102), and for those attending zero or one class, it was 25% (3/12) (*p* = 0.087)	

continued

TABLE 8 Impact of person-delivered education (with or without navigation tool) on service impact (*continued*)

Study	Design	Quality	Mechanisms	Time period of measurement	Data source	Impact on ED	Impact on GP consultations
B.I and B.II							
DeSalvo *et al.*,[137] USA	Non-RCT	Weak	Awareness, education, persuasion, tailoring	3 and 6 months	Records, self-report	All: (–) these patients had an average of 0.16 emergency room visits per patient in the 3 months subsequent to the index visit. In contrast, there were 0.29 subsequent visits per patient in the control group ($p < 0.01$). By the end of the first 3 months, the difference had disappeared (intervention 0.32 vs. control 0.28; $p = 0.14$). The addition of a social worker to the team in the second phase did not result in a change in emergency room use (0.3 visits per patient in both the intervention and control groups; $p = 0.5$)	
Shnowske *et al.*,[93] USA	Retrospective cohort study	Moderate/weak	Awareness, education, tailoring	3 months	Records	• All: (+) mean number of ED visits per month before was 1.20 ± 0.66, and after was 0.71 ± 0.54. This represents approximately a 41% (95% CI 43.2% to 54.8%) decrease in ED visits per month • Minor: The visit change analysis showed that visits for pain-related complaints decreased by 0.51 visits per month	All: mean number of PCP visits per month before was 0.31 ± 0.64, and after assignment was 0.28 ± 0.68 ($p = 0.30$). Had expected to see an increase

BA, before and after; CI, confidence interval; NS, not significant; PCP, primary care provider; PED, paediatric emergency department.

Notes

(+) indicates a statistically significant reduction in service use, (–) indicates a null result and (±) indicates that results were mixed. Pilot studies are indicated by italics.

Intervention description and mechanisms

The interventions were delivered by nurses[88,137] or community health workers[126] and varied in terms of length of time spent on training patients and the number of minor illnesses addressed. For example, a paediatric ED nurse delivered a 90-minute training session to parents,[88] and community health workers gave three 90-minute training sessions on minor illness.[126] The mechanisms included both education and empowerment, as patients were trained in self-management.

Impact on service use

In *Table 8*, (+) indicates a statistically significant reduction in service use, (–) indicates a null result, and (±) indicates that results were mixed. Pilot studies are indicated by italics. Removing the pilot studies, three studies measured impact on EDs and two of these showed a reduction in use. Only one full study measured impact on GP consultations; they expected an increase because they aimed to shift care from EDs.

Other outcomes

One RCT that was judged to be at high risk of bias, evaluating person-delivered education, reported high levels of satisfaction with the upper respiratory infection intervention.[126] Two studies judged to be weak or at high risk of bias reported improved knowledge scores following the intervention,[88,126] but a third trial, also at high risk of bias, found that the intervention did not improve participants' confidence when faced with fever in a child: anxiety was reduced more in the control group.[103] One study of this type reported no relevant outcome data on satisfaction or intentions at all (*Table 9*).[137]

Current examples in the NHS

We are aware that multiple types of health professional in the NHS educate patients informally about managing minor ailments when patients attend for care for that ailment, for example GPs, health visitors and pharmacists. We could find no examples of health professionals or trainers routinely offering formal education in managing minor health problems in the UK. The NHS has 'care navigators' who work in general practice and guide patients to the right clinician within a practice, and offer support for long-term conditions and social support. There are also social prescribers in primary care or volunteers who may offer some education and navigation.

Conclusions and relevance to the NHS

The evidence base for person-delivered education was small, context specific (USA only) and had some underpowered pilot studies, so few conclusions can be drawn. Although the NHS may have services similar to this type of intervention, we feel that there are no routinely available interventions currently in the NHS. The NHS would have to introduce this type of intervention and evaluate it. The feasibility of such an initiative delivered by health professionals is doubtful in times of staff shortage, and costs are likely to be prohibitive. Our PPI panel wondered about the use of volunteers to offer training, but also pointed out that patients need to trust the expertise of any trainers.

Box 3 provides a plain English summary of this section.

4. Combination of written education and person-delivered education (A.II and B.II)

Size and quality of the evidence base

Seventeen articles (15 studies) assessed leaflets/booklets and an interactive session with a person to educate people about minor health problems (*Table 10*). Ten were offered at a specific time in a patient's care[75–78,83,85,99,102,112,131] and seven at a general time.[81,82,120,121,127,134,135] They are presented in *Table 10* in alphabetical order within these two groups. The evidence base for interventions given at a specific time was largely generated in Europe, whereas interventions offered at a general time were largely undertaken in the USA. There were seven RCTs and four controlled before-and-after studies that measured impact on service use. The formal quality assessment showed a mix of medium- to poor-quality studies. Seven articles relied on self-report and/or we had concerns about quality in terms of large loss to follow-up,[83,127] the control group being very different from the intervention group,[75] poor analysis with reliance on subgroup analysis[78] or very short follow-up.[131]

TABLE 9 Other outcomes for person-delivered education

Study	Design	Quality	Mechanisms	Data collection time points	Data source	Impact on other outcomes
Fieldston *et al.*,[88] USA	BA pilot	Moderate/weak	Education, empowerment	6 months	Knowledge tests	(+) Knowledge: the intervention increased knowledge as measured by performance on the 19-item evaluation questionnaire, with mean scores increasing from 55% in the pre-intervention assessment to 77% ($p < 0.001$) immediately following the intervention. All three content areas (colds, fever and trauma) saw increase in knowledge, comparing the pre-intervention and post-intervention test results. Among the 20 participants, the mean score on the follow-up test declined from the value immediately after intervention (79% for those 20 participants to 71%; $p = 0.031$), but remained higher than before the intervention (61%; $p = 0.015$). For the same group, at follow-up, the mean scores for specific content areas were not significantly different from post-intervention scores, except for trauma, in a negative direction (74–62%; $p = 0.044$)
O'Neill-Murphy *et al.*,[103] USA	RCT pilot	High risk of bias	Education, empowerment	2 weeks and 8 weeks	Telephone interview	(–) Anxiety levels: > 40% of parents in each group reported that they had moderate to high levels of anxiety related to their child's fever on arrival to the ED. After either fever education programme, parents in both groups reported reduced levels of fever anxiety: control group, 82%; intervention group, 85%. At the 2-week follow-up, parents in both groups reported that they felt less anxious when their child has a fever (86% of the control group and 50% of the intervention group)

Study	Design	Quality	Mechanisms	Data collection time points	Data source	Impact on other outcomes
Stockwell *et al.*,[126] USA	RCT	High risk of bias	Awareness, education, empowerment	5 months	Knowledge–Attitudes instrument	• (+) Satisfaction: almost all intervention parents reported that the education sessions (97.3%) and URI kit (93.0%) were very useful; 87.3% used the kit at least a few times over the winter • (+) Knowledge: URI knowledge/attitudes and home remedy safety attitudes – mean baseline Knowledge–Attitudes instrument scores were similar for intervention and standard curriculum families (4.2 vs. 4.6 out of 10, respectively; $p = 0.27$). Mean post-intervention scores increased to 5.5 for intervention families, but remained the same (4.7) for standard curriculum families ($p = 0.011$), and the mean difference between baseline and post-intervention scores for intervention families was significantly different than for standard curriculum families (1.3 vs. 0.097; $p = 0.001$). Home remedy beliefs at baseline were also similar (28.9% of intervention families believed that all home remedies were safe or were unsure vs. 37.2% of standard curriculum families; $p = 0.28$), but were different post intervention (17.8% vs. 38.9%; $p = 0.005$). The percentage of intervention families who had incorrect home remedy beliefs post intervention (52.0%) was also lower, but not significantly lower, than for standard curriculum families (75.7%; $p = 0.053$), when those who had both correct baseline and post-intervention beliefs were removed

BA, before and after; URI, upper respiratory infection.

Note

(+) indicates a statistically significant reduction in service use, (–) indicates a null result and (±) indicates that results were mixed.

BOX 3 Plain English summary 3

There was not much research on doctors or nurses educating patients about minor problems. The research was done in the USA. It may not be possible to use it in the UK because there is a shortage of doctors and nurses.

Intervention description and mechanisms

The interactive part of the intervention was provided by a researcher,[85,134] a doctor in a consultation,[75,78,99,102,112,131] a nurse[135] or trainers/employers.[81,82,120,121,127] Because of the interactive component, there were additional mechanisms to the education mechanism in purely written educational interventions: tailoring, anxiety reduction and empowerment were common.

Impact on service use

In *Table 10*, (+) indicates a statistically significant reduction in service use, (–) indicates a null result and (±) indicates that results were mixed. Pilot studies are indicated by italics. Three articles did not report impact on service use.[76,78,112] Nine studies measured impact on ED attendances, but one was a pilot study (see *Table 10*). Five out of the eight full studies showed a reduction in any indicator of service use. Twelve measured impact on GP consultations, but one was a pilot study. Seven of the 11 full studies showed a reduction in the number of GP consultations.

In *Table 10*, one article showed an unexpected increase in the use of GP out-of-hours services and a non-statistically significant increase in the use of primary care generally,[121] raising the issue of unintended consequences of trying to increase health literacy. The authors raise the concern that a lot of data were missing in their routine data set and their results should be treated with caution. Furthermore, they measured service use overall, rather than for minor conditions, so it is possible that any increase in service use was for major problems. Nonetheless, it is important to recognise the possibility that service use might be increased by these interventions.

Other outcomes

Eleven of the 17 articles reported relevant outcomes (*Table 11*). Four articles reported no relevant outcome data on these outcomes.[75,85,102,112,134]

Satisfaction Only two of these articles reported on participants' satisfaction with the interventions.[99,135] Both were of moderate quality (or were assessed as having some concerns); both were also for interventions targeted at parents: one found no significant differences in terms of satisfaction, level of reassurance, parental enablement or the parent's rating of the 'usefulness of any information received in the consultation',[99] whereas the other reported high levels of satisfaction with the education provided at well-child visits for infants.[135]

Change in behaviour or intentions Eight articles evaluated patients' reported changes in behaviours and intentions to consult following an intervention, and each of these studies found a positive direction of change, regardless of whether the intervention was aimed at a specific group[78,83,131] or populations more generally.[81,82,121,127,135] Five of the eight articles were judged to be weak or at high risk of bias; two non-RCTs were assessed as being of moderate quality[121,135] and one RCT was judged to have some concerns.[131]

Confidence Two studies also reported increased confidence among participants to deal with minor illness[120] or improved locus of control following the intervention.[121]

Knowledge Two studies compared knowledge between intervention and control groups: a moderate-quality trial of a targeted intervention reported a significant improvement in knowledge in the

TABLE 10 Impact of interventions combining educational information delivered in person and writing (e.g. leaflets) on service use

Study	Design	Quality	Mechanisms	Time period of measurement	Data source	Impact on ED	Impact on GP consultations
Specific							
Chande *et al.*,[85] USA	RCT	High risk of bias	• Awareness • Education • Persuasion • Tailoring	6 months	Records	• All: (–) return to PED within 6 months: 21 patients (30%) from the intervention group and 16 (26%) from the control group ($p = 0.68$) • Minor: (–) 17 patients (81%) of intervention group returnees to the PED had minor illness, as did 11 (69%) of control group returnees	
de Bont *et al.*,[102] the Netherlands	Cluster RCT	Some concerns	• Education • Tailoring	• 2 weeks (same illness) • 6 months (OOH)	Records		Minor: (–) reconsultation with OOH service within 2 weeks: usual care group ($N = 13,410$): $n = 861$ (5.5%); access to booklet group ($N = 11,945$): $n = 741$ (5.4%); access to booklet, OR 0.95 (95% CI 0.83 to 1.09). Reconsultation with OOH service in 6 months: OR 0.99 (95% CI 0.84 to 1.18)
Francis *et al.*,[99] UK	RCT	Some concerns	• Education • Anxiety • Tailoring	2 weeks	Self-report		Minor: (–) there was no significant difference between the intervention and control groups in the odds of reconsulting in primary care during the 2 weeks after registration. Primary care reconsultation for same illness episode within the first 2 weeks: intervention 33/256 (12.9%) vs. control 44/272 (16.2%); OR 0.75 (95% CI 0.41 to 1.38). There was no significant intervention effect when telephone consultations were counted as reconsultations along with face-to-face primary care consultations (OR 0.81, 95% CI 0.47 to 1.42), or when consultations at EDs were included along with primary care consultations (OR 0.85, 95% CI 0.48 to 1.51)

continued

TABLE 10 Impact of interventions combining educational information delivered in person and writing (e.g. leaflets) on service use (*continued*)

Study	Design	Quality	Mechanisms	Time period of measurement	Data source	Impact on ED	Impact on GP consultations
Herman *et al.*,[83] USA	BA study	Weak	Education	6 months	Self-report	All: (+) visited the ED – 73% pre vs. 43% post, $p < 0.0001$; visited the ED more than once: 36% pre vs. 26% post, $p = 0.19$	
Plass *et al.*,[75] the Netherlands	CBA study	Moderate	• Education • Tailoring	24 months	Records		Minor: (+) intervention group – a significant decrease in self-reported care-seeking behaviour concerning minor ailments and self-limiting health problems ($p < 0.001$). At baseline, the participants reported that, during the previous 6 months, they had consulted their GP 3.0 (SD 2.2) times because of 4.9 (SD 2.1) different minor illnesses. Six months later, they reported that they had consulted their GP 2.1 (SD 2.0) times for 5.1 (SD 3.2) different minor illnesses. One year after the intervention, they reported 1.7 (SD 1.8) consultations for 5.3 (SD 2.7) different minor illnesses. Control group: the number of consultations for minor illnesses was, on average, 2.4 (SD 2.3) for 5.4 (SD 3.7) different minor illnesses

Study	Design	Quality	Mechanisms	Time period of measurement	Data source	Impact on ED	Impact on GP consultations
Rutten *et al.*,[77] the Netherlands	RCT	High risk of bias	Education	12 months	Not clear		All: (+) in both groups, the consulting behaviour changed. In the experimental practices, the GP was confronted less often with everyday cough (16 before vs. 11 after, compared with 28 before vs. 34 after in control practices) and more often with alarming symptoms (31 before vs. 47 after, compared with 16 before vs.19 after in control practices; $p < 0.05$)
Sustersic *et al.*,[131] France	RCT	Some concerns	Education	2 weeks	Self-report		Minor: (+) 23.4% consulted for the same symptoms in the households of the intervention group, compared with 56.2% in the control group ($p < 0.01$)
General							
Bertakis,[134] USA	RCT	High risk of bias	• Awareness • Education • Tailoring	12 months	Records	Minor: (–) appropriate visits: 0.2 ± 1.1 vs. 0.03 ± 0.9; $p = 0.095$. Appropriate visits: 75.3% ± 40.7% control vs. 84% ± 35.2% intervention; $p = 0.072$	Minor: (+) appropriate visits: 97.6% ± 11.2% control vs. 99.5% ± 4.8% intervention; $p = 0.016$
Herman and Mayer,[82] *USA*	*CBA pilot*	*Weak*	• *Education* • *Empowerment*	*6 months*	*Self-report*	*All: (+) 32 fewer visits to the ED (p < 0.01)*	*All: (+) visits to doctor or clinic – post intervention, there were 161 fewer visits to the doctor or clinic (p < 0.01) and 67 fewer calls to the doctor (p < 0.03)*

continued

TABLE 10 Impact of interventions combining educational information delivered in person and writing (e.g. leaflets) on service use (*continued*)

Study	Design	Quality	Mechanisms	Time period of measurement	Data source	Impact on ED	Impact on GP consultations
Herman and Jackson,[81] USA	BA	Weak	• Education • Empowerment	6 months	Self-report	All: (+) number of visits decreased from 0.79 per year to 0.33 i.e. by 58% (95% CI¼51%–66%)	All: (+) the pre-training mean number of clinic visits per child was 3.69 per year (0.3072 per child per month). The post-training mean was 2.1922 per year (0.1851 per child per month), showing a reduction of 1.47 visits per child per year ($p < 0.001$). Tracking survey data showed that doctor or clinic visits decreased by 42% (95% CI 33% to 46%)
McWilliams *et al.*,[135] USA	CBA study	Moderate	• Education • Empowerment • Anxiety • Persuasion	12 months	Records	• Minor: (+) intervention – 80% decrease in ED visits for ear pain [from mean 107 (SD 410) per 1000 to mean 21 (SD 144) per 1000]; after regression models: $p = 0.009$. Control: number of ED visits – from 48 (248) to 60 (295) (25% increase); $p = 0.009$ • A 40% decrease in urgent care visits, but after regression models this was not statistically significant ($p = 0.33$): intervention – from 315 (658) to 188 (568); control – from 365 (835) to 263 (662), (28% decrease); $p = 0.33$	Minor: (–) 28% decrease in primary care visits for ear pain in the intervention sites [from 762 (1249) to 550 (1064) visits], compared with no change in control sites [from 667 (1491) to 639 (1269), 4% decrease], but after regression models, no change ($p = 0.14$)
Powell,[127] USA	Prospective cohort study	Weak	Education	5 months	Self-report	All: (+) reduced ED visits by 52	All: (+) reduced GP visits by 126
Steinweg *et al.*,[120] USA	Survey	Weak	• Education • Empowerment • Tailoring	6 months	Self-report	Minor: (+) a total of 181 ED visits avoided, with 39.8% of the respondents indicating that they avoided at least one visit	Minor: (+) 72% of the respondents avoided at least one clinic visit. A total of 423 clinic visits were avoided during the 6-month study period

Study	Design	Quality	Mechanisms	Time period of measurement	Data source	Impact on ED	Impact on GP consultations
White *et al.*,[121] UK	CBA study	Moderate	• Education • Empowerment • Anxiety • Persuasion	6 months	Records	All: (–) no statistically significant changes were seen in ED use when comparing the intervention group with the comparison (OR 1.64, 95% CI 0.84 to 3.32; $p = 0.157$), or in use of NHS Direct (OR 1.36, 95% CI 0.88 to 2.11; $p = 0.169$)	All: (–) the intervention did not make a detectable difference to the number of consultations with GPs or other PHCPs in the follow-up period. Expected number of PHCP consultations for a person in the intervention group was 1.17 times that of their counterpart in the comparison group (95% CI 0.93 to 1.46; $p = 0.182$). The proportion of people using services in the follow-up period was statistically significantly increased in the intervention group than in the comparison group for OOH services (OR 2.26, 95% CI 1.10 to 4.92; $p = 0.031$)

BA, before and after; CBA, controlled before and after; CI, confidence interval; OOH, out of hours; OR, odds ratio; PED, paediatric emergency department; PHCP, primary health-care provider.

Notes

(+) indicates a statistically significant reduction in service use, (–) indicates a null result and (±) indicates that results were mixed. Pilot studies are indicated by italics.

TABLE 11 Other outcomes for interventions combining written education and person-delivered education

Study	Design	Quality	Mechanisms	Data collection time points	Data source	Impact on other outcomes
Specific						
Francis *et al.*,[99] UK	RCT	Some concerns	• Education • Anxiety • Tailoring	2 weeks	Telephone questionnaire	(–) Satisfaction: there were no significant differences in terms of satisfaction, level of reassurance, parental enablement, or the parent's rating of the 'usefulness of any information received in the consultation'
Herman *et al.*,[83] USA	BA study	Weak	Education	6 months	Telephone survey	(+) Intention: hypothetical responses to low-acuity child medical problem scenarios: • Temperature of 99.5 °F (37.5 °C) – pre intervention vs. post intervention: (1) do nothing and wait, 26% vs. 31%; (2) look in a health book, 5% vs. 27%; (3) talk to family or friends, 6% vs. 5%; (4) visit a physician's office or clinic, 44% vs. 31%; (5) go to the ED, 16% vs. 7%; (6) do not know, 3% vs. 0% ($p = 0.0002$) • Vomiting for 1 day – pre intervention vs. post intervention: (1) do nothing and wait, 14% vs. 10%; (2) look in a health book, 1% vs. 20%; (3) talk to family or friends, 7% vs. 10%; (4) visit a physician's office or clinic, 65% vs. 55%; (5) go to the ED, 12% vs. 5%; (6) do not know, 1% vs. 0% ($p = 0.0025$) • Earache – pre intervention vs. post intervention: (1) do nothing and wait, 4% vs. 7%; (2) look in a health book, 2% vs. 25%; (3) talk to family or friends, 3% vs. 3%; (4) visit a physician's office or clinic, 82% vs. 61%; (5) go to the ED, 7% vs. 5%; (6) do not know, 1% vs. 0% ($p = 0.0469$) • Cough – pre intervention vs. post intervention: (1) do nothing and wait, 20% vs. 34%; (2) look in a health book, 7% vs. 31%; (3) talk to family or friends, 7% vs. 3%; (4) visit a physician's office or clinic, 61% vs. 29%; (5) go to the ED, 3% vs. 2%; (6) do not know, 1% vs. 0% ($p = 0.0171$) When asked again about the low-acuity child health scenarios, there was a reduction in the proportion who would visit a physician's office or clinic for each complaint, and also a significant reduction in the proportion that would go to the ED for a low-grade fever and for vomiting for 1 day

Study	Design	Quality	Mechanisms	Data collection time points	Data source	Impact on other outcomes
Rutten *et al.*,[78] the Netherlands	RCT	High risk of bias	Education	Unclear	Not clear	(+) Behaviour: changes in consulting behaviour – • Initial behaviour did not follow guidelines: experimental ($n = 122$) vs. control ($n = 232$) – change of behaviour: desired change, 56% vs. 30%; undesired change, N/A vs. N/A; unchanged, 42% vs. 68%; undefinable, 2% vs. 2% ($p < 0.001$) • Initial behaviour followed guidelines: experimental ($n = 102$) vs. control ($n = 92$) – desired change, N/A vs. N/A; undesired change, 30% vs. 67%; unchanged, 66% vs. 29%; undefinable, 4% vs. 3% ($p < 0.001$)
Sustersic *et al.*,[131] France	RCT	Some concerns	Education	2 weeks	Telephone interview/survey	(+) Behaviour: for the whole population (adults and adults accompanying children), those in the PIL group significantly showed behaviour that was closer to that recommended by the PIL than those in the group that had not received a PIL (mean behaviour score 4.9 vs. 4.2; $p < 0.01$). This was confirmed by the alternative analytical approach, whereby the behaviour scores were dichotomised and used in univariate analysis (recommended behaviour 71.8% vs. 43.0%; $p < 0.01$) (+) Knowledge: likewise, those in the PIL group had a mean knowledge score that was significantly higher than that of those in the control group (mean knowledge score 4.2 vs. 3.6; $p < 0.01$).The adult patient subgroup showed behaviour that was closer to that recommended by the PIL than adult patients in the control group (mean behaviour score 4.9 vs. 4.0; $p < 0.01$). The adult and child group showed the same tendency, but did not reach significance (mean behaviour score 4.9 vs. 4.5; $p = 0.11$) For the adult patient subgroup, knowledge was significantly better in the group that received a PIL (mean knowledge score 4.2 vs. 3.5; $p < 0.01$), irrespective of the condition studied or of sociodemographic parameters (with the exception of the level of education, for which the difference was not significant)

continued

TABLE 11 Other outcomes for interventions combining written education and person-delivered education (*continued*)

Study	Design	Quality	Mechanisms	Data collection time points	Data source	Impact on other outcomes
General						
Herman and Mayer,[82] USA	CBA pilot study	Weak	• Education • Empowerment	6 months	Self-report instrument	• (+) Satisfaction: most parents claimed to have used the book and had a positive experience with it. A total of 145 (96%) rated the book as 'very easy to understand,' with none reporting that it was 'hard to understand' and only 3% reporting that they had not used the book. A total of 122 parents (81%) found the book to be 'very useful' and 26 (17%) found it useful 'sometimes'. Only 2% reported that they had not used the book in response to a question about the book's usefulness ('If you used this book, how useful was it?') • (±) In response to the question 'If you used this book, what would make the book better?', roughly 42% of the parents (63/151) thought that the book was 'perfect the way it is', and 32% (48/151) felt that it would be helpful to 'add more information'. With 13% of parents (20/151) recommending that the authors 'add more pictures', more than half (51%) seemed curious to learn more, either by indicating their general desire for 'more information' and more pictures (a combined total of 45%) or by suggesting that the authors 'make [the book] longer' (6%). Seventy-one per cent of respondents (107/151) claimed to have used the book 'frequently', with 67% (101/151) rating the book 'very well liked'. [One-third of parents (33%) found the book to be 'okay'] (+) Behaviour: accessing health information – according to the survey, exposure to the self-care book or to the book with additional training affected the way many parents accessed their health information. Before the intervention, about half of the parents (52%) claimed to derive health information 'from the doctor or clinic'. Following the intervention, however, only 18% claimed to access health information this way, a decrease of 34%. The effects of the training were evident in parents' responses to the question 'When your child is sick, where do you first go for help?'. In the control group (those who received the book without the additional training), 69% responded that they would

Study	Design	Quality	Mechanisms	Data collection time points	Data source	Impact on other outcomes
						'call [their] child's regular doctor or health phone line'. In the intervention group, however, which received both the book and training in how to use it efficiently, 58% responded that they would 'look in a book', with only 28% reporting that they would 'call [their] child's regular doctor or health phone line'. (Only 1% of those in the control group responded that they would 'look in a book' first.) Eight per cent of those in the control group had noted that they would 'take [their] child to the emergency room', whereas only 3% of those in the intervention group claimed that they would take that route when a child was sick (17% in the control group would 'call family or friends', whereas only 7% in the intervention group chose that option). Overall, then, 6 months following the intervention, more parents claimed that they would turn to a book and fewer claimed that they would take a child to the clinic or ED in response to a perceived illness • (+) Confidence: parents' confidence levels seemed to be positively affected by the book and training. When asked if they felt confident caring for their child's health-care needs after reading the book, 84% responded that they were 'more confident after reading the book' and 16% felt 'the same after reading the book' (+) Intention: parent responses to mild conditions, including what they would do if their child had a fever of 99.5 °F, had an earache, was vomiting and had diarrhoea, or had a runny nose and a cough. In each case, more parents would look in a book and fewer would call 911, go to the ED or go to the doctor or a clinic Change in parent responses regarding method of treatment, from pre to post intervention: • Do nothing and wait – ○ Fever of 99.5 °F: 15% ○ Earache: 2% ○ Vomit and diarrhoea: 4% ○ Runny nose or cough: –18%

continued

TABLE 11 Other outcomes for interventions combining written education and person-delivered education (*continued*)

Study	Design	Quality	Mechanisms	Data collection time points	Data source	Impact on other outcomes
						• Keep them home from school – ○ Fever of 99.5 °F: –10% ○ Earache: 15% ○ Vomit and diarrhoea: 9% ○ Runny nose or cough: –2% • Look in a book – ○ Fever of 99.5 °F: 13% ○ Earache: 13% ○ Vomit and diarrhoea: 17% ○ Runny nose or cough: 19% • Call 911/go to emergency room – ○ Fever of 99.5 °F: –3% ○ Earache: –4% ○ Vomit and diarrhoea: –2% ○ Runny nose or cough: –5% • Go to doctor/clinic – ○ Fever of 99.5 °F: –6% ○ Earache: –27% ○ Vomit and diarrhoea: –8% ○ Runny nose or cough: –12% • Other – ○ Fever of 99.5 °F: –12% ○ Earache: –2% ○ Vomit and diarrhoea: –20% ○ Runny nose or cough: 12%

Study	Design	Quality	Mechanisms	Data collection time points	Data source	Impact on other outcomes
Herman and Jackson,[81] USA	BA study	Weak	• Education • Empowerment	6 months	Self-report instrument	• (+) Behaviour (responses to illness): the proportion of parents who answered using the ER as a first source of help was 4% (369/9240) before the training and 1% (73/7281) after the training. Although 85% of parents reported in the pre assessment that they always can take care of their child, 90% reported getting worried to some degree when their child was sick, and 57% reported that they were sometimes unsure of what to do when their child was sick • Results from the parental assessment showed a significant change in behaviour across all measures. When asked, 'When your child is sick, where do you first go for help?', responses that listed doctor visits as the first source for treatment decreased from 69% to 33%, and seeking treatment at an ER decreased from 8% to 2%. Parents also were asked how they would respond to specific common childhood illnesses, such as a fever of 99.5 °F. Possible responses ranged from using the health book provided in the training to taking the child to the doctor or the ER. After the training, the proportion of parents who stated that they would refer to a health book increased from 5% to 48% (+) Anxiety: after participating in the intervention and receiving training in the use of a health book, the percentage of parents who reported being 'very worried' when their child is sick decreased by one-third (+) Missed workdays: workdays missed by the primary caretaker per year decreased by 42% (95% CI 35% to 50%), and school days missed per year decreased by 29% (95% CI 23% to 35%). Changes in school days missed were confirmed through examination of school records

continued

TABLE 11 Other outcomes for interventions combining written education and person-delivered education (*continued*)

Study	Design	Quality	Mechanisms	Data collection time points	Data source	Impact on other outcomes
McWilliams *et al.*,[135] USA	CBA study	Moderate	• Education • Empowerment • Anxiety • Persuasion	12 months	Questionnaire	(+) Satisfaction: using a scoring system from −10 to 10, parents at the 15-month WCV strongly endorsed this intervention, showing support for both aspects of the intervention (nurse teaching and access to prescription). Support for this intervention remained high for those seen at the 24-month WCV, even for families who had not experienced an episode of ear pain after the nursing intervention (+) Intentions: when surveyed at the 24-month WCV, 42.0% of parents indicated that their children had in fact experienced ear pain since the 15-month WCV. More than 80% of this subgroup believed that the nursing education helped them avoid an ED or after-hours visit: 54.3% ‘strongly agreed’, 31.4% ‘somewhat agreed’, 8.6% ‘were unsure’, 5.7% ‘somewhat disagreed’ and 0% ‘strongly disagreed’. Likewise, > 80% of these same parents indicated that access to antipyrine–benzocaine otic drops helped avoid an ED or after-hours visit: 62.9% ‘strongly agreed’, 25.7% ‘somewhat agreed’, 11.4% ‘were unsure’, 0% ‘somewhat disagreed’ and 0% ‘strongly disagreed’
Powell,[127] USA	Prospective cohort study	Weak	Education	5 months	Questionnaire	(+) Intentions: (usefulness, understanding, etc.) > 90% for 607 employees who returned questionnaire; 70% felt that using the guide would help them visit the doctor less frequently
Steinweg *et al.*,[120] USA	Survey	Weak	• Education • Empowerment • Tailoring	6 months	Survey	(+) Enablement: programme outcome – confidence to treat minor illness: increased, 77%; no change, 23%; decreased, 0%
White *et al.*,[121] UK	CBA study	Moderate	• Education • Empowerment • Anxiety • Persuasion	6 months	Questionnaire	(+) Enablement (locus of control) – change in scores from baseline: • 6 months – ○ Intervention: mean 20.02 (SD 4.40), $n = 363$ ○ Control: mean 20.15 (SD 4.01), $n = 266$ • 12 months – ○ Intervention: mean 0.72 (SD 4.09), $n = 325$ ○ Control: mean 0.36 (SD 3.73), $n = 251$

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Study	Design	Quality	Mechanisms	Data collection time points	Data source	Impact on other outcomes
						There was a statistically significant positive effect of the intervention on recovery locus of control at 6 months, and small effects in favour of the intervention on recovery locus of control (0.88 points, 95% CI 0.27 to 1.49 points) and self-esteem (20.99 points, 95% CI 21.60 to 20.37 points) at 12 months (–) Knowledge: there was no statistically significant effect of being in the intervention group on perceived health status, levels of social support or knowledge about children's cough, back pain or crying in babies at 6 and 12 months' follow-up, controlling for baseline, gender and setting (+) Intentions: statistically significant positive effects of being in the intervention group were seen at 6 months in intention to use GP services less for minor ailments and, at 12 months in knowledge about back pain. Intention to use services: at baseline, > 90% of all participants stated an intention to use the family doctor, and > 80% stated an intention to use the pharmacist or family for support. At the 12-month follow-up, intention to use support from friends, hospital, the library, occupational health workers and social workers had increased in the intervention group, but not the comparison group. Intention to use support from health visitors and midwives had decreased in the comparison group, but not in the intervention group

BA, before and after; CBA, controlled before and after; CI, confidence interval; ER, emergency room; N/A, not applicable; PIL, patient information leaflet; SD, standard deviation; WCV, well-child visit.

Note
(+) indicates a statistically significant reduction in service use, (–) indicates a null result and (±) indicates that results were mixed.

intervention group,[131] whereas a moderate-quality controlled before-and-after study of a more general intervention found no such difference, despite improvements across other measures such as intentions and locus of control.[121]

Current examples in the NHS

We could find no examples of this type of intervention in routine use in the NHS.

Conclusion and relevance to the NHS

Even though this type of intervention had additional mechanisms to written material only, the conclusions from the evidence base were similar to those drawn about written information only. There is potential for this type of intervention to affect service use, but there is no strong evidence base to say that it does.

Box 4 provides a plain English summary of this section.

5. Multicomponent interventions (A.II and B.II with mass media campaigns D)

Size and quality of the evidence base

Five articles (four studies) used additional components to the written information combined with a person-delivered approach described in the previous section, adding mass media advertisements[79,80,115,128,139] (*Table 12*). They were based in North America, with one based in Taiwan.[139] None of the studies was a RCT. They were of moderate quality in our formal quality assessment, but in our informal assessment of quality, we identified concerns about a downwards trend in service use in the control group,[79] and service use based on self-report.[80]

Description of interventions and mechanisms

The mass media components included public education campaigns in a specific geographical area, or the use of posters to promote training workshops. The mechanisms tended to include empowerment as well as education.

Impact on service use

In *Table 12*, (+) indicates a statistically significant reduction in service use, (–) indicates a null result and (±) indicates that results were mixed. One study did not measure service use.[139] Three articles measured impact on ED attendances and three of these showed a reduction in use. Two measured impact on GP consultations, with one showing a reduction. Note that Hibbard *et al.*[79] and Wagner *et al.*[80] are different components of the same study, with the former using routine data to measure impact and the latter using a controlled before-and-after survey of self-reported use.

Other outcomes

Three of the five articles of the multicomponent type reported other outcomes (*Table 13*). Two studies of this type reported no relevant outcome data on satisfaction or intentions.[80,115]

Satisfaction Two articles reported on participants' satisfaction: there were high levels of reported satisfaction both with an educational workshop[128] and with the provision of a local minor illness service.[139]

Behaviour and intentions Three articles reported a positive impact.[79,128,139] Two of the cohort studies were of moderate quality[79,128] and one was of weak quality.[139]

BOX 4 Plain English summary 4

> A lot of research looked at a person training patients in how to look after minor problems and giving them leaflets or booklets too. The findings were the same as for leaflets and booklets by themselves.

TABLE 12 Impact of multicomponent intervention on service use

Study	Design	Quality	Mechanism	Time period of measurement	Data source	Impact on ED	Impact on GP consultations
Barr *et al.*,[115] Canada	BA study	Moderate	• Education • Persuasion	6 months	Records	Minor: (+) visits for non-disease-related crying: pre intervention: 724/20,394 (3.5%) of visits. The relative risk of a visit for crying or colic in the post-implementation period compared with the pre-implementation period was 0.705 (95% CI 0.59 to 0.85; $p < 0.001$), representing an overall 29.5% reduction in visits	
Hibbard *et al.*,[79] USA	Non-RCT	Moderate	• Education • Empowerment	12 and 24 months	Records	All: (+) emergency rooms visits began to decline in the intervention group following the intervention Minor: (±) TLAS visits showed a steady decline in the comparison communities. In the intervention communities, however, TLAS visits increased during the first follow-up year, but decreased during the second period. They remained higher during that period than at baseline and were higher in the intervention communities than in the other two comparison communities by a factor of nearly two. But they were lower in the second follow-up period than the first follow-up period. ED visits began to decline the intervention communities, whereas they increased in one comparison community	

continued

TABLE 12 Impact of multicomponent intervention on service use (*continued*)

Study	Design	Quality	Mechanism	Time period of measurement	Data source	Impact on ED	Impact on GP consultations
Powell *et al.*,[128] USA	BA study	Moderate	• Education • Empowerment • Tailoring	12 months	Records	All: (+) the frequency of ED visits decreased by 100 visits or 19.8%	All: (+) the frequency of health-care provider office visits decreased by 932 visits (18.4%). All categories of health-care provider office visits showed declines (freestanding laboratory, accidents, consultations, regular, all other). The frequency of all outpatient visits declined by 1032, or 18.5%. This averaged a little over 1 fewer visit per employee. All 938 subscribers (371 employees and 567 dependents): frequency of health-care provider office visits decreased by 522 visits, or 12.2%. The frequency of subscriber total outpatient visits declined by 495 visits, or 10.8%
Wagner *et al.*,[80] USA	CBA study	Moderate/weak	• Education • Empowerment	12 months	Self-report		All: (–) seeing a doctor (0 vs. ≥ 1 visits) – at baseline, 84.5% of the intervention group had visited a doctor in the past year, and 86.1% of the control group had done so. At 1 year: 88.9% intervention vs. 86.8% control; difference in differences = 3.7%, or = 1.38 (95% CI 0.97 to 1.95); *p* = NS. Number of visits: baseline – 3.69 intervention vs. 3.84 control; 1 year: 3.73 intervention vs. 3.67 control; *p* = NS. After adjusting for observable characteristics, both seeing a doctor and number of visits were not statistically associated with the Healthwise Communities Project intervention

BA, before and after; CBA, controlled before and after; CI, confidence interval; NS, not significant; TLAS, time-limited acute symptom(s).

Note

(+) indicates a statistically significant reduction in service use, (–) indicates a null result and (±) indicates that results were mixed.

TABLE 13 Other outcomes for multicomponent interventions

Study	Design	Quality	Mechanism	Data collection time points	Data source	Impact on other outcomes
Chiu *et al.*,[139] Taiwan	Survey	Weak	• Awareness • Education • Empowerment	9 months	Survey	(+) Satisfaction: 80% ($n = 80$) of the respondents were aware of the existence of the ESCMSs, and the MMI service was known to most residents and was used by most of them. Compared with respondents who had not used the MMI service ($n = 30$), those who had used the service ($n = 50$) considered the ESCMSs more helpful (90% vs. 77%; $p < 0.05$) (+) Intentions: compared with respondents who had not used the MMI service ($n = 30$), those who had used the service ($n = 50$) had greater willingness to seek help from the ESCMS in the future (88% vs. 57%; $p < 0.01$)
Hibbard *et al.*,[79] USA	Non-RCT	Moderate	• Education • Empowerment	12 and 24 months	Survey	(+) Behaviour: the effects observed for manual use appeared to be greater in the intervention community than in the comparison communities. The intervention respondents were more likely to indicate that using a self-care manual helped them self-treat a symptom and saved them a visit to the doctor. The magnified effect observed in the intervention community for manual use does not occur for users of a nurse advice line or computer program. Thus, it appears that the intervention increased the use of manuals as well as the effects of using a manual
Powell *et al.*,[128] USA	BA study	Moderate	• Education • Empowerment • Tailoring	12 months	Survey	(+) Satisfaction: workshop evaluation – the results show a high level of satisfaction with the guide and the workshop: • 97% of employees found the workshop helpful • 96% of employees found the workshop enjoyable (+) Understanding: 89% of employees reported having a better understanding of when to see the health-care provider; 92% of employees feel that they are wiser health-care consumers (+) Intentions: 73% of employees think that they will need to visit their health-care provider less frequently; 66% of employees think that they will be absent from work less often

BA, before and after; ESCMS, easy-access self-care medical spot; MMI, non-prescription medications for minor illness.

Note
(+) indicates a statistically significant reduction in service use, (–) indicates a null result and (±) indicates that results were mixed.

Examples in the NHS

We could find no examples of this type of intervention in routine use in the NHS.

Conclusion and relevance to the NHS

The findings for this type of intervention were essentially the same as for the combination of written information with person-delivered education, and for written information by itself.

Box 5 provides a plain English summary of this section.

6. Self-triage (C.III and A.III)

Size and quality of evidence base

Nine studies reported self-triage interventions: most of them were digital self-triage interventions,[53,84,98,104,113,114,140] and two older studies report a paper-based symptom-scoring system akin to self-triage.[132,133] They are presented in *Table 14* in alphabetical order within these digital and paper groups.

BOX 5 Plain English summary 5

Not a lot of research has been done on using leaflets, people giving training in looking after minor health problems, and advertising in newspapers, etc. at the same time. Some of the research showed a reduction in use of A&E and GPs, but some did not.

A&E, accident and emergency.

TABLE 14 Impact of self-triage tools on service use

Study	Design	Quality	Mechanisms	Time period of measurement	Data source	GP use
Digital						
Little *et al.*,[84] UK	RCT	High risk of bias	• Awareness • Education • Empowerment • Tailoring	5 and 12 months	Records	All: (±) based on self-report, a modest increase in contacts for NHS Direct among those who had a RTI in the intervention group [37/1574 (2.4%) vs. 20/1661 (1.2%), multivariate RR 2.25, 95% CI 1.00 to 5.07; $p = 0.048$], but reduced contact with doctors [239/1574 (15.2%) vs. 304/1664 (18.3%), RR 0.71, 95% CI 0.52 to 0.98; $p = 0.037$]. There was no evidence that self-management advice resulted in delayed consultations for serious illnesses (e.g. lobar pneumonia, meningitis, septicaemia) and, hence, an increased number of hospitalisations; in

TABLE 14 Impact of self-triage tools on service use (*continued*)

Study	Design	Quality	Mechanisms	Time period of measurement	Data source	GP use
						fact, the number of hospitalisations reduced, albeit not statistically significantly, both in the shorter term (20 weeks) and longer term (1 year). Use of primary care records at 12 months showed no difference in consultations at the GP (RR 0.85, 95% CI 0.65 to 1.12; $p = 0.259$) and the hospitalisation rate was lower in intervention group, but this was not statistically significant (RR 0.35, 95% CI 0.11 to 1.10; $p = 0.073$)
Yardley et al.,[53] *UK*	*Exploratory RCT*	*High risk of bias*	• *Education* • *Empowerment* • *Anxiety* • *Tailoring*	*4 weeks*	*Self-report*	*All: of the people in the internet doctor group, 11 (11.6%) had consulted their doctor or used other health-care services (mainly NHS Direct) for their symptoms, compared with a substantially greater proportion* (n = *21, 17.6%) in the control group, although this difference did not approach significance in this small sample (p = 0.22)*
van der Gugten *et al.*[98] the Netherlands	RCT	Some concerns	• Education • Anxiety • Tailoring	12 months	Records	All: (–) intervention ($N = 314$) vs. control ($N = 305$): • No visits: 156 (49.7%) vs. 150 (49.2%); IRR 0.96 (95% CI 0.85 to 1.09); $p = 0.532$. Record data only, similar for combined record and self-report data • 1 visit: 27 (8.6%) vs. 27 (8.9%) • 2 visits: 49 (15.6%) vs. 39 (12.8%) • 3 visits: 32 (10.2%) vs. 37 (12.1%) • > 3 visits: 50 (15.9%) vs. 52 (17.0%)

continued

TABLE 14 Impact of self-triage tools on service use (*continued*)

Study	Design	Quality	Mechanisms	Time period of measurement	Data source	GP use
Paper						
Thomson *et al.*,[132] UK	RCT	Some concerns	• Education • Anxiety • Tailoring	6 months	Records	All: (–) no differences were detected between groups in the use of primary care services, excluding number of child health surveillance and immunisation attendances: intervention, median 2; control, median 2 ($p = 0.26$). Use of OOH service did not differ either (86 vs. 85 consultations; $p = 0.93$)
Thornton *et al.*,[133] UK	Prospective cohort study	Weak	• Education • Anxiety • Tailoring	6 months	Self-report	All: only reports numbers of mothers reporting contact with health-care professionals. Contacts with their health visitor, midwife and doctor were mostly for minor complaints

CI, confidence interval; IRR, incidence rate ratio; OOH, out of hours; RR, risk ratio; RTI, respiratory tract infection.

Notes
(+) indicates a statistically significant reduction in service use, (–) indicates a null result and (±) indicates that results were mixed. Pilot studies are indicated by italics.

The digital self-triage evidence base was highly relevant to the UK because three articles were undertaken in the UK and four in the Netherlands. Some did not measure outcomes.[104,114] Of the ones that did, some were RCTs,[84,98] with another RCT acting as an exploratory study for one of these full RCTs.[53] The formal quality assessment did not identify these RCTs as being of high quality. Our own informal assessments identified concerns that only very educated people were included[98] and that there was reliance on self-report for some outcomes on service use.[84] Yardley *et al.*[53] was an exploratory study/pilot, and so did not have the necessary statistical power to detect a change in GP consultations. The paper-based self-triage evidence base was small and limited to a scoring system for very young children.

Description of interventions and mechanisms

The digital interventions included eConsult[104] and an especially developed digital triage intervention.[53,84] Three interventions focused on respiratory problems, either in the general population in the UK[53,84] or among children in the Netherlands.[98] The paper-based system was the same in both studies, asking parents to score symptoms. The common mechanisms were education and tailoring, with some interventions also offering attention to anxiety reduction. One of the interventions adopted reinforcement techniques by sending e-mail reminders to users on an ongoing basis to maintain awareness of the intervention.[84]

Impact on service use

In *Table 14*, (+) indicates a statistically significant reduction in service use, (–) indicates a null result and (±) indicates that results were mixed. Pilot studies are indicated by italics. Five studies measured impact on service use (see *Table 14*), focusing on GP use. One study was a pilot and one study offered such limited information about impact on service use that we could not interpret the findings. Two studies were of key interest because they were relatively recent digital tools.[84,98] Little *et al.*[84] offered a positive picture of digital self-triage, showing fewer GP consultations when this intervention was used.

In Little *et al.*,[84] the proportions of GP consultations were 15% in the self-triage group vs. 18% in the control group, based on self-report of those who had a respiratory illness; a similar difference was evident when routine records were used, although this was not statistically significant because all consultations were included, not simply those for respiratory illness. In contrast, there was no difference in GP consultations for the European study.[98] Authors of this study point out that they tested the intervention on a highly educated sample and that their results may not be generalisable to those in lower socioeconomic groups.

Other outcomes

Seven of the nine included articles of the self-triage type reported relevant outcomes (*Table 15*). Of these seven articles, all but two were assessed as being weak or at high risk of bias; the exceptions being a moderate-quality qualitative study[114] and a RCT with only some concerns.[98] Two studies of this type reported no relevant outcome data on satisfaction or intentions at all.[84,132]

Satisfaction Six of the nine articles of the self-triage type reported on participants' satisfaction. Four articles reported clear satisfaction with the intervention,[53,98,133] one reported that only slightly more than 50% of respondents were satisfied or very satisfied with the intervention app,[140] and one study reported barriers to the acceptability of the website for self-triage.[114]

Behaviour, enablement and intentions The mixed findings on satisfaction for the app and website were also reflected in respondents' intentions: satisfaction with the app or website was highest for those respondents who received advice commensurate with their prespecified intentions.[113,140] Two studies that reported a positive change in behaviour and intentions to consult also reported positive effects on either satisfaction[53] or satisfaction and confidence.[98]

Current examples in the NHS

The NHS in England has recently introduced NHS 111 Online, a digital self-triage service. Anyone can check a symptom, either to get advice about where and when to seek help, or to get general information about the symptom and how to manage it. Symptoms are checked only for patients aged > 5 years; people using the self-triage for young children are asked to contact NHS 111 by telephone. The service is available at https://111.nhs.uk (accessed 7 September 2022), and a page is shown in *Figure 9*.

We found that Buckinghamshire CCG had a similar service called 'AskFirst', that is a symptom checker that offers self-care advice and helps people find local services [www.buckinghamshireccg.nhs.uk/public/your-services/feeling-unwell/askfirst/ (accessed 18 November 2021)]. It can be downloaded onto a mobile phone.

A large number of general practices in the UK have signed up to eConsult where patients can get advice about self-managing symptoms and direction to services such as pharmacy [https://econsult.net/nhs-patients/how-to-use-econsult (accessed 23 September 2021)]. It appears that a patient makes a query online, and a GP triages that query, rather than self-triage by the patient. We included the Cowie *et al.*[104] study in our review, which used eConsult. In Cowie *et al.*,[104] eConsult was described as offering self-care advice, so we included it in our review. However, descriptions of its use routinely in the NHS imply that a GP makes decisions, not the patient.

Conclusion and relevance to the NHS

This type of intervention has potential, but the evidence base needs strengthening for impact on primary care, and does not exist for the impact on emergency care. NHS 111 Online is a relatively new service in England that offers digital self-triage. A RCT of the active use of NHS 111 Online (potentially with reminders to use it), with measurement of its impact on EDs as well as GP consultations, would add considerably to the evidence base.

Box 6 provides a plain English summary of this section.

TABLE 15 Other outcomes for self-triage interventions

Study	Design	Quality	Mechanisms	Data collection time points	Data source	Impact on other outcomes
Digital						
Nijland *et al.*,[114] the Netherlands	Qualitative	Moderate	Education	6 months	Survey	(–) Satisfaction: user-friendliness – 106 (40.8%) out of the 260 times the 14 patients used the apps, they faced usability problems; quality of care – 146 (56%) times, they faced quality-of-care problems, such as comprehensiveness of information
Nijland *et al.*,[113] the Netherlands	Survey	Weak	Education	54 weeks	Survey	(–) Enablement (self-care advice): 15% of patients were given self-care advice, so authors considered it to be a very cautious intervention (±) Intentions: patients used the triage system to gather information about their complaint (*n* = 72, 49%), more than for deciding whether or not a doctor has to be contacted (*n* = 38, 26%) Preceding the triage consultation, nearly half of patients (*n* = 73, 49%) had the intention to visit a GP for their complaint. Of the patients with an intention to visit (*n* = 72), most expected self-care advice (*n* = 30) and fewer expected to be advised to visit a GP (*n* = 22), or had no expectations at all (*n* = 20). All the patients who expected to be advised to visit a GP (*n* = 22) received such advice, whereas, of the patients who expected tailored self-care advice (*n* = 30), the majority (63%) received advice to visit a GP. In most cases, contact with a doctor (GP advice) was given (*n* = 54, 76%) A positive attitude towards advice was strongly related to the perceived usefulness of the advice, as reflected in understandability, reliability of information, applicability in daily life and effectiveness. It appeared that 57% actually had complied with the advice. Patients who complied with the advice were more highly educated (55%) and frequent users of medication (40%); furthermore, the received advice corresponded, in most cases (84%), with expected advice. Reasons for non-compliance were lack of confidence in the advice and fear to follow-up the provided advice

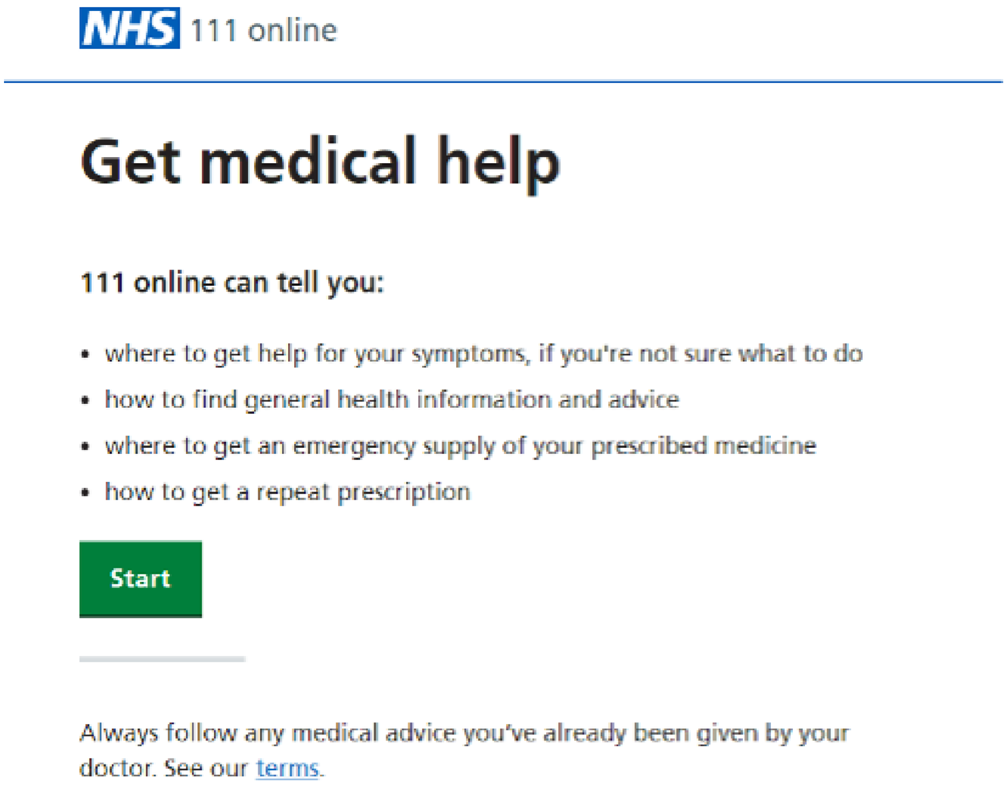
Study	Design	Quality	Mechanisms	Data collection time points	Data source	Impact on other outcomes
Yardley *et al.*,[53] UK	Exploratory RCT	High risk of bias	• Education • Empowerment • Anxiety • Tailoring	4 weeks	Patient enablement instrument	(+) Enablement: the median patient enablement score was significantly greater in the internet doctor group than in the control group [median score of 3 vs. 2, respectively (IQR 0–5), for the whole sample; $p = 0.03$] (+) Satisfaction with web-delivered advice in the internet doctor vs. control groups ($n = 332$) (scale/item mean for each group) – • Total scale (summed items divided by 3): 6.58 (SD 1.96) vs. 5.86 (SD 2.27); $p = 0.002$ • The website gave me all the advice I needed: 6.40 (SD 2.05) vs. 5.63 (SD 2.51); $p = 0.002$ • The website was helpful to me: 6.41 (SD 2.17) vs. 5.72 (SD 2.51); $p = 0.007$ • I felt I could trust the website: 6.91 (SD 2.21) vs. 6.25 (SD 2.54); $p = 0.01$ (+) Intentions to consult the doctor declined between baseline and the intermediate (48-hour) follow-up; although the decline was greater in the internet doctor group, this difference did not reach significance. Consultation necessity beliefs and emotional reactions to illness declined at follow-up to a similar extent in both groups. Poor understanding of illness declined in the internet doctor group, but slightly increased in the control group, resulting in a just significant interaction between time and group effects. Self-confidence to self-care remained stable, similar and high in both groups at both time points
van der Gugten *et al.*,[98] the Netherlands	RCT	Some concerns	• Education • Anxiety • Tailoring	12 months	Questionnaire	(+) Satisfaction: • Clear information on programme (when applicable) – yes, 99.1% • Possibility to find information that was needed (when applicable) – yes, 77.5%; no, 1.3%; partly, 21.3% (+) Behaviour: changed (when applicable) – yes, because of the information I went to the doctor, 3.8%; yes, because of the information I did not go to the doctor, 5.8%; no, I wanted to go and I did, 65.4%; no, I did not want to go and I did not go, 25.0%

continued

TABLE 15 Other outcomes for self-triage interventions (*continued*)

Study	Design	Quality	Mechanisms	Data collection time points	Data source	Impact on other outcomes
Verzantvoort *et al.*,[140] the Netherlands	Prospective cohort study	Weak	• Education • Anxiety	Within 24 hours of app use	Survey, telephone interview	• (±) Satisfaction with the app ($n = 4456$): very dissatisfied, 3.3%; dissatisfied, 8.2%; neutral, 32.8%; satisfied, 46.5%; very satisfied, 9.2% • Satisfaction with app ($n = 126$): 19/126 answered that they were dissatisfied with the app and provided a total of 21 explanations for this. The majority (62%) related to a perceived inability to enter the (complete) story of their illness. Other reasons for dissatisfaction related to the app's advice (24%) and the structure of the app (14%). Of the participants who were telephoned, 39 did not intend to follow the app's advice and gave 33 reasons for this. The three main reasons were feelings of being unable to tell their complete story (33%), already having contacted a doctor (27%) or trusting their own judgement better (27%). A total of 65 suggestions were communicated to further improve the app. These suggestions mainly related to the issues previously mentioned: 51% to enable better and more complete entry of all aspects of their illness into the app; 32% to improve the structure, speed and operation; 12% regarding the app's advice; and 5% related to its layout • (±) Intentions: follow the app's advice? Yes, 65%. App's advice: call doctor, 58%; GP, 15.6%; OOH clinic, 42.4%; do not call doctor, 42.1%; self-care advice, 33.8%; and wait and see, 8.3%. The intention to follow the app's advice was greatest among participants receiving the advice to contact their GP during daytime (75%), and was 67% for those receiving self-care advice, 61% for contacting the OOH clinic and 56% for wait-and-see advice ($p < 0.001$) • Furthermore, this intention was associated with satisfaction (OR 2.5, 95% CI 2.2 to 2.9; $p < 0.001$), age < 13 years (OR 1.8, 95% CI 1.3 to 2.3; $p < 0.001$) and male sex (OR 1.2, 95% CI 1.1 to 1.4; $p = 0.045$)
Paper						
Thornton *et al.*,[133] UK	Prospective cohort study	Weak	• Education • Anxiety • Tailoring	6 months	Questionnaire	(+) Satisfaction: they all found Baby Check easy to use; between 68% and 81% found it useful, and 96% would recommend it to others

CI, confidence interval; IQR, interquartile range; OOH, out of hours; OR, odds ratio; SD, standard deviation.



NHS 111 online

Get medical help

111 online can tell you:

- where to get help for your symptoms, if you're not sure what to do
- how to find general health information and advice
- where to get an emergency supply of your prescribed medicine
- how to get a repeat prescription

Always follow any medical advice you've already been given by your doctor. See our terms.

FIGURE 9 NHS 111 Online screenshot. Contains public sector information licensed under the Open Government Licence v3.0.

BOX 6 Plain English summary 6

There is not a lot of research on computer sites that check patients' symptoms. This type of service is available in the NHS, so it is important to test if it helps to reduce the use of A&E or a GP for minor problems.

A&E, accident and emergency.

7. Other types of interventions

Size and quality of the evidence base

Seven articles did not fit the six common types of interventions. Six of these were a rare type of intervention[94,108,111,116,122,125] and one was a qualitative study focusing on five interventions, and therefore could not be included in the typology.[118]

Description of intervention and mechanisms

All six interventions included in the typology had awareness as a mechanism, and four also had education as a mechanism.

Impact in service use

In *Table 16*, (+) indicates a statistically significant reduction in service use, (–) indicates a null result and (±) indicates that results were mixed. Six of the studies measured the impact on either emergency or primary care. Two of the five articles showed a reduction in ED use and the single study that measured GP use, expecting to see a reduction, showed a reduction. Hou *et al.*[122] is an interesting study because the intervention was a community campaign to reduce the use of ambulances for minor problems.

TABLE 16 Other types of interventions and their impact on service use

Study	Design	Quality	Mechanisms	Time period of measurement	Data source	Impact on ED	Impact on GP consultations
Beal *et al.*,[116] USA	CBA study	Moderate	• Awareness • Education	12 months	Records, self-report	All: (–) no significant changes in emergency care visits after accounting for covariates	All: non-urgent health-care use significantly decreased for both enrolled and comparison youth in the year after study launch ($t[150] = 5.65$; $p < .01$; and $t[150] = 5.13$; $p < .01$, respectively), but the decrease for the intervention group was smaller for than hoped for
DeCamp *et al.*,[111] USA	RCT	Some concerns	• Awareness • Empowerment • Persuasion • Tailoring	15 months	Records	All: (+) reduced use of EDs. Salud al Día ($n = 79$) vs. usual care ($n = 78$): ED visits, mean 1.23 (SD 1.66) vs. 1.82 (SD 1.64); $p = 0.03$; IRR 1.48 (95% CI 1.04 to 2.12) for control vs. intervention. Frequency of ED use differed ($p = 0.03$): • 0 visits – intervention, $n = 33$ (42%); control, $n = 17$ (22%) • 1 visit – intervention, $n = 19$ (24%); control, $n = 23$ (29%) • ≥ 2 visits – intervention, $n = 27$ (34%); control, $n = 38$ (49%)	
Hou *et al.*,[122] Australia	BA study	Weak	• Awareness • Persuasion	3 months	Records	All: (+) fewer patients arrived at the ED by road ambulance or other means, as opposed to own transport (OR 0.90, 95% CI 0.80 to 1.00; $p = 0.055$) Minor: other results were counterintuitive. Patients arriving at the ED had significantly lower clinical urgency after the campaign than before the campaign. The changes were mainly driven by the decrease of ATS 3 from 46.5% to 44.0% and the increase of ATS 4 from 26.7% to 29.5%. Patients attending the ED were significantly less likely to have higher clinical urgency after the campaign than before the campaign (Wald χ^2 test; $p = 0.0007$)	

Study	Design	Quality	Mechanisms	Time period of measurement	Data source	Impact on ED	Impact on GP consultations
Rector *et al.*,[125] USA	RCT	Some concerns	• Awareness • Education • Persuasion • Tailoring	6 months	Records	• All: (–) analysed separately for two Medicaid schemes: plan A and plan B. In plan A the percentage of household members in the intervention group who visited an ED differed from the control group by –1.1% (95% CI –3.1% to 0.8%), that is a reduction that was not statistically significant. The difference in plan B was –1.2% (95% CI –4.1% to 1.4%) • Minor: (–) ED use by diagnosis – although 50–60% of the visits had a diagnosis discussed in First Look (booklet), the percentages of ED visits for these specific conditions were similar in the intervention and control groups in both health plans	All: the hypothesis was that GP-type visits would increase. Neither health plan differed significantly in the percentage of intervention households or household members who visited an office-based physician. There were also no differences when subgrouping by age (< 19 years and ≥ 19 years)
Robbins *et al.*,[108] UK	RCT	High risk of bias	• Awareness • Education • Empowerment	7 months	Records		• All: (±) parents receiving the intervention visited the child health clinic on significantly fewer occasions than parents in the control group: mean 6 vs. mean 9, respectively ($p = 0.039$). There were no other significant differences in service use between the two groups: GP visits, prescriptions (e.g. antibiotics), minor illness, nurse telephone and home visits, health visitor telephone and home visits • Minor: (–) there were no significant differences in service use between the two groups for minor illness

continued

TABLE 16 Other types of interventions and their impact on service use (*continued*)

Study	Design	Quality	Mechanisms	Time period of measurement	Data source	Impact on ED	Impact on GP consultations
Sturm *et al.*,[94] USA	RCT	High risk of bias	• Awareness • Education • Tailoring	6 and 12 months	Records	All: (–) PED follow-up at 6 and 12 months. Control ($N = 168$) vs. intervention ($N = 164$): high acuity follow-up – • 6 months: 18 (10.7%) vs. 22 (13.4%); $p = 0.56$ • 12 months: 69 (41.1%) vs. 74 (45.1%); $p = 0.53$ Minor: (±) PED follow-up at 6 and 12 months. Control ($N = 168$) vs. intervention ($N = 164$): low acuity follow-up – • 6 months: 31 (18.4%) vs. 21 (12.8%); $p = 0.14$ • 12 months: 91 (54.2%) vs. 70 (42.7%); $p = 0.047$	All: the intervention group had 203 well-child visits (1.23 per patient), compared with 195 (1.16 per patient) in the control group (rate difference 0.02 per person-year (95% CI –0.2 to 0.3; $p = 0.87$). The intervention group had 139 sick visits during the follow-up period (0.85 visits per patient), compared with 109 in the control group (0.65 per patient) (rate difference 0.19 per person-year (95% CI 0.013 to 0.39; $p = 0.036$). That is, the treatment group used the PCP more, as planned

ATS, Australasian Triage Scale; BA, before and after; CBA, controlled before and after; CI, confidence interval; IRR, incidence rate ratio; OR, odds ratio; PCP, primary care provider; PED, paediatric emergency department; SD, standard deviation.

The indicator measured was ED use, specifically arriving at an ED by ambulance, so it is described in the 'impact on ED' column in *Table 16*. In the UK, minor problems are dealt with by ambulance personnel at a person's home/location of the call and are not taken to an ED, so Hou *et al.*'s [122] indicator is not a good indicator of ambulance use in the UK.

Other outcomes

Only two of the seven articles of this miscellaneous type reported relevant outcomes (*Table 17*). One was a controlled before-and-after study of moderate quality.[116] This study of adolescents leaving the care system reported that the majority found the intervention, the I Care Guide, helpful.[116] The second was a qualitative study using focus groups to rank caregivers' preferences regarding different types of educational interventions for childhood illness: the most preferred was the mobile app, and the least preferred were printouts for specific illnesses; this was the same regardless of a participant's baseline level of health literacy.[112] There was little qualitative information available about why people preferred an intervention, although there were some comments about the accessibility of the mobile app and the comprehensiveness of the information.

TABLE 17 Other outcomes for 'other' types of intervention

Study	Design	Quality	Mechanisms	Data collection time points	Data source	Impact on other outcomes
Beal *et al.*,[116] USA	CBA study	Moderate	• Awareness • Education	12 months	Records, self-report	(±) Satisfaction: the majority of adolescents reported that the I Care Guide was somewhat (46%) or very helpful (42%), and 78% of participants who responded to surveys at the 12-month follow-up reported that they still had the guide (42% of all participants who received a guide at enrolment). The majority of youth (80%) reported using the I Care Guide at least once during the study, with sections discussing emergency care, reproductive health and symptoms most commonly endorsed
Ohns,[118] USA	Qualitative	Strong	Education	Cross-sectional	Focus groups	• (+) The preferred method of education identified by the focus groups was the mobile app, Kids Doc, created by the American Academy of Paediatrics. Second, was the 24-hour nurse call line; third was the book, *My Child is Sick!* Fourth was the booklet, Caring for Your Sick Child: Managing Common Infections at Home; and fifth was the patient education printout specific to diagnosis. Of note, 25 of the 30 caregivers ranked the Patient education printout as their fourth ($n = 8$) or fifth ($n = 17$) choice

continued

TABLE 17 Other outcomes for ‘other’ types of intervention (*continued*)

Study	Design	Quality	Mechanisms	Data collection time points	Data source	Impact on other outcomes
						• (±) There was no statistical significance found when comparing literacy scores and preferred method of education (ranking the educational option as their first or second choice). A one-way ANOVA with Tukey post hoc comparisons indicated that those who preferred the mobile app were younger (27.6 ± 5.8 years) than those who preferred the 24-hour nurse line (34 ± 4.9 years) and those who preferred the *My Child is Sick!* book (30 ± 3 years) ($p = 0.03$)

CBA, controlled before and after.

Current examples in the NHS

Not relevant.

Conclusion and relevance to the NHS

It is difficult to draw conclusions about this miscellaneous type.

Impact on service use: multivariable regression

Using a logistic regression of reduction in ED use versus null, we tested whether or not characteristics of the study, context or intervention were more likely to result in reductions. We repeated this for reduction in GP consultations versus null. We tested the decade in which the study was published, the country, the place of delivery, whether or not the intervention was targeted at people in poverty/with low health literacy, whether it was targeted at a parent of a young child or all people, whether it was given at a specific or a general time, the type of intervention, the study design, the quality of research, the time period measured, whether or not records were used for measurement, the presence of mechanisms of impact, the Flesch score and usability. The Flesch score and usability were available for some papers only. We could not measure approach to intervention development because this was so poorly described in most papers. Numbers were small for this analysis (low statistical power) and a large number of variables were tested, so it is a problematic analysis. There were no statistically significant findings, with the exception of the decade in which articles were published: the 2000s had a greater proportion of studies showing a reduction in ED attendance and GP consultations. There is no explanation for this.

Chapter 5 Second stakeholder event

Background

Towards the end of the study, we held a virtual PPI event (in September 2021) followed by a virtual stakeholder event that included PPI members (in October 2021). The aim was to elicit stakeholders' perceptions of the findings and actions that could be taken. We held the PPI event first so we could hear PPI views alone before hearing the views of all stakeholders together. Both meetings were virtual because of COVID-19. In the stakeholder event, we aimed to involve representatives from the following groups: patients, carers and members of the public, CCGs, NHS England urgent and emergency care, general practice, EDs and emergency ambulance services; we also aimed to involve the NHS England health literacy lead. We report the two meetings together because they discussed similar issues.

Stakeholders attending the events

Ten PPI members attended the PPI event. Nineteen stakeholders attended the stakeholder event along with research team members:

- eight PPI representatives (two provided input outside the meeting)
- five NHS England and CCG commissioners
- one representative from NHS England Health Literacy
- one ED consultant
- one GP
- one NHS trust manager
- two ambulance service representatives (a medical director and a paramedic).

We invited the same stakeholders from the first stakeholder event and some additional stakeholders who had learnt about our review. As the meeting was held virtually, people were able to attend from different parts of England, including the north-east, south-west, London and Yorkshire.

The events

At the PPI event, the team presented study findings in a series of short presentations, leaving most of the time for discussion. We heard useful feedback on how the findings may be relevant to the NHS, the role of family and friends when accessing services, and factors that influence people's use of urgent care. The second stakeholder event was held on 13 October 2021 and lasted 2 hours. The team presented the findings of the review, including the following:

- the types of interventions identified
- the effectiveness of different types of interventions
- the readability and user-friendliness of interventions
- implications of the review for the NHS, considering how feasible, appropriate, meaningful and effective the interventions were.

We also discussed potential ways of disseminating the findings to influence practice. Margaret Ogden (PPI co-applicant) helped to organise the events, gave a presentation to stakeholders about the user-friendliness of the interventions, and supported the facilitation of the events.

The issues raised and actions taken

After the events, we recorded the points made by attendees at the PPI event and the second stakeholder event and how we would address each point in the report (*Table 18*). We circulated our write-up to the stakeholders so they could add to the document; none responded.

TABLE 18 Comments from the PPI event and second stakeholder event about the review findings

Issue	Detail	Action
Number of studies found	Attendees were surprised that so few studies were found, and how few were based in the UK. People discussed how they knew of interventions that were being used in parts of the UK, but have not necessarily been evaluated, and thus would not have been included in the review	We will include this reaction in the report when we reflect on the evidence base. We will also discuss how interventions are delivered in the NHS that have not undergone evaluation resulting in publication
Health literacy is not the only issue	Attendees described how sometimes people need to see their GP (and other health professionals) for some issues and struggle to get an appointment. Consequently, people end up accessing more urgent care. Improving health literacy is not going to help this. People expressed frustration about access to GPs	We will be clear in the report that people face difficulties accessing care and that health literacy is one of many issues that need to be addressed. We will be clear that we are not saying health literacy is the only issue, or the most important one
Wider system capacity	Attendees discussed that, although the interventions may be valuable, the current health-care system has a lot of problems, such as delays getting through to 111 or seeing a GP. So, it is not just the effectiveness of interventions within a research context, but whether or not they work within the wider health-care system, and the accessibility of alternative services to GPs and A&E	We will reflect on how the health-care system affects whether or not interventions can be used in practice (feasibility)
Local infrastructure	Attendees discussed how access to services was partly shaped by local infrastructure, for example was the A&E nearer to the patient than the minor injuries unit? They felt that this issue may influence behaviour and, again, is not about health literacy	We will ensure that, in our report, we discuss how there are many factors beyond health literacy that influence people's use of health-care services
People need to have increased health literacy, not just awareness of other services	Attendees discussed how the decision not to attend an A&E department was about more than simply having awareness of alternative services. It was also about having the confidence in the moment of a health crisis to access services. For example, an attendee described how the majority of people surveyed in one A&E felt that they would make the same decision to use A&E again, despite now knowing an alternative service might be more suitable	It will be important to consider that interventions need to take account of the fact that people make decisions when they or someone they support are experiencing a health crisis. We will reflect on the fact that people are being asked to change their behaviour and make decisions when experiencing stress

TABLE 18 Comments from the PPI event and second stakeholder event about the review findings (*continued*)

Issue	Detail	Action
Knowing about interventions being used in the NHS	Attendees had not seen some of the interventions that are available in the NHS (e.g. NHS 111 Online). The group discussed how to promote them, for example put on television screen in general practice waiting rooms, use of schools and local newsletters. Attendees felt that it needed to be easy to access where anyone can check out symptoms and find out what to do	We will have a recommendation in the report that any interventions need to be known about by the intended recipients
Lack of studies focused on ambulance services	The review did not identify any studies delivered by ambulance services or measuring the impact of use of ambulance services. We discussed whether or not people were surprised about this and the initiatives that may be happening in the NHS currently	We will include in our report the reflection that no studies had been identified in this setting and the potential for interventions to be developed to be used with people using ambulance services for minor problems
Settings for the interventions	Attendees discussed how the interventions found in the review were generally delivered in health-care contexts such as leaflets handed out by GPs, but there could be scope to use places like food banks to reach other people	We will reflect in our findings about the scope for delivering interventions in alternative settings
Targeted vs. universal interventions	Attendees discussed that there could be a need for both more universal interventions, such as leaflets delivered to everyone in a town, and more targeted interventions, for example coaching support with people who need more support to improve their health literacy	We will reflect in the report about the different intensities and purposes of different interventions and whether or not a ‘stepped’ approach is feasible
Care navigators	We showed that some of the studies in the review evaluated people being provided with support from care navigators, but said that these interventions are not in use in the UK. Attendees pointed out that there are care navigator-type projects being conducted in the UK. For example, some general practices use volunteer community health champions to advise people on potential services. Social prescribing is being rolled out throughout general practices and one of its functions could be supporting people to feel more confident accessing alternative forms of support	We will discuss the findings of the review with our social prescribing networks. We will relate these NHS initiatives to the evidence base in our report
Role of community pharmacists and trust	Attendees discussed that, in the UK, we do not have as much of a culture of using pharmacists as a form of advice as other countries such as France. Some general practices are starting to employ pharmacists to provide advice to patients, for example those on multiple medications People felt that there needed to be greater promotion of the training, qualifications and skills pharmacists have, to help increase the public’s trust of getting support from different types of health-care professionals	This raised the issue of trust in different services and interventions. We are assessing the trustworthiness of interventions in our review using our user-friendliness tool. We will also reflect, in the discussion section of our report, about the importance of addressing people’s trust in alternative sources of support

continued

TABLE 18 Comments from the PPI event and second stakeholder event about the review findings (*continued*)

Issue	Detail	Action
Needing to have people we trust to promote interventions (e.g. family members)	Attendees discussed the importance of having people you trust recommending the interventions, such as people supporting a relative to use the NHS website or a health visitor recommending support	In the discussion section of the report, we will reflect on how engagement with interventions may rely on people learning about them through family members, friends and health professionals
Volunteers	Attendees proposed that volunteers could support the delivery of interventions such as care navigators to help make interventions more cost-effective. Person-delivered interventions do not have to be delivered by health-care professionals	In the discussion section of the report, we will reflect on the potential role of volunteers to deliver interventions
Online triage tools	Although some attendees had used online triage tools, such as eConsult, through their GPs, a challenge is that having underlying health conditions often excludes people from using these	We will reflect on whether or not, in any of the included studies, patients with underlying health conditions were included
User-friendliness of interventions	Attendees discussed how developing the UFAT was an important part of the review. They felt that it was something that could be used beyond the review, including by people designing patient-facing information. People gave the example that general practice websites are often not well designed	In the report, we will include information on how the user-friendliness tool could be used to assess other patient-facing materials such as general practice websites
Having resources available in different languages and accessible in different formats	Attendees spoke about the need to have resources available in different languages and different formats. But they appreciated that funders did not always have the budget for this and that a considerable range of languages would be needed. One attendee discussed the Recite Me software (Recite Me, Gateshead, UK), which can change websites into more accessible formats	Within the user-friendliness tool, we are assessing whether or not interventions include information about how to access the tool in different formats or languages. In our report, we will also reflect on the importance of ensuring that this is taken account of when designing health literacy interventions
Having well-designed, user-friendly resources	Attendees spoke about the importance of having well-designed interventions, such as a clear layout and reasonable font size. They felt that the user-friendliness of interventions may affect the chance to improve health literacy	We are assessing the user-friendliness of interventions in the review. We will explore whether or not the user-friendliness scores are associated with the effectiveness of interventions. Doing this will help us understand the potential impact of having a well-designed intervention
Tone of interventions	Attendees said that it is important that any interventions are appropriate in their tone and not patronising	We have assessed the tone of interventions through the user-friendliness tool and this will be included in the results section of the report
Reaching everyone	Attendees discussed that there are some people who are not engaged in mainstream media/digital platforms, etc. It is important to consider how these people can be reached through interventions	We will reflect in our report about whether or not any of the studies in the review considered how to reach less engaged people

TABLE 18 Comments from the PPI event and second stakeholder event about the review findings (*continued*)

Issue	Detail	Action
COVID-19 brings opportunities	Attendees discussed that, although COVID-19 has been disruptive, it may also provide opportunities. People have got used to accessing services differently and have realised how important it is to look after our health	We will reflect in our report about the impact of the COVID-19 pandemic and how it may be an opportune time to try and improve health literacy to change service use for minor health problems
Finding interventions at the right time	Attendees discussed the need for interventions to be on hand when they need them. Attendees described how sometimes leaflets get put in a drawer and people cannot find them when they need them. Booklets can be stored on a bookshelf. The PPI members liked *The Little Orange Book*, feeling that they could have it to hand in paper format	We will have a section in the report about finding interventions when they are needed
Changing ingrained behaviours	Attendees discussed how people may have grown up accessing specific services, for example A&E in countries where primary care may not be available. Other people said they had grown up not accessing A&E because it was far from their home, so they would not think about accessing it. We discussed how ingrained experiences of accessing services may be and education needs to be from a young age or aimed at people new to the country/area (e.g. students and refugees)	We will highlight that there appears to be a gap in interventions that are aimed at children (as opposed to parents) or people new to a country
Educating people about alternative methods of support	Attendees spoke about the need to provide education to people to increase health literacy, such as courses or education in schools	We will reflect on whether or not there is a gap in the types of interventions that have been evaluated and whether or not further research is needed on education sessions in schools
Being risk averse when making decisions for other people	Attendees discussed how people were often more risk averse when making decisions for children or people they care for than when making decisions for themselves, such as teachers having to decide whether to take a schoolchild to A&E	We have included a number of interventions aimed at parents of young children in our review. We have not found interventions aimed at people in other caring relationships and will explain that this is a gap in the research
Positive experiences shape people's future use	Attendees discussed that a positive experience of an alternative source of support, such as using an internet website, will increase people's willingness to use it again instead of attending urgent care services	In the report, we will reflect on people building on their experiences of new interventions
Keeping interventions updated	Attendees pointed out that leaflets can get out of date. They were keen that interventions are kept up to date, for example websites are updated and health services have strategies for ensuring that leaflets are replaced	We will reflect on whether or not any of the included studies considered the long-term use of interventions, such as how to keep them up to date
Safety: what if it's something serious?	PPI members felt that there will always be cases when people do not know if their indigestion is a heart attack or a cyst is breast cancer. Attendees wondered how interventions strike that balance of helping people to assess whether something is non-urgent or serious	The safety of interventions is important and one of the adverse effects of the interventions could be people not accessing urgent care when they need to. There will be a section in the findings of the report about the safety of interventions

continued

TABLE 18 Comments from the PPI event and second stakeholder event about the review findings (*continued*)

Issue	Detail	Action
Which interventions work for whom?	Attendees discussed how the interventions had been tested in different populations, in different settings and given at different times. People felt that it might be worthwhile including in the report a matrix based on all of the intervention formats and looking at what could work for whom	We are doing a multiple regression analysis to see if there are any characteristics of interventions or people that result in reduced use of primary or emergency care
Interventions can be relatively low cost, so even a little impact makes it worth it	Attendees discussed how interventions such as a leaflet can be relatively cheap. So even if they only have some impact on a small number of people, it could be worthwhile doing them	We will reflect on the level of impact interventions need to have given their cost (although the cost data we have are very poor)
Finding out why some interventions work and others do not	Attendees were really intrigued by why some interventions were effective and others were not. They thought that it was an important area of learning to help with designing future interventions	We are doing a multiple regression analysis to see if there are any characteristics of interventions or people that result in reduced use of primary or emergency care
Reducing use of A&E may increase use of services such as general practice	Attendees were concerned that reducing the use of A&E may increase use of services such as general practice	Some of the interventions in the review aimed to reduce use of A&E by increasing use of the GP. Indeed this may be a consequence of reducing use of A&E
It can be difficult to monitor the impact of interventions in practice	Attendees pointed out that it can be difficult to measure the impact of NHS initiatives on A&E because of issues of data quality. Therefore, it can be difficult to understand the impact of initiatives	In our report, we will reflect on the challenges of understanding the impact of health literacy interventions, especially when trying to use routine data in evaluations rather than data specifically collected for a research study
Interest in interventions currently being used in the NHS	Attendees discussed that there are many interventions that are being used in routine practice, such as *The Little Orange Book* or the Sheffield 'Plan B' social media campaign. However, because they are not being formally evaluated as part of an academic study, people may not know about their existence or benefit from their learning	In our report, we will discuss that a future area of research could be undertaking an exploratory study to learn what interventions are being used in the UK and learn from their experiences

A&E, accident and emergency.

Chapter 6 Discussion and conclusions

Summary of findings

A total of 67 articles (64 studies) were included: 37 from the USA, 16 from the UK, 12 from the rest of Europe and two from the rest of the world. There were seven intervention types: navigation tools directing people to the range of services available ($n = 7$); written education about managing minor health problems in booklet or website format ($n = 17$); person-delivered education ($n = 5$); written education with person-delivered education ($n = 17$); multicomponent of written education, person-delivered education and mass media campaign ($n = 5$); self-triage ($n = 9$); and other ($n = 7$). Most articles reporting satisfaction with the intervention, enablement and perceived changes to behaviour showed positive results. Nineteen out of 30 (63%) articles measuring impact on ED attendances showed a reduction. Sixteen out of 27 (59%) articles measuring impact on GP consultations showed a reduction. Returning to the logic model specified earlier in the report (see *Figure 1*), the interventions appeared to improve short-term and intermediate-term outcomes (when measured), but there was variation in whether or not they affected the longer-term outcomes of reduced use of EDs or GPs. There was no indication that variation in the evidence base was explained by any of a range of population, research design or intervention characteristics, including complexity of the intervention. Interventions ranged in reading age and user-friendliness. The few articles reporting safety ($n = 8$) showed that interventions were safe.

Strengths and limitations of the evidence base

The evidence base had six strengths. First, the evidence base was generally very recent (almost half of the included articles had been published since 2010: 32/67), which increases its applicability to current contexts. Second, it derives from the multiple settings of primary care, secondary care and the community, rather than interventions delivered in a single setting only. Third, around one in four articles were conducted in the UK (16/67), and so a sizeable part of the evidence base is highly applicable to the context of interest. Fourth, it was extensive, covering a range of intervention types. Fifth, multiple study designs were used, including a high number of RCTs and quasi-experimental studies. Sixth, there were a considerable number of studies aimed at parents of young children, a group that has been identified as high users of emergency and primary care for minor health problems.[4]

The evidence base had seven limitations. First, members of the PPI panel reflected that the evidence base was much smaller than they had expected. Second, the quality of the evidence base was often assessed as being poor, with many RCTs assessed as being at high risk of bias, and all but one non-randomised study being assessed as being of only moderate or weak quality. Third, the evidence base was highly heterogeneous in terms of the study designs, intended populations, the details of the interventions themselves, outcome measurements, and lengths of follow-up. This was especially the case for the measurement of service use outcomes, both in terms of the indicator used and the time period of measurement. This prevented the statistical pooling of interventions and outcomes, so the size of any positive effects for any particular intervention type could not be precisely quantified. Fourth, a large proportion of the studies were conducted in the USA (37/67), which has a financially distinct health and social care system, compared with the UK, which is likely to moderate patient decisions around accessing care. Fifth, cost data or analyses were rarely reported; if they were reported, it was sometimes as a discussion point, rather than details of methods used to calculate costs. So it could not be determined whether or not even a small statistically significant effect might be cost-effective, especially for relatively basic, low-resource intervention types. Sixth, there was almost no explicit assessment of safety. Seventh, there were surprisingly few interventions delivered in emergency care, and none delivered by ambulance services. The emergency care-delivered interventions were dominated by recently published North American studies of interventions aimed at parents of young children, rather than aimed at adults seeking help for their own health.

Relevance of the evidence base

Approximately one-quarter of articles were conducted in the UK (16/67), and so a sizeable part of the evidence base was highly applicable to the UK context. The interventions in the evidence base were similar to interventions in current use in the NHS, for example booklets about minor health problems, NHS website symptom checker, NHS 111 Online.

Fit with other evidence

Do educational leaflets/booklets work in other areas?

We found that there was evidence that leaflets/booklets could help to reduce the use of emergency and primary care for minor health problems, but the evidence base was too mixed and not of high enough quality to draw firm conclusions about this. The best we could say was that they have the potential to work. Educational leaflets/booklets are used in other areas. For example, a leaflet-based intervention was used for people calling out an emergency ambulance when they had a hypoglycaemic event, resulting in a reduction in repeat calls to the ambulance service for hypoglycaemia.[147] The evidence base in other areas can be limited. A 2021 systematic review of health literacy interventions in cancer identified 87 intervention studies, but found that most of them focused on the early stage of developing interventions, rather than evaluating outcomes of developed interventions.[148]

Ease of reading and reading age

We found a range of readability scores for interventions in our review. This is reflected in other research. Other studies have made judgements about patient-facing written materials, identifying FRE scores of 54, compared with our range of 23–93, where 100 is very easy.[149] These authors highlighted the importance of assessing readability so that improvements can be made to materials. A lack of attention to literacy levels for patient information leaflets in general practice has been found. Only 24% of patient information leaflets met recommended reading criteria.[62] A recent study of the readability of general practice websites using FRE and the FKGL found that less than one in four were at or below the recommended reading age for online content of 9–14 years in an assessment of approximately 1000 general practices in Scotland.[63] Our assessment of an existing intervention in the NHS, (*The Little Orange Book*,[68] judged to be suitable for most adults, having a FRE score of 67 and scoring almost perfectly in our user-friendliness assessment) shows that the NHS can produce excellent educational materials.

Has COVID-19 changed things?

A question that emerged in the PPI meetings was whether things were different since the pandemic and might this affect the transferability of evidence across time. We believe that the need for self-care increased during the lockdown periods of the global COVID-19 pandemic, as ED attendances dropped and face-to-face GP consultations were partly replaced with online ones because of fear of catching COVID-19. A survey and qualitative interview study of people who contacted primary care during the lockdown in New Zealand identified that health-care-seeking decisions were influenced by their ability to self-care and self-triage.[150] The conclusions of that study were that more support for people to self-care and self-triage would help pressurised services in emergency situations, such as a pandemic, as well as in usual times. They may also help patients attend to minor health problems when they are fearful of attending services.

Developing interventions

We found very little information about how interventions were developed. There is a lot of interest in co-design approaches to intervention development currently, that is the people who will use an intervention help to design it. There is also interest currently in the use of psychological theories when developing interventions for behaviour change. We did find some examples of co-design and use of psychological theories in our review, but we did not have enough examples or enough information about the development processes to determine if taking these approaches was more likely to result in effective interventions. Co-design of educational leaflets for minor health problems in combination with attention to psychological theory is occurring in recently produced interventions.[151]

Trusting the source of information

Our team expected to see trust in the source of information as a possible mechanism of action. PPI members identified it as an important issue. It did not make a significant appearance in our review, even though it has been identified as affecting behaviour.[152,153]

Strengths and limitations of the review

The systematic review had eight strengths. First, all processes (study selection, data extraction and quality assessment) were carried out by experienced reviewers. Second, the literature search was undertaken by a qualified senior information specialist and was comprehensive, involving the interrogation of multiple databases, supplemented by further techniques, such as reference-checking of included studies and reviews, searching of many grey literature sources (e.g. websites of relevant organisations) and focused searching for the publications of known relevant authors. This was an important issue because of the nebulous nature of the intervention we were interested in. Third, the data were not appropriate for statistical analysis, but the synthesis involved the application of a novel typology, going beyond standard narrative synthesis techniques to deliver practical findings. Fourth, focusing specifically on health literacy interventions, rather than considering them as a subgroup in a wider set of interventions, allowed for a more nuanced understanding of this type of intervention. Fifth, the focus on both emergency and primary care allowed the bringing together of similar interventions used for the same purpose of reducing the use of services. Sixth, assessing the readability and user-friendliness of interventions, as well as effectiveness, drew attention to a strength or weakness of an intervention that might affect its ability to have an impact on service use. Seventh, the extensive involvement of PPI, including having a PPI co-applicant, four events for PPI, and inclusion of members of the Deep End Patient Panel from one of the most socially deprived areas in the UK, grounded the review and findings in the reality of people's lives. Eighth, the engagement of a wide range of stakeholders helped to ensure that the findings were useful to them. For example, it led to us identifying an intervention produced and used within the NHS currently that we included in our user-friendliness assessment and could recommend for wider use in terms of being a high-quality resource.

The systematic review had seven limitations. First, we found studies mainly from the USA, the UK and the rest of Europe. We may have missed research from the rest of the world, but it is also plausible that interest in improving health literacy to reduce the use of emergency and primary care is limited to those countries. There is some support for this: there has been an exponential growth in publications about health literacy more generally, with a dominance of the USA, Australia and the UK,[154] which makes it unlikely that we missed global health literature. Second, we are likely to have missed grey literature and literature that did not measure primary and emergency care use. Towards the end of the review, one of our stakeholders identified a small-scale evaluation of *The Little Orange Book* undertaken by a patient group.[141] The findings were very similar to those in our review in that users of the intervention found the intervention very helpful. An additional finding was that staff regarded it highly. From discussions with our stakeholders, there are likely to be more of these types of studies that are not published in peer-reviewed journals or easily found using grey literature searches.

It is also possible that we missed relevant studies published in databases because we required a focus on reduction of service use. When finalising the report, we found an article reporting the development and evaluation of a component of a mass media campaign to reduce the use of emergency ambulance services for non-emergencies.[155] The campaign was successful in terms of reaching people and changing their attitudes towards ambulance use. That is, it was similar to the findings of our review in that it was successful for short-term outcomes. The next step for the research group was to measure the effect on ambulance use. Third, the majority of each systematic review process (study selection, data extraction and quality assessment) was performed by a single reviewer (CC). However, as an initial step, and to ensure complete clarity and consistency in the application of inclusion criteria and data extraction, four project team members (CC, LP, AOC and AF) all screened 100 titles and abstracts, and extracted three studies, to identify, discuss and resolve any ambiguities. There was also independent checking by a second reviewer (LP) of a minimum of 10% of the article data extractions and critical appraisals ($n = 7$), and disagreements were found to be rare and easily resolved. All decisions were also checked with reference to a third member of the project team (AOC or AF). Fourth, it was sometimes difficult to stay clear about the boundaries of the research when health professionals such as pharmacists and health visitors offer advice to patients about managing future minor health problems. We have ensured that we are clear that the review was about interventions to help patients make decisions themselves without input from health professionals. Fifth, we could not access all the interventions to do readability testing and user-accessibility assessments. Sixth, we had intended to use context–mechanism–outcome chains in our synthesis, but this did not feel like a helpful process, so we did not do it. Seventh, the 'feasible, appropriate, meaningful and effective' framework was not helpful during our second stakeholder event. It may have been more useful if we had identified one intervention or intervention type that stood out as effective and warranted further detailed discussion about its use in the NHS.

Strengths and limitations of the patient and public involvement activity

The GRIPP2 checklist[46] and Pollock *et al.*'s[48] framework were used to help us reflect on our PPI. The PPI activity had seven strengths. First, we involved 14 different people, each with different characteristics and life experiences. Second, we had a PPI member (MO) as an active member of the project team. This ensured that, when conducting the review, there was always a PPI voice who provided valuable advice, feedback and support throughout the project. Third, one of our co-applicants was the stakeholder lead (AF), ensuring that there was researcher and administrator time dedicated to supporting people. Fourth, we involved PPI members throughout the review, including at protocol development stage, developing the UFAT and when considering the implications of the results. Fifth, we kept people informed throughout the study by having a project newsletter, and our stakeholder lead (AF) encouraged telephone and e-mail exchanges if people wanted to contribute outside meetings. Sixth, we remunerated people for their involvement. Seventh, we provided additional support to facilitate involvement, including training on engaging in virtual meetings and on using Twitter.

The PPI activity had three limitations. First, because of COVID-19, we held all our events virtually. We feel that we mitigated against problems with technology, but could have made more use of small breakout rooms during meetings to allow quieter members to contribute. Virtual meetings also reduced any opportunity for informal rapport-building, such as chatting over coffee. Second, there was a long gap of no PPI meetings between the November 2020 and June 2021 meetings. Although we kept the PPI group updated about the review through newsletters, an interim meeting in the spring may have been valuable. We did not undertake any meetings in that period because we were at the search/extraction stage of the review and we wanted to work with PPI members when we had emerging findings to discuss. Third, the university's financial systems made remuneration complex for some members. This caused stress and resulted in delays in payments for some people. Our department is working with the university to simplify PPI payments so that it does not become a barrier to engagement.

Reflections on doing this type of research

We have five recommendations for researchers doing this work in the future. First, measure actual use of services using records, rather than relying on self-report. Second, be consistent as a research community about the measurement time period. The most common measurement time periods were 6 months and 1 year. Third, we noted that some studies used records from a single hospital only; intervention users may have actively sought care outside this hospital if they felt that their local ED was trying to persuade them not to attend. If possible, we recommend also measuring impact on surrounding EDs. Fourth, not many studies measured safety, and this is a really important issue to patients and the public. It is heartening that those that measured safety found these interventions to be safe. Fifth, we felt that the low scoring in the formal quality assessment of these studies was harsh given the difficulty of undertaking research in such complex environments. This was particularly the case for the RCTs in our review. Researchers could review these assessment tools for application to pragmatic RCTs.

Implications for decision-makers

A number of health literacy interventions are used in the NHS currently. Commissioners and service providers have developed booklets and websites to help parents of young children and the general population to manage minor health problems and decide where best to go for care. Policy-makers have developed NHS 111 Online for self-triage. Rather than develop further new interventions, commissioners and service providers could contact their counterparts in different regions and make use of existing good-quality interventions. It might also be helpful to have a space where local evaluations can be shared. Once commissioners and service providers locate a relevant intervention, they could assess the reading age and user-friendliness, and improve these if necessary. This is important for websites as well as information in booklet format. Our PPI members were keen that commissioners and service providers look for ways to make existing interventions available to more people (e.g. through school) and available in different languages or formats, such as online videos. We know that NHS 111 Online is advertised on bus stops and some navigation tools are posted on social media, yet the PPI members often had not seen them. The PPI members were concerned about a lack of digital literacy in some parts of the population and a lack of access to technology; they described initiatives they had come across such a health champion in general practice who could help people to look things up on a tablet. They also described a system that, when added to a website, reads the website content aloud and translates it into different languages. Finding ways of making existing good-quality interventions more accessible and used by the general population might benefit people's ability to care for minor health problems and seek health care from the most appropriate place. It is also important to continue to evaluate existing interventions in terms of measuring impact on service use and cost-effectiveness, because this cannot be taken for granted.

Recommendations for further research

- Focus on understanding how to improve access to existing good-quality interventions (particularly those currently used in the NHS), rather than develop new interventions.
- Continue to evaluate the effectiveness and cost-effectiveness of these types of interventions, given that these types of interventions have potential to reduce the use of emergency and urgent care, and that self-care for minor health problems may be necessary during pandemics and to facilitate the sustainability of emergency and urgent care provision.
- Measure the safety of these interventions.
- Focus on understanding why an intervention did or did not work, rather than only measuring impact on service use, that is use mixed-methods evaluations of RCTs/quasi-experimental designs and process evaluation/qualitative research.

- Undertake more rigorous economic evaluation of these interventions.
- Evaluate interventions aimed at adults using EDs for minor health problems because few studies did this.
- Pay more attention to 'displacement', whereby people use different services from the ones being measured.
- As a research community, measure changes in service use in a consistent way and at a consistent time post intervention. This will facilitate a future meta-analysis. Consider measuring change in attendances at a service for minor health problems/non-urgent reasons at 1 year post intervention.
- Consider ways of making it easier to monitor change in service use over time using routine data.

Conclusions

Health literacy interventions have potential to reduce emergency and primary care use. They need further rigorous evaluation to determine which work best and for whom.

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Ethics statement

This study is a systematic review with stakeholder involvement and did not need ethics approval.

Data-sharing statement

This report generated no new data; therefore, there are no further data to be shared other than those included in the report. Any further queries should be submitted to the corresponding author.

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Appendix 1 Final search strategy

Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations, Daily and Versions(R).

Date range searched: 1946 to 11 January 2021.

1. Health Literacy/or (health literacy or educational intervention* or self triage).mp.
2. *health education/or *health promotion/or *patient education as topic/or *prenatal education/or *"Caregivers"/ed [Education]
3. (pamphlet* or booklet* or information leaflet* or patient leaflet*).ti,ab. or (digital intervention* or internet or web-based or text* or SMS or mobile app*).ti,hw,kw.141287
4. exp *Primary Health Care/
5. *community pharmacy services/or *call centres/or *hotlines/or *triage/
6. *Family Practice/or *General Practice/or *Practice Management, Medical/or *"Telemedicine"/
7. (((urgent or emergency) adj2 (treatment or department or care or services)) or minor injur* or minor illness* or general practi* or GP or (consult* adj2 doctor) or primary care or primary health* or community health cent* or "out of hours").ti,ab,kw.
8. exp *Health Services Accessibility/or *"Health Services Needs and Demand"/
9. (empower* or ((manag* or reduc* or decreas* or cope* or mitigat* or influenc* or effect or affect*) adj3 (preventable or unnecessar* or non-urgent or non-urgent or avoidable or low acuity or frequent) adj3 (demand* or pressure* or "use" or usage or utili* or admission* or visit* or crowding or surge))).ti,ab.
10. Self-care/or (self-manag* or self-care or treatment seeking or help seeking or care seeking or self-limiting).ti,ab,kw.
11. 1 or 2 or 3
12. 4 or 5 or 6 or 7
13. 8 or 9 or 10
14. 12 and 13
15. 14 or *"General Practice"/sn or *Emergency Service, Hospital/sn
16. 11 and 15
17. limit 16 to English language.

Appendix 2 User-Friendliness Assessment Tool

The following criteria assess the user-friendliness of interventions. By user-friendliness, we mean how easy it is to understand the information being communicated. It has been developed based on health literacy guidance from NHS Digital[156] in the UK and the Centers for Disease Control and Prevention[67] in the USA. Furthermore, we have consulted patients and members of the public about the tool.

Assess the intervention for each of the items below and total it up to provide a total score (maximum score of 42).

(1) Is it clear that the intervention was written by an organisation generally considered a trustworthy source? ***For example the local hospital, a well-known charity or national body?***

☐ 3 points- It is clear that the intervention is written by an organisation considered trustworthy.

☐ 2 points- The intervention appears to be written by an organisation considered trustworthy but it could be clearer who wrote the intervention.

☐ 1 point- It is difficult to understand who wrote the intervention or there are concerns about who wrote the information.

☐ 0 points- The intervention is written by an untrustworthy source. E.g. a blog post that does not include any references to evidence.

☐ 0 points- There is no information about who has written the intervention.

(2) Does the intervention use pictures (video clips, photos, models, or charts) to help the user understand the content? For example, if an intervention is about rashes does it include pictures of a rash? If it is about temperature, does it include a diagram of how to read a thermometer?

☐ 3 points- There is extensive use of pictures that help the reader.

☐ 2 points- There is some use of pictures that help the reader.

☐ 1 point- There is little use of pictures or the pictures are sometimes not easy to understand and/or are irrelevant to the text.

☐ 0 points- There is no use of pictures.

☐ 0 points- Pictures are used but they are not easy to understand and/or irrelevant to the text.

(3) Is the text organised and presented in a way to make it easier to read (formatting). For example, is the text broken up into sections and with the use of short paragraphs and/or bullet point/numbering lists (rather than long paragraphs of text).

☐ 3 points- The whole intervention is well formatted.

☐ 2 points- Generally, the intervention is formatted in a way that helps the reader but there are some issues.

☐ 1 point- The formatting has some positive aspects but there are also many issues which could be improved to help the reader.

☐ 0 points- There is little attempt to format the text to help the reader.

☐ 0 points- The formatting makes it difficult for the reader to understand the information.

(4) Are methods used to draw attention to the key messages? For example, text is put in bold, italics or boxes are used to signal the key messages.

☐ 3 points- Methods are used throughout the resource to draw attention to the key messages.

☐ 2 points- Methods are used to draw attention to the key messages but there are some places where it could be improved.

☐ 1 point- There is little use of methods to draw attention to key messages or there are many issues which could be improved.

☐ 0 points- There is no use of methods to draw attention to the key messages.

(5) Is the content ordered in a logical way? For example, is there initially an explanation of the issue, followed by solutions.

☐ 3 points- The content is well ordered in a way that helps the reader understand the information.

☐ 2 points- Generally, the content is well ordered but there are some issues.

☐ 1 point- There are many issues with the ordering of the content.

☐ 0 points- The resource is poorly ordered which makes it difficult for the reader to understand the information.

(6) Is the font (printed text style) appropriate? For example, a Sans serif font (e.g. Arial, Calibri, Helvetica), font size is 12 or more, only one or two fonts are used, italics or underlining are not used too much.

☐ 3 points- An appropriate font style and size is used throughout the document.

☐ 2 points- Generally an appropriate font style and size is used but there are some issues.

☐ 1 point- Sometimes an appropriate font style is used but there are many issues throughout the resource.

☐ 0 points- There are issues with the font style throughout the document.

(7) Is the intervention written to the reader, that is, using the 2nd person? For example, '*if you have a rash you can speak to your pharmacist/chemist''* rather than '*if someone has a rash they can visit a pharmacist'.*

☐ 3 points- Intervention is fully written in the 2nd person.

☐ 2 points- Intervention is mainly written in the 2nd person but occasionally uses the 3rd person.

☐ 1 point- The intervention is mainly written in the 3rd person with some parts written in the 2nd person.

☐ 0 points- The intervention is written in the 3rd person.

(8) Does the intervention use accurate language rather than vague language?. For example, '*if your rash does not go away in 7 days contact your GP'* rather than '*contact your GP if your rash does not improve in a few days*'.

☐ 3 points- The intervention uses accurate language throughout.

☐ 2 points- Intervention generally uses accurate language but there are some occasions when it does not.

☐ 1 point- Sometimes there is use of accurate language but there are many uses of inaccurate language.

☐ 0 points- Intervention does not use accurate language.

(9) If medical terms are used within the intervention, are Plain English terms used too? For example, '*piles (haemorrhoids'*) or '*your blood sugar levels (HbA1c) will be measured regularly if you have diabetes'.*

☐ 3 points- Throughout the intervention, medical terms are not used or medical terms are supported by Plain English language explanations.

☐ 2 Points- Generally medical terms are not used or medical terms are supported by Plain English language explanations but there are some instances where this is not the case.

☐ 1 point- Occasionally medical terms are supported by Plain English language explanations but there are many instances where medical terms are not supported by Plain English Explanations.

☐ 0 points- The intervention uses medical terms with no explanations.

(10) Is the tone of the intervention appropriate for the reader? *For example it does not seem to be telling people off.*

☐ 3 points- The tone throughout the resource feels appropriate for the intended audience.

☐ 2 points- The tone generally is appropriate but there are some issues.

☐ 1 point- There are many instances when the tone is inappropriate but occasions when it is appropriate.

☐ 0 points- The tone is inappropriate throughout the resource.

(11) If acronyms are used in the intervention, are they explained? For example if BMI is used, on its first use 'body mass index' should also appear. More commonly used items like NHS may not be

explained. Although it is important to be aware that they would not be common to all populations so would depend on who the resource was aimed at. E.g. if the resource was aimed at migrants, the term 'family doctor' rather than GP may be better.

☐ 3 points- Any use of acronyms is supported by explanations when first used or there is no use of acronyms.

☐ 2 points- Generally the use of acronyms is supported by explanations when first used but there are some occasions when no explanation is provided.

☐ 1 point- There are many cases of acronyms not being explained.

☐ 0 points- Acronyms are not supported by explanations.

(12) When numbers or statistics are used, do they help to communicate information to readers in a clear manner? For example, numerals rather than words are used, numbers rather than percentages are used e.g. 1 in 100, absolute not relative risk is given.

☐ 3 points- Throughout the document, numbers or statistics are used clearly to help readers understand the information.

☐ 2 points- Generally the use of numbers or statistics are easy to understand but there are some occasions when their use could be improved.

☐ 1 point- There are many cases where the use of numbers or statistics is not easy to understand or causes confusion but occasions when their use is helpful.

☐ 0 points- Numbers are not used when they could have helped.

☐ 0 points- In the majority of cases, how numbers are used causes confusion.

(13) Is any information included about how to get hold of the intervention in alternative formats such as large print or translated versions? For example a phone number to access alternative formats.

☐ 3 points- It is clear that the intervention is available in a range of alternative formats and contact details are provided about how to get hold of the information.

☐ 2 points- There is some reference to the intervention being in other formats but it is unclear how to access them.

☐ 1 point- There is a vague reference to alternative formats but no detail about which formats the intervention is available in and/or no information on how to access them.

☐ 0 points- There is no mention of the intervention being available in other formats and how to get hold of them.

(14) Do you feel the right information has been provided, in the right way to allow you to take action? For example, you feel sufficient information has been provided for you to understand alternative sources of support.

☐ 3 points- Sufficient information has been included in the resource.

☐ 2 points- Generally sufficient information has been included but there are some aspects where more detail is needed.

☐ 1 point- There are many aspects where more information is needed but occasionally parts of the resource do include sufficient information.

☐ 0 points- There is not sufficient information included to take action.

Total score= _________________

Appendix 3 Articles excluded at full-text stage

Wrong population (not patients accessing services for minor illness, non-urgent care, e.g. chronic illness)

1. Agarwal G, Pirrie M, McLeod B, Angeles R, Tavares W, Marzanek F, *et al.* Rationale and methods of an evaluation of the effectiveness of the community paramedicine at home (CP@home) program for frequent users of emergency medical services in multiple Ontario regions: a study protocol for a randomized controlled trial. *Trials* 2019;**20**:75.
2. AHC M. Better patient education can lead to lower medical costs: focus on health literacy. *Case Manage Advis* 2020;**31**:1–3.
3. Blancafort Alias S, Monteserin Nadal R, Moral I, Roque Figols M, Rojano I Luque X, Coll-Planas L. Promoting social capital, self-management and health literacy in older adults through a group-based intervention delivered in low-income urban areas: results of the randomized trial AEQUALIS. *BMC Public Health* 2021;**21**:84.
4. Botelho A, Dias IC, Fernandes T, Pinto LMC, Teixeira J, Valente M, *et al.* Overestimation of health urgency as a cause for emergency services inappropriate use: insights from an exploratory economics experiment in Portugal. *Health Soc Care Community* 2019;**27**:1031–41.
5. Bronsky ES, McGraw C, Johnson R, Giordano K, Orlando A, Bar-Or D. CARES: a community-wide collaboration identifies super-utilizers and reduces their 9-1-1 call, emergency department, and hospital visit rates. *Prehosp Emerg Care* 2017;**21**:693–9.
6. Cambon J, Cordier T, Munnich EL, Renda A, Kapur B, Hoxhaj S, *et al.* Effects of educational messaging on urgent and emergent care-seeking behaviors among publicly insured populations. *Am Health Drug Benefits* 2018;**11**:86–93.
7. Greene JC, Haun JN, French DD, Chambers SL, Roswell RH. Reduced hospitalizations, emergency room visits, and costs associated with a web-based health literacy, aligned-incentive intervention: mixed methods study. *J Med Internet Res* 2019;**21**:e14772.
8. Hibbard JH, Greene J. The impact of an incentive on the use of an online self-directed wellness and self-management program. *J Med Internet Res* 2014;**16**:e217.
9. Judson TJ, Odisho AY, Neinstein AB, Chao J, Williams A, Miller C, *et al.* Rapid design and implementation of an integrated patient self-triage and self-scheduling tool for COVID-19. *J Am Med Inform Assoc* 2020;**27**:860–6.
10. Kelley L, Capp R, Carmona JF, D'Onofrio G, Mei H, Cobbs-Lomax D, *et al.* Patient navigation to reduce emergency department (ED) utilization among Medicaid insured, frequent ED users: a randomized controlled trial. *J Emerg Med* 2020;**58**:967–77.
11. Michelen W, Martinez J, Lee A, Wheeler DP. Reducing frequent flyer emergency department visits. *J Health Care Poor Underserved* 2006;**17**(1 Suppl.):59–69.
12. Nejtek VA, Aryal S, Talari D, Wang H, O'Neill L. A pilot mobile integrated healthcare program for frequent utilizers of emergency department services. *Am J Emerg Med* 2017;**35**:1702–5.
13. Pascual FT, Hoang K, Hollen C, Swearingen R, Hakimi AS, King JA, *et al.* Outpatient education reduces emergency room use by patients with epilepsy. *Epilepsy Behav* 2015;**42**:3–6.
14. Pillow MT, Doctor S, Brown S, Carter K, Mulliken R. An Emergency department-initiated, web-based, multidisciplinary approach to decreasing emergency department visits by the top frequent visitors using patient care plans. *J Emerg Med* 2013;**44**:853–60.
15. Yu J, Zhang HW, Shao YK, Lei Y, Chen H, Pu ZH, *et al.* A smartphone-based online tool for prehospital self-triage of COVID-19. *Chin J Acad Radiol* 2020;**3**:175–80.

Wrong intervention/not a primary research evaluation

1. Anonymous. Distribution of health handbook leads to reduction in ER visits. *Healthc Demand Dis Manag* 1999;**5**:31–2.
2. Anonymous. CMs educate members on appropriate ED use: program targets frequent flyers. *Case Manag Advis* 2007;**18**:125–6.
3. Anonymous. Program helps beneficiaries avoid unnecessary ED visits: care coordination steers members toward primary care. *Case Manag Advis* 2008;**19**:65–7.
4. Anonymous. Reducing ‘frequent fliers’ in the emergency room: Medicaid members connect with primary care. *Case Manag Advis* 2008;**19**:51–2.
5. Anonymous. Patient education program slashes ED readmissions. *ED Manag* 2009;**21**:42–3.
6. Anonymous. In review of ED utilization reduction strategies, data regarding impact on safety, outcomes in short supply. *ED Manag* 2014;**26**:8–10.
7. Botelho A, Dias IC, Fernandes T, Pinto LMC, Teixeira J, Valente M, *et al.* Overestimation of health urgency as a cause for emergency services inappropriate use: insights from an exploratory economics experiment in Portugal. *Health Soc Care Community* 2019;**27**:1031–41.
8. Chastonay OJ, Lemoine M, Grazioli VS, Canepa Allen M, Kasztura M, Moullin JC, *et al.* Health care providers’ perception of the frequent emergency department user issue and of targeted case management interventions: a cross-sectional national survey in Switzerland. *BMC Emerg Med* 2021;**21**:1–10.
9. DeVries A, Li C-H, Oza M. Strategies to reduce non-urgent emergency department use: experience of a Northern Virginia Employer Group. *Medical Care* 2013;**51**:224–30.
10. Eminovic N, Wyatt JC, Tarpey AM, Murray G, Ingrams GJ. First evaluation of the NHS Direct Online clinical enquiry service: a nurse-led web chat triage service for the public. *J Med Internet Res* 2004;**6**(2).
11. Grossman LK, Rich LN, Johnson C. Decreasing non-urgent emergency department utilization by Medicaid children. *Paediatrics* 1998;**102**(1 Pt 1):20–4.
12. Gustafsson S, Martinsson J, Wälivaara BM, Vikman I, Sävenstedt S. Influence of self-care advice on patient satisfaction and healthcare utilization. *J Adv Nurs* 2016;**72**:1789–99.
13. Gustafsson S, Savenstedt S, Martinsson J, Walivaara B-M. Need for reassurance in self-care of minor illnesses. *J Clin Nurs* 2018;**27**:1183–91.
14. Houghton J. Minor illness management: empowering parents through shared knowledge. *Paediatr Nurs* 2005;**17**:24–5.
15. Kantonen J, Lloyd R, Mattila J, Kauppila T, Menezes R. Impact of an ABCDE team triage process combined with public guidance on the division of work in an emergency department. *Scand J Prim Health Care* 2015;**33**:74–81.
16. Nguyen CA, Shih JA, Lin KV, Aladesanmi OA. Targeting national emergency department overuse: a case for primary care, financial incentives, and community awareness. *Harvard Health Policy Rev* 2014;**14**:23–6.
17. Peetoom KKB, Smits JJM, Ploum LJL, Verbakel JY, Dinant G-J, Cals JWL. Does well-child care education improve consultations and medication management for childhood fever and common infections? A systematic review. *Arch Dis Child* 2017;**102**:261–7.
18. Trevett AJ, Martin JR, Ross WA, Macfarlane E. The introduction of a daily telephone advice service: how is it used and is it worth the effort? *Scott Med J* 1998;**43**:57–8.
19. Williams K, White L, Plorde M, Eisenberg M. Empowering the patient: after-care instructions reduce calls and improve quality of life. *J Emerg Med Serv* 2008;**33**:42–9.

Wrong outcome

1. Baker MD, Monroe KW, King WD, Sorrentino A, Glaeser PW. Effectiveness of fever education in a paediatric emergency department. *Paediatr Emerg Care* 2009;**25**:565–8.

2. Lass M, Tatari CR, Camilla Hoffmann M, Huibers L, Maindal HT. Contact to the out-of-hours service among Danish parents of small children – a qualitative interview study. *Scand J Prim Health Care* 2018;**36**(2).
3. Olsen JR, Gallacher J, Piguet V, Francis NA. Development and validation of the Molluscum Contagiosum Diagnostic Tool for parents: diagnostic accuracy study in primary care. *Br J Gen Pract* 2014;**64**:e471–6.
4. South J, Darby F, Bagnall A-M, White A. Implementing a community-based self-care training initiative: a process evaluation. *Health Soc Care Community* 2010;**18**:662–70.

Appendix 4 Characteristics of included studies (studies in alphabetical order)

Study	Country	Study design	Brief intervention description (n^a)	Control (n)	Population	Parent or all	Delivery setting	Headline finding
Adesara 2011[110]	USA	CBA study	Educational posters in family medical centre; family medical centre letter sent to non-admitted non-emergency ED attendees after ED discharge in clinic hours only (1114 patient records reviewed; 316 non-emergency, and 281 sent a letter)	NR	People aged 18–70 years who had used ED service for a non-emergency problem (general)	All	ED	Brief office-based intervention resulted in a reduction in the number of ED visits of 40 per month
Anhang Price 2013[123]	USA	Prospective cohort study (pilot)	SORT for Kids: triage website for adults and carers to determine if PED is appropriate (294)	N/A	Individuals seeking care for a child aged < 18 years with influenza-like illness attending a PED with a temperature, cough or sore throat	Parent	Community/ workplace/ other	This pilot study suggests that web-based decision support to help parents and adult caregivers self-triage children with influenza-like illness is feasible. However, prospective refinement of the clinical algorithm is needed to improve its specificity without compromising patient safety because it classified a lot of children as high risk
Barr 2015[115]	Canada	BA study	Period of PURPLE Crying prevention programme (NR)	Pre intervention (20,394)	Parents of newborns (0–5 months of age) in metropolitan area	Parent	Community/ workplace/ other	The findings imply that improved parental knowledge of normal crying, secondary to a public health programme, may reduce medical ED use for crying complaints in the early months of life

Study	Country	Study design	Brief intervention description (n^a)	Control (n)	Population	Parent or all	Delivery setting	Headline finding
Beal 2020[116]	USA	CBA study	I Care Guide and companion website (www.icare2check.org) (151)	Usual care (151)	Adolescents (aged ≥ 16 years) expecting to leave child protective services custody for at least 12 months. Mainly African American	All	Community/ workplace/ other	As expected, ICare2Check was associated with increased engagement in health care generally and non-urgent ambulatory care specifically, but no change in emergency care use
Bertakis 1991[134]	USA	RCT	FPC patient advisor booklet with an educational intervention (108)	FPC patient advisor booklet without educational intervention (106)	New patients attending the FPC	All	ED	The educational intervention did not change the total number of patient visits or telephone calls, but did affect the appropriateness of patient use of health-care services
Chande 1996[85]	USA	RCT	Specialised educational materials, including 10-minute videotape on paediatric health care issues to be watched in the PED and an informational booklet to take away on common paediatric ailments (69 families)	No intervention: standard discharge instructions (61 families)	People who have used a PED for a minor problem (general); parents; family carers. Mainly African American	All	ED	A one-time educational intervention in the PED does not alter long-term ED use habits for minor illness
Chande 1999[130]	USA	RCT	Health promotion intervention (102)	No intervention (93)	Children < 13 months of age, enrolled in a Medicaid managed care plan, who used the PCP for primary care and presented to the PED with minor illness	All	ED	There was no difference in health-care use between the intervention and control groups at the 12-month follow-up. The health promotion intervention did not alter use habits
Chiu 2012[139]	Taiwan	Survey	CGPSC programme implemented through easy-access self-care medical spots	N/A	Population of remote mountainous area in Tai-Tung County located in Eastern Taiwan	All	Community/ workplace/ other	The CGPSC programme was a viable option to help residents in remote areas to manage minor illnesses

Study	Country	Study design	Brief intervention description (*n*[a])	Control (*n*)	Population	Parent or all	Delivery setting	Headline finding
Cowie 2018[104]	UK (Scotland)	MM study	eConsult web-based triage: provides individuals with self-care assessment and advice for the most common conditions seen in general practice, and also a consultation system	N/A	Primary care patients from general practices (a mix of urban/rural areas)	All	ED	Expectations that eConsult would offer an additional and alternative method of accessing GP services were largely met, but less certain that it has fulfilled expectations of promoting self-help
Davis 2018[86]	USA	BA study	Family medicine clinic opening hours increased and standardised and patient education provided (unclear)	Pre intervention (NR)	Individuals seeking care for others (parents), individuals seeking care for others aged 0–18 years, Medicaid users	Parent	Primary care	Increasing access to primary care clinic and improving patient education decreased low-acuity PED visits
de Bont 2018[102]	Netherlands	Cluster RCT	Illness-focused interactive booklet (10 GP OOH co-operatives and 11,945 consultations)	Usual care (10 GP OOH co-operatives and 13,410 consultations)	Children aged 3 months to 12 years with fever from 20 large, rural and urban GP OOH centres	Parent	Primary care	Mainly focused on antibiotic prescribing as primary outcome. Benefit of intervention was largely restricted to the cases in which family physicians actually used the booklet. Secondary outcome showed reduced intention to consult for similar illnesses
DeSalvo 2000[137]	USA	Non-RCT	Individualised patient education (first phase: 288; second phase: NR)	Usual care (NR)	Primary care clinic patients who had visited the ED, serving financially disadvantaged patients	All	ED	The attempt to change patients' behaviour and move patients from emergency rooms to primary care settings had minimal success

Study	Country	Study design	Brief intervention description (n^a)	Control (n)	Population	Parent or all	Delivery setting	Headline finding
DeCamp 2020[111]	USA	RCT	Salud al Día (Health Up-to-Date) interactive text message service, including appointment reminders, support for obtaining medicines, support for completing referrals, illness care monitoring and education (79)	Usual care (78)	Individuals seeking care for others (parents): singleton infant < 2 months of age, self-identification as Latino or Latina, preferred health-care language of Spanish, and one household mobile phone in urban primary care centre; 87% had limited or marginal health literacy	Parent	Primary care	This Spanish-language text messaging intervention reduced ED use and increased influenza vaccine receipt among a population at high risk of health-care disparities. Tailored text message interventions are a promising method for addressing disparities
Elsenhans 1995[138]	USA	Non-RCT	Self-care manual mailed to 2144 people aged 22–40 years; all people presenting with targeted complaints given a booklet (NR)	No intervention (NR)	Those aged 22–40 years with heaviest use of internal medicine unit with selected visit type, (e.g. upper respiratory infections, aches and pains), and everyone who attended with targeted complaints	All	ED	Identifying high users of discretionary visit types and targeting them for self-care interventions is associated with a measurable shift in the pattern of visit use
Enard 2013[87]	USA	CBA study	Patient navigation programme (1905)	No intervention (11,737)	Primary care-related patients attending ED. Culturally and linguistically diverse Medicaid and uninsured patients aged 18 months to 65 years, mainly black and Hispanic, who frequently use the ED for primary care	All	ED	Intervention was associated with decreased odds of returning to the ED among less frequent primary care-related ED users within 12 months and all users within 24 months. The savings associated with reduced primary care-related ED visits were greater than the cost to implement the programme

Study	Country	Study design	Brief intervention description (n[a])	Control (n)	Population	Parent or all	Delivery setting	Headline finding
Fieldston 2013[88]	USA	BA pilot study	Health education and training intervention by PED nurses to 32 caregivers in primary care	Pre intervention (NR)	Caregivers (mothers, fathers and grandmothers) of children (aged 7 months to 5 years) from four urban primary care centres, largely ethnic minority communities	Parent	Primary care	Intervention led to increased caregiver knowledge regarding management of common minor childhood illnesses, increased after-hours telephone use, but no significant decrease in ED use
Francis 2009[99]	UK	Cluster RCT	Interactive booklet on childhood respiratory tract infections in 30 practices with patients (274 patients)	Usual care (31 practices, 284 patients)	Children (aged 6 months to 14 years) consulting with a respiratory tract infection (cough, cold, sore throat, earache for ≤ 7 days) and their parents	Parent	Primary care	No change in primary outcome of reconsultation for same illness episode in 2 weeks. Intervention led to important reductions in antibiotic prescribing and reduced intention to consult (self-reported) without reducing satisfaction with care
Hansen 1990[105]	Denmark	RCT	Health booklet on minor illnesses: stuffy or runny nose, sore throat, cough, vomiting, diarrhoea, fever and minor trauma (50 families)	No intervention (48 families)	Individuals seeking care for others (parents of children aged 0–8 years), individuals seeking care for others (family carers)	Parent	Primary care	Families that received the booklet reported significantly more self-treatments, demanded significantly fewer consultations and had significantly fewer consultations in which worry was the main reason
Heaney 2001[96]	UK	RCT	*What Should I Do?* booklet: 40 common health problems and information on when to self-care or consult a doctor (1702 participants at end of study). Health-care manual: 50 common health problems and information about keeping healthy (1688)	No intervention (1563)	General population (no history of service use for minor problems) and OOH users in previous 12 months	All	ED	Widespread distribution of information booklets about the management of minor illness is unlikely to reduce demand for health services

Study	Country	Study design	Brief intervention description (*n*[a])	Control (*n*)	Population	Parent or all	Delivery setting	Headline finding
Herman 2004[82]	USA	CBA study (pilot)	Training class plus book *What to Do When Your Child Gets Sick*, which offers easy-to-understand information on > 50 common childhood medical problems. Aim was to evaluate the training aspect (236)	Received book only (170)	Head Start parents (low-income parents of children aged 0–5 years), many of whom lack basic health literacy skills	Parent	Community/ workplace/ other	During the 6-month follow-up, parents who received the book reported a 48% reduction in ED visits and a 37.5% reduction in clinic visits
Herman 2009[83]	USA	BA study	Health literacy intervention (self-help book on child health problems) (61)	Pre-intervention period (113)	Parents bringing children to ED for non-urgent complaints. Mainly Latina mothers on Medicaid or Medicare	Parent	ED	Health literacy interventions may reduce non-urgent ED visits and help mitigate ED overcrowding and rising costs of care
Herman 2010[81]	USA	BA study	Health literacy intervention: training class plus book *What to Do When Your Child Gets Sick*, plus subsequent reinforcement, based on booklet (9240 at baseline; 7281 at 6-month follow-up)	N/A	Head Start parents (low-income parents of children aged 0–5 years), a vulnerable population, ethnically diverse	Parent	Community/ workplace/ other	The average number of ED and doctor visits among parents decreased by 58% and 41%, respectively ($p < 0.001$). Workdays missed by the primary caretaker per year decreased by 42%, and school days missed per year decreased by 29% ($p < 0.001$)
Hibbard 2001[79]	USA	Non-RCT	Community-wide self-care information project (Healthwise Communities Project) (959, with 718 at the 36-month follow-up)	Two comparison communities. Unclear but probably no action taken at all (1954, with 1617 at the 36-month follow-up)	A regional community of 250,000 people in 112,000 households	All	Community/ workplace/ other	The intervention increased the use of self-care resources. Users believe that these products help them make better decisions regarding when to seek care and how to self-treat problems. The utilisation data findings provide some evidence to support this conclusion

Study	Country	Study design	Brief intervention description (*n*[a])	Control (*n*)	Population	Parent or all	Delivery setting	Headline finding
Holden 2020[89]	UK	RCT (not published yet, ISRCTN record used)	Targeted education (1963 families)	Usual care (1969 families)	Parents and carers of children (aged < 5 years) who attend PED or urgent care centre with a non-urgent health problem	Parent	ED	There was no difference in service use between treatment and control arms
Hou 2012[122]	Australia	BA study	Triple Zero community awareness campaign for appropriate ambulance usage (17,793 ED attenders post intervention; 17,920 pre intervention)	N/A	Patients attending the ED for 3 months pre/post campaign	All	Community/ workplace/ other	The campaign had no significant impact on the arrival mode of the patients, but the illness acuity of the patients decreased, whereas the illness severity of the patients increased
Huyer 2018[112]	Canada	Qualitative	PED physician-delivered education using two-page pamphlet entitled 'Choosing Wisely' (42)	N/A	Individuals seeking care for others (other care relationship)	All	ED	Barriers to and enablers of pamphlet use were identified. Sustaining doctor participation was a challenge owing to many factors, including unclear communication by the organisation and the fact that the intervention was aimed at all attenders, including high acuity
Ladley 2018[90]	USA	RCT	Enhanced standard of care + text messages (108)	Enhanced standard of care (99)	Caregivers of newborns (0–10 weeks of age) receiving primary care at a single urban high-volume academic primary care clinic who were offered the intervention for the first 6 months of a child's life. Largely ethnic minority communities, 70% with low health literacy	Parent	Primary care	Educational text messages reduced ED use

Study	Country	Study design	Brief intervention description (*n*[a])	Control (*n*)	Population	Parent or all	Delivery setting	Headline finding
Lepley 2020[136]	USA	RCT (pilot)	Acute illness educational intervention: • Low-health-literacy paediatric health book + video training (24) • Paediatric mHealth app (25) • Both book and app (24)	Instructional handout on car seat safety (25)	English-speaking parents or guardians of children (aged < 12 years) presenting to PED with non-urgent complaints. Half had low household incomes	Parent	ED	Giving understandable, written health information with short introductory videos to vulnerable populations in a PED has the capacity to empower parents with knowledge to care for a sick or injured child
Little 2001[106]	UK	RCT	• Self-management booklet for 42 conditions and when to contact the doctor (1334) • Two-page summary card/leaflet on self-management of respiratory illnesses and other common illness (1334)	One-page leaflet with surgery times and how to contact the doctor in an emergency	Random sample of patients from practice registers recruited by post	All	ED	Fewer patients attended with minor illnesses in the booklet and leaflet groups. Data suggest that posting detailed information booklets about minor illness to the general population would have a limited effect
Little 2016[84]	UK	RCT	Internet-delivered intervention providing advice to manage respiratory tract infections (852 reported at least one illness)	No access to intervention (920 reported at least one illness)	Adults (aged ≥ 18 years) registered with GPs (43,769 people invited; 3044 consented)	All	ED	There was reduced contact with GPs and a slight increase in contact with NHS Direct for symptoms that did not warrant immediate medical attention, without increasing hospitalisations
Macfarlane 1997[101]	UK	RCT	Information leaflet on lower respiratory tract infection handed out by GP at consultation (501)	No leaflet (505)	Consecutive, previously well adults (aged > 16 years) who consulted with a lower respiratory tract infection	All	ED	Informing previously well patients about the natural history of lower respiratory tract infection symptoms is an effective strategy for reducing reconsultations

Study	Country	Study design	Brief intervention description (*n*[a])	Control (*n*)	Population	Parent or all	Delivery setting	Headline finding
Macfarlane 2002[100]	UK	RCT	GP verbal advice on the need for antibiotics and information leaflet (106)	GP verbal advice on need for antibiotics, but no leaflet (153)	Previously well adults presenting with acute bronchitis	All	ED	Rates of antibiotic use were lower in the leaflet group, but reconsultation rates were the same in both groups, and no patients required referral to hospital for respiratory illness during follow-up
McWilliams 2008[135]	USA	CBA study	Anticipatory guidance at well-child visit (nurse teaching and prescription access) (191)	Usual care (133)	Children who attended a 15-month well-child visit	All	Primary care	Nurse-administered anticipatory guidance reduced ED visits for ear pain in toddlers and was well appreciated by parents
Mullett 2002[117]	Canada	Prospective cohort study	Partnerships for Better Health (self-care intervention) (153)	N/A	Delivered to 27,000 people in a region	All	Community/ workplace/ other	We were provided with concrete examples of how the resources provided the information the public needed to gain the confidence to be fully informed partners in looking after their health
Murray 2011[124]	UK	Two surveys of NHS Choices users	NHS Choices website (1559 completed an online survey); 125 GP waiting-room survey participants. Framed as a primary care service, but not offered in general practice, so included here	N/A	User of online NHS Choices (aged > 18 years) and general practice participants recruited from the waiting room	All	Community/ workplace/ other	NHS Choices has been shown to alter health-care-seeking behaviour, attitudes and knowledge among its users, and results in reduced demand for primary care consultations among young, healthy users for whom reduced health service use is likely to be appropriate

Study	Country	Study design	Brief intervention description (n^a)	Control (n)	Population	Parent or all	Delivery setting	Headline finding
Nijland 2008[114]	Netherlands	Qualitative research: scenarios and interviews	Web-based primary care apps for supporting self-care (28)	N/A	14 health staff (included GPs, physicians specialising in communicable diseases, and a psychologist); 14 patients	All	ED	Patients' and caregivers' expectations did not correspond with their experiences of the use of the internet-based apps. User-friendliness and quality of care were important aspects of the intervention
Nijland 2009[113] (in this group because the software is described in Nijland 2008[114] as for use in primary care)	Netherlands	Retrospective cohort study of routine data and survey	Web-based triage (6538 in cohort, 192 in online survey)	N/A	Public	All	ED	Web-based triage can promote self-management for minor ailments, especially for patients who have a positive attitude towards computer-generated advice
Ohns 2019[118]	USA	Qualitative study	Paper summary of five interventions to reduce non-urgent ED use: a commonly used diagnosis-specific handout, a booklet of the most common childhood illnesses and symptoms, a comprehensive book of common childhood illnesses and symptoms, a 24-hour nurse call line, and a mobile app, KidsDoc, developed by the American Academy of Pediatrics (30)	N/A	Parents of children aged < 10 years, low income	Parent	Community/ workplace/ other	KidsDoc was the preferred method. Materials should be redesigned using best practices to reduce health literacy demands and match consumer preferences. This focus group provides valuable information and a step towards future research to address health literacy using materials identified by low-income consumers

Study	Country	Study design	Brief intervention description (*n*[a])	Control (*n*)	Population	Parent or all	Delivery setting	Headline finding
O'Neill-Murphy 2001[103]	USA	RCT (pilot)	Interactive fever education (pamphlet + discussion and training) (44)	Standard fever education (pamphlet alone) (43)	Parents/primary caretakers with children aged 3 months to 5 years who presented to the ED with a chief complaint of fever. Mainly African American and lower socioeconomic group	Parent	ED	The control group had as much reduction of their level of anxiety after receiving written information, in the form of a pamphlet, as the interactive intervention group
Patel 2018[91]	USA	RCT (three arms)	Education and information about alternative venues of care: emergency physician telephone call to discuss services; mailed information on services (609); mailed information only (771)	Matched controls (1827 and 1542)	Aged > 18 years, low acuity. Low-risk adults with a recent treat-and-release ED visit. Younger and older patients (aged < 65 and ≥ 65 years) analysed separately	All	ED	Patients aged ≥ 65 years (telephone follow-up by an emergency physician) had a 22% reduction in ED use; patients aged < 65 years (mailed educational information) had a 27% reduction in ED use
Plass 2005[75]	Netherlands	CBA study	Self-care booklet for minor illness handed out by GP (162), and 132 who were in a group that was not interviewed	No intervention (85)	Patients (Turkish, Dutch and other nationalities) who frequently visit their GP (five times a year), living in deprived areas of The Hague	All	ED	The results indicate that distribution by the GP of booklets with tailored information when a patient is ill leads to a reduction in consultations for minor illnesses
Plass 2006[76]	Netherlands	BA study structured interview	Self-care booklet for minor illness (117 at 1 year)	N/A	Patients (Turkish and Dutch) who frequently visit their GP (five times a year), living in deprived areas of The Hague	All	ED	Despite the reduction in consultations up to 2 years post intervention, there was no change in self-reported self-care behaviours
Platts 2005[107]	UK	RCT	Self-care health book (660); NHS Direct (659) of those completing the questionnaire at 12 months	No intervention (648)	Primary care adult patients in South East England, an affluent area	All	ED	Handing out of self-care health books provided qualitative benefits for patients, but did not reduce attendance at the general practice

Study	Country	Study design	Brief intervention description (*n*[a])	Control (*n*)	Population	Parent or all	Delivery setting	Headline finding
Powell 1995[127]	USA	Prospective cohort study	Reports two studies: 1. Demand management programme of booklet and workshop (1000) 2. Booklet given to employees participating in health screening (1236)	N/A	Employees	All	Community/workplace/other	By managing their employees' demands with comprehensive self-care materials, employers can have a significant impact on health-care use and, potentially, health-care costs
Powell 1997[128]	USA	BA study	Self-care workshop and booklet (328)	N/A	Employees at Berk-Tek, Inc. (New Holland, PA, USA), a manufacturer of copper and fibre optic data communication wire and cable	All	Community/workplace/other	Reduction in demand for health-care services can be accomplished by teaching employees to make better decisions about when they should see their health-care provider or go to the ED vs. when they should self-care
Racine 2009[92]	USA	RCT	Follow-up telephone call by the primary care practice within 72 hours of the initial PED visit to counsel about the availability of after-hours advice and when to access the PED (2166)	Usual discharge instructions (2080)	Families of paediatric patients (aged 0–21 years) from four participating primary care practices with an index PED visit (April–December 2005). Large proportions of African American and Hispanic populations	Parent	Primary care	Follow-up telephone calls from primary care practices after PED visits counselling patients on the use of services can modulate subsequent care-seeking behaviour and decrease future PED use
Rector 1999[125]	USA	RCT	Mailing booklet about non-urgent care to Medicaid beneficiaries (3579)	No booklet (3344)	Urban Medicaid populations with a history of ED use (mostly families with children, so a mix of adults and children)	All	Community/workplace/other	Intervention did not have a significant effect on use of EDs

Study	Country	Study design	Brief intervention description (*n*[a])	Control (*n*)	Population	Parent or all	Delivery setting	Headline finding
Robbins 2003[108]	UK	RCT	Home visit and booklet (54)	No intervention (49)	Parents of 6-week-old babies	Parent	Primary care	The trial showed a reduction in the use of a child health clinic, but no effect on use of other services. It demonstrated reduction in parents' intentions to consult a doctor
Rutten 1991[78]	Netherlands	RCT (practices randomised)	Rational practice policy/patient education about cough (224)	No intervention (324)	Patients aged 1–60 years consulting with an 'everyday' cough at least twice in the pre-intervention period (and having at least one cough consultation in the post-intervention period also)	All	ED	A rational practice policy and the provision of patient education stimulated patients to modify their consulting behaviour by reducing their subsequent consultations for cough. This could result in a reduction in the costs of health care
Rutten 1993[77]	Netherlands	RCT (practices randomised)	Systematic patient education about cough (224)	No intervention (324)	Patients consulting with an 'everyday' cough at least twice in the pre-intervention period (and having at least one cough consultation in the post-intervention period also)	All	ED	The consulting pattern was changed in the desired direction (reducing consultations for everyday cough and increasing them for coughs with alarming symptoms) by means of a relatively simple modification of the usual policy
Shnowske 2018[93]	USA	Retrospective cohort study	Care guide use for repeated non-emergent complaints (287)	N/A	Patients aged > 18 years who repeatedly present to the ED for non-emergency complaints	All	ED	Although there was a statistically significant decrease in ED visits after care guide initiation, this may be due, in part, to the diminished prescription of opioids in the ED

Study	Country	Study design	Brief intervention description (*n*[a])	Control (*n*)	Population	Parent or all	Delivery setting	Headline finding
Spoelman 2016[129]	Netherlands	CBA study	Nationwide evidence-based health website (912,000 patients who visited their GP)	Reference group of topics not viewed on the website	General population, although framed as a community primary care population	All	Community/ workplace/ other	This study showed that, 2 years after the launch of an evidence-based health website, nationwide primary care usage decreased by 12%. This effect was most prominent for telephone consultations
Steelman 1999[119]	USA	Non-RCT	Fever education: slide presentation on well-infant care topics + additional presentation on fever and mailed reminders (50, but only 17 completed the study)	Slide presentation on well-infant care topics (43, but only 14 completed the study)	Military paediatric well-infant clinic population	Parent	Community/ workplace/ other	Intervention improved parental knowledge, but did not translate into anticipated improvement in clinic and emergency room use patterns
Steinweg 1998[120]	USA	Survey	Self-care intervention programme coupled with a health promotion pharmacy (276 eligible; 191 responded)	N/A	Military setting	All	Community/ workplace/ other	Increased knowledge of personal health issues; confidence to treat minor illnesses; 72% of respondents reported avoiding at least one clinic visit; 39.8% reported avoiding at least one ED visit
Stockwell 2014[126]	USA	RCT	URI-related educational intervention + standard curriculum (76 families; 99 children)	Standard curriculum (78 families; 98 children)	Predominantly Latino Early Head Start families with children aged < 4 years	Parent	Community/ workplace/ other	An URI health literacy-related educational intervention embedded into Early Head Start decreased PED visits and adverse care practices
Sturm 2014[94]	USA	RCT	PCP-specific teaching + standard discharge instructions (164)	Standard discharge instructions (168)	Children (aged 3 months to 16 years) seen in the PED for non-urgent concerns. Mainly African American	All	ED	A simple low-cost intervention was able to decrease non-urgent PED use and redirect these patients to their PCP for future sick visits over a 12-month period

Study	Country	Study design	Brief intervention description (*n*[a])	Control (*n*)	Population	Parent or all	Delivery setting	Headline finding
Sustersic 2013[131]	France	Cluster RCT (doctor)	Four patient information leaflets (181 patients, 15 physicians)	No leaflet (207 patients, 15 physicians)	All consecutive adults and children (aged < 18 years and accompanied by an adult) diagnosed with acute gastroenteritis or tonsillitis	All	ED	Patient information leaflets given by the physician during the consultation significantly modified the patient's behaviour and knowledge of the disease, compared with patients not receiving the leaflets. There were fewer visits for the same symptoms for people in the same household
Thomson 1999[132]	UK	RCT	Baby Check + Play It Safe (accident prevention leaflet) (497)	Play It Safe (accident prevention leaflet) only (500)	Mothers of newborns: mothers of babies born in the participating practices over 14 months. English-speaking mothers only	Parent	Primary care	Distributing illness assessment guidelines to an unselected group of mothers may be well received, but tangible benefits to the parents, babies or health-care providers are difficult to detect. No difference in primary care use
Thornton 1991[133]	UK	Prospective cohort study × 2	Baby Check scorecard (70); Baby Check scorecard + nurse validation visit (104)	None	Mothers of term babies	Parent	Primary care	Mothers found it useful. There was no comparison of service use, so no relevant conclusions could be drawn
Usherwood 1991[97]	UK	RCT	Booklet and covering letter (210 households)	No intervention (209 households)	Parents registered with primary care with children aged 2–12 years	Parent	Primary care	The overall effect of the booklet was a statistically non-significant reduction in consultations for the symptoms that it addressed ('booklet symptoms')

Study	Country	Study design	Brief intervention description (n^a)	Control (n)	Population	Parent or all	Delivery setting	Headline finding
van der Gugten 2015[98]	Netherlands	RCT	WHISTLER-online intervention: internet programme to inform on respiratory symptoms and support decisions about contacting primary care physicians (323)	Usual care (i.e. no specific programme to support decision-making) (322)	Parents of children who participated in the ongoing WHISTLER prospective cohort study of determinants of respiratory illnesses. Recruited at age 2–3 weeks from primary health-care centres and followed for 1 year. Needed to have access to a computer	Parent	Primary care	Although parents greatly appreciated the provided facilities, a personalised e-support programme on respiratory illnesses in infants did not substantially reduce health-care use for respiratory symptoms
Verzantvoort 2018[140]	Netherlands	Prospective cohort study	Self-triage for acute primary care via a smartphone application (group 1: survey – 4456; group 2: telephone group to check if the right triage occurred – 126)	N/A	Primary care users	All	ED	The app 'Should I see a doctor?' could be a valuable tool to guide patients in contacting the OOH primary care clinic for acute care
Wagner 2001[80]	USA	CBA study	Community-wide self-care information project (Healthwise Communities Project): handbook, website, advice line, media campaign (5909 questionnaires returned for all groups)	No intervention likely (5909 questionnaires returned for all groups)	A regional community	All	Community/workplace/other	The Healthwise Communities Project had a small (non-statistically significant) effect on overall self-reported use
White 2012[121]	UK	CBA study	Self-care skills training course (868 undertaking the intervention and 544 completing data collection)	No intervention (700 joining the control group and 414 completing data collection)	People voluntarily attending self-care skills training courses, which were held in parent and child groups and in workplaces in intervention areas	All	Community/workplace/other	The training programme had a small but positive effect, which was still evident at 12 months, on individuals' knowledge and confidence levels with regard to managing their own health, but did not lead to reductions in health service use

Study	Country	Study design	Brief intervention description (n^a)	Control (n)	Population	Parent or all	Delivery setting	Headline finding
Wood 2017[109]	USA	CBA study	Brief video discharge instructions added to standard written/verbal discharge instructions (41)	Standard discharge instructions (42)	PED attendees: caregivers of children (aged up to 21 years) presenting with one of three common paediatric diagnoses: gastroenteritis, bronchiolitis or fever	Parent	ED	Analysis found that the video group achieved significantly higher knowledge scores on the post-test survey ($p < 0.001$) than the control group, particularly regarding treatment and when to seek further medical care
Yardley 2010[53]	UK	Exploratory RCT	Tailored theory-based, web-based intervention providing tailored advice for self-management of minor respiratory symptoms (368)	Static web page with advice on reducing consultations and undertaking self-care, used in Little 2001[106] (346)	Online volunteers with unknown characteristics, but advertised to university students	All	ED	Our findings provide initial evidence that tailored web-based advice could help patients self-manage minor symptoms to a greater extent
Yoffe 2011[95]	USA	CBA study in realistic evaluation	Parent-focused educational intervention booklet given in a primary care setting (NR, but 6000 booklets distributed)	Pre intervention and clinics in other areas (NR)	Children aged ≤ 10 years from clinic serving low-income population	Parent	Primary care	There was a substantial and statistically significant reduction in ED use for non-urgent care of children in the intervention group, and a proportional reduction in ED charges for this group

BA, before and after; CBA, controlled before and after; CGPSC, community-run and general practitioner-supervised self-care for minor illnesses; FPC, family practice clinic; mHealth, mobile health; MM, mixed methods; N/A, not applicable; NR, not reported; OOH, out of hours; PED, paediatric emergency department; PCP, primary care provider; PURPLE, Peak of crying, Unexpected, Resists soothing, Pain-like face, Long lasting, Evening; URI, upper respiratory infection; WHISTLER, WHeezing Illnesses STudy LEidsche Rijn.

[a] Varies between numbers included in a study and numbers completing a questionnaire.

Appendix 5 Description of interventions (studies in alphabetical order)

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
Adesara 2011[110]	Educational posters in FMC; FMC letter sent to non-admitted ED attendees after ED discharge	To teach/encourage patients to be seen in primary care rather than ED	- Researcher - FMC	Individual and general: written letters sent to individuals who had ED record of non-urgent visit; poster in the waiting area, examination rooms and triage room of the FMC	No	No details	- Service awareness and knowledge - Persuasion	A.I, specific
Anhang Price 2013[123]	SORT for Kids: triage website for adults and carers of children with influenza-like illness	To determine if PED is appropriate	- CDC - Home but tested in a PED in this pilot study	Individual; website; written: based on the child's age and usual health status, the algorithm assigns a child with influenza-like illness to one of three risk groups: (1) high-risk cases who should receive immediate care in an ED; (2) intermediate-risk cases who warrant expedited evaluation by the child's paediatrician or another PCP; and (3) low-risk children who should be able to safely recover at home, provided their condition does not worsen. Website based on guidance from the CDC/AAP clinical algorithm produced during the 2009 novel influenza A (H1N1) pandemic to help health-care professionals and call centre personnel efficiently triage children	By question response	Evidence-based: algorithm based on clinical guidance developed by the CDC to help parents and adult caregivers determine if a child with influenza-like illness requires ED care. Converted into plain English to help health literacy	- Service awareness and knowledge - Tailored	C.I general
Barr 2015[115]	Period of PURPLE Crying prevention programme	To support caregivers in their understanding of early infant crying and to prevent shaken baby syndrome	- Province wide - Dose 1: maternity ward nurse during admission at maternity hospital. Dose 2: home by public health nurses. Dose 3: public education campaign	- Individual: F2F; written and audiovisual materials - 10-minute DVD and 10-page booklet - The materials are reviewed, and parents take the materials home with them to use when needed and to share with other caregivers	Interaction with nurses	No details	- Education - Persuasion (danger of doing something)	A.II and B.II and D general

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
Beal 2020[116]	I Care Guide and companion website, (www.icare2check.org) (*n* = 151)	To assist foster youth in navigating the health-care system and maintaining connections to primary care	- Live Well Collaborative - Home	- Unclear; website and written - Access to website and pocket-sized guide given to relevant young adults; the guide included space to record personal health information, such as medications, immunisation records and family medical history, as well as providing information on accessing health care (including primary care doctors, dentists, and eye doctors), sexual and reproductive health, and managing medical emergencies. The guide included a chart listing various symptoms and guidance on appropriate level of health care (e.g. when to seek emergency care). Information regarding prevention of pregnancy and sexually transmitted infections and emergency hotlines were included. Website: additional information not present in the I Care Guide included interactive features such as maps showing health-care facility locations, a tool to assist youth in deciding what type of medical treatment (e.g. self-treatment, primary care or emergency services) they need	None	Target population based: designed by experts from the Live Well Collaborative engaged with foster youth and stakeholders; the format, organisation and styling of information was informed by youth focus groups	- Service awareness and knowledge, mainly - Education	A.I and A.II and C.I general

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
Bertakis 1991[134]	FPC patient advisor booklet with an educational intervention	To support patients to use services more appropriately	Researcher delivered it to new patients at their first appointment at a FPC	• Individual: F2F, written materials • 25-minute educational discussion on using 70-page FPC patient medical advisor booklet describing the FPC; specific information regarding appropriate use of the clinic facilities; and 44 common symptoms in adults and children with recommendations on self-treatment, 'when to see a doctor' and a list of OTC medications and their uses. Encouraged to ask questions. Flesch score: grade 8–9 reading level	During the session, patients were encouraged to ask questions about the book and its use	No details	• Service awareness and knowledge • Education • Tailored	A.II and B.II general
Chande 1996[85]	Specialised educational materials: video and booklet	To reduce the number of PED visits by educating parents about use of their PCP and providing information about common paediatric illnesses	• Researcher • PED	• Individual, F2F, video, written • 10-minute videotape on paediatric health-care issues and an information booklet on common paediatric ailments (written at sixth-grade reading level). The following topics were covered in both the booklet and the videotape: the role of a PCP, how to take a temperature, how to comfort a crying baby, treatment of asthma, treatment of chickenpox, child safety and management of minor illnesses such as a cold or diarrhoea. These educational materials were reviewed with the family by a single research assistant, who read the booklet with the parents and answered their questions	Researcher doctor read the booklet with the parents and answered their questions while they were waiting to be discharged	With the assistance of a professional with expertise in urban community health education to make it understandable to the patient population	• Service awareness and knowledge • Education • Tailored • Persuasion	A.II and B.II specific

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
Chande 1999[130]	Health promotion intervention	To encourage patients to seek care from their PCP and reduce the number of visits to the PED for minor illness	• Researcher/doctor • PED	• Individual: F2F, telephone, discussion, written • Detailed review (20–30 minutes with each family) of the child's medical record with the parents and explanation of what to expect at future well-child visits, and discussion of the role of the PCP. Families were informed that the PCP's hours were being expanded so that children with minor illness could be seen during evening and weekend hours, and given a phone number they could call 24 hours a day for advice from their PCP	Parents were encouraged to ask any questions they had about accessing their PCP	Theory-based: designed to affect the factors identified by Green and Kreuter's PRECEDE–PROCEED model	• Service awareness and knowledge • Tailored • Persuasion	B.I specific
Chiu 2012[139]	Community-run and GP-supervised self-care for minor illnesses programme implemented through ESCMSs	To provide a service for minor illnesses	• Service managers (trained for at least 4 hours on basic knowledge of self-care for minor illnesses, related medications and available resources) • 10 services locally	• Individual, F2F, written • Information pamphlet (seventh-grade reading level) included basic knowledge on self-care for minor illnesses and minor injuries; description of all the services provided by the ESCMSs; the service guideline; the minor illnesses cared for in the service; photographs of the medications used; the condition these medications are to be used for and the correct dosage; locations of ESCMSs, and the name and telephone number of the resident in charge (i.e. manager) of each ESCMS; the number of the consultation hotline; and service schedule. Supplementary materials (such as thermometers, bandages, sterilised gauges) were also available in the first-aid kit for each household	No	Target population based: authors conducted a survey (pre test) to gather the information on residents' personal experiences of, and their needs for, the self-care of minor illnesses and minor injuries	• Service awareness and knowledge • Education • Empowerment	A.II and B.II and D general

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
Cowie 2018[104]	eConsult website: provides individuals with self-care assessment and advice for the most common conditions seen in general practice	To provide patients with a means of self-care	• Unclear: accessed via GP website • Home	• General, website • Website provides individuals with self-care assessment and advice in the form of symptom checkers, videos and self-help guides about the commonest conditions seen in general practice; triage of their circumstances to enable signposting to alternative services, such as community pharmacy and online counselling; access to NHS 24 (www.nhs24.scot) (national self-care and self-help advice for Scotland); access to 24/7 telephone advice within 1 hour from NHS 24 by requesting a callback through use of a web form; and consultations based on submission of a condition-based questionnaire by the patient with a response from the practice by telephone within 1 working day	Self-triage and facility to request a response from health professionals to a questionnaire	Developed by the Hurley Group, an NHS partnership led by practising GPs	• Service awareness and knowledge • Education • Tailored	C.III general
DeSalvo 2000[137]	Individualised patient education	To improve access to the primary care clinics	• Nurse and/or social worker • Home	• Individual, telephone • Patients who had visited the local ED were contacted by a primary care nurse. When contacted, patients were asked the reason for the ED visit, the outcome of the visit, whether or not they had tried to be seen in the clinic for their problem, and their reason for going to the ED instead of the clinic. The nurse identified barriers to clinic access, such as transportation problems, financial concerns, lack of	Personalised information offered by nurse	Target population based: based on a survey of people who had frequently used the local ED	• Service awareness and knowledge • Education • Persuasion • Tailored	B.I and B.II specific

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
				knowledge about medical conditions, and addressed these problems through education, support and referral to appropriate resources in the hospital and community. Appointments were scheduled as needed. With each patient contact, the nurse provided information about disease and illness management at home, how to contact the clinic for an episodic or routine appointment, and how to recognise and manage a true medical emergency. Every patient was given information about how to contact the on-call physician when the clinic was closed. Follow-up contacts were made by the nurse as needed. In the second 3-month phase, a social worker did half of the calls				
Elsenhans 1995[138]	Self-care manual: the Healthwise Handbook	To reduce the demand for primary care services for selected visit types	• Telephone triage nurses [received full-day's training on book from Healthwise Inc. (Boise, ID, USA)] • Home	• Individual, by post, telephone • Participants received the Healthwise Handbook and commendation letter by post; telephone triage nurses trained in advising using the handbook could be contacted as needed. In addition, people presenting with targeted complaints were given the handbook. Nurse was trained, but unclear as to purpose of training	Unclear	Healthwise Handbook was developed in the USA	Education	A.II general

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
Enard 2013[87]	Patient navigation programme	To decrease ED use by effectively connecting uninsured and Medicaid patients with medical homes and other support resources	• PNs are bilingual, state-certified community health workers trained in peer-to-peer counselling • ED (PNs determine the most appropriate time during the ED visit to initiate navigation)	• Individual, F2F, verbal • Using a standard set of questions, the PNs engage the patients or clients to identify and understand the specific barriers to appropriate primary care use (e.g. lack of insurance, lack of financial resources) and to begin to determine local, state and federal resources that can support the client's needs. PNs educate the clients about the importance of making and keeping appointments and receiving preventative health care, and they provide contact information for future questions and concerns. After the clients' discharge from the ED, the PNs follow up with them within 3–10 days to monitor the success of the referral, review next steps and assist with additional support needs. In addition, the PNs proactively engage with community-based providers, such as federally qualified health centres, to nurture positive referral relationships and maintain updated information about each provider	PNs document and tailor the intervention on the basis of the clients' responses	By the Memorial Hermann Community Benefit Corporation (Houston, TX, USA) in November 2008 as a performance improvement initiative in its largest hospital	• Service awareness and knowledge • Persuasion • Tailored	B.I specific

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
Heaney 2001[96]	*What Should I Do?* booklet, and a health-care manual	To reduce unnecessary consultations and to enhance self-care	• Unclear • Home	• Individual, by post, written • The *What Should I Do?* booklet outlines 40 common health problems and provides information on when to consult a doctor and on self-care, when appropriate • The health-care manual outlines 50 common health problems and also provides information about keeping healthy	No	*What Should I Do?* booklet developed in the Netherlands; health-care manual, developed by a GP and practice nurse in Dunkeld, Scotland	Education	A.II general
Herman 2004[82]	Training class plus book	To enhance knowledge and self-care	• Head Start co-ordinators • Head Start	• Group, F2F, class, written • Delivered once • Training on how to use the book and provision of the book *What to Do When Your Child Gets Sick*, which offers easy-to-understand information on > 50 common childhood medical problems	No	Selected self-care tool is part of a series of easy-to-read self-help books published by the Institute for Healthcare Advancement	• Education • Empowerment	A.II and B.II general
Herman 2009[83]	Health literacy intervention (self-help book on child health problems)	To reduce future ED and outpatient clinic resource use	• Researchers • PED	• Individual, F2F, written • For 5–10 minutes, parents presenting to PED with children with non-urgent complaints were instructed and quizzed on how to use the fourth-grade reading-level self-help book *What to Do When Your Child Gets Sick* as an aid for managing their child's health-care needs (e.g. how to locate book sections covering cough, vomiting, headache or any other health-related complaints). They were then given a free copy of the book	None	No details	Education	A.II and B.II specific

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
Herman 2010[81]	Training class plus book, plus subsequent reinforcement, based on booklet	To enhance knowledge and self-care (skill development and literacy)	• Head Start site staff • Head Start	• Group, F2F, class, written • Delivered once • 2-hour training class on how to use the book (including slides) and provision of the book *What to Do When Your Child Gets Sick*, which offers easy-to-understand information on > 50 common childhood medical problems. Training given to parents at third-grade reading level, focusing on skill development	No	Selected self-care tool is part of a series of easy-to-read self-help books published by the Institute for Healthcare Advancement	• Education • Empowerment	A.II and B.II general
Hibbard 2001[79]	Community-wide self-care information project (Healthwise Communities Project)	To enhance self-care and, in turn, decrease unnecessary use of health care and reduce costs	• Healthwise Inc. • Home, community	• General, by post, website, media, telephone, written • A Healthwise Handbook was mailed to every household in a four-county area. A Healthwise website (an expanded version of the manual) was made available, and a telephone nurse advice line was set up. The nurses used the information from the website and the manual to advise callers. Resource centres at work sites, health-care delivery sites and libraries were set up to support access to the website, manuals and other health education materials. Workshops for health-care providers were conducted on how to integrate self-care resources into clinical practice. Workshops for consumers, often at their place of work, were conducted on how to use the self-care resources. A media campaign ran throughout the intervention period and included billboards, radio and newspaper advertisements; magnets mailed to households; and weekly newspaper articles	No	No details	• Education • Empowerment	A.II and B.II and D general

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
Holden 2020[89]	Targeted educational materials for families who attend emergency or urgent care services with a child aged < 5 years in a non-urgent situation	To reduce future repeat non-urgent attendances	• Researchers • Home	• Individual, post, written • Non-urgent attenders identified within 72 hours and sent targeted and behaviourally informed, written educational materials (the 'educational bundle'): ○ Personalised cover letter containing the child's name and hand-signed by a clinician ○ *How to Help Your Unwell Child*, an eight-page information booklet ○ An A5 factsheet with information on how to identify serious childhood illnesses ○ NHS 111 fridge magnet	Personalised letter	No details	Education	A.II specific (and small A.I)
Hou 2012[122]	Triple Zero community awareness campaign	To raise public awareness of appropriate ambulance use	• Queensland Government • Community	• General, advertising, media • Posters, print media, radio and television advertisements	No	No details	• Service awareness and knowledge • Persuasion	D general

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
Huyer 2018[112]	ED physician-delivered education using two-page pamphlet	To educate caregivers and influence future PED use by equipping them to better distinguish emergency from non-emergency conditions and offer alternative sources for care	• PED physicians • PED (after being seen and prior to discharge)	• Individual, F2F, written • ≤ 5-minute discussion of two-page pamphlet, *Choosing Wisely*, between PED physicians and caregivers; discussion followed the organisation of the pamphlet's four sections: ◦ Explanation of the importance of appropriate PED use ◦ Rating of the seriousness of the presenting child's condition ◦ Examples of emergency and non-emergency conditions ◦ Alternatives to PED in the community and resources for finding a PCP • The pamphlet was written at an accessible literacy level. Public education was also planned, but this was not fully implemented	Rating of the seriousness of the child's presenting condition	Target population based: by a multidisciplinary team including PED physicians, hospital administrators, public relations and patient education experts, with input from and piloting by parent groups. The pamphlet's design and content were based on published initiatives aimed at educating patients and caregivers about ED use	• Service awareness and knowledge • Education • Tailored	A.II and B.II specific

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
Lepley 2020[136]	1. Low health literacy paediatric health book (+ video training on how to use book) 2. Paediatric mHealth app 3. Both book and app	To determine if a brief educational intervention mHealth app is feasible (or used), and to determine its acceptability and usefulness with/without a written intervention	• Unclear • PED	• Individual, F2F, mobile app, written • Instruction on interventions given to English-speaking parents or legal guardians aged ≥ 18 years with children aged < 12 years presenting with non-urgent chief complaints • Book: 10-minute video on a fifth-grade reading level written intervention, *What to Do When Your Child is Sick*. This book provides educational content on diagnosis and treatment of 56 common paediatric illnesses and injuries, many of which are non-urgent ED conditions (in addition to two parental advice topics) • mHealth app educational resource for parents. The 'Children's On Call' app represents a mobile platform for parent education on paediatric illness and injury. It provides content on 150 illnesses and injuries, as well as 60 first aid topics and numerous parental advice topics. Along with verbal instruction on how to download and use the app and hands-on instruction, an instructional handout was given. Verbal instructions for download and the instructional handout were adjusted per device type with each parent [Android vs. Apple (Apple Inc. Cupertino, CA, USA) products]	Advice/instructions given to each parent	• Video content by Kansas Head Start to instruct parents on how to use the intervention book • App uses information from the Barton Schmidt Paediatric Telephone Advice manual	Education	C.II specific

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
Little 2001[106]	1. Self-management booklet for 42 conditions and advice on when to contact the doctor 2. Two-page summary card/leaflet on self-management of respiratory illnesses and other common illnesses	To help patients' confidence in managing minor illness, help in their decision to consult the doctor, and hence reduce rates of consultation for minor illness	• GP • Home	• Individual, by post, written • Patients were sent a letter from their GP explaining the value of patient information leaflets or booklets. The GP endorsed the leaflet or booklet enclosed with the letter and encouraged patients to use them before consulting • Booklet group: *What Should I Do?*, a booklet summarising self-management for 42 conditions and when to contact the doctor. Summary card group/leaflet group: patients were sent a two-sided summary of self-management. One page dealt with respiratory illnesses and the second page with other common illnesses	No	• Booklet: no details • Leaflet: evidence based and target population based – when possible, on evidence from trials or systematic reviews, and developed in consultation with GPs and patients	Education	A.II general
Little 2016[84] (see Yardley 2010[53] using the same intervention)	Internet-delivered interactive intervention providing advice to manage respiratory tract infections	To reduce the number of contacts with GPs for individuals who experienced a respiratory tract infection	• Patients access via GP website • Home	• General, website • Patients logged on to website and completed questions about their symptoms and medical history, and were then presented with advice recommending one of the following: ○ For mild symptoms, self-management – self-care section provided options to select advice on self-management without medication (including rest, fluid intake) or with medication ○ For more severe symptoms, phoning the NHS Direct helpline, which provided nurse-led advice about the need to seek further medical help, or, alternatively, seeking medical attention immediately	On logging on to the website, users could select tailored advice based on their personal symptoms	Theory based: commonsense model of self-regulation of illness and social–cognitive theory to build self-confidence. Website was piloted and evaluated by researchers	• Service awareness and knowledge: NHS Direct • Education • Empowerment • Tailored	C.III general

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
				• Patients could challenge advice by selecting further in-depth information about the symptoms of common complications or serious illness compatible with their symptoms, and by clicking on frequently asked questions. E-mail prompts were sent to remind patients of the website. Participants had access for 20 weeks. Accessible to people with limited education and no previous computer experience				
Macfarlane 1997[101]	Information leaflet on LRTI	To investigate if a simple leaflet affects reconsultation rates for previously well adults presenting to their GP with a LRTI	• GP hands out leaflet • Home	• Individual, written • Leaflet provided by GP at end of LRTI consultation, but not discussed (leaflet to be read at home). The leaflet provides information: reasons for cough; process of recovery; things to look out for; what to do if you develop new, or experience a worsening of, symptoms	No	Target population based: researchers designed the leaflet with the advice of the GP researchers and some patients	Education	A.II specific
Macfarlane 2002[100]	Leaflet: verbal advice on antibiotics for bronchitis and information leaflet compared with verbal advice alone	To assess whether or not written advice affects the likelihood of patients' reconsultating for original illness over and above verbal advice	• GP • Primary care (end of consultation), home	• Individual, F2F, written • GP provided verbal information based on a prompt card regarding bronchitis with/without an information leaflet (not discussed; to be read at home by the patient)	No	Researchers developed leaflet based on LRTI leaflet (Macfarlane 1997[101])	Education	A.II specific
Mullett 2002[117]	Partnerships for Better Health (self-care intervention)	To test if a self-care intervention affects self-care attitudes, knowledge and behaviour enough to influence participants' use of medical services	• Unclear • Home	• Individual, by post, telephone, written • Healthwise Handbook, health-care diary sent to each patient's home. A health support line was also available. Leaflets were sent every few months about common and seasonal health problems	No	No details	Education	A.II general

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/modifications	How developed	Mechanism of action	Type
Murray 2011[124]	NHS Choices website	To determine if a website can reduce the frequency of primary care consultations among young, healthy users who may not require F2F consultation	• UK NHS • Home	• General, website • NHS Choices (www.nhs.uk) is the public-facing website of the NHS in England and Wales and provides medical and lifestyle information and online health tools	No	NHS Choices was developed and funded by the UK Department of Health and Social Care	Education	C.II general
Nijland 2008[114]	Web-based primary care apps for supporting self-care	To determine user-centred criteria for successful application of internet-based technology for supporting self-care	• Unclear • Home	• General, internet apps • Using any one of three internet apps, patients can search for self-care information about their health complaint by means of a digital medical encyclopaedia with alphabetically ordered lists or online health brochures. Two apps provide self-care tools that can be used for obtaining information about the possible causes of a health complaint, and checking the necessity of a doctor's visit and getting (self-care) advice for non-urgent health complaints. All three apps offer the possibility of secure e-mail communication between patient and caregiver. Questions have to be answered within 24 hours, and caregivers receive a reimbursement for each web consultation	Includes potential individual responses	References for apps provided	Education	C.III general

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
Nijland 2009[113]	Web-based triage	To evaluate the feasibility of such a system for self-care and triage	• Unclear • Home	• General, website • Website (www.dokterdokter.nl): patients enter information required to assess the specific health situation using a dynamic questionnaire. Each complaint leads to a specific triage module: consumers receive an online form with the computer-generated diagnosis and advice, varying from 'contact a doctor immediately' in urgent situations to tailored self-care advice in the case of a minor ailment	Patient complaint generates specific advice	System was developed with 25 'entry' complaints based on the criteria: high frequency, no physical contact required to assess the medical situation, and the possibility to rule out emergencies	Education	C.III general
Ohns 2019[118]	Paper summary describing five patient educational options in a variety of formats and media	To help caregivers manage common childhood illnesses at home and determine when additional care is needed	• AAP • Unclear	Individual, written, telephone, mobile app 1. A commonly used diagnosis-specific handout: patient education printout specific to diagnosis 2. Booklet of the most common childhood illnesses and symptoms, *My Child is Sick!* 3. A comprehensive book of common childhood illnesses and symptoms, *Caring for Your Sick Child: Managing Common Infections at Home* 4. 24-hour nurse call line 5. AAP Kids Doc, a mobile application Note: this study was an assessment of stakeholders' preferred format for receiving information	No (other than specificity to illness for some interventions)	No details	Education	Not applicable

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
O'Neill-Murphy 2001[103]	Interactive fever education (pamphlet + discussion and training)	To reduce parental fever anxiety, increase parent fever home management and reduce number of return ED visits	• Unclear • ED	• Individual, F2F, written • The pamphlet was designed to provide parents with useful information regarding fever and its management. The language of the pamphlet was examined and placed on a sixth-grade reading level through a computer program. The pamphlet also offered simple drawings that enhanced the written information to further help the parents understand the fever education material • Interactive discussion: review of the fever pamphlet, discussion of parents' questions and concerns, and instruction and demonstration in correct use of a thermometer	Interactive discussion: parents were given the opportunity to share their current level of practice regarding fever management and to express any concerns that may be linked to anxiety	No details	• Education • Empowerment	B.II specific
Patel 2018[91]	Education and information about alternative venues: EP telephone call to discuss services plus mailed information on services; another arm received mailed information only	To reduce future ED use for low-acuity problems	• EPs (received standardised training from the researchers on study, its goals, and their roles in contacting patients by telephone) • ED	• Individual, telephone and post, verbal and written • EPs phoned low-risk adults with a recent treat-and-release ED visit, and followed a detailed script that described services available through the organisation's AACC and online services, and mailed information about the organisation's AACC and online services. A second arm in the study received mailed information only	Conversation closed with opportunity for feedback and questions	No details	• Service awareness and knowledge • Tailored	A.I specific and B.I specific

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
- Plass 2005[75] - Plass 2006[76]	Self-care booklet for minor illnesses	To reduce care-seeking behaviour (GP consultations) by stimulating self-care behaviour for minor illnesses among Turkish and Dutch inhabitants of a deprived area	- GP - Primary care	- Individual, F2F, written - When patients consulted their GP for a minor illness, the GP handed them a small booklet and gave brief instructions on how to use it. The booklet contained guidelines on the management of 12 minor illnesses [headache, stress, (low) back pain, sleeplessness, stomach ache, coughing, flu, diarrhoea and earache, and children's diseases such as chickenpox, fever and sore throat]. Each guideline had a brief description of the ailment and advice on when to seek professional help, plus suggestions for self-treatment	The booklet was compiled and delivered by the local GP to make it as relevant to the local population as possible	Local GPs compiled this booklet based on an existing, more extensive booklet	- Education - Tailored	A.II and B.II specific
Platts 2005[107]	Self-care health book; NHS Direct book	To determine if provision of a self-care health book with implied GP endorsement (handed out in a consultation) could successfully encourage patients to self-care	- GP - Primary care (at consultation)	- Individual, F2F, written - At the consultation, the GP issued the patient with either a Healthwise Handbook or an NHS Direct book - The Healthwise Handbook has 350 indexed pages of illustrated descriptive text, covering first aid and emergencies, health problems and staying healthy, and how best to use the doctor and nurse. It describes > 180 conditions organised in chapters by body areas and functions, together with self-care and when to see a doctor	No	- Healthwise Handbook was developed in the USA - No information about NHS Direct book	Education	A.II specific

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
				• The NHS Direct healthcare guide is designed to work alongside the NHS Direct telephone service; it has 128 indexed pages containing photographs and is organised by main presenting symptom in colour-coded body areas. It provides decision support flow charts to help decide when to self-treat, with tips on what to do, and when to seek medical attention • Book was endorsed and reinforced at subsequent consultations by these patients				
Powell 1995[127]	Demand management programme	To reduce employees' health service use, increase self-efficacy and satisfaction, and reduce costs	• Employer (MEMC Electronic Materials Inc., St Peters, MO, USA) • Workplace	• Group, F2F, workshop, written • Study 1: the healthy-living guide was distributed to employees. All employees had to attend a workshop on the guide delivered by the company's health and wellness co-ordinator. The healthy life self-care guide addresses 25 of the top medical conditions, accounting for 90% of acute care physician office visits, for example acne, asthma, backaches, bronchitis • Study 2: the guide was sent to employees who had had a health screening	No	No details	Education	A.II and B.II general

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
Powell 1997[128]	Self-care workshop and booklet	To reduce employees' health service use, increase self-care and reduce costs	• Health education consultants from insurer • Workplace	• Group, F2F, workshop, written • A 55-minute interactive self-care workshop on common illnesses and examples of appropriate health care, that is both the avoidance of ED treatment for common illnesses such as a sore throat, and the need for emergency treatment for life-threatening situations that may appear harmless. Provision of the American Institute for Preventive Medicine's *HealthyLife® Self-Care Guide*,[157] a 64-page booklet of 25 of the most common health problems, including cold, influenza, backache, cough, headache, fever, sore throat, nausea and chest pain. It also contained information on how to communicate effectively with health-care providers selected by the health insurer. Promotional materials were also used, such as supervisor and employee memos, newsletter articles, posters, table tents and incentives	Workshops were interactive (included discussions) and were held at all times to accommodate shift work. Materials were personalised for the worksite	No details	• Education • Empowerment • Tailored	A.II and B.II and D general

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
Rector 1999[125]	Mailing booklet about non-urgent care to Medicaid beneficiaries	To encourage use of alternatives to emergency care, including care by office-based physicians, telephone nursing assistance and self-care	Health provider (United HealthCare Services, Inc., Minnetonka, MN, USA)	• Individual, post, written • Booklet mailed to head of household. First Look booklet: a 44-page, fourth-grade level guide to use of medical services (e.g. how to choose a personal doctor, provided guidance on when to use emergency services, and advised members to call their personal doctor in non-emergency situations) and self-care for minor conditions, for example cold, influenza, cough, diarrhoea, earache, fever, headache, nausea, vomiting, sore throat, bites, stings, bruises, cuts. A toll-free 24-hour telephone number for an assistance service staffed by nurses was prominently displayed throughout the pamphlet. Messages to establish a relationship with a personal doctor and avoid use of emergency services for minor problems were reiterated on the final pages. The last page provided a quick reference guide for self-care and prominently displayed the number of the nurse assistance service	English; people could request Spanish version	Target population based: UnitedHealth Group and the Channing L. Bete Company (Deerfield, MA, USA), using a focus group, developed the First Look booklet	• Service awareness and knowledge • Education • Persuasion • Tailored	A.I and A.II general

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
• Rutten 1991[78] • Rutten 1993[77]	Rational practice policy and systematic patient education (leaflet) about cough	To modify consulting behaviour of patients with cough	• GP or practice nurse • Primary care	• Individual, F2F, written • GP or practice nurse discussed the content of the leaflet with patients at the consultation (Rutten 1991[78]) or sent the leaflet to a patient's house if it had been a telephone consultation (Rutten 1993[77]) and asked them to keep it and to consult it when they next had a cough. The leaflet, consisting of one double-folded page, contained the following categories of information: statements on the self-limiting character of respiratory symptoms and aggravating behaviour, self-care advice, advice to ask the practice nurse for a prescription in cases of dry tickling or nocturnal cough and advice to consult the GP when cough had persisted or was accompanied by one of the serious symptoms. GPs and practice nurses were asked to behave in a particular way when consulted about an 'everyday' cough	No	No details	Education	A.II and B.II specific

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
Shnowske 2018[93]	Care guide use for repeated non-emergent complaints	To reduce ED visit frequency by directing patients to a more appropriate service for care	• Case manager • Not reported	• Individual, unclear, verbal • A care guide is initiated for patients who repeatedly present to the ED for non-emergent complaints. Once a care guide is initiated, a case manager is assigned to the patient who then assists the patient in overcoming barriers to finding non-emergent care. This may include locating a PCP and scheduling an appointment, providing patient education, helping develop pain management guides and assistance with finding financial resources, among other things	Individualised case management	No details	• Service awareness and knowledge • Education • Tailored	B.I and B.II specific
Spoelman 2016[129]	Nationwide evidence-based health website	To determine whether or not the release of a nationwide evidence-based health website is associated with reduction in health-care resource use	• Dutch scientific society of GPs (NHG) • Community (media coverage)	• General, website • Publicly available non-commercial website, providing reliable medical information and advice based on the guidelines of the NHG; the online advice matches the most recent GP guidelines. Online content uses plain understandable language and covers > 600 topics. Each topic consists of several 'patient situations', for example 'I need to start inhalation medication' • Information on what to do and when to contact the GP is given. The situations can include illustrations, short videos, patient decision aids and e-health self-management tools such as a self-test on alcohol use. Reliable and understandable information	None	Evidence based: content of website is based on NHG guidelines	Education	C.II general

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
Steelman 1999[119]	Fever education: slide presentation on well-infant care topics + additional presentation on fever and mailed reminders	To improve parental understanding and management of childhood fever	• Unclear • Military setting	• Group, F2F, presentation, post, written • Attendees at WCVs received standard age-appropriate slide presentation discussing infant well-care presentation. The intervention group also received one 10-minute slide presentation on childhood fever (e.g. diagnosis of fever, proper measurement of fever, management of fever and situations requiring a physician) and a mailout at 1 month and at 3 months summarising the key points of the additional presentation, and were encouraged to call the paediatric clinic investigator if they had any questions	Not reported	No details	Education	A.II specific (and very minor B.II)
Steinweg 1998[120]	SCIP coupled with a HPP	To increase participant confidence, knowledge and self-efficacy, and decrease the number of participant clinic visits for self-limiting conditions	• Multidisciplinary team of military health-care providers • Unclear	• Group and individual, F2F, verbal, written • 2.5-hour block of instruction comprising four educational sections, including effective treatment of acute, minor illness at home and wise use of health-care services. Participants also receive a copy of the self-care decision manual, *Take Care of Yourself*, to enhance their ability to make wise choices about personal health issues, to use preventative screening and health-care services effectively, to do self-care correctly, and to use medications appropriately.	Participants conclude the SCIP with a confidential consultation with a health-care provider	No details	• Education • Empowerment • Tailored	A.II and B.II general

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
				The HPP supports the SCIP participant to effectively treat symptoms associated with self-limiting conditions. Each SCIP participant receives a HPP eligibility card on completion of the programme				
Stockwell 2014[126]	URI-related educational intervention + standard curriculum	To decrease the number of PED visits and adverse care practices for URIs	• Trained Latina community health workers hired for the study • Early Head Start classes	• Group, F2F, class, verbal • Three 1.5-hour education modules were provided to whichever parent/caregiver attended Early Head Start as part of their regular curriculum in their Early Head Start parent–child group. URI health literacy education was in addition to this standard provision, and consisted of three modules: i. Viral vs. bacterial infections; URI vs. influenza; influenza vaccination; antibiotic resistance; when/where a family should seek care; and how to use a URI care kit, including a digital thermometer, nasal saline and bulb suction ii. OTC medications and common home remedies for that community (e.g. sancochito) with a safety emphasis iii. How to measure medications, read prescription labels, and prepare for medical visits	English, Spanish	No details	• Service awareness and knowledge • Education • Empowerment	B.II general

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
Sturm 2014[94]	Information about services offered by a patient's specific PCP and standard discharge instructions	To reduce non-urgent PED visits	• Researchers (received a 60-minute training session and followed a standard script) • PED (after being seen and prior to discharge)	• Individual, F2F, written • In a standardised 10-minute session, study representatives described the leaflet to caregivers and answered questions. Intervention patients were given a laminated copy of this one-page form to take home: handout contained information on patients' preferred PCP (office hours/location, scope of practice, ability to do radiographs, blood work, sutures, etc.) and the preferred steps that patients should take to address medical concerns and obtain medical advice	Information is specific to the parents' own PCP; patients could ask questions	• Handout developed with input from their self-identified PCP • Spanish speakers given Spanish version	• Service awareness and knowledge • Education • Tailored	A.I and B.I and A.II and B.II specific
Sustersic 2013[131]	PILs	To assess if PILs have an impact on patient behaviour	• Physician • Primary care (during consultation)	• Individual, F2F, written • Physicians gave and discussed the PIL corresponding to the patient's condition during the consultation. The PILs selected concerned acute gastroenteritis and tonsillitis. The PILs were A4 size (210 × 297 mm) and included an illustration related to the condition and information on the causes of the condition, its symptoms, the risks, the usual course of the disease, treatments, and persisting or new symptoms that would require further medical consultation	No	Evidence based: PILs written by first author with cited sources, for example relevant Cochrane reviews	Education	A.II and B.II specific

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
Verzantvoort 2018[140]	Self-triage for acute primary care via a smartphone application ‘Should I see a doctor?’	To assess the impact of the app on patients’ decisions to contact the OOH service for acute care, as well as to provide reassurance, information and self-care options	• NHG distributed it to all general practices via flyers and media • Home	• General, mobile app • The ‘Should I see a doctor?’ (in Dutch, ‘moet ik naar de dokter?’) app is a self-triage tool for acute care. Patient selects the relevant body region, then chooses symptoms, answers yes/no questions, sometimes supplemented with a pain-rating scale, and for the presence of specific symptoms that raise an alarm. Patients receive one of the following advice options: reassurance that it is safe to wait and see, with disease-/symptom-specific self-care information; contact a doctor, either the OOH clinic or own GP, depending on symptoms and timings; in case of doubt, worry or increasing illness, contact a health-care facility	Personalised to patient’s symptoms	Apeldoorn OOH GP clinic and Van Campen Consulting (Zaltbommel, the Netherlands), in collaboration with NHG	• Education • Anxiety	C.III general
Wagner 2001[80]	Community-wide self-care information project (Healthwise Communities Project): handbook, website, advice line, media campaign	To give consumers skills and resources to make more informed self-care and health-care decisions, and reduce unnecessary health-care use	• Healthwise Inc. • Home, community	• General, by post, website, media, telephone, written • Every household in a specified area received the Healthwise Handbook and had access to a telephone advice line, and the Healthwise website (an expanded version of the manual), which included more information on different treatment options and what is known about their efficacy and outcomes. A telephone nurse advice line was also set up. The nurses used the information from the website and the manual to advise callers	None	No details	• Education • Empowerment	A.II and B.II and D general

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
				• Workshops for health-care providers were conducted on how to integrate the self-care resources into clinical practice. Workshops for consumers, often at their place of work, were provided on how to use the self-care resources. A media campaign ran throughout the intervention period and included billboards, radio and newspaper advertisements, magnets mailed to households and weekly newspaper articles				
White 2012[121]	Self-care skills training course	To determine if skills training leads to increased knowledge and skills, confidence to undertake self-care, intention to self-care and changes in patterns of service use	• Self-care support co-ordinators • Workplaces and community-based services used by parents with young children	• Group, F2F, written • Course delivered in small group sessions in non-clinical settings with six 3-hour sessions over a 3–6 weeks. The course was composed of six blocks of activity that explored attitudes and personal skills in relation to health care and self-care. A handbook containing reference material and follow-up exercises accompanied the course	None	No details	• Education • Empowerment • Anxiety	A.II and B.II general
Wood 2017[109]	Brief VDI added to standard written/ verbal discharge instructions	To improve knowledge about the child's diagnosis, treatment and illness duration, and when to seek further medical care	• Nurse • PED	• Individual, F2F, video and written • During triage, EBP team members identified caregivers who fitted inclusion criteria and provided them with the VDI that corresponded to their child's diagnosis, in addition to the standard discharge instructions (written printout and verbal instructions from their provider and	None	The interprofessional EBP team developed VDI scripts for the three most common ED diagnoses. The scripts mirrored the content of the written discharge instructions plus images	Education	A.II specific

Study	Brief intervention description	Why	Who, where/when	How, how much, materials and procedures	Tailoring/ modifications	How developed	Mechanism of action	Type
				discharge nurse). The VDI consisted of a member of the EBP team reading a 3–5 minute script with images and text to reinforce the verbal messages. The videos described symptoms associated with the diagnosis, treatment of the symptoms, expected illness duration and when to seek further medical care				
Yardley 2010[53] (further tested by Little 2016[84])	Tailored theory-based intervention: web-based intervention – internet doctor providing tailored advice for self-management of minor respiratory symptoms	To determine if intervention improves patient 'enablement' (i.e. perceived ability to self-manage health and illness) and use of health services (i.e. contacting the doctor)	• Research website, but exploratory study for primary care so included here • Home	• General, website • Fully automated digital triage system that provided tailored computer-generated advice on whether to contact health services or self-care. Patients can access diagnostic pages (completing symptoms questions), treatment pages providing self-management information, and a common Questions section. Details about the medical expert on the team and the medical evidence behind the advice are also provided	Complex algorithm enabled patient to follow decision-making process depending on their symptoms	Evidence and theory based: by research team using latest relevant evidence and theory (common sense model, social cognitive theory)	• Education • Empowerment • Anxiety • Tailored	C.III general

AACC, Advice and Appointment Call Centre; AAP, American Academy of Pediatrics; CDC, Centers for Disease Control and Prevention; DVD, digital versatile disc; EBP, Evidence-Based Practice Project; EP, emergency physician; ESCMS, easy-access self-care medical spot; F2F, face to face; FMC, family medical centre; FPC, family practice clinic; HPP, health promotion pharmacy; LRTI, lower respiratory tract infection; mHealth, mobile health; NHG, Nederlands Huisartsen Genootschap [Dutch College of General Practitioners]; OOH, out of hours; OTC, over the counter; PCP, primary care provider; PED, paediatric emergency department; PIL, patient information leaflet; PN, patient navigator; PURPLE, Peak of crying, Unexpected, Resists soothing, Pain-like face, Long lasting, Evening; SCIP, self-care intervention programme; URI, upper respiratory infection; VDI, video discharge instructions; WCV, well-child visit.

Appendix 6 Quality assessment (by study design)

Risk-of-bias assessments (cohort studies): modified Newcastle–Ottawa Scale (in alphabetical order)

Study	Selection of intervention group	Selection of control group	Comparability of cohorts	Assessment of outcome	Adequacy of follow-up	Overall assessment
Adesara 2011[110]	Adult patients from a single primary care site who had visited an ED for a non-emergency reason during clinic hours ($n = \text{NR}$)	Similar clinic for adult patients only on same site ($n = \text{NR}$)	Limited reporting (with clear differences in non-emergency ED visits pre intervention)	Records	Inadequate (6 months: 3 during intervention, 3 post intervention)	Weak
Anhang Price 2013[123]	Convenience sample of caregivers attending PED with influenza-like illness ($n = 294$)	Not applicable	Same cohort ($n = 165$), but no details on differences	Structured interview (survey)	Inadequate (7 days for reconsultation rates); cross-sectional for usability	Weak
Barr 2015[115]	Detailed and consistent identification of relevant attendances (infants aged 0–5 months) for one site ($n = \text{NR}$)	Historical (same criteria, same site) ($n = 724$)	Not reported	Records	Adequate (3 years)	Moderate
Beal 2020[116]	Convenience sample of adolescents in child protective services ($n = 151$)	Matched controls ($n = 151$)	Differences between cohorts across a number of variables	Records, structured interview (survey)	Adequate (1 year)	Moderate
Chiu 2012[139]	Convenience sample of residents with access to service ($n = 100$)	Not applicable	Not applicable	Survey	Cross-sectional	Weak
Davis 2018[86]	Detailed and consistent identification of relevant attendances (paediatric) for one primary care site ($n \geq 1000$)	Historical (same criteria, same site) ($n \geq 1000$)	NR (only numbers for each time period)	Records	Adequate (1 years)	Moderate/weak
DeSalvo 2000[137]	Convenience sample of ED attendees from primary care clinics (odd-numbered patient records) ($n = 288$)	ED attendees from same primary care clinics with even-numbered patient records ($n = \text{NR}$)	NR	Records	Inadequate (6 months)	Weak
Elsenhans 1995[138]	Purposive sample of internal medicine clinic-registered age group with heaviest ED use rates ($n = 2144$)	Same age group with heaviest ED use rates at comparable internal medicine clinic ($n = \text{NR}$)	Limited data, but generally comparable	Records for total ED use and ED use for specific complaints	Inadequate (4 months)	Moderate/weak

Study	Selection of intervention group	Selection of control group	Comparability of cohorts	Assessment of outcome	Adequacy of follow-up	Overall assessment
Enard 2013[87]	Convenience sample of frequent users of ED for primary care complaints, aged 18–65 years (*n* = 1907)	Sample with similar characteristics but who did not receive the intervention (*n* = 11,737)	Adequate	Records	Adequate (1 and 2 years)	Strong
Fieldston 2013[88]	Convenience sample of caregivers of children aged 6 months–5 years) attending four primary care sites (*n* = 32)	Historical (same sample) (*n* = 32)	Same cohort	Records	Inadequate (6 months)	Moderate/ weak
Herman 2004[82]	Convenience sample of Head Start families at named sites (*n* = 236 families)	Head Start families at named sites that did not receive the full intervention (*n* = 170 families)	NR	Survey	Inadequate (6 months) (total number of families with 6-month data: 224)	Weak
Herman 2009[83]	Convenience sample of caregivers of children (aged 0–18 years) attending the PED for non-emergency complaints (*n* = 113)	Historical (same sample) (*n* = 61)	Same cohort (comparable to pre-intervention across variables)	Questionnaire	Inadequate (6 months)	Weak
Herman 2010[81]	Convenience sample of Head Start families at named sites (*n* = 7281 families)	Not applicable	Not applicable	Survey	Inadequate (6 months)	Weak
Hibbard 2001[79]	One intervention community (*n* = 959)	Two comparison communities (*n* = 1954)	Unclear	Records, survey	Adequate (3 years)	Moderate
Hou 2012[122]	Patients attending ED post implementation (*n* = 17,920)	Historical (same criteria, same site): pre implementation (*n* = 17,793)	Some significant differences between cohorts	Records	Inadequate (3 months)	Weak
McWilliams 2008[135]	All parents attending a 15-month WCV at one site (*n* = 191)	Historical (same criteria, same site) and alternative sites of same provider (*n* = 133)	Differences across some variables	Records	Adequate (1 year)	Moderate
Mullett 2002[117]	Small convenience sample of volunteers who had received the intervention handbook (*n* = 153)	Not applicable	Not applicable	Diary	Adequate (1 year)	Weak
Murray 2011[124]	Convenience sample of intervention users and primary care patients with access to intervention (*n* = 1559 and *n* = 125)	Not applicable	Not applicable	Survey	Cross-sectional	Weak
Nijland 2009[113]	Convenience sample of intervention users (*n* = 192)	Not applicable	Not applicable	Survey	Cross-sectional	Weak

Study	Selection of intervention group	Selection of control group	Comparability of cohorts	Assessment of outcome	Adequacy of follow-up	Overall assessment
Plass 2005[75]	Purposive sample of adult patients who frequently consulted primary care for minor illness ($n = 294$)	Sample with same consultation criteria, except not only minor illness, from alternative sites in same area ($n = 85$), plus reference group	Differences across some variables	Records, interviews	Adequate (2 years)	Moderate
Plass 2006[76]	Purposive sample of adult patients who frequently consulted primary care for minor illness ($n = 162$)	Not applicable	Not applicable	Structured interview (survey)	Adequate (1 year)	Moderate (self-report of use)
Powell 1995[127]	Employees at a single organisation ($n = 1000$)	Not applicable	Not applicable	Survey, records	Cross-sectional	Weak
Powell 1997[128]	Employees at a single organisation ($n = 371$)	Historical (same criteria, same site)	Not applicable	Records, survey	Adequate (1 year)	Moderate
Shnowske 2018[93]	Convenience sample of patients who frequently attended ED with non-urgent complaints and who received the intervention ($n = 287$)	Historical (same sample) ($n = 287$)	Same cohort	Records	Inadequate (3 months)	Moderate/ weak
Spoelman 2016[129]	Purposive sample of general practices	Historical (same criteria), plus reference group	NR	Records	Adequate (3 years)	Moderate
Steelman 1999[119]	Convenience sample of parents attending 2-, 4- and 6-month WCVs at one site ($n = 50$)	Convenience sample of parents attending 2-, 4- and 6-month WCVs at one site ($n = 43$)	NR	Records, survey	Inadequate (unclear, 4 months?)	Weak
Steinweg 1998[120]	Participants in a military setting ($n = 283$)	Not applicable	Not applicable	Survey	Inadequate (6 months)	Weak
Thornton 1991[133]	New mothers on a birth register ($n = 104$)	Not applicable	Not applicable	Questionnaire	Inadequate (6 months) (too few instances of illness to evaluate)	Weak
Verzantvoort 2018[140]	Convenience sample of intervention users who volunteered to participate ($n = 126$)	Not applicable	Not applicable	Structured interview (survey)	Cross-sectional	Weak
Wagner 2001[80]	Random households in an intervention community ($n = 1899$)	Same criteria in two comparison communities ($n = 4010$)	NR	Questionnaire	Adequate (1 year)	Moderate/ weak
White 2012[121]	Convenience sample of patients from three primary care trusts ($n = 868$)	Convenience sample of patients from two primary care trusts ($n = 700$)	Differences across some variables	Records, survey	Adequate (1 year)	Moderate
Wood 2017[109]	Convenience sample of caregivers of children (aged 0–21 years) attending the PED for non-emergent complaints ($n = 83$)	Historical (same sample)	Same cohort	Questionnaire	Inadequate (immediately before and after intervention)	Weak

Study	Selection of intervention group	Selection of control group	Comparability of cohorts	Assessment of outcome	Adequacy of follow-up	Overall assessment
Yoffe 2011[95]	All parents of children aged $\leq$ 10 years at a primary care site ($n = \text{NR}$)	Historical (same criteria, same site) and alternative sites in same area ($n = \text{NR}$)	Differences across some variables	Records	Adequate (18 months)	Weak/ moderate

PED, paediatric emergency department; NR, not reported; WCV, well-child visit.

Risk-of-bias assessments (randomised controlled trials): Cochrane Risk of Bias Tool v.2.0 (in alphabetical order)

Study	Bias arising from the randomisation process (sequence generation, allocation concealment, balance between groups)	Bias due to deviations from intended intervention (blinding, deviations, likely effect on outcomes)	Bias due to missing data (attrition)	Bias due to measurement of outcome (blinding of assessors, potential for differences between groups)	Bias in selection of reported results (prespecified outcomes, potentially different measures)	Overall bias
Bertakis 1991[134]	High	Some concerns	Low	Low	Some concerns	High
Chande 1996[85]	Some concerns	High	Low	Some concerns	Some concerns	High
Chande 1999[130]	Low	High	Low	Some concerns	Some concerns	High
de Bont 2018[102]	Low	Low	Low	Some concerns	Low	Some concerns
DeCamp 2020[111]	Low	Low	Low	Low	Some concerns	Some concerns
Francis 2009[99]	Low	Some concerns	Low	Low	Some concerns	Some concerns
Hansen 1990[105]	High	Some concerns	Low	Some concerns	Some concerns	High
Heaney 2001[96]	Low	Some concerns	Some concerns	Some concerns	Some concerns	High
Holden 2020[89]	Some concerns	Some concerns	Low	Some concerns	Low	Some concerns
Ladley 2018[90]	Low	Low	Low	Low	Low	Low
Lepley 2020[136]	Some concerns	Some concerns	High	High	Some concerns	High
Little 2001[106]	Some concerns	Some concerns	High	Low	Some concerns	High
Little 2016[84]	Low	Some concerns	High	Low	Some concerns	High
Macfarlane 1997[101]	Some concerns	Low	Low	Some concerns	Some concerns	High
Macfarlane 2002[100]	High	Some concerns	Low	Some concerns	Some concerns	High
O'Neill-Murphy 2001[103]	High	Some concerns	High	High	Some concerns	High
Patel 2018[91]	Some concerns	High	Some concerns	Some concerns	Some concerns	High

Study	Bias arising from the randomisation process (sequence generation, allocation concealment, balance between groups)	Bias due to deviations from intended intervention (blinding, deviations, likely effect on outcomes)	Bias due to missing data (attrition)	Bias due to measurement of outcome (blinding of assessors, potential for differences between groups)	Bias in selection of reported results (prespecified outcomes, potentially different measures)	Overall bias
Platts 2005[107]	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns	High
Racine 2009[92]	Low	Low	Low	Low	Some concerns	Some concerns
Rector 1999[125]	Some concerns	Some concerns	Low	Low	Some concerns	Some concerns
Robbins 2003[108]	High	Some concerns	High	Some concerns	Some concerns	High
Rutten 1991[78]	Some concerns	High	High	Some concerns	Some concerns	High
Rutten 1993[77]	Some concerns	Some concerns	Some concerns	Some concerns	Some concerns	High
Stockwell 2014[126]	Some concerns	Some concerns	Low	Some concerns	Some concerns	High
Sturm 2014[94]	High	Some concerns	Low	Low	Some concerns	High
Sustersic 2013[131]	Low	Some concerns	Low	Some concerns	Some concerns	Some concerns
Thomson 1999[132]	Low	Low	Low	Low	Some concerns	Some concerns
Usherwood 1991[97]	High	Some concerns	Some concerns	Some concerns	Some concerns	High
van der Gugten 2015[98]	Low	Low	Low	Low	Some concerns	Some concerns
Yardley 2010[53]	Low	Some concerns	High	Some concerns	Some concerns	High

Risk-to-rigour assessments: modified Critical Appraisal Skills Programme (qualitative studies)

Study	Clear statement of aims	Qualitative methodology appropriate	Recruitment strategy appropriate	Data collection appropriate	Researcher reflexivity	Ethics issues addressed	Data analysis sufficiently rigorous	Clear statement of findings	Overall assessment
Huyer 2018 §	Yes	Yes	Yes	Yes	Not reported	Yes	Yes	Yes	Strong
Nijland, 2008†	Yes	Yes	Unclear	Yes	Not reported	Not reported	Yes	Yes	Moderate
Ohns, 2019§	Yes	Yes	Yes	Yes	Not reported	Yes	No	Limited	Moderate

Risk-to-rigour assessments: Mixed Methods Appraisal Tool (mixed-methods studies)

Study	Adequate rationale for using a mixed-methods design to address the research question?	Are the different components of the study effectively integrated to answer the research question?	Are the outputs of the integration of qualitative and quantitative components adequately interpreted?	Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?	Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?	Overall assessment
Cowie 2018[104]	Yes	No (very limited, principally only regarding costs)	No (very limited)	Unclear	Qualitative: yes; quantitative: limited	Weak

Appendix 7 Impact on service use (studies in alphabetical order)

Study	Brief intervention description (*n*)	Follow-up	Data source	Service use: 1. ED all visits 2. ED minor/non-urgent/inappropriate visits 3. GP all visits 4. GP minor/non-urgent visits/inappropriate visits
Adesara 2011[110]	FMC educational posters and letter sent to non-admitted ED attendees after discharge	Baseline, 6 months	Records	1. (+) ED visits attributable to FMC patients: pre = 6.83%, during = 6.22%, post = 6.15%. Approximately 40 ED visits saved per month. Internal medicine clinic: pre = 1.34%, during 1.69% (difference pre – during vs. FMC, $p < 0.001$), post = 1.43% (difference pre – post vs. FMC, $p < 0.001$) 2. None 3. None 4. None
Beal 2020[116]	I Care Guide and companion website	12 months	Records, self-report	1. No significant changes in emergency care visits after accounting for covariates 2. None 3. (±) Non-urgent health-care use significantly decreased for both enrolled and comparison youth in the year after study launch ($t[150] = 5.65$; $p < 0.01$; and $t[150] = 5.13$; $p < 0.01$, respectively), but decrease was smaller than hoped for in intervention group 4. None Across all types of health-care use, self-report data generally indicated higher health-care use than records' data
Bertakis 1991[134]	Family practice clinic patient advisor booklet with/without an educational intervention	12 months	Records	Control group vs. experimental group (note that this is the booklet vs. booklet + seminar): 1. None 2. (–) Appropriate visits, mean (SD): 0.2 (1.1) vs. 0.03 (0.9); $p = 0.095$. Appropriate visits, mean (SD): 75.3% (40.7%) vs. 84% (35.2%); $p = 0.072$ 3. None 4. (+) Family practice clinic appropriate visits, mean (SD): 97.6% (11.2%) vs. 99.5% (4.8%); $p = 0.016$
Chande 1996[85]	Specialised educational materials: video and booklet	6 months	Records	1. (–) Return to PED within 6 months: 21 patients (30%) from the intervention group and 16 (26%) from the control group ($p = 0.68$) 2. (–) 17 patients (81%) of intervention group returnees to the PED had minor illness, as did 11 (69%) of control group returnees 3. None 4. None

Study	Brief intervention description (*n*)	Follow-up	Data source	Service use: 1. ED all visits 2. ED minor/non-urgent/inappropriate visits 3. GP all visits 4. GP minor/non-urgent visits/inappropriate visits
Chande 1999[130]	Health promotion intervention	12 months	Records, self-report (data combined for outcomes)	1. (–) ED: at study entry, 94 out of 102 in the intervention group and 87 out of 93 in the control group had made at least one visit to the ED ($p = 0.79$). At the 1-year follow-up, 84 out of 102 in the intervention group and 73 out of 93 in the control group had made at least one visit to the ED ($p = 0.59$). There was no significant difference in rates of use of the ED 2. (–) At study entry, 55 out of 102 (54%) in the intervention group and 55 out of 93 (59%) in the control group had made two or more ED visits for minor illness in the preceding year. At the 1-year follow-up, 61 out of 102 (60%) in the intervention group and 57 out of 93 (61%) in the control group had made two or more ED visits for minor illness ($p = 0.95$) 3. (–) At study entry, 95 out of 102 in the intervention group and 75 out of 93 in the control group had seen their PCP at least once ($p = 0.59$). At the 1-year follow-up, 81 out of 102 in the intervention group and 77 out of 93 in the control group made at least one visit to their PCP ($p = 0.59$); however, the total number of PCP visits by both groups increased by almost 50%. Although there was no difference between the control and intervention groups at the 1-year follow-up, the total increase in visits for both groups is significant ($p < 0.001$) 4. None
Davis 2018[86]	Family medicine clinic opening hours increased and standardised and patient education provided	3 and 12 months	Records	1. (+) 62 fewer PED visits than in the same 3 months the previous year; each month post intervention saw fewer visits than the corresponding month pre intervention. The numbers continued to decrease at 12 months: 284-visit decrease in total paediatric ED visits (29.8%). In 2015, the clinic was at 71.5 visits per 100 persons per year. Following interventions, in 2017, the rate changed to 41.9 visits per 100 persons per year. The proportions of paediatric patients using the clinic instead of the ED also shifted from 2015 to 2017. In October–December 2015, 47.5% (64 patients) of patients used the clinic for URI. In 2017, that number increased to 78.2% (97 patients) who were seen in the clinic as opposed to the ED. This was a statistically significant shift ($p < 0.0001$) 2. (±) 41.1% (from 82 to 48) decrease in level-3 (urgent) visits to the ED and a 16.7% (from 120 to 100) decrease in level-4 (less urgent) visits in the initial 3 months. These changes were maintained when examining the data 1 year later. The number of level-5 (not acute) visits remained unchanged

Study	Brief intervention description (*n*)	Follow-up	Data source	Service use: 1. ED all visits 2. ED minor/non-urgent/inappropriate visits 3. GP all visits 4. GP minor/non-urgent visits/inappropriate visits
				3. (+) Walk-in clinic visits during this time continued to increase. The proportions of paediatric patients using the clinic instead of the ED shifted from 2015 to 2017. In October–December 2015, 47.5% (64 patients) of patients used the clinic for URI. In 2017, that number increased to 78.2% (97 patients) who were seen in the clinic, as opposed to the ED, for a diagnosis of URI. This was a statistically significant shift ($p < 0.0001$). Similar shifts were seen in fever and otitis media; however, the sample size was not great enough to draw significance conclusions. The increased use of the walk-in clinic corresponded with the continued decrease in the total number of PED visits as the panel size grew by > 200 patients 4. None
de Bont 2018[102]	Illness-focused interactive booklet	Within 2 weeks for same illness episode and 6 months for OOH repeated consultation	Records, self-report used for service use intention	1. None 2. None 3. None 4. (±) Records: reconsultation of OOH within 2 weeks – usual care group ($N = 13,410$): $n = 861$ (5.5%); access to booklet group ($N = 11,945$): $n = 741$ (5.4%); access to booklet: OR 0.95 (95% CI 0.83 to 1.09). Reconsultation to OOH in 6 months: OR 0.99 (95% CI 0.84 to 1.18). Self-report: intention to reconsult for similar illnesses reduced OR 0.55 (95% CI 0.35 to 0.85), or 75.6% intervention vs. 84.4% control
DeSalvo 2000[137]	Individualised patient education	3 months pre intervention, 3 and 6 months post intervention	Records, self-report	1. (–) These patients had an average of 0.16 ER visits per patient in the 3 months subsequent to the index visit. In contrast, there were 0.29 subsequent visits per patient in the control group ($p < 0.01$). By the end of the first 3 months, the difference had disappeared (0.32 vs. 0.28; $p = 0.14$). The addition of a social worker to the team in the second phase did not result in a change in ER use (0.3 visits per patient in both the intervention and the control groups; $p = 0.5$) 2. None 3. None 4. None
DeCamp 2020[111]	Salud al Día (Health Up to Date) interactive text message service	15 months	Records	1. (+) Reduced use of EDs. Salud al Día, $n = 79$; usual care, $n = 78$. ED visits, mean (SD): 1.23 (1.66) vs. 1.82 (1.64); $p = 0.03$; IRR 1.48 (95% CI 1.04 to 2.12) for control vs. intervention. Frequency of ED use differed ($p = 0.03$) (intervention vs. control): ○ 0 visits – $n = 33$ (42%) vs. $n = 17$ (22%) ○ 1 visit – $n = 19$ (24%) vs. $n = 23$ (29%) ○ ≥ 2 visits – $n = 27$ (34%) vs. $n = 38$ (49%)

Study	Brief intervention description (*n*)	Follow-up	Data source	Service use: 1. ED all visits 2. ED minor/non-urgent/inappropriate visits 3. GP all visits 4. GP minor/non-urgent visits/inappropriate visits
Elsenhans 1995[138]	Self-care handbook	4 months	Clinic records	Service use (intervention unit vs. control unit): 1. None 2. None 3. (+) Decrease in total visits: 21% vs. 8%; decrease in total visits per member per month: 18% vs. 12% 4. (+) Decrease in targeted TLAS visits: 33% vs. 9%; decrease in TLAS visits per member per month: 31% vs. 13%; decrease in TLAS total visits per member per month: 5.3% vs. 0.31%; $p \leq 0.05$
Enard 2013[87]	Patient navigation programme	12 and 24 months	Records	1. (+) For people who did not use the ED frequently in the previous year, the mean number of primary care-related ED visits declined significantly in the corresponding post-observation period, compared with that of controls. The OR was 0.83 (95% CI 0.71 to 0.98) for people who had a baseline attendance of one or more visits at 12 months. At 24 months, the OR was 0.55 (95% CI 0.47 to 0.63). In all cases, intervention participants were associated with greater reductions in mean visits and cost per person than the reductions seen with comparison participants 2. None 3. None 4. None
Fieldston 2013[88]	Health education and training by PED nurses	6 months	Records	1. (–) Mean number of ED visits for the index child reduced following the intervention, although the difference was NS: 0.67 mean ED visits before and 0.58 after ($p = \text{NS}$) 2. None 3. (–) Mean number of ambulatory visits for the index child reduced following the intervention, although the difference was NS: 2.7 before vs. 2.3 after ($p = \text{NS}$). The number of after-hours telephone calls to the PCP rose significantly from 0.33 per patient to 1.46 per patient ($p = 0.047$) 4. None
Francis 2009[99]	Interactive booklet on childhood respiratory tract infections	2 weeks	Self-report	(–) There was no significant difference between the intervention and control groups in the odds of reconsulting in primary care during the 2 weeks after registration, but the intervention group was less likely to intend to consult for a similar illness in the future 1. None 2. None 3. None 4. (±) Primary outcome: primary care reconsultation for same illness episode within first 2 weeks – intervention 33/256 (12.9%) vs. control 44/272 (16.2%); OR 0.75 (95% CI 0.41 to 1.38). There was no significant intervention effect when

Study	Brief intervention description (n)	Follow-up	Data source	Service use: 1. ED all visits 2. ED minor/non-urgent/inappropriate visits 3. GP all visits 4. GP minor/non-urgent visits/inappropriate visits
				telephone consultations were counted as reconsultations along with face-to-face primary care consultations (OR 0.81, 95% CI 0.47 to 1.42), or when consultations at EDs were included along with primary care consultations (OR 0.85, 95% CI 0.48 to 1.51). Parent intends to consult if their child has similar illness in future: intervention 136/256 (55.3%) vs. control 201/272 (76.4%); OR 0.34 (95% CI 0.20 to 0.57)
Hansen 1990[105]	Booklet about common illnesses	6 months	Self-report of illness and self-treatment; GP records for consultations	1. None 2. None 3. All: (+) families that received the booklet reported significantly more self-treatments, had significantly fewer consultations and had significantly fewer consultations for which worry was the main reason. Mean number of patient-initiated consultations: intervention 0.288 (2SD 0.3–0.2); control 0.426 (2SD 0.5–0.4). For home visits: intervention 0.098 (2SD 0.1–0.7); control 0.195 (2SD 0.2–0.2) (no p-values given). In the intervention group, 19% said worry was a reason; in the control group, it was 31% ($p = 0.0075$). GP assessed appropriateness of consultation: intervention 88%; control 81% 4. None
Heaney 2001[96]	*What Should I Do?* booklet and health-care manual	1 year pre intervention, 1 year post intervention	Records	Change of use: mean rates of health service (primary care) use in year before and year after intervention (95% CI for estimated effect of booklet adjusted for baseline) – 1. None 2. None 3. (–) OOH contacts: book group – 0.13 before vs. 0.11 after; control group – 0.11 before vs. 0.13 after; before–after difference –0.02 (95% CI –0.06 to 0.01). OOH total contacts: book group –8.53 before vs. 6.57 after; control group –9.02 before vs. 6.65 after; before–after difference 0.22 (95% CI –0.31 to 0.75) 4. (–) Contacts for minor illness: Book: Before vs. After 1.13 vs. 1.09; Control Before vs. After 1.06 vs. 1.07; Before After Difference (95% CI) 0.03 (–0.17 to 0.10); Total Contacts for minor illness Book Before vs. After 2.24 vs. 1.74; Control Before vs. After 2.43 vs. 1.84 Before After Before After Difference (95% CI) 0.02 (–0.25 to 0.29)
Herman 2004[82]	Training class plus book	6 months	Self-report	1. Post vs. pre intervention: 32 fewer visits to the ED ($p < 0.01$) 2. None 3. Post vs. pre intervention: visits to doctor or clinic – post intervention they made 161 fewer visits to the doctor or clinic ($p < 0.01$) and 67 fewer calls to the doctor ($p < 0.03$) 4. None

Study	Brief intervention description (*n*)	Follow-up	Data source	Service use: 1. ED all visits 2. ED minor/non-urgent/inappropriate visits 3. GP all visits 4. GP minor/non-urgent visits/inappropriate visits
Herman 2009[83]	Health literacy intervention (self-help book on child health problems)	6 months	Self-report	Months pre intervention ($n = 110$) vs. post intervention ($n = 61$): 1. (±) Visited the ED: 73% vs. 43%, $p < 0.0001$; visited the ED more than once: 36% vs. 26%, $p = 0.19$; 2. None 3. None 4. None
Herman 2010[81]	Training class plus book, plus subsequent reinforcement, based on booklet	6 months, and then 3 years for a subsample	Self-report on survey	1. (+) Tracking survey data show that the number of ER visits decreased from 0.79 per year to 0.33 per year (i.e. decreased by 58%) (95% CI 51% to 66%). At 3 years (for a subsample), the reduction in the number of ER visits remained stable, while at-home treatment for minor childhood illnesses increased from the pilot study through the 2003 and 2005 programme years 2. See above 3. (+) The pre-training mean for the number of clinic visits per child is 3.69 per year (0.3072 per child per month). The post-training mean is equal to 2.19 per year, showing a reduction of 1.47 visits per child per year ($p < 0.001$). Tracking survey data show that doctor or clinic visits decreased by 42% (95% CI 33% to 46%). At 3 years, the reduction in doctor/clinic visits remained stable, while at-home treatment for minor childhood illnesses increased from the pilot study through the 2003 and 2005 programme years 4. See above
Hibbard 2001[79]	Community-wide self-care information project (Healthwise Communities Project)	12 and 24 months	Records	1. (+) ER visits definitely began to decline in the intervention group following the intervention 2. (±) TLAS visits showed a steady decline in the comparison communities. In the intervention communities, however, TLAS visits increased during the first follow-up year, but decreased during the second period. They remained higher during that period than during the baseline and were higher in the intervention communities than in the other two comparison communities by a factor of nearly two. But they were lower in the second follow-up period than the first follow-up period. ER visits definitely began to decline in the intervention communities while they increased in one comparison community 3. None 4. None

Study	Brief intervention description (n)	Follow-up	Data source	Service use: 1. ED all visits 2. ED minor/non-urgent/inappropriate visits 3. GP all visits 4. GP minor/non-urgent visits/inappropriate visits
Holden 2020[89]	Targeted educational materials for families who attend emergency or urgent care services with a child aged < 5 years in a non-urgent situation	11 months	Records	1. None 2. (–) Average number of non-urgent attendances (including reattendances from October 2017 to September 2018): intervention vs. control – mean 1.3 (SD 0.8) vs. mean 1.3 (SD 0.7); reattendance rate: 23.2% vs. 24.6%; 3. None 4. None
Hou 2012[122]	Triple Zero community awareness campaign	3 months	Records	1. Fewer patients arrived at the ED by road ambulance or other means as opposed to own transport (OR 0.90, 95% CI 0.80 to 1.00; $p = 0.055$) 2. Other results were counterintuitive. Patients arriving at the ED had significantly lower clinical urgency after the campaign than before the campaign. The changes were mainly driven by the decrease of ATS 3 from 46.5% to 44.0% and the increase of ATS 4 from 26.7% to 29.5%. After the campaign, patients attending the ED were significantly less likely to have higher clinical urgency than those attending before the campaign (Wald χ^2 test, $p = 0.0007$) ATS score (1–5),[a] pre vs. post intervention ($p < 0.0001$), n (%): 1 = 349 (2.0) vs. 358 (2.0) 2 = 2309 (12.9) vs. 2165 (12.2) 3 = 8326 (46.5) vs. 7827 (44.0) 4 = 4786 (26.7) vs. 5253 (29.5) 5 = 2042 (11.4) vs. 2092 (11.8) Missing = 108 (0.6) vs. 98 (0.6). Predictors of reduced urgency: older age, male, weekday, arrival by own transport, not waiting to be seen. After the campaign, fewer patients arrived at the ED by road ambulance or other means as opposed to own transport, although the impact of the campaign on the arrival mode was only close to statistical significance after controlling for other factors (Wald χ^2 test, $p = 0.055$) 3. None 4. None
Ladley 2018[90]	Anticipatory guidance at WCV + text messages	12 months	• Records for ED use, but limited to single ED • Self-report for satisfaction	1. (+) Control, 240 total visits (mean 2.12, SD 2.26) vs. intervention 168 total visits (mean 1.44, SD 1.65); $p < 0.05$. All ED visits: IRR 1.48 (95% CI 1.11 to 1.97; $p < 0.01$); urgent ED visits: IRR 1.79 (95% CI 1.05 to 3.05 $p = 0.03$) 2. (+) Non-urgent ED visits: IRR 1.43 (95% CI 1.06 to 1.94); $p = 0.02$ 3. None 4. None

Study	Brief intervention description (*n*)	Follow-up	Data source	Service use: 1. ED all visits 2. ED minor/non-urgent/inappropriate visits 3. GP all visits 4. GP minor/non-urgent visits/inappropriate visits
Lepley 2020[136]	1. Low health literacy paediatric health book (+ video training on how it use book) 2. Paediatric mHealth app 3. Book and app	6 months	Records, self-report	1. (–) Record review: no significant difference in rate of ED visits between the app and control groups (14% more visits; IRR 1.14, 95% CI 0.56 to 2.34), between the book and control groups (22% fewer visits; IRR 0.78, 95% CI 0.34 to 1.74) or between the book/app and control groups (40% fewer visits; IRR 0.60, 95% CI 0.25 to 1.42). Comparison of parental self-report with objective records of ED visits showed that 12.5% of parents inaccurately under-reported the number of ED visits in a 6-month period in all intervention arms 2. None 3. None 4. None
Little 2001[106]	1. Self-management booklet 2. Two-page summary card/leaflet on self-management of respiratory and common illness	12 months	Records	1. None 2. None 3. None 4. (+) Compared with the control group, fewer patients in the booklet and summary card groups attended frequently with minor illnesses: OR (adjusted for baseline attendance, and controlling for clustering at a practice level using practice as a cluster term in the model) compared with control – booklet: OR 0.81 (95% CI 0.67 to 0.99; $p = 0.043$); summary card: OR 0.83 (95% CI 0. 27 to 0.96; $p = 0.011$) (±) Compared with the previous year, there were small non-significant reductions in the incidence of contacts with minor illness for the booklet group (IRR 0.97, 95% CI 0.84 to 1.13) and summary card group (IRR 0.93, 95% CI 0.80 to 1.07)
Little 2016[84]	Internet-delivered intervention providing advice to manage respiratory tract infections	5 and 12 months	Self-report, records for reconsultations in primary care	1. None 2. None 3. (+) Based on self-report, a modest increase in contacts for NHS Direct among those who had a respiratory tract infection in the intervention group [37/1574 (2.4%) vs. 20/1661 (1.2%), multivariate risk ratio 2.25 (95% CI 1.00 to 5.07; $p = 0.048$)], but reduced contact with doctors [239/1574 (15.2%) vs. 304/1664 (18.3%), risk ratio 0.71 (95% CI 0.52 to 0.98; $p = 0.037$)]. There was no evidence that self-management advice resulted in delayed consultations for serious illnesses (e.g. lobar pneumonia, meningitis, sepsis) and, hence, increased hospitalisations; in fact, there were reduced hospitalisations, albeit not statistically significant, both in the shorter term (20 weeks) and longer term (1 year). Use of primary care records at 12 months showed no difference in consultations at the GP (risk ratio 0.85, 95% CI 0.65 to 1.12; $p = 0.259$), and the hospitalisation rate was lower in the intervention group, but this was not statistically significant (risk ratio 0.35, 95% IC 0.11 to 1.10; $p = 0.073$) 4. None

Study	Brief intervention description (n)	Follow-up	Data source	Service use: 1. ED all visits 2. ED minor/non-urgent/inappropriate visits 3. GP all visits 4. GP minor/non-urgent visits/inappropriate visits
Macfarlane 1997[101]	Information leaflet on lower respiratory tract infection	1 month	GP recorded reconsultations	Reconsultation rates: 1. None 2. None 3. (+) For the whole group, patients who received the leaflet had significantly fewer reconsultations for the same symptoms over the following month (14.9%) than those who did not receive a leaflet (21.4%) (OR 1.56, 95% CI 1.11 to 2.19; $p = 0.007$). Stratified analysis revealed no confounding effect for the presence of lower respiratory tract infection symptoms (Mantel–Haenszel weighted OR 1.52, 95% CI 1.10 to 2.11; $p = 0.007$). For the 723 patients who were treated with antibiotics, significantly fewer patients receiving a leaflet reconsulted (60/369, 16%), than those who did not receive the leaflet (81/354, 23%) (OR 1.53, 95% CI 1.03 to 2.26; $p = 0.02$). In the smaller group that was not prescribed antibiotics initially, the same trend for a reduction in reconsultations in the leaflet group was seen, but the difference was no longer significant 4. None
Macfarlane 2002[100]	Verbal advice on antibiotics and information leaflet, compared with verbal advice only	1 month	Records	1. None 2. None 3. (–) The reconsultation rates were similar for all patients: leaflet group 11/104 vs. no-leaflet group 14/105 4. None
McWilliams 2008[135]	Anticipatory guidance at WCV and prescription	12 months for service use	Records for service use	Visit use for ear pain before and after the nurse-administered anticipatory guidance programme, compared with control sites; mean (SD) rates per 1000 before programme ($n = 168$) and after programme ($n = 191$): 1. None 2. (±) 80% decrease in ED visits for ear pain, after regression models $p = 0.009$; 40% decrease in urgent care visits, but after regression models this was not statistically significant ($p = 0.33$). Intervention group, ED visits before vs. after, mean (SD): intervention – 107 (410) vs. 21 (144), –80% change; control – 48 (248) vs. 60 (295), 25% change; $p = 0.009$. Urgent care visits, before vs. after, mean (SD) rates per 1000: intervention – 315 (658) vs. 188 (568), –40% change; control – 365 (835) vs. 263 (662), –28% change; $p = 0.33$ 3. None 4. (–) 28% decrease in primary care visits for ear pain, compared with no change in control sites, but, after regression models, no change ($p = 0.14$): before vs. after, mean (SD) rates per 1000 – intervention: 762 (1249) vs. 550 (1064), –28% change; control: 667 (1491) vs. 639 (1269), –4% change; $p = 0.14$

Study	Brief intervention description (*n*)	Follow-up	Data source	Service use: 1. ED all visits 2. ED minor/non-urgent/inappropriate visits 3. GP all visits 4. GP minor/non-urgent visits/inappropriate visits
				Other: reduction in total attendances to all services for ear pain ($p = 0.045$) (–), before vs. after, mean (SD) rates per 1000 – intervention: 1184 (1763) vs. 759 (1390), –36% change; control: 1080 (2038) vs. 962 (1621), –11% change; $p = 0.045$
Murray 2011[124]	NHS Choices website	At the time of visiting the website	Self-report	1. None 2. None 3. (–) Online sample ($n = 1559$): effect of NHS Choices on frequency of GP visits – decreases the number of visits I make: $n = 515$, 33.0%, 95% CI 30.7 to 35.4; increases the number of visits I make: $n = 43$, 2.8%, 95% CI 2.0 to 3.7; makes no difference: $n = 839$, 53.8%, 95% CI 51.3 to 56.3; did not answer: $n = 162$, 10.4%, 95% CI 8.9 to 12.0. GP sample ($n = 125$): effect of NHS Choices on frequency of GP visits – decreases the number of visits I make: $n = 23$, 18.4%, 95% CI 12.0 to 26.3; increases the number of visits I make: $n = 2$, 1.6%, 95% CI 0.2 to 5.7; makes no difference: $n = 88$, 70.4%, 95% CI 61.6 to 78.2; did not answer: $n = 12$, 9.6%, 95% CI 5.1 to 16.1. Was NHS Choices used to help with appointment today? Yes: $n = 24$, 19.2%, 95% CI 12.7 to 27.2; no, did not use internet for this appointment: $n = 87$, 69.6%, 95% CI 60.7 to 77.5; no, use another internet site: $n = 4$, 3.2%, 95% CI 0.9 to 8.0; did not answer: $n = 10$, 8.0%, 95% CI 3.9 to 14.2 4. None
O'Neill-Murphy 2001[103]	Interactive fever education (pamphlet + discussion and training)	2 and 8 weeks	Self-report	1. (–) Only one child, in the control group, had visited the ED in the time period, even though 30% ($n = 11$) of the control and 43% ($n = 10$) of the intervention had a fever in the previous 2 weeks 2. None 3. None 4. None
Patel 2018[91]	Education and information: emergency physician telephone call to discuss services plus mailed information on services; mailed information only	6 months	Records	1. (±) ED visits: telephone intervention vs. matched control outcome (model): relative visit/utilisation rate 0.92 (CI 0.77–1.10), $p = 0.36$ (≥ 65 years: 0.78 (0.62–0.99), $p = 0.04$); mail intervention vs. matched control outcome: 1.07 (0.92–1.23), $p = 0.40$ (< 65 years: 0.73 (0.55–0.98), $p = 0.03$) 2. None 3. Days with AACC calls: telephone intervention vs. matched control outcome (model): 0.93 (0.68–1.27), $p = 0.63$; mail intervention vs. matched control outcome: 0.83 (0.60–1.13), $p = 0.23$ 4. None

Study	**Brief intervention description (*n*)**	**Follow-up**	**Data source**	**Service use:** **1. ED all visits** **2. ED minor/non-urgent/inappropriate visits** **3. GP all visits** **4. GP minor/non-urgent visits/inappropriate visits**
Plass 2005[75]	Self-care booklet for minor illness	12 months pre intervention and 24 months post intervention	Records for service use, self-report	1. None 2. None 3. None 4. (+) Intervention group: a significant decrease in self-reported care-seeking behaviour concerning minor ailments and self-limiting health problems was found [$F(2,230) = 8.9$; $p = 0.001$]. At baseline, the participants reported that, during the previous 6 months, they had consulted their GP a mean of 3.0 (SD 2.2) times because of a mean of 4.9 (SD 2.1) different minor illnesses. Six months later, they reported that they had consulted their GP a mean of 2.1 (SD 2.0) times for a mean of 5.1 (SD 3.2) different minor illnesses. One year after the intervention, they reported 1.7 (SD 1.8) consultations for 5.3 (SD 2.7) different minor illnesses Control group: the number of consultations for minor illnesses that the participants in the reference group reported was an average of 2.4 (SD 2.3) for 5.4 (SD 3.7) different minor illnesses, and did not differ significantly from the number of consultations reported by the intervention group at time 2. However, there was a difference based on nationality. The medical records of both the intervention group [$t(94) = 3.3$; $p = 0.001$] and the control group [$t(122) = 2.7$; $p = 0.007$] showed a significant decrease in care-seeking behaviour concerning minor illnesses. This effect remained 2 years after the intervention, in particular among the Dutch participants in the intervention group [$t(31) = 2.4$; $p = 0.02$] The medical records of both the intervention group ($p = 0.001$) and the second intervention group that did not get lots of interviews as part of the research ($p = 0.007$) showed a significant decrease in care-seeking behaviour concerning minor illnesses. This effect remained 2 years after the intervention. The medical records of the controls did not show a change in the number of consultations for minor illnesses during the research period
Platts 2005[107]	Self-care health book; NHS Direct	12 months	Records	Consultation rates: 1. (–) Differences between the groups in the number of visits to EDs and in the numbers of telephone calls, home visits and nurse clinics were small and not statistically significant 2. None 3. (–) Mean annual consultation rates, including routine GP consultations and emergency consultations with a GP or nurse practitioner, for the 12-month period of the study, classified by age group, sex and book

Study	Brief intervention description (*n*)	Follow-up	Data source	Service use: 1. ED all visits 2. ED minor/non-urgent/inappropriate visits 3. GP all visits 4. GP minor/non-urgent visits/inappropriate visits
				group, did not, in general, differ between the three arms of the study. Use of NHS Direct telephone service: a total of 160 participants made an average of 1.19 calls to the NHS Direct telephone service. In a multivariable logistic regression model, the odds for calling NHS Direct were nearly doubled for being allocated to the NHS Direct group, rather than to the control or the self-care book group ($p < 0.01$) 4. None
Powell 1995[127]	Health guide given as part of health screening	5 months	Self-report	1. Reduced number of ED visits by 52 2. None 3. Reduced number of GP visits by 126 4. None
Powell 1997[128]	Self-care workshop and booklet	12 months	Records	1. (+) The frequency of ED visits decreased by 100 visits, or 19.8% 2. None 3. (+) The frequency of health-care provider office visits decreased by 932 visits (18.4%). All categories of health-care provider office visits showed declines (freestanding laboratory, accidents, consultations, regular, all other). The frequency of all outpatient visits declined by 1032, or 18.5%. This averaged a little over 1 fewer visit per employee. All 938 subscribers (371 employees and 567 dependents): frequency of health-care provider office visits decreased by 522 visits, or 12.2%. The frequency of subscriber total outpatient visits declined by 495 visits, or 10.8% 4. None
Racine 2009[92]	Follow-up counselling telephone call by the primary care practice within 72 hours of the initial PED visit to counsel about appropriate services	12 months	Records	All intervention vs. control follow-up visits by type of visit within 1 year of index visit ($N = 23{,}516$), type of visit: 1. (+) Both intervention and control groups were as likely to return to the PED after their initial PED visit (38% intervention vs. 39% control; $p = 0.26$). But, looking at visits, the adjusted odds of returning to a PED rather than another service was 0.88 (95% CI 0.82 to 0.94). Intervention vs. control: PED – $n = 2145$ (17.7%) vs. $n = 2329$ (20.4%); $p < 0.001$; hospitalisation – $n = 325$ (2.7%) vs. $n = 302$ (2.6%); $p = 0.96$; subspecialty – $n = 2744$ (22.6%) vs. 2220 (19.5%); $p < 0.001$ 2. None 3. (–) Primary care, intervention vs. control: $n = 6905$ (57.0%) vs. $n = 6546$ (57.4%); $p = 0.68$ 4. None 5. (+) Total, intervention vs. control: 12,119 vs. 11,397; $p < 0.001$. The adjusted OR of a follow-up visit by an intervention subject, compared with by control subject, being to the PED was 0.88

Study	Brief intervention description (*n*)	Follow-up	Data source	Service use: 1. ED all visits 2. ED minor/non-urgent/inappropriate visits 3. GP all visits 4. GP minor/non-urgent visits/inappropriate visits
Rector 1999[125]	Mailing booklet (First Look) about non-urgent care to Medicaid beneficiaries	6 months	Records	1. (–) Analysed separately for two Medicaid schemes: plan A and plan B. In plan A, the percentage of household members in the intervention group who visited an ED differed from the control group by –1.1% (95% CI –3.1% to 0.8%), that is a reduction that was not statistically significant. The difference in plan B was –1.2% (95% CI –4.1% to 1.4%) 2. (–) ED use by diagnosis: although 50–60% of the visits had a diagnosis discussed in First Look, the percentages of ED visits for these specific conditions were similar in the intervention and control groups in both health plans. Overall, the intervention did not lead to proportionately fewer visits for conditions discussed in First Look 3. (–) The hypothesis was that GP-type visits would increase. Neither health plan differed significantly in the percentage of intervention households or household members who visited an office-based physician; there were also no differences when subgrouping by age (< 19 years and ≥ 19 years) 4. None
Robbins 2003[108]	Home visit and booklet	7 months	Case note review for service use	1. None 2. None 3. (±) Parents receiving the intervention visited the child health clinic on significantly fewer occasions than parents in the control group: mean of 6 vs. 9 times ($p = 0.039$). There were no other significant differences in service use between the two groups: GP visits, prescriptions (e.g. antibiotics), minor illness, nurse telephone and home visits, health visitor telephone and home visits 4. (–) There were no other significant differences in service use between the two groups specifically for minor illness
Rutten 1993[77]	Systematic patient education about cough	12 months	Not clear	1. None 2. None 3. (+) In both groups, the consulting behaviour changed. In the experimental practices, the GP was confronted with everyday cough on fewer occasions (16 before vs. 11 after in intervention practices, 28 before vs. 34 after in control practices) and with alarming symptoms more often (31 before vs. 47 after, compared with 16 before vs. 19 after in the control group) 4. None

Study	Brief intervention description (*n*)	Follow-up	Data source	Service use: 1. ED all visits 2. ED minor/non-urgent/inappropriate visits 3. GP all visits 4. GP minor/non-urgent visits/inappropriate visits
Shnowske 2018[93]	Care guide use for repeated non-emergent complaints	3 months (compared with 12 months previously)	Records	1. The mean number of ED visits per month was 1.20 (SD 0.66) before the care guide and 0.71 (SD 0.54) after care guide assignment. This represents approximately a 41% (95% CI 43.2% to 54.8%) decrease in ED visits per month 2. The visit change analysis showed that visits for pain-related complaints decreased by 0.51 visits per month. These results demonstrate that care guide initiation reduces ED use by at least 40% for chronic non-emergent complaints, but fails to show that these patients are being redirected back to primary care resources 3. The mean number of PCP visits per month was 0.31 (SD 0.64) before the care guide and 0.28 (SD 0.68) after care guide assignment ($p = 0.30$). Had expected to see an increase 4. None
Spoelman 2016[129]	Evidence-based health website	3 years	Records (website and health records)	Trend in total number of consultations per 1000 patients per month before and after launch of the website: 1. None 2. None 3. (±) Trend in total number of consultations per 1000 patients per month before and after launch of the website: type of consultations – pre-intervention slope vs. post-intervention slope/slope change; *p*-value: ○ Top 10 topics: 28.408/0.092 vs. 0.077/–0.169; 0.003 The consultation rate decreased by 6.2% in the first year and by 11.6% after 2 years. All consultations: 272.109/0.826 vs. –0.794/–1.620; $p < 0.001$; so the change in the slope of GP consultations before and after the website was introduced was –1.620 ($p < 0.0001$). The trend for the top 10 topics reduced while the rates for the reference group stayed the same: ○ Top 10 topics: 28.408/0.092 vs. 0.077/–0.169; 0.003 ○ Constipation: 0.026 vs. –0.007/–0.033; < 0.001 ○ Vaginal discharge: 0.013 vs. –0.016/–0.029; < 0.001 ○ Irritable bowel syndrome: 0.009 vs. –0.003/–0.011; < 0.001 ○ Herpes zoster 0.002 vs. –0.001/–0.003; < 0.001 ○ Bladder infection in women: 0.090 vs. –0.011/–0.101; 0.009 ○ Lower back pain: 0.012 vs. –0.013/–0.025; 0.03

Study	Brief intervention description (*n*)	Follow-up	Data source	Service use: 1. ED all visits 2. ED minor/non-urgent/inappropriate visits 3. GP all visits 4. GP minor/non-urgent visits/inappropriate visits
				○ Gout: 0.008 vs. 0.004/–0.004; 0.38 ○ Shoulder symptoms: 0.000 vs. –0.004/–0.005; 0.46 ○ Diarrhoea: –0.008 vs. –0.013/–0.005; 0.7 ○ Sinusitis: –0.007 vs. –0.015/–0.008; 0.76 ○ Reference group: –0.005 vs. –0.006/–0.001; 0.96 ○ Head trauma: 0.001 vs. 0.001/0.000; 0.94 ○ Premenstrual syndrome: 0.000 vs. 0.000/0.000; 0.92 ○ Contact eczema: –0.006 vs. –0.007/–0.001; 0.96
Steelman 1999[119]	Fever education: slide presentation on well-infant care topics + additional presentation on fever and mailed reminders	4 months	Records	1. None 2. Intervention vs. control: appropriate number of ER and clinic visits: 5 vs. 9; inappropriate visits: 6 vs. 8; $p > 0.99$ 3. None 4. Intervention vs. control: appropriate number of ER and clinic visits: 5 vs. 9; inappropriate visits: 6 vs. 8; $p > 0.99$
Steinweg 1998[120]	SCIP coupled with a HPP	6 months	Self-report	1. None 2. (+) A total of 181 visits to the ER were avoided, with 39.8% of the respondents indicating that they avoided at least one visit to the ER 3. None 4. (+) Avoidance of clinic visits for self-limiting conditions. The SCIP questionnaire revealed that 72% of the respondents avoided at least one clinic visit. A total of 423 clinic visits were avoided by the SCIP questionnaire respondents during the 6-month study period. During the same 6-month study period, a total of 221 HPP visits (63.6%) were recorded by SCIP questionnaire respondents; 25% used the HPP two or more times during the study
Stockwell 2014[126]	URI-related educational intervention + standard curriculum	5 months	Self-report	1. (+) Children aged < 4 years from intervention families had fewer PED visits per illness episode than the standard curriculum group [18/205 (8.8%) vs. 29/191 (15.2%); $p = 0.049$]. The majority of this difference was for children aged 6–48 months [intervention families, 16/194 (8.2%) vs. standard curriculum, 29/185 (15.7%); $p = 0.025$). The relationship between intervention status and fewer PED visits was also significant on the family level ($p = 0.03$). Intervention families attending all three classes had 6.2% of illness episodes result in a PED visit for a child aged 6–48 months (5/80), whereas, for those attending two classes, it was 7.8% (8/102) and for those attending 0 or 1 class it was 25% (3/12) ($p = 0.087$) 2. None 3. None 4. None

Study	Brief intervention description (*n*)	Follow-up	Data source	Service use: 1. ED all visits 2. ED minor/non-urgent/inappropriate visits 3. GP all visits 4. GP minor/non-urgent visits/inappropriate visits
Sturm 2014[94]	PCP-specific teaching and standard discharge instructions	6 and 12 months	Records	1. (–) PED follow-up at 6 and 12 months, control ($N = 168$) vs. intervention ($N = 164$): high-acuity follow-up – 6 months, $n = 18$ (10.7%) vs. $n = 22$ (13.4%); $p = 0.56$; 12 months, $n = 69$ (41.1%) vs. $n = 74$ (45.1%); $p = 0.53$ 2. (+) PED follow-up at 6 and 12 months, control ($N = 168$) vs. intervention ($N = 164$): low-acuity follow-up – 6 months, $n = 31$ (18.4%) vs. $n = 21$ (12.8%); $p = 0.14$; 12 months, $n = 91$ (54.2%) vs. $n = 70$ (42.7%); $p = 0.047$ 3. (–) The intervention group had 203 WCVs (1.23 per patient), compared with 195 (1.16 per patient) in the control group (rate difference 0.02 per person-years, 95% CI –0.2 to 0.3; $p = 0.87$). The intervention group had 139 sick visits during the follow-up period (0.85 visits per patient), compared with 109 in the control group (0.65 per patient) (rate difference 0.19 per person-year, 95% CI 0.013 to 0.39; $p = 0.036$), that is the treatment group used their PCP more, as planned 4. None
Sustersic 2013[131]	Patient information leaflets	2 weeks	Self-report in telephone interview	1. None 2. None 3. None 4. (+) Proportion consulting for the same symptoms in the households of intervention group: 23.4%, vs. 56.2% of controls ($p < 0.01$)
Thomson 1999[132]	Baby Check scorecard and accident prevention leaflet	6 months	Records	Consultation rates 1. None 2. None 3. (–) No differences were detected between groups in the use of primary care services, excluding child health surveillance and immunisation attendances: median of 2 vs. 2 consultations for intervention vs. control ($p = 0.26$). Use of OOH service did not differ either (86 vs. 85 consultations; $p = 0.93$) 4. None
Thornton 1991[133]	Baby Check scorecard/booklet and nurse validation visit	6 months	Self-report	Medical contacts 1. None 2. None 3. Only reports numbers of mothers reporting contact with health-care professionals. Contacts with their health visitor, midwife or doctor were mostly for minor complaints
Usherwood 1991[97]	Booklet and covering letter	12 months	Contact record completed by practice staff	Initial contacts recorded for booklet symptoms per household: 1. None 2. None 3. None

Study	Brief intervention description (n)	Follow-up	Data source	Service use: 1. ED all visits 2. ED minor/non-urgent/inappropriate visits 3. GP all visits 4. GP minor/non-urgent visits/inappropriate visits
				4. (±) Although there was no significant difference between the booklet and control groups for daytime health centre contacts, there were differences for daytime home visits and for contacts OOH. For daytime home visits, the mean frequency of initial contacts was substantially lower in the booklet group than in the control group for households with one or two children. It is not clear why this trend was reversed for households with three children. Despite this, had the booklet been mailed to all the households in the practice, then the estimated effect on the frequency of initial daytime home visits for booklet symptoms was –0.28, that is a 28.7% reduction. For OOH contacts for booklet symptoms, the mean frequencies of initial contacts were higher in the booklet group than in the control group for all sizes of household. Had the booklet been mailed to all the households in the practice, then OOH consultations would have increased by 173%. Consultation behaviour appeared to be dependent on symptom
van der Gugten 2015[98]	WHISTLER-online intervention to inform on respiratory symptoms and support decisions on contacting appropriate services	12 months	Records for service use, and self-report for preceding month on monthly questionnaire (data combined for some outcomes)	Number of visits for respiratory symptoms during the entire first year of life 1. (–) None 2. None 3. (–) Intervention ($N = 314$) vs. control ($N = 305$): No visits: 156 (49.7%) vs. 150 (49.2%); IRR 0.96 (95% CI 0.85 to 1.09; $p = 0.532$) record data only, similar for combined record and self-report data 1 visit: 27 (8.6%) vs. 27 (8.9%) 2 visits: 49 (15.6%) vs. 39 (12.8%); 3 visits: 32 (10.2%) vs. 37 (12.1%); > 3 visits: 50 (15.9%) vs. 52 (17.0%) 4. None
Wagner 2001[80]	Community-wide self-care information project (Healthwise Communities Project): handbook, website, advice line, media campaign	12 months	Self-report	1. None 2. None 3. [b]Entry in care (0 vs. ≥ 1 visits) (% yes): at baseline, 84.5% of the intervention group had visited a doctor in the previous year, vs. 86.1% of the control group; at 1 year: 88.9% intervention vs. 86.8% control; difference in differences 3.7%, OR 1.38 (95% CI 0.97 to 1.95; $p = \text{NS}$). Number of visits: Baseline – 3.69 intervention vs. 3.84 control; 1 year: 3.73 intervention vs. 3.67 control; $p = \text{NS}$. After adjusting for observable characteristics, both entry into care and number of visits were not statistically associated with the Healthwise Communities Project intervention 4. None

Study	Brief intervention description (*n*)	Follow-up	Data source	Service use: 1. ED all visits 2. ED minor/non-urgent/inappropriate visits 3. GP all visits 4. GP minor/non-urgent visits/inappropriate visits
White 2012[121]	Self-care skills training course	6 months, with 12-month gap between baseline and after period	Records	Consultations: 1. (–) When comparing the intervention group with the comparison, no statistically significant changes were seen in use of A&E services (OR 1.64, 95% CI 0.84 to 3.32; $p = 0.157$) or in use of NHS Direct (OR 1.36, 95% CI 0.88 to 2.11; $p = 0.169$). In both groups, males were statistically significantly less likely to use NHS Direct than females in the follow-up period (OR 0.49, 95% CI 0.28 to 0.82; $p = 0.009$). The proportion of people using services in the follow-up period was statistically significantly increased in the intervention group, compared with the comparison group, for outpatient visits (OR 3.11, 95% CI 1.83 to 5.45; $p < 0.001$) and hospital admissions (OR 3.90, 95% CI 1.80 to 9.42; $p = 0.001$) 2. None 3. (–) The intervention did not make a detectable difference to the number of consultations with GPs or other PCPs in the follow-up period, taking into account the number of baseline consultations as appropriate (expected number of GP consultations for a person in the intervention group is 1.15 times that of their counterpart in the comparison group, 95% CI 0.96 to 1.36; $p = 0.126$; expected number of PCP consultations for a person in the intervention group is 1.17 times that of their counterpart in the comparison group, 95% CI 0.93 to 1.46; $p = 0.182$). In both groups, males were statistically significantly less likely than females to consult GPs or other PCPs in the follow-up period for a given level of baseline consultations (expected number of GP consultations for a male participant is 0.75 times that of their female counterpart, 95% CI 0.61 to 0.92; $p = 0.005$; expected number of PCP consultations for a male participant is 0.55 times that of their female counterpart, 95% CI 0.42 to 0.73 consultations; $p < 0.001$) The proportion of people using services in the follow-up period was statistically significantly increased in the intervention group, compared with the comparison group, for OOH services (OR 2.26, 95% CI 1.10 to 4.92; $p = 0.031$) 1. None

Study	Brief intervention description (n)	Follow-up	Data source	Service use: 1. ED all visits 2. ED minor/non-urgent/inappropriate visits 3. GP all visits 4. GP minor/non-urgent visits/inappropriate visits
Yardley 2010[53]	Web-based intervention providing tailored advice for self-management of minor respiratory symptoms	4 weeks	Self-report	1. None 2. None 3. (–) Of the people in the internet doctor group, 11 (11.6%) had consulted their doctor or used other health-care services (mainly NHS Direct) for their symptoms, compared with a substantially greater proportion ($n = 21$, 17.6%) in the control group, although this difference did not approach significance in this small sample ($p = 0.22$) 4. None
Yoffe 2011[95]	Parent-focused educational intervention booklet	18 months	Records	1. (+) There was a dramatic drop in ED use rates by children seen in the clinic in which the booklet was distributed. The reductions range from 55% to 81%, compared with the same month of the previous year and compared with other geographies. The two-factor, mixed-model analysis of variance showed that, compared with the control groups, the decline in use rates by intervention patients was statistically significant ($p < 0.001$) 2. None 3. None 4. None

a The ATS is an ordinal scale for rating clinical urgency. It ranges from 1 to 5, with 1 being assigned to the most urgent presenting problem.

b Medical use; seeing a doctor.

AACC, Advice and Appointment Call Centre; A&E, accident and emergency; ATS, Australasian Triage Scale; CI, confidence interval; ER, emergency room; FMC, family medical centre; HPP, health promotion pharmacy; IRR, incidence rate ratio; mHealth, mobile health; NS, not significant; OOH, out of hours; OR, odds ratio; PCP, primary care provider; PED, paediatric emergency department; SCIP, self-care intervention programme; SD, standard deviation; TLAS, time-limited acute symptom; URI, upper respiratory infection; WCV, well-child visit; WHISTLER, WHeezing Illnesses STudy LEidsche Rijn.

Appendix 8 Other outcomes (studies in alphabetical order)

Study	**Brief intervention description (*n*)**	**Follow-up**	**Data source**	**Views regarding interventions, intentions, behaviour, knowledge and confidence, effect of intervention (non-service use)**
Anhang Price 2013[123]	SORT for Kids: triage website for adults and carers of children with influenza-like illness	Cross-sectional	• Records of treatments during visit • Self-report telephone survey for satisfaction	• 5.2% ($n = 15$) of visits to the PED were deemed clinically necessary by checking records of the PED visit • (–) SORT identified a large proportion of clinically unnecessary visits as high risk • (+) Satisfaction: 90% of participants reported that the website was 'very easy' to understand and use. Ratings did not differ by respondent race, ethnicity or educational attainment
Beal 2020[116]	I Care Guide and companion website	12 months	Self-report	• (–) Satisfaction: the majority of adolescents reported that the I Care Guide was somewhat (46%) or very helpful (42%), and 78% of participants who responded to surveys at the 12-month follow-up reported that they still had the guide (i.e. 42% of all participants who received a guide at enrolment). The majority of youth (80%) reported using the I Care Guide at least once during the study, with sections discussing emergency care, reproductive health, and symptoms information most commonly endorsed • (–) The ICare2Check website (www.icare2check.org) was used less frequently by study participants, with 140 unique users locally accessing the site over the study period and a median frequency of one visit per local user
Chiu 2012[139]	Community-run and GP-supervised self-care for minor illnesses programme implemented through ESCMSs	9 months	Self-report	(+) Use: 80% ($n = 80$) of the respondents were aware of the existence of the ESCMSs, and the MMI service was known to most residents and was used by most of them. Compared to respondents who had not used the MMI service ($n = 30$), those who had used the service ($n = 50$) considered the ESCMSs more helpful (90.00% vs. 76.67%; $p < 0.05$) and had greater willingness to seek help from the ESCMSs in the future (88.00% vs. 56.67%; $p < 0.01$)
Cowie 2018[104]	eConsult website: self-care assessment and advice for the conditions most commonly presented to GPs	5 months	System log data and self-report patient surveys	• Patient data from surveys (only 6.5% of patients completed the surveys) • Satisfaction: flexibility around eConsult use – there was consensus around the flexibility gained from eConsult use, with patients greatly appreciating how the service could fit around them and their lifestyle: 'As someone who works 9–5 it is very convenient service. It is trustworthy and reliable which makes it even better' (patient)

Study	Brief intervention description (*n*)	Follow-up	Data source	Views regarding interventions, intentions, behaviour, knowledge and confidence, effect of intervention (non-service use)
				• Issues concerning when eConsult is appropriate to use: there were some concerns raised around when eConsult should be used and when other means of communication were more appropriate. It was felt that given the length of time taken to enter the required details for an eConsult, more clarity should be provided as to whether the eConsult was appropriate to complete for the patient's current need: 'Using the system for the first time, found it a bit frustrating repeating answers to some of the questions' (patient) • However, such comments were balanced out by patients who felt that the service suited their needs and sat well with existing services[104]
Elsenhans 1995[138]	Self-care manual	12 months	Self-report	Satisfaction: there was general enthusiasm among members and staff, and the majority recommended the continued use of the self-care manual; no dissatisfaction was expressed
Fieldston 2013[88]	Health education and training by PED nurses in primary care	6 months	Knowledge tests	• (+) Knowledge: the intervention increased knowledge, as measured by performance on the 19-item evaluation questionnaire, with mean scores increasing from 55% in the pre-intervention assessment to 77% ($p < 0.001$) immediately following the intervention • All three content areas (colds, fever and trauma) saw increase in knowledge, comparing the pre-intervention and post-intervention test results. Among the 20 participants, the mean score on the follow-up test declined from the value immediately after the intervention (79% for those 20 participants to 71%; $p = 0.031$), but remained higher than before the intervention (61%; $p = 0.015$). For the same group, the mean scores for specific content areas were not significantly different at follow-up from post-intervention levels, except for trauma, in a negative direction (from 74% to 62%; $p = 0.044$)
Francis 2009[99]	Interactive booklet on childhood respiratory tract infections	2 weeks	Self-report	(–) Satisfaction: there were no significant differences in terms of satisfaction, level of reassurance, parental enablement or the parent's rating of the 'usefulness of any information received in the consultation'
Hansen 1990[105]	Health booklet on minor illnesses	6 months	Self-report	(+) Confidence: self-management of episodes of illness – 51% in the intervention group and 36% in the control group reported some kind of self-treatment. This difference was significant

Study	Brief intervention description (*n*)	Follow-up	Data source	Views regarding interventions, intentions, behaviour, knowledge and confidence, effect of intervention (non-service use)
Herman 2004[82]	Training class plus book	6 months	Self-report	• (+) Use: most parents claimed to have used the book and had a positive experience with it. A total of 145 (96%) rated the book as 'very easy to understand', with none reporting that it was 'hard to understand' and only 3% reporting that they had not used the book. A total of 122 parents (81%) found the book to be 'very useful' and 26 (17%) found it useful 'sometimes'. Only 2% reported that they had not used the book in response to a question about the book's usefulness ('If you used this book, how useful was it?') • (±) In response to the question 'If you used this book, what would make the book better?', roughly 42% of the parents (63/151) thought the book was 'perfect the way it is', and 32% (48/151) felt that it would be helpful to 'add more information'. With 13% of parents (20/151) recommending that the authors 'add more pictures', more than half (51%) seemed curious to learn more, either by indicating their general desire for 'more information' and more pictures (a combined total of 45%) or by suggesting that the authors 'make [the book] longer' (6%). Seventy-one per cent of respondents (107/151) claimed to have used the book 'frequently', with 67% (101/151) rating the book 'very well liked'. [One-third of parents (33%) found the book to be 'okay'] • (+) Use: accessing health information – according to the survey, exposure to the self-care book or to the book with additional training affected the way many parents accessed their health information. Before the intervention, about half of the parents (52%) claimed to derive health information 'from the doctor or clinic'. Following the intervention, however, only 18% claimed to access health information this way, a decrease of 34%. The effects of the training were evident in parents' responses to the question 'When your child is sick, where do you first go for help?'. In the control group (those who received the book without the additional training), 69% responded that they would 'call [their] child's regular doctor or health phone line'. In the intervention group, however, which received both the book and training in how to use it efficiently, 58% responded that they would 'look in a book', with only 28% reporting that they would 'call [their] child's regular doctor or health phone line'. (Only 1% of those in the control group responded that they would 'look in a book' first.) Eight per cent of those in the control group had noted that they would 'take [their] child to the emergency room', whereas only 3% of those in the intervention group claimed they would take that route when a child

Study	Brief intervention description (*n*)	Follow-up	Data source	Views regarding interventions, intentions, behaviour, knowledge and confidence, effect of intervention (non-service use)
				was sick. (Seventeen per cent in the control group would 'call family or friends', whereas only 7% in the intervention group chose that option.) Overall, then, 6 months following the intervention, more parents claimed they would turn to a book and fewer claimed they would take a child to the clinic or ED in response to a perceived illness • (+) Confidence: parents' confidence levels seemed to be positively affected by the book and training. When asked whether or not they felt confident caring for their child's health-care needs after reading the book, 84% responded that they were 'more confident after reading the book' and 16% felt 'the same after reading the book' • Intention: parent responses to mild conditions, including what they would do if their child had a fever of 99.5 °F (37.5 °C), had an earache, was vomiting and had diarrhoea, or had a runny nose and a cough. In each case, more parents would look in a book and fewer would call 911, go to the ED, or go to the doctor or a clinic: parent responses, % change pre vs. post intervention – ○ Do nothing and wait: fever of 99.5 °F, 15%; earache, 2%; vomiting and diarrhoea, 4%; runny nose or cough, –18% ○ Keep them home from school: fever of 99.5 °F, –10%; earache, 15%; vomiting and diarrhoea, 9%; runny nose or cough, –2% ○ Look in a book: fever of 99.5 °F, 13%; earache, 13%; vomiting and diarrhoea, 17%; runny nose or cough, 19% ○ Call 911; go to ED: fever of 99.5 °F, –3%; earache, –4%; vomiting and diarrhoea, –2%; runny nose or cough, –5% ○ Go to doctor; clinic: fever of 99.5 °F, –6%; earache, –27%; vomiting and diarrhoea, –8%; runny nose or cough, –12% ○ Other: fever of 99.5 °F, –12%; earache, –2%; vomiting and diarrhoea, –20%; runny nose or cough, 12%
Herman 2009[83]	Health literacy (self-help book on child health problems)	6 months	Self-report	(+) Intention: hypothetical responses to low-acuity child medical problem scenarios: • Temperature of 99.5 °F (37.5 °C) – pre intervention vs. post intervention: (1) do nothing and wait, 26% vs. 31%; (2) look in a health book, 5% vs. 27%; (3) talk to family or friends, 6% vs. 5%; (4) visit a physician's office or clinic, 44% vs. 31%; (5) go to the ED, 16% vs. 7%; (6) do not know, 3% vs. 0% ($p = 0.0002$)

Study	Brief intervention description (*n*)	Follow-up	Data source	Views regarding interventions, intentions, behaviour, knowledge and confidence, effect of intervention (non-service use)
				• Vomiting for 1 day – pre intervention vs. post intervention: (1) do nothing and wait, 14% vs. 10%; (2) look in a health book, 1% vs. 20%; (3) talk to family or friends, 7% vs. 10%; (4) visit a physician's office or clinic, 65% vs. 55%; (5) go to the ED, 12% vs. 5%; (6) do not know, 1% vs. 0% ($p = 0.0025$) • Earache – pre intervention vs. post intervention: (1) do nothing and wait, 4% vs. 7%; (2) look in a health book, 2% vs. 25%; (3) talk to family or friends, 3% vs. 3%; (4) visit a physician's office or clinic, 82% vs. 61%; (5) go to the ED, 7% vs. 5%; (6) do not know, 1% vs. 0% ($p = 0.0469$) • Cough – pre intervention vs. post intervention: (1) do nothing and wait, 20% vs. 34%; (2) look in a health book, 7% vs. 31%; (3) talk to family or friends, 7% vs. 3%; (4) visit a physician's office or clinic, 61% vs. 29%; (5) go to the ED, 3% vs. 2%; (6) do not know, 1% vs. 0% ($p = 0.0171$) When asked again about the low-acuity child health scenarios, there was a reduction in the proportion who would visit a physician's office or clinic for each complaint, and also a significant reduction in the proportion that would go to the ED for a low-grade fever and for vomiting for 1 day
Herman 2010[81]	Training class plus book, plus subsequent reinforcement, based on booklet	6 months	Self-report	• (+) Changes in behaviour (anxiety, responses to illness): the proportion of parents who answered using the ER as a first source of help was 4% (369/9240) before the training and 1% (73/7281) after the training. Although 85% of parents reported in the pre assessment that they can always take care of their child, 90% reported getting worried to some degree when their child was sick, and 57% reported that they were sometimes unsure of what to do when their child was sick. After participating in the intervention and receiving training in the use of a health book, the percentage of parents who reported being 'very worried' when their child is sick decreased by one-third • (+) Results from the parental assessment showed a significant change in behaviour across all measures. When asked, 'When your child is sick, where do you first go for help?', responses that listed doctor visits as the first source for treatment decreased from 69% to 33%, and seeking treatment at an ER decreased from 8% to 2%

Study	Brief intervention description (*n*)	Follow-up	Data source	Views regarding interventions, intentions, behaviour, knowledge and confidence, effect of intervention (non-service use)
				• (+) Parents also were asked how they would respond to specific common childhood illnesses, such as a fever of 99.5 °F. Possible responses ranged from using the health book provided in the training to taking the child to the doctor or the ER. After the training, the proportion of parents who stated that they would refer to a health book increased from 5% to 48% • Outcomes: workdays missed by the primary caretaker per year decreased by 42% (95% CI 35% to 50%), and school days missed per year decreased by 29% (95% CI 23% to 35%). Changes in school days missed were confirmed through examination of school records
Hibbard 2001[79]	Community-wide self-care information project (Healthwise Communities Project)	12 and 24 months	Self-report	(+) Use: the effects observed for manual use appeared to be greater in the intervention community than in the comparison communities – the intervention respondents were more likely to indicate that using a self-care manual helped them self-treat a symptom and saved them a visit to the doctor. The magnified effect observed in the intervention community for manual use does not occur for use of a nurse advice line or computer program. Thus, it appears that the intervention increased the use of manuals, as well as the effects of using a manual
Huyer 2018[112]	ED physician-delivered education using two-page pamphlet	Cross-sectional	Self-report	• (±) Health-care staff: thematic grouping of barriers and enablers for physician participation following the domains of the TDF: ○ TDF domain: social/professional role and identity – – Barriers: message already part of physician discharge instructions; mot the PED physician's job to deliver message – Enabler: pamphlet provided more structure to discharge conversation ○ TDF domain: beliefs about consequences – – Barriers: message seemed unnecessary and inappropriate for high-acuity patients; uncertainty regarding effectiveness of the initiative; changing caregivers' behaviour seen as an intractable problem – Enabler: sense of urgency regarding need to address PED overcrowding ○ TDF domain: environmental context and resources – – Barriers: time required to discuss pamphlet; mixed messaging from hospital administration about pamphlet usage; lack of viable options other than the PED in the community – Enablers: pamphlet accessibility (attached to chart); training and support from hospital administration; media campaign to promote awareness of initiative

Study	**Brief intervention description (*n*)**	**Follow-up**	**Data source**	**Views regarding interventions, intentions, behaviour, knowledge and confidence, effect of intervention (non-service use)**
				○ TDF domain: social influences – – Barrier: caregivers' anxiety may justify the visit, even if the child's condition does not – Enablers: caregivers who asked for or were receptive to feedback about the appropriateness of their visit; caregivers who had come appropriately and could be recruited as advocates to spread the Choosing Wisely message ○ TDF Domain: emotion – – Barriers: physician perceived pamphlet as judgemental or shaming; fear of negative reactions from caregivers – Enabler: constructive outlet for expressing frustration over unnecessary visits • Implementation: although all physicians interviewed had used the pamphlet, their participation in the initiative was inconsistent. Only about one-quarter of the physicians gave the pamphlet to all caregivers regardless of the acuity of the child's condition, as intended. The majority of physicians targeted the pamphlet only to low-acuity visits, with some also using the pamphlet for medium-acuity visits as a way to reinforce that those caregivers had made the correct choice in coming to the PED
Ladley 2018[90]	Text messages	12 months	Self-report	High levels of satisfaction and engagement at the 12-month survey in the intervention group: 91% (75/79 who completed the survey) felt more comfortable making decisions about when to take their baby to the ED
Lepley 2020[136]	1. Low health literacy paediatric health book (+ video training on how to use book) 2. Paediatric mHealth app 3. Book and app	6 months	Self-report	• (+) Satisfaction: modified intention to treat – combined app ($n = 37$) vs. combined book ($n = 37$) vs. control ($n = 23$): ○ Used intervention – 35.1% vs. 73.0%^{a} vs. 78.3%^{a} ○ Very/somewhat useful – 37.8% vs. 70.3%^{a} vs. 78.3%^{a} ○ Very/somewhat understandable – 46.0% vs. 94.6%^{b} vs. 100.0%^{b} ○ Recommend intervention to family or friends – 48.7% vs. 94.6%^{b} vs. 100.0%^{a} ○ (–) Satisfaction: per-protocol analysis – combined app ($n = 20$), combined book ($n = 37$), combined control ($n = 23$): ○ Used intervention – 60.0% vs. 73.0% vs. 78.3% ○ Very/somewhat useful – 70.0% vs. 70.3% vs. 78.3% ○ Very/somewhat understandable – 85.0% vs. 94.5% vs. 100.0% ○ Would recommend to others – 90.0% vs. 94.5% vs. 100.0%

Study	Brief intervention description (*n*)	Follow-up	Data source	Views regarding interventions, intentions, behaviour, knowledge and confidence, effect of intervention (non-service use)
				• In per-protocol analysis, comparing groups of those who were followed up at least once, there was no difference in use ($p = 0.530$), understanding ($p = 0.222$), recommendations ($p = 0.517$) or usefulness ($p = 0.983$) of the app, compared with the book. Of note, parents in the book + app group prefer the book over the app. When given a choice between the book and the app, the majority of parents would choose the book alone (61.1%) or both (27.8%); none of the parents would choose the app alone • Authors note in the discussion that the mHealth app used a lot of medical jargon and was not good for people with lower health literacy levels
Little 2001[106]	• Self-management booklet for 42 conditions and when to contact the doctor • Two-page summary card/leaflet on self-management of common illnesses	12 months	Self-report	• Satisfaction: most respondents could remember receiving a leaflet or booklet (booklet 85%, card 70%, control 52%; $p < 0.001$) and found them useful (booklet 81%, card 78%, control 62%; $p < 0.001$) • Confidence: more patients in the intervention groups than in the control group felt greater confidence in managing common illnesses (booklet 32%, card 34%, control 12%; $p < 0.001$), but there was no difference in willingness-to-wait score
McWilliams 2008[135]	Anticipatory guidance at WCV and prescription for ear drops	Measured at 24-month clinic, so 9 months later	Self-report	• 80% believed that the training intervention helped them avoid an ED or after-hours visit, similarly for the ear drops • (+) Satisfaction: using a scoring system from –10 to 10, parents at the 15-month WCV strongly endorsed this intervention, showing support for both aspects of the intervention (nurse teaching and access to prescription) • (+) Satisfaction: support for this intervention remained high for those seen at the 24-month WCV, even for families who had not experienced an episode of ear pain after the nursing intervention • (+) Intentions: when surveyed at the 24-month WCV, 42.0% of parents indicated that their children had in fact experienced ear pain since the 15-month WCV. More than 80% of this subgroup believed that the nursing education helped them avoid an ED or after-hours visit: 54.3% 'strongly agreed', 31.4% 'somewhat agreed', 8.6% 'were unsure', 5.7% 'somewhat disagreed' and 0% 'strongly disagreed'. Likewise, > 80% of these same parents indicated that access to antipyrine–benzocaine otic drops helped avoid an ED or after-hours visit: 62.9% 'strongly agreed', 25.7% 'somewhat agreed', 11.4% 'were unsure', 0% 'somewhat disagreed' and 0% 'strongly disagreed'

Study	Brief intervention description (*n*)	Follow-up	Data source	Views regarding interventions, intentions, behaviour, knowledge and confidence, effect of intervention (non-service use)
Mullett 2002[117]	Partnerships for Better Health (self-care intervention), including the Healthwise Handbook	12 months	Diary	Examples from patient diaries describing how the handbook helped them make decisions and self-care, and also what was missing from the handbook
Murray 2011[124]	NHS Choices website	At the time of using the website or visiting the GP	Self-report	Satisfaction: • Online sample ($n = 1559$) – use of NHS Choices in relation to GP consultations: ○ Very satisfied – $n = 252$, 18.1%, 95% CI 14.4% to 18.1% ○ Satisfied – $n = 794$, 57.1%, 95% CI 48.4% to 53.4% ○ Neither satisfied nor dissatisfied – $n = 334$, 24%, 95% CI 19.4% to 23.5% ○ Dissatisfied – $n = 7$, 0.5%, 95% CI 0.2% to 0.9% ○ Very dissatisfied – $n = 4$, 0.3%, 95% CI 0.1% to 0.7% ○ Did not answer – $n = 168$, 10.8%, 95% CI 9.3% to 12.4% • GP sample ($n = 125$) – use of NHS Choices if have used the website in relation to GP consultations: ○ Very satisfied – $n = 7$, 5.6%, 95% CI 2.3% to 11.2% ○ Satisfied – $n = 39$, 31.2%, 95% CI 23.2% to 40.1% ○ Neither satisfied nor dissatisfied – $n = 14$, 11.2%, 95% CI 6.3% to 18.1% ○ Dissatisfied – $n = 0$, 0.0%, 95% CI 0.0% to 2.9% ○ Very dissatisfied – $n = 1$, 0.8%, 95% CI 0.0% to 4.4% ○ Has not used – $n = 34$, 27.2%, 95% CI 19.6% to 35.9% ○ Did not answer – $n = 30$, 24.0%, 95% CI 16.8% to 32.5% Knowledge: online sample ($n = 1559$) – patients who agree/strongly agree that use of NHS Choices for their GP appointments means: • I know more about my condition/illness – $n = 1189$, 76.3%, 95% CI 74.1% to 78.4% • I know more about my treatment options – $n = 108$, 69.4%, 95% CI 67.0% to 71.7% • I am more confident to ask questions – $n = 984$, 63.1%, 95% CI 60.7% to 65.5% • I am confident to express my point of view – $n = 870$, 55.8%, 95% CI 53.3% to 58.3%

Study	Brief intervention description (*n*)	Follow-up	Data source	Views regarding interventions, intentions, behaviour, knowledge and confidence, effect of intervention (non-service use)
Nijland 2008[114]	Web-based primary care apps for supporting self-care	6 months	Self-report	• Feasibility (barriers affecting it): Patients – lack of education, underuse or misuse of applications because of lack of education, uncertainty about regulations for using internet for self-care Caregivers (health professionals) – unclear regulations about e-mail consultation: lack of a transparent protocol for e-mail consultation; unclear regulations about prerequisites for using e-mail consultation; lack of quality inspection of e-mail consultation applications; insufficient reimbursement for e-mail consultation. Lack of education and training: underuse or misuse of applications because of lack of education. Interoperability of systems: applications could not be integrated with the existing patient information system or medical records. Concerns about patient equity of access: concerns about the risk of widening of the gap between those who have access to new technology and those who have been excluded • Acceptability (barriers to): Patients – navigation problems: lack of a search engine; lack of an adequate search option; unclear navigation structure; hyperlinks were non-existent or useless; unclear or unattractive layout of web pages; no features for printing information; user-friendliness [40.8% (106/260) of the times the 14 patients used the apps, they faced usability problems]; quality of care [146 (56%) said they faced quality-of-care problems such as comprehensiveness of information]; technical problems: software bugs, drop-down menus or back buttons failed Caregivers (health professionals) – navigation problems: unclear navigation structure, hyperlinks lacking or useless; lack of feedback features; lack of documentation features; unclear answer procedures/formats; technical problems: software bugs • Meaningfulness (factors affecting quality of care: relevance, comprehensibility of information, responsiveness): Patients – problems with relevance of information: information provided by the digital medical encyclopaedia was too general to be useful; information provided by the virtual body was too limited to be useful; self-care advice insufficiently tailored to personal needs. Problems with comprehensibility of information: semantic

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				mismatch between system and users because of unclear medical terms and lack of features to verbalise a problem in their own vocabulary; self-care advice hard to interpret; self-care advice frightening. Problems with responsiveness: caregiver used more than prescribed response time to answer patients' questions Caregivers (health professionals) – non-profitability of e-mail consultation: requests from patients still required personal contact with a caregiver. Concerns about a higher chance of interpretation difficulties: carefulness with formulating answers to patient requests, such as being extremely careful when formulating the answer because of possible legal consequences. Concerns about a higher chance of misuse: requests from unknown patients through using the account of known patients
Nijland 2009[113]	Web-based triage	54 weeks	Self-report	• 15% of patients were given self-care advice, so authors considered it to be a very cautious intervention • Intentions: patients used the triage system to gather information about their complaint ($n = 72$, 49%), more than for deciding whether or not a doctor needed to be contacted ($n = 38$, 26%) • Preceding the triage consultation, nearly half of patients ($n = 73$, 49%) had the intention to visit a GP for their complaint. Of the patients with an intention to visit ($n = 72$), most expected self-care advice ($n = 30$) and fewer expected to be advised to visit a GP ($n = 22$), or had no expectations at all ($n = 20$). All the patients who expected to be advised to visit a GP ($n = 22$) received such advice, whereas, of the patients who expected tailored self-care advice ($n = 30$), the majority (63%) received advice to visit a GP. In most cases, contact with a doctor (GP advice) was given ($n = 54$, 76%) • A positive attitude towards advice was strongly related to the perceived usefulness of the advice, as reflected in understandability, reliability of information, applicability in daily life and effectiveness. It appeared that 57% actually had complied with the advice. Patients who complied with the advice were higher educated (55%) and frequent users of medication (40%); furthermore, the received advice corresponded, in most cases (84%), with expected advice. Reasons for non-compliance were lack of confidence in the advice and fear to follow-up the provided advice

Study	Brief intervention description (n)	Follow-up	Data source	Views regarding interventions, intentions, behaviour, knowledge and confidence, effect of intervention (non-service use)
Ohns 2019[118]	Patient education information in a variety of formats and media	Cross-sectional	Focus groups	• (+) The preferred method of education identified by the focus groups was the mobile app, Kids Doc, created by the American Academy of Paediatrics. Second was the 24-hour nurse call line; third was the book, *My Child is Sick!*; fourth was the booklet, *Caring for Your Sick Child: Managing Common Infections at Home*; and fifth was the patient education printout specific to diagnosis. Of note, 25 of the 30 caregivers ranked the patient education printout as their fourth ($n = 8$) or fifth ($n = 17$) choice • (±) There was no statistical significance found when comparing literacy scores and preferred method of education (ranking the educational option as their first or second choice). A one-way ANOVA with Tukey post hoc comparisons indicated that those who preferred the mobile app were younger (27.6 ± 5.8 years) than those who preferred the 24-hour nurse line (34 ± 4.9 years) and those who preferred the *My Child is Sick!* book (30 ± 3 years) ($p = 0.03$) • Little qualitative information available about why people preferred an intervention – some comments about how good it was that they were available from anywhere the parents are, and comprehensiveness of information
O'Neill-Murphy 2001[103]	Interactive fever education (pamphlet + discussion and training)	2 and 8 weeks	Self-report	(–) Confidence: > 40% of parents in each group reported that they had moderate to high levels of anxiety related to their child's fever on arrival to the ED. After either fever education programme, parents in both groups reported reduced levels of fever anxiety: control group, 82%; intervention group, 85%. At the 2-week follow-up, parents in both groups reported that they felt less anxious when their child has a fever (86% of the control group and 50% of the intervention group)
Plass 2006[76]	Self-care booklet for minor illness	12 months	Self-report	Behaviour: mean scores on determinants of self-care behaviour, All: • Attitude towards self-care over time: T0: 3.4; T1: 3.7 (significant difference between T0 and T1); T2: 3.3 (significant difference between T1 and T2). Shows reduction in self-care • Perceived behavioural control over self-care: T0: 3.1; T1: 3.6 (significant difference between T0 and T1); T2: 3.4 (significant difference between T0 and T2). Shows reduction in control over self-care
Platts 2005[107]	Self-care health book; NHS Direct	12 months	Self-report	• Satisfaction and understanding: participants' perceptions of books – participants who had been allocated a book and had consulted it at least once were asked whether or not the book provided all of the information required. Responses were requested on

Study	Brief intervention description (*n*)	Follow-up	Data source	Views regarding interventions, intentions, behaviour, knowledge and confidence, effect of intervention (non-service use)
				a scale from 1 (all provided) to 5 (none provided). Those allocated the self-care book gave a mean response of 2.42 (SD 1.09), compared with 2.85 (SD 1.30) for those allocated the NHS Direct book ($p < 0.001$) Similarly, although both books were found to be easy to understand by most participants, the self-care book was seen as better for understanding ($p < 0.001$), and better for knowing what to do ($p < 0.001$); the advice from the self-care book was followed more often ($p = 0.002$), and using the self-care book was more often likely to lead to a change of mind on what to do ($p = 0.003$) Participants whose educational qualifications were below A Level were more likely to report that they found the information in the self-care book 'harder to understand' than those whose qualifications were at or above A Level, at both 3 months ($p = 0.004$) and 12 months ($p = 0.006$). Similarly, at 3 months, those whose educational qualifications were below A Level were more likely to report that they found the information in the NHS Direct book 'useful for knowing what to do' than those whose qualifications were at or above A Level (3 months, $p = 0.012$; 12 months, $p = 0.009$) • Confidence: in both book groups, in response to the question 'did using the book make you more or less likely to try to deal with the problem yourself?', around 57%, at both 3 and 12 months, responded 'more likely'. This compares with only around 13% responding 'less likely' ($p < 0.001$). The question 'Did using the book make you more or less likely to contact the practice?' resulted in a response of 'less likely' in 40% of study participants, compared with around 20% who responded 'more likely' ($p < 0.001$)
Powell 1995[127]	Demand management programme	Cross-sectional	Self-report	(+) Satisfaction and understanding (usefulness, understanding, etc.): > 90% for 607 employees who returned the questionnaire; 70% felt that using the guide would help them visit the doctor less frequently
Powell 1997[128]	Self-care workshop and booklet	Post intervention, 6 months	Self-report	• (+) Satisfaction and understanding: workshop evaluation: the results show a high level of satisfaction with the guide and the workshop: ○ 97% of employees found the workshop helpful ○ 96% of employees found the workshop enjoyable ○ 89% of employees reported having a better understanding of when to see the health-care provider ○ 92% of employees feel that they are wiser health-care consumers

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				○ 73% of employees think that they will need to visit their health-care provider less frequently ○ 66% of employees think that they will be absent from work less often • Self-reported evaluations (6 months): 218 participants (66%) returned the 22-item evaluation. Of these participants: ○ 59% reported using the guide before contacting their health-care provider ○ 61% felt that the guide better prepared them for health-care provider visits ○ 63% stated that the guide positively affected their families ○ 47% felt that the guide helped them decide when to see a health-care provider ○ 97% felt that the guide is a source of good health advice ○ 86% felt that the guide was an invaluable employee benefit ○ 97% stated that the guide was easy to understand ○ 39% stated that the guide helped them save money on health care during the previous 6 months ○ 59% felt that the guide would help them save money on health care in the subsequent 6 months
Robbins 2003[108]	Home visit and booklet	7 months	Self-report	• (±) Parental confidence and knowledge. Both groups reported increased feelings of confidence and knowledge; however, at 7 months, the intervention group appeared to have less confidence than the control group and felt that they had less knowledge relating to all scenarios, except knowledge about spots. Home care options for each of the five scenarios: the intervention group showed a trend towards greater certainty when choosing home care actions • (±) Intentions: overall, the intervention group appeared more certain than the control group as to whether they would want to see a doctor urgently or routinely. There was evidence in both groups of a change over time, as shown by an increase in certainty and a reduction in the number of respondents indicating that they did not know how to respond to the scenarios, in terms of seeing the doctor both urgently and routinely. The intervention group was slightly more certain with regard to seeing the health visitor (intervention 93.9%, control 90.7%) and the pharmacist (intervention 91.8%, control 88.4%). Both groups showed an increase in certainty between questionnaires one and two. This was the greatest for seeing the pharmacist, who appeared to be poorly used at baseline (intervention 61.1%, control 55.1%)

Study	Brief intervention description (*n*)	Follow-up	Data source	Views regarding interventions, intentions, behaviour, knowledge and confidence, effect of intervention (non-service use)
Rutten 1991[78]	Patient education about cough	Unclear	Unclear	• Behaviour: changes in consulting behaviour: • Initial behaviour did not follow guidelines: experimental ($n = 122$) vs. control ($n = 232$): change of behaviour: desired change, 56% vs. 30%; undesired change, N/A vs. N/A; unchanged, 42% vs. 68%; undefinable, 2% vs. 2%; $p < 0.001$ • Initial behaviour followed guidelines: experimental ($n = 102$) vs. control ($n = 92$) – desired change, N/A vs. N/A; undesired change, 30% vs. 67%; unchanged, 66% vs. 29%; undefinable, 4% vs. 3%; $p < 0.001$
Steelman 1999[119]	Fever education: slide presentation on well-infant care topics + additional presentation on fever and mailed reminders	4 months	Self-report	(+) Knowledge: evaluation of knowledge on fever – average incorrect response: • Baseline – intervention 11.5 vs. control 11.4; $p = 0.35$ • 2 months – intervention 10.4 vs. control 11.8; $p = 0.006$ 4 months – intervention 8.5 vs. control 10.3; $p = 0.002$
Steinweg 1998[120]	Self-care intervention programme coupled with a health promotion pharmacy	6 months	Self-report	(+) Confidence: programme outcome – confidence to treat minor illness: increase, 77%; no change, 23%; decrease, 0%
Stockwell 2014[126]	URI-related educational intervention + standard curriculum	5 months	Self-report	• (+) Satisfaction: almost all intervention parents reported that the education sessions (97.3%) and URI kit (93.0%) were very useful; 87.3% used the kit at least a few times over the winter • (+) Knowledge: URI knowledge/attitudes and home remedy safety attitudes – mean baseline Knowledge–Attitudes instrument scores were similar for intervention and standard curriculum families (4.2 vs. 4.6 out of 10; $p = 0.27$). Mean post-intervention scores increased to 5.5 for intervention families, but remained the same (4.7) for standard curriculum ones ($p = 0.011$), and the mean difference in baseline to post-intervention scores for intervention families was significantly different than for standard curriculum families (1.3 vs. 0.097; $p = 0.001$). Home remedy beliefs at baseline were also similar (28.9% of intervention families believed that all home remedies were safe or were unsure, vs. 37.2% of standard curriculum families; $p = 0.28$), but were different post intervention (17.8% vs. 38.9%; $p = 0.005$). The proportion of intervention families that had incorrect home remedy beliefs post intervention (52.0%) was also lower, but not significantly lower, than that of the standard curriculum families (75.7%; $p = 0.053$), when those who had both correct baseline and post-intervention beliefs were removed

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Sustersic 2013[131]	PILs	10–15 days	Self-report in structured telephone interview	• Behaviour: for the whole population (adults and adults accompanying children), those in the PIL group significantly showed behaviour that was closer to that recommended by the PIL than those in the group that had not received a PIL (mean behaviour score 4.9 vs. 4.2; $p < 0.01$). This was confirmed by the alternative analytical approach, in which the behaviour scores were dichotomised and used in univariate analysis (recommended behaviour 71.8% vs. 43.0%; $p < 0.01$) • Knowledge: likewise, those in the PIL group had a mean knowledge score that was significantly higher than those in the control group (mean knowledge score 4.2 vs. 3.6; $p < 0.01$). The adult patient subgroup showed behaviour that was closer to that recommended by the PIL than adult patients in the control group (mean behaviour score 4.9 vs. 4.0; $p < 0.01$). The adult and child group showed the same tendency, but did not reach significance (mean behaviour score 4.9 vs. 4.5; $p = 0.11$). For the adult patient subgroup, knowledge was significantly better in the group that received a PIL (mean knowledge score 4.2 vs. 3.5; $p < 0.01$), irrespective of the condition studied or of sociodemographic parameters (with the exception of the level of education, for which the difference was not significant)
Thornton 1991[133]	Booklet for one cohort, booklet and visit for second cohort	6 months	Self-report	Satisfaction: they all found Baby Check easy to use, between 68% and 81% found it useful, and 96% would recommended it to others
Usherwood 1991[97]	Booklet and covering letter	12 months	Self-report	(+) Satisfaction: perceived usefulness of the booklet – frequency of response: • Has the advice in the booklet changed anything that you would do for your child when he or she is ill? Yes definitely, 21; yes probably, 47; not sure, 17; no, probably not, 15; no definitely not, 1 • Overall, has the booklet been useful to you? Yes definitely, 41; yes probably, 52; not sure, 7; no, probably not, 2; no definitely not, 0 • Do you think that other families in the practice would find the booklet useful? Yes definitely, 71; yes probably, 55; not sure, 8; no, probably not, 0; no definitely not, 0
van der Gugten 2015[98]	WHISTLER-online intervention to inform on respiratory symptoms and support decisions on contacting appropriate services	12 months	Self-report	(+) Satisfaction and behaviour: information needed and behaviour change – • Clear information on programme (when applicable): yes, 99.1% • Possibility to find information that was needed (when applicable): yes, 77.5%; no, 1.3%; partly, 21.3%

Study	Brief intervention description (n)	Follow-up	Data source	Views regarding interventions, intentions, behaviour, knowledge and confidence, effect of intervention (non-service use)
				• Behaviour changed (when applicable): yes, because of the information I went to the doctor, 3.8%; yes, because of the information I did not go to the doctor, 5.8%; no, I wanted to go and I did, 65.4%; no, I did not want to go and I did not, 25.0%
Verzantvoort 2018[140]	Self-triage for acute primary care via a smartphone app	Within 24 hours of app use	Self-report	• Satisfaction with the app ($n = 4456$): very dissatisfied, 3.3%; dissatisfied, 8.2%; neutral, 32.8%; satisfied, 46.5%; very satisfied, 9.2% • Intentions: follow the app's advice? Yes, 65% – app's advice: call doctor, 58%; GP, 15.6%; OOH clinic, 42.4%; Do not call doctor, 42.1%; self-care advice, 33.8%; wait and see, 8.3%. This intention was highest among participants receiving the advice to contact their GP during daytime (75%), and was 67% for those receiving self-care advice, 61% for contacting the OOH clinic and 56% for wait-and-see advice ($p < 0.001$) • Intention and satisfaction: furthermore, this intention was associated with satisfaction (OR 2.5, 95% CI 2.2 to 2.9; $p < 0.001$), age < 13 years (OR 1.8, 95% CI 1.3 to 2.3; $p < 0.001$) and male sex (OR 1.2, 95% CI 1.1 to 1.4; $p = 0.045$). Satisfaction with app ($n = 126$): 19 out of 126 answered that they were dissatisfied with the app and provided a total of 21 explanations for this; the majority (62%) related to a perceived inability to enter the (complete) story of their illness. Other reasons for dissatisfaction related to the app's advice (24%) and the structure of the app (14%). Thirty-nine telephoned participants did not intend to follow the app's advice and gave 33 reasons for this. The main three reasons were (1) feelings of being unable to tell their complete story (33%), (2) already having contacted a doctor (27%) and (3) trusting their own judgement better (27%). A total of 65 suggestions were communicated to further improve the app. These suggestions mainly related to the following: 51% to enable better and more complete entry of all aspects of their illness into the app; 32% to improve the structure, speed and operation; 12% regarding the app's advice; and 5% with respect to its layout
White 2012[121]	Self-care skills training course	6 and 12 months	Self-report, interviews	• (+) Locus of control: change in scores from baseline – 6 months: intervention, mean 20.02 (SD 4.40), $n = 363$; control, mean 20.15 (SD 4.01), $n = 266$; 12 months: intervention, mean 0.72 (SD 4.09), $n = 325$; control, 0.36 (SD 3.73), $n = 251$. There was a statistically significant positive effect of the intervention on recovery locus of control at 6 months, and small effects in favour of the intervention on recovery locus of control (0.88 points, 95% CI 0.27 to 1.49 points) and self-esteem (20.99 points, 95% CI 21.60 to 20.37 points) at 12 months

Study	Brief intervention description (*n*)	Follow-up	Data source	Views regarding interventions, intentions, behaviour, knowledge and confidence, effect of intervention (non-service use)
				• (–) Knowledge: there was no statistically significant effect of being in the intervention group on perceived health status, levels of social support or knowledge about children's cough, back pain or crying in babies at the 6- and 12-month follow-ups, controlling for baseline, gender and setting • (+) Intentions: statistically significant positive effects of being in the intervention group were seen at 6 months in intention to use GP services less for minor ailments and, at 12 months, in knowledge about back pain. Intention to use services: at baseline, > 90% of all participants stated an intention to use the family doctor, and > 80% stated an intention to use the pharmacist or family for support. At the 12-month follow-up, intention to use support from friends, hospital, the library, occupational health workers and social workers had increased in the intervention group, but not in the comparison group. Intention to use support from health visitors and midwives had decreased in the comparison group, but not in the intervention group
Wood 2017[109]	Brief VDI added to standard written/verbal discharge instructions	2 months	Five-question survey	• (+) Knowledge: significant improvements in knowledge scores were observed after SDI or VDI were provided (65% pre instructions vs. 75% post instructions $p < 0.001$). Knowledge significantly improved post instructions for gastroenteritis (73% post vs. 57% pre; $p = 0.005$), fever (76% post vs. 69% pre; $p < 0.001$) and bronchiolitis (64% post vs. 49% pre; $p = 0.025$). Post-instructions knowledge improvement was significantly greater in the VDI group for all diagnoses combined (pre–post difference: 13% VDI vs. 6% SDI; $p = 0.027$) • (±) Caregivers demonstrated significantly greater knowledge improvement for gastroenteritis (pre–post difference: 23% VDI vs. 0% SDI; $p = 0.027$). Similar knowledge improvement trends were noted for other diagnosis groups, but group differences did not achieve statistical significance [pre–post difference: fever, 9% VDI vs. 7% SDI ($p = .47$); bronchiolitis, 23% VDI vs. 11% SDI ($p = 0.32$)] • (+) Knowledge level (percentage correct) was significantly higher for caregivers in the VDI group than for those in the SDI group for all diagnoses combined (82% VDI vs. 67% SDI; $p < 0.001$). When stratified by diagnosis group, caregivers of children with fever and bronchiolitis demonstrated significantly greater knowledge after receiving VDI than after receiving SDI [fever, 84% VDI vs. 70% SDI ($p < 0.001$); bronchiolitis, 83% VDI vs. 53% SDI ($p = 0.019$)]. A similar trend was observed in the gastroenteritis group, but the difference did not reach statistical significance (75% VDI vs. 68% SDI; $p = 0.41$). Evaluation of question types revealed that caregivers

Study	Brief intervention description (*n*)	Follow-up	Data source	Views regarding interventions, intentions, behaviour, knowledge and confidence, effect of intervention (non-service use)
				were least knowledgeable regarding duration of disease (mean post-instructions knowledge for all participants: 81% diagnosis, 81% treatment, 43% disease duration, 78% seek care; $p < 0.001$). This pattern was similar across all diagnosis groups ($p > 0.29$) • (±) Perceived satisfaction/helpfulness: caregivers rated the discharge instructions favourably in both the SDI group and the VDI group. The highest VDI ratings were observed for the bronchiolitis discharge instructions (100% very/extremely helpful), and the lowest VDI ratings were for the fever instructions (63% very/extremely helpful). There were no significant differences in caregivers' perceived helpfulness of SDI when compared with VDI (all $p \geq 0.13$)
Yardley 2010[53]	Web-based intervention providing tailored advice for self-management of minor respiratory symptoms	48 hours	Self-report	• Confidence: median patient enablement score was significantly greater in the internet doctor group than in the control group (median score of 3 vs. 2, respectively, with an interquartile range of 0–5 for the whole sample; $p = 0.03$) • Satisfaction with web-delivered advice in the internet doctor vs. control groups ($n = 332$): scale/item mean (SD) for each group: ○ Total scale (summed items divided by 3): 6.58 (SD 1.96) vs. 5.86 (SD 2.27); $p = 0.002$ ○ The website gave me all the advice I needed: 6.40 (SD 2.05) vs. 5.63 (SD 2.51); $p = 0.002$ ○ The website was helpful to me: 6.41 (SD 2.17) vs. 5.72 (SD 2.51); $p = 0.007$ ○ I felt I could trust the website: 6.91 (SD 2.21) vs. 6.25 (SD 2.54); $p = 0.01$ • Intentions to consult the doctor declined between baseline and the intermediate (48-hour) follow-up; although the decline was greater in the internet doctor group, this difference did not reach significance. Consultation necessity beliefs and emotional reactions to illness declined at follow-up to a similar extent in both groups. Poor understanding of illness declined in the internet doctor group, but slightly increased in the control group, resulting in a just-significant interaction between time and group effects. Self-confidence to self-care remained stable, similar and high in both groups at both time points

a $p < 0.01$ for comparison with the app group.

b $p < 0.001$ for comparison with the app group.

A Level, Advanced Level; CI, confidence interval; ER, emergency room; ESCMS, easy-access self-care medical spot; mHealth, mobile health; MMI, non-prescription medications for minor illness; N/A, not applicable; OOH, out of hours; OR, odds ratio; PED, paediatric emergency department; PIL, patient information leaflet; SD, standard deviation; SDI, standard discharge instructions; T, time; TDF, theoretical domains framework; URI, upper respiratory infection; VDI, video discharge instructions; WCV, well-child visit; WHISTLER, WHeezing Illnesses STudy LEidsche Rijn.

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