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Information resources to aid parental decision making on when to seek medical care for their acutely sick child: What does the literature tell us about what works?

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Abstract

Objective

To identify the effectiveness of information resources to help parents decide when to seek medical care for an acutely sick child under 5 years of age, including the identification of factors influencing effectiveness, by systematically reviewing the literature

Methods

Five databases and five websites were systematically searched using a combination of terms on children, parents, education, acute childhood illness. A narrative approach, assessing quality via the Mixed Methods Appraisal Tool, was used due to non-comparable research designs.

Results

Twenty-two studies met the inclusion criteria: 9 Randomised Control Trials, 8 Non-randomised intervention studies, 2 Qualitative Descriptive studies, 2 qualitative studies and 1 mixed method study. Consultation frequency (15 studies), knowledge (9 studies), anxiety/reassurance (7 studies), confidence (4 studies) satisfaction (4 studies) and antibiotic prescription (4 studies) were used as measures of effectiveness. Quality of the studies was variable but themes supported information needing to be relevant and comprehensive to enable parents to manage an episode of minor illness Interventions addressing a range of symptoms along with assessment and management of childhood illness, appeared to have the greatest impact on the reported measures. The majority of interventions had limited impact on consultation frequencies, No conclusive evidence can be drawn from studies measuring other outcomes.

Conclusion

Findings confirm that information needs to be relevant and comprehensive to enable parents to manage an episode of minor illness. Incomplete information leaves parents still needing to seek help. Irrelevant information appears to reduce parents' trust in the intervention.

Key words

Parent information, acute childhood illness, integrative review, measures of effectiveness, health education

Strengths and Limitations

- This is the first review of the outcome of information resources which aid parental decision making utilising systematic search and quality assessment criteria.
- The findings are limited by the quality of the studies and not being able to control for the impact of different healthcare delivery systems.

BACKGROUND

Acute illness is a universal experience for children and families and represents the most common type of illness in childhood, particularly in 0-5 year olds. Acute illness includes short term illnesses, predominantly infections such as coughs, colds, diarrhoea, vomiting and ear infections. Home management is often supported by consultations in primary care, where children under 5 years old constitute 40% of General Practitioner (GP) workload [1], with most consultations for acute illness [2, 3]. Under 1 year olds are seen more often than all other age groups other than the over 75s [2] and urgent care and emergency department service use by young children appears to be rising [4-6].

Parents' anxiety about acute childhood illness leads them to seek information to help them decide whether or not to seek help from a healthcare professional [7-11]. A wide range of information is available for families, such as written leaflets or via websites much of which is either unknown to parents[5, 7] or does not seem to be making any impact on service use when children are acutely sick at home [11-14]. The increase in consultation rates for non-urgent care [4-6] suggests more effective information sources are needed.

We aimed to systematically review the literature to identify the effectiveness of information resources to help parents decide when to seek medical care for an acutely sick child under 5 years of age, including the identification of factors influencing effectiveness.

Our research questions were:

- What measures of effectiveness have been used to evaluate such interventions?
- How effective are existing interventions in helping parents know when to seek help for an acutely sick child at home?
- What factors influence effectiveness of information provision to help parents know when to seek help for an acutely sick child at home?

METHODS

Search Strategy

We systematically searched five electronic databases (Medline, CINAHL, PsycNET, ASSIA Web of Knowledge) and five websites (Centre for Review and Dissemination York, National Institute for Health and Care Excellence, Health Technology Assessment programme, NHS Evidence, the Cochrane Library) using a combination of terms on children, parents/carers, education, acute childhood illness (see Appendix 1). We scanned reference lists of key articles, and attempted to contact authors when further information was required to determine eligibility and inform quality assessment.

Selection Criteria

Studies which met all the following criteria were included:

1. Studies which included children from 0-4 years with research participants being their parents or caregivers. Initial pilot searches aimed solely at children under five years yielded minimal results.

2. An educational intervention on acute childhood illness was provided to parents/caregivers in any form (written, visual, verbal or electronic) designed to help with decision making about whether or not to seek medical help

3. The study was conducted in primary care, emergency departments, ambulatory settings or in the home, in high income countries as defined by Organisation for Economic Co-operation and Development (OECD). We included all study types.

Studies were excluded if they focused on chronically ill children, hospital in-patient settings, or educational interventions designed for health professionals. We limited our search to papers published in the English language, between January 1990 and June 2014 (inclusive). The decision to search from 1990 was taken pragmatically as health services have evolved considerably since the latter half of the twentieth century.

The titles and abstracts of studies identified in the search were retrieved and assessed by one reviewer who excluded those that were clearly not relevant. The full text of remaining studies was assessed for inclusion by two reviewers; discrepancies were resolved by discussion between all authors. Reasons for exclusion were recorded (Appendix 2).

Data Extraction & Quality Assessment

Data from included studies were extracted by one reviewer and checked by a second reviewer. All studies which met the inclusion criteria were included regardless of quality, which was assessed by two other reviewers using the Mixed Methods Appraisal Tool (MMAT)[15].

Evidence Synthesis: Synthesizing qualitative and quantitative research

Narrative synthesis was used to summarize and explain findings across studies [16, 17]. Meta-analysis was inappropriate due to non-comparable research designs.

RESULTS

The search identified 7,863 studies, of which 22 were included (Figure 1). Table 1 shows the characteristics of included studies of which there were nine randomised controlled trials, eight non-randomised intervention studies, two qualitative descriptive studies, two qualitative studies and one mixed method study. Thirteen were conducted in the United States (US), six in the UK, two in Canada and one in Denmark. Parents/caregivers of children aged 0-14 years were included across all studies, with 12 studies limiting inclusion to parents of children under the age of 6 years. Studies were conducted in primary care (9), Emergency department/hospital (7), child health clinics (3) and children's health centres (3).

Interventions involved written information in all but one study, which used video alone [20]. Written information was augmented by video/slide presentations [21-25], home visits [12, 26], reinforcement within consultations [21, 25, 27-30] or was part of a structured educational programme [31-33]. Three separate studies reported on the same 'Baby Check' intervention in different settings/populations [26, 34, 35].

Quality of included studies is summarized in Table 1, and detailed in Appendix 3. Only two studies were given the highest quality score, with many being given low scores, often due to insufficient reporting of methods.

Measures of effectiveness

The most frequently used measures of effectiveness were: consultation frequency (15 studies), parent knowledge (9 studies), parent anxiety/reassurance (7 studies), parent satisfaction (4 studies), parent confidence and clinician antibiotic prescribing (both 4 studies).

Consultation frequency

Six of the fifteen studies which measured this outcome showed a significant reduction in either actual consultation rates or intention to consult in the future (see Table 2). Three of these studies evaluated effects on consultation rates over a longer (1 to 3 year) period post intervention and found persistence of effect. [19, 31, 36]. One study showed a reduction in home visits but with an increase in out-of-hours visits [36]. The 8 remaining studies on consultant frequency showed no difference on consultation rates with the specified intervention.

Knowledge

Nine studies assessed the effect of interventions on parental knowledge of childhood illnesses including fever, upper respiratory infections, febrile convulsion and otitis media (see Table 3). Most interventions used multiple methods to provide information, such as written materials supported by verbal explanations [12, 21, 24, 25, 29, 30, 37]. Timing of outcome measurement ranged from immediately to 32 months later. Eight studies found a significant increase in parental knowledge after interventions [20, 21, 24, 25, 30, 33, 37, 38] with a spread of 24 hours to 12 months for post intervention re-assessment. One paper showed reduction in knowledge at 7 months [12].

Anxiety/Reassurance

Of the seven randomized controlled studies that reported this outcome, only one reported significantly reduced concern compared with control group following intervention [28]. Using Baby Check to score their baby's illness reassured 41% (14/34) [34] and 46% [26] of parents respectively. In Herman and Jackson's [31] study the percentage of parents reporting that they were 'very worried' when their child was sick reduced by one third

Satisfaction

Four studies assessed the effects of interventions on parent's satisfaction with their communication with health professionals [21, 27], and with the educational information received [29, Anhang 2013]. Two studies reported non-significantly increased satisfaction in both control and interventions groups [21, 27] , while another reported significantly increased satisfaction for both intervention groups compared to controls [29]. The fourth study suggested a web-based self-triage tool would be well received by parents [39]

Confidence

Two of four studies [12, 21] measuring the effect of interventions on parents' confidence in managing childhood illness at home did not show an increase in levels of confidence. However Thornton et al's [26] field trials of 'Baby Check' found parents' confidence in the tool itself increased over time, whilst Kai's [34] qualitative exploration found that parents felt 'Baby Check' had increased their confidence to monitor their child and given them 'moral support' for their decision to consult a doctor .

Antibiotic prescription

Four studies assessed the effect of interventions on antibiotic prescription. Francis et al [27] found a significant reduction in antibiotic prescriptions given by clinicians in the intervention group (19.5% intervention vs. 40.8% control (95% confidence interval 13.7 to 28.9, $P < 0.001$)); and Stockwell et al [33] showed a reduction in the number of parents who sought antibiotics without a prescription or used over the counter medication inappropriately; however this small study (11 parents) failed to report effects on antibiotics sought by parents from health professionals. Two other studies [12, 35] found no significant differences in antibiotic prescribing.

Factors influencing the effectiveness of an intervention

Factors which may have influenced the effectiveness of interventions were identified from a comparison of study populations, settings and the content, format and delivery of educational interventions.

Content of interventions: Range of topics addressed by the interventions

Eleven studies assessed interventions which focused on a single symptom or type of childhood illness alone (such as fever, febrile convulsions, respiratory tract infection, otitis media), whilst ten provided information on a range of different childhood illnesses.

Three single-topic studies measured consultation behavior, of which one [27] found reduced intention to consult in the intervention compared to control group [27] whilst two did not [20, 24]. Two single-topic studies assessed anxiety/reassurance, one found no effect [27] and the other a reduction in both intervention and control groups [32]. Confidence was assessed in one single-topic study [21] which found no effect. Antibiotic prescribing was assessed in two respiratory focused studies [27, 33], one of which showed a significant reduction in prescribing in the intervention group in the first two weeks post intervention [27] and the other a non-significant reduction in seeking antibiotics without prescription after the intervention [33].

Four of the ten studies evaluating the effects of providing information on multiple childhood illnesses or symptoms showed trends towards reduction in consultation rates or intention to consult [19, 28, 31, 36]. Four multi-topic intervention studies reported a reductions in anxiety or increased reassurance [26, 28, 31, 34]. Confidence improved in two of the 'Baby Check' studies [26, 34] but in another study, there was no effect on confidence [12]. Neither of two multi-topic studies demonstrated a significant reduction in antibiotic prescribing [12, 35].

In summary, reduction in consultation rates, reduction in anxiety and increases in confidence appeared more common in multi-topic compared to single-topic interventions, whilst reduction in antibiotic prescribing was more effective with single illness focused interventions.

Content of interventions: Information on assessment and/or management of childhood illness

Four interventions specifically intended to enable parents to assess the severity of their baby's illness and know when to seek medical attention for their child [25, 26, 34, 35]. One of these interventions informed parents about fever and home management of fever and found that 90% of parents rated the information helpful in decision making and as a communication tool [21]. In contrast, nearly one third of parents did not think the 'Baby Check' educational tool was useful [26], and a qualitative study of the same tool [34] revealed that even when parents scored their child's

illness as minor they still consulted for the illness within 24 hours after the assessment, because they wanted practical advice on management.

Content of the interventions: Accessibility of the information

Many of the papers provided brief descriptions of the strategies used to make interventions easy to understand for parents. Three designed their interventions specifically for parents with low levels of health literacy [31, 33, 40]. The language used in the ‘Baby Check’ score card was simplified to accommodate low health literacy through the translation of professional terms such as ‘reduced tone’ as ‘floppiness’ [26] and a further three studies reported that their interventions were designed for age 11-12 year old reading level [19, 32,41]. One study specifically mentioned using cartoons and humor to increase the accessibility of information [19]. There was no identifiable relationship on outcomes between studies which did or did not design interventions for easy reading. However, Krantz’s qualitative study evaluating parents’ views of a fever guide found that parents liked the one page, easy-to-read style, the use of simple diagrams such as a thermometer showing both Fahrenheit and Celsius, and pictures of how to measure a child’s temperature. Parents felt that these pictures were likely to enhance recall of the information.

Delivery method for interventions: Interactive or one-way flow

Six studies provided educational interventions to parents in an interactive manner, i.e the parent could engage with the intervention rather than just receiving information [21, 25, 27, 31-33, 37]: two showed significant reductions in consultation rates or intention to consult [27, 31] and four significantly improved parental knowledge [21, 25, 33, 37].

Two additional studies [19, 28] used a relatively simple non-discursive method to provide information to parents, showing significant reductions in consultations of up to 88% in a comparison of attendances to an Emergency Department per month one year following the intervention. . These shared a common feature: when health professionals gave their booklets to parents, they emphasized that the content was important and would help them to look after their acutely sick child. These findings intimate that educational interventions can be successful even when they are provided using a simple method, but clearly further studies are needed to demonstrate this.

Intervention setting

None of the four interventions which were delivered in the waiting room of an emergency department [20, 22, 23, 32] had significant effects on consultation rates, anxiety or parental knowledge. These studies involved both single topic and multi-topic interventions with varying delivery mechanisms and suggest that it is the environment in which the intervention was delivered which is associated with effectiveness, rather than the content of the intervention itself.

Two US studies [31, 33] took place in children’s health centres: one reduced consultation rates in local emergency departments and primary care [31] and the other improved parental knowledge [33]. Peer support and a trustworthy environment were two important factors suggested by the authors as related to this success.

Parent involvement in intervention development or evaluation

One studies involved parents in the development [27] and four in the evaluation of the educational intervention [19, 28, 31, 36]. Four showed reduction in consultation rates, intention to consult, or improved parental knowledge [19, 27, 28, 31],. In comparison, studiesusing existing educational

materials as their intervention, without modification and evaluation by its target population, were less successful [12, 35].

DISCUSSION

This systematic review and synthesis of informational interventions intending to help parents decide when to seek medical help for an acutely sick child identified measures of effectiveness used to evaluate interventions, as well as factors which appear to influence the effectiveness of interventions. Unlike previous reviews which focused on interventions specifically for respiratory tract infections [42] or acute pediatric hospital admissions [43], our review was broader as we identified factors influencing effectiveness of interventions on parents' help seeking behavior for all common acute illnesses at home.

Measures of effectiveness

Consultation frequency, knowledge, reassurance/anxiety, satisfaction, confidence and antibiotic prescribing were used as measures of effectiveness. Studies which found reductions in consultation rates [19, 29, 31] were all conducted in the US, which may reflect differences in health service delivery systems and possible financial costs associated with unscheduled consultations. These differences in parental motivations may limit applicability in other countries such as the UK where direct parent-incurred health service costs are less relevant.

Results from studies measuring parents' knowledge of acute childhood illness indicate that when both verbal and written information were provided, parents were more likely to retain knowledge in the long term than when only given written information [21, 24, 25, 30, 33, 37, 38]. Verbal reinforcement may signal to parents that health professionals endorse the information.

Providing information did not seem to be directly linked to increased satisfaction, although it is not clear whether the studies we found used a valid measurement tool. Limited information was available about the methods used to measure parent satisfaction, which included a question over the phone [29], or using one or two items within a rating scale administered by phone [21, 27]. Satisfaction is a complex phenomenon and it is therefore unlikely that such simple measures will elucidate factors which influence it. No conclusions can be drawn regarding the impact of interventions on parents' confidence to care for their child.

The effectiveness of interventions at reducing antibiotic prescriptions mirror those of Andrews et al.'s [2] review of interventions specifically focused on reducing consultation and antibiotic use in respiratory tract infection, which found that educational materials reduced consultation rates by up to 40%. The two respiratory focused studies which we identified, one from the UK and one from the USA, both indicated a reduction in antibiotic use, whilst neither of the less focused interventions demonstrated any effect on antibiotic use.

We were unable to easily identify an intervention which works consistently to reduce consultation rates, to improve parents' knowledge, confidence or satisfaction.

Factors influencing the effectiveness of an intervention

Interventions providing information on multiple childhood illnesses or symptoms appeared to be more effective (e.g. reduction in consultation rates or intention to consult, reduction in anxiety or increased reassurance), compared to interventions addressing single symptoms. This may be

because common childhood symptoms, such as fever, cough, sore throat, vomiting and diarrhoea, often occur simultaneously. Therefore, although parents receiving fever education may feel more competent in managing fever, they may continue to seek a medical consultation for other symptoms about which they have less knowledge or confidence. Moreover, educational material which addressed the assessment of illness severity as well as management of minor illness appear to be more effective in supporting parents to care for their children and seek help when necessary: if information is only provided on assessment this may still leave parents needing advice about how to manage, even minor, illness.

Parents' involvement in the development of educational interventions may improve effectiveness. These findings support the general trend towards involving patients and the public in research [4], emphasizing the importance of working collaboratively with the end users of interventions.

O'Neill-Murphy et al [32] argued that information provided in an interactive method is more effective in improving knowledge than non-interactive methods. However, our findings do not clearly support this position as we noted significant effects for interventions delivered with, and without, interaction. Involving health professionals in the *distribution* of booklets, with or without an interactive discussion, may increase the perceived value and reliability of the information and motivate parents to read the booklets, trust the home management strategies suggested and, finally, impact on their behavior. Parents have previously been found to trust information from doctors more than that from other sources [9].

Studies in the review were conducted in a range of settings; those conducted in emergency departments were the least effective [20, 22, 23, 32]. Having an acutely sick child is a stressful time for parents, generating considerable anxiety and uncertainty about when to seek medical help [9, 11, 5]. Stress can impair learning [46], therefore it is not surprising that in Chande et al's study only 65% of participants in the intervention group remembered the video in the emergency department. However, two US studies [31, 33] conducted in children's health centres showed reduction in consultation rates in local emergency departments and in primary care [31] and improved parental knowledge [33]. We do not know whether interventions delivered in children's centres would similarly work in the UK, although community education on childhood illness has been suggested in a recent UK survey of parents' first contact choices [47].

Strengths and limitations

The strengths of our review lie in its inclusiveness. Given the non-comparable research designs, we used an integrative narrative approach, recognized as an effective method for summarizing and synthesizing findings across multiple study designs [16, 17]. This approach enabled us to identify influences on effectiveness across a wider range of studies and topics than would have been possible with a single study type or topic focused review.

As with any systematic review our findings are limited by the number and quality of included studies. Included studies were highly heterogeneous in terms of design, as well as interventions, outcomes measured, populations and settings which limited our ability to perform more quantitative syntheses. In addition study quality was modest and often limited by poor reporting. The literature

search was limited to papers published in English and published since January 1990. However, it was evident that some of the earlier included studies are already of limited direct relevance to contemporary health services. For example, the 'Baby Check' tool used in three studies included a requirement for parents to measure rectal temperature, which is no longer recommended practice. Also no studies compared differing healthcare delivery systems; health systems are likely to have implications on the impact of different interventions.

Recommendations for clinical practice: How best to provide information to help parents decide when to seek help for an acutely sick child

Our findings indicate that interventions with the following characteristics are more likely to be effective:

- Comprehensive information on childhood illness
- Information on assessment of children's need for a medical consultation *and* on how to manage minor illness at home
- Reinforcement or support by local health care professionals
- Delivery away from the stressful environment of the emergency department. This could be in primary care, in the home or in social care settings.
- Co-production with parents.

Even without the development of new materials for parents of acutely ill children, there are messages here for clinicians using existing materials. Clinicians need to select resources which provide information on multiple common symptoms of childhood illness. Evidence from focus groups parents indicates development with parents is good practice. Interventions in this area can have unexpected consequences which need to be considered prior to implementation, as for example one primary care based intervention which resulted in shifting consultation from day time home visits to the out of hours service [36].

Information is best provided in primary care or social care settings. Community centres such as SureStart Children's Centres in the UK provide a potential route for the delivery of health information by health professionals, such as health visitors.

Directions for future research

Most of the studies included in the review were quantitative, providing valuable information on the effects of educational interventions. More qualitative studies are needed, which are able to provide in-depth understanding about what, how, and why interventions affect parents' abilities to assess and manage acute childhood illnesses. This information should be underpinned by research which identifies both parents' and health professionals' current use of information resources, and their views on how these resources need to be developed. Finally it is important that any future interventions for parents should be co-developed with parents themselves [48,49]. Given the rising rates of consultations and the considerable impact this is having on the health service in the UK, as well as on parents, there is a pressing need for larger scale implementation studies taking into account the findings of this review.

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3 **Conclusion**
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7 Overall, the majority of reviewed interventions had limited effects on consultation rates. Although
8 many studies showed an improvement in parental knowledge of childhood illness, this did not
9 necessarily lead to more confidence and less anxiety in parents when looking after their child at
10 home. Interventions providing comprehensive information on childhood illness which can be used
11 for both assessing children’s need for a medical consultation and for managing minor illness at home
12 were more effective in reducing consultation rates than those focused on a single symptom/ illness
13 or only on assessing the child’s level of acuity. Interventions also appeared more effective if parents
14 were involved in their development or evaluation.
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18 **Contributorship statement**
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21 Sarah Neil, Monica Lakhanpaul, Caroline Jones and Matthew Thompson conceived the original idea.
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23 Sarah Neil prepared an initial manuscript which Damian Roland revised. All authors contributed to
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25

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40 The authors have no competing interests to declare.
41

42 **Data Sharing**
43

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45

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Table 1 Characteristics and quality assessment of studies included

Author(s)/Date	Setting	Aim	Design	Sample	Intervention	Main Outcomes	Quality Assessment*
Qualitative studies							
Kai 1994	Health Visitor & General Practitioner baby clinics (United Kingdom)	To explore disadvantaged parents' perceptions & use of the Baby Check booklet.	Qualitative interview & records of consultations	Parents of 34 babies < 6 months attending weekly baby clinic in GP in disadvantaged area.	Parents were given a copy of Baby Check. Unstructured 30-90 minute interviews with parents until baby was 6 months.	Perceptions, use of the booklet & consultations for illness among disadvantage parents.	**
Krantz 2001	Parent Resource Centre. Children's Hospital Ontario (Canada)	To describe the development of, & pilot, a fever anticipatory guidance tool for parents.	Qualitative interview	15 first-time parents with children aged 2 months to 4 years from inner city Parent Resource Centre.	The Fever Anticipatory Guidance Tool.	Views on, & use of, the booklet.	*
Randomised controlled trials							
Baker et al. 2009	ED (United States)	Effect of a brief educational video during ED visit for minor febrile illnesses.	RCT	280 parents of children aged 3 months to 3 years presenting to with febrile illness	<i>Intervention:</i> 11 minute video on home management of fever. <i>Control:</i> 8 minute video on home & automobile safety.	Knowledge, attitudes, & return ED visits for minor febrile illnesses within 2 years	***
Broome et al. 2003	6 clinics in 6 states (United States)	Effect of a structured education program on parents'/grandparents'	RCT	216 children from 3/12 to 6 years of age &	<i>Intervention 1:</i> video & brochure on	Knowledge, confidence, & satisfaction in	*

		knowledge, confidence, & satisfaction in assessing & managing a child's fever.		their parents /grandparents. 183 followed up at 3 months & 145 at 6 months.	childhood fever in clinic; <i>Intervention 2:</i> brochure & video in clinic, plus health professional reinforced content & answered parents' questions during consultation; <i>Control:</i> 'usual' care.	assessing & managing child's fever at 48 hours, 1, 3, & 6 months post intervention;	
Chande et al. 1996	Urban paediatric ED (United States)	Effect of educational intervention on common childhood illness on ED visits	RCT	130 parents of children with minor illnesses in ED.	<i>Intervention:</i> 10 minute video on paediatric health care issues plus information booklet on common paediatric ailments. <i>Control:</i> standard ED discharge instructions.	Return visits to ED over 6-months.	*
Francis et al. 2009	General practice (United Kingdom)	Effect of interactive booklet on respiratory tract infections on re-consultation for same illness episode, antibiotic use, future consultation	Cluster RCT	61 practices in Wales & England. 558 parents of children (6 months to 14 years) with a	<i>Intervention:</i> Eight page booklet on childhood respiratory tract infections within	Re-consultation within 2 weeks, antibiotic prescribing & consumption, future consultation	****

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		intentions, & parental satisfaction.		respiratory tract infection.	consultations & as a take home resource. <i>Control:</i> 'usual' consultation.	intentions, parent satisfaction & usefulness of information received, reassurance & enablement.	
Hansen 1990	General practice (Denmark)	Effect of booklet on families' minor illness-behaviour for children < 8 years.	RCT	100 young families with min. one child < 8 years in one practice.	<i>Intervention:</i> Booklet on common childhood problems, presented by GP. Parent recorded illnesses. <i>Control:</i> Unclear. ?'usual care' plus diary completion.	Consultation frequency & anxiety over 6 months.	**
McCarthy et al. 1990	US Private practice and primary care centre	Effect of Acute Illness Observation Scales (AIOS) on mother's judgements about acute illness in children under 24 months.	RCT	369 mothers with 2 week old baby.	<i>Intervention:</i> AIOS film plus fever scenario scoring. Film shown again at 6 & 15 months. AIOS used to score illness prior to & with doctor during consultation. <i>Control:</i> Routine advice about fever. Illness scored on 3 point	Reliability, specificity and sensitivity of mother's judgements compared to clinician assessment from 2 weeks of age, for 32 months.	*

					scale.		
Robbins et al. 2003	Primary care (United Kingdom)	Effect of home visit & infant minor illness booklet on parent's illness management & consultation rates.	RCT	Single GP practice: 103 parents of babies born in 6-month birth cohort.	<i>Intervention:</i> Postal booklet on common childhood illnesses. Research nurse visit when baby 6 weeks old. <i>Control:</i> Routine health visiting service.	Confidence, knowledge, home care activities & desire to contact professionals. Prescription & consultation rates tracked for 6 months.	***
Thomson et al. 1999	General Practice (United Kingdom)	Effect of Baby Check, an illness scoring system for babies ≤ 6/12, on parents' use of health services for their baby.	RCT	997 mothers with new babies	<i>Intervention:</i> Baby Check plus an accident prevention leaflet. <i>Control:</i> accident prevention leaflet alone.	Consultation behaviour tracked for 6 months	***
Usherwood 1991	General practice (United Kingdom)	Effect of a children's symptom booklet on GP consultations.	RCT	419 households with 634 children born 1975 to 1984 registered with one practice	<i>Intervention:</i> Postal booklet on cough, fever, sore throat, diarrhoea & vomiting. <i>Control:</i> No intervention. Baseline data gathered for 2 months prior to intervention.	Consultation rates for 12 months post intervention.	*

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Non-randomised trials							
Herman & Jackson 2010	Head Start agencies (United States)	Effect of educational intervention on health utilisation for acute illness in children ≤ 5 years.	Cohort study (prospective)	9,240 parents with one child enrolled in Head Start. 7,281 completed the training. 581 tracked annually for 2 years.	Health training programs using reference guide 'What to Do When Your Child Gets Sick' by Mayer & Kuklierus (2007) in 55 Head Start agencies in 35 states. Tracked for 3 months, trained in 4th month, follow up for 6 months. Annual visits for 581 parents.	ED & primary care consultation rates for 3-year period	***
Isaacman et al. 1992	Paediatric ED (United States)	Effect of two standardized simplified discharge instructions on parents information recall.	CT (Non-randomised control)	197 parents of children discharged with otitis media (OM).	<i>Intervention 1:</i> standardised verbal discharge information on OM from HCPs in ED <i>Intervention 2:</i> as above + typewritten information from health professionals in ED. <i>Control:</i> 'usual' discharge information.	Knowledge & management of OM before leaving ED, at 24 & 72 hours post intervention. Return visits to ED & parent reported physician contact within 72 hours.	**

Kelly et al. 1996	Private paediatrician's office, 4 Primary care centres (United States)	Effect of educational intervention on knowledge & management of fever	Pre-test post-test cohort study	86 caretakers of children 2 months to 5 years presenting for routine health care or acute minor illness. 50 follow up interviews.	Printed fever management sheet at end of initial interview. Identified knowledge deficits addressed.	Questionnaire on fever knowledge & management before & 2 to 4 weeks after intervention.	**
O'Neill Murphy et al. 2001	Urban ED Children's Hospital of Philadelphia (United States)	Effects of educational programme on parents' anxiety about fever, home management & consultation behaviour.	Quasi-experimental, pre-test post-test pilot study	87 parents with children aged 3 months to 5 years with fever > 38.4	<i>Intervention:</i> Interactive Fever Program <i>Control:</i> Standard Fever Education Programme	Anxiety, consultation behaviour, home management before & after HCP consultation, 2 & 8 weeks after the intervention.	*
Rosenberg & Pless 1993	Montreal Children's hospital ED (Canada)	Effect of ED based parent education on future ED visit rates.	Non-randomised CT	300 parents of children > 6 months in ED.	<i>Intervention:</i> educational pamphlet on common childhood illness plus video in waiting room. <i>Control:</i> 'usual' care. (Sequential recruitment to intervention then control)	Consultation behaviour 4 & 12 months post intervention.	
Steelman et al. 1999	Military Paediatric Clinic (United States)	Effect of educational intervention on parent's childhood	Pre-test post-test CT	93 parents attending 2, 4, & 6 month	<i>Intervention:</i> standardised slide	Knowledge of fever, clinic & ED usage at	

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	States)	fever knowledge & consultation rates.		well-infant visits.	presentation on well-infant care + 10 minute presentation on fever & mail out at 1 & 3 months. <i>Control:</i> standardised slide presentation on well-infant care.	enrolment, 2 & 4 months post intervention.	
Wassmer & Hanlon 1999	Worcester Royal Infirmary DGH (United Kingdom)	Effect of information for parents on febrile convulsions on parent's knowledge.	Non-Randomised CT	Intervention: 50 parents of children with 1st febrile convulsion May to Dec 1996. <i>Control:</i> 50 parents of children at community health clinic with no febrile convulsion.	<i>Intervention:</i> verbal & written information on febrile convulsions during consultation. <i>Control:</i> no information provided. Assume 'usual care'.	Parental knowledge of febrile convulsion 1yr post intervention.	
Yoffe et al. 2011	Primary care clinic (United States)	Effect of parent-focused educational intervention on non-urgent ED visits.	Realistic evaluation	Parents of all children ≤ 10 years attending 3 primary care clinics. Number receiving the booklet was not provided.	<i>Intervention:</i> booklet on common childhood illness to the parents with children registered with one primary care clinic.	ED consultation rates Nov.2007 to Apr.2009	

					<i>Control:</i> Parents of children registered with two other clinics not receiving the booklet.		
Quantitative descriptive studies							
Thornton et al. 1991	Conducted in the home (United Kingdom)	Use of Baby Check (BC), an illness scoring system for babies \leq 6/12, by mothers at home	Two field trials	Study A: 104 mothers of term babies, randomly selected from the birth register Study B: 70 mothers of term babies born on selected days	<i>Study A:</i> Mothers used BC daily for a week & recorded contacts with HCPs. Research nurse visit to grade mother's competence in booklet use. <i>Study B:</i> Mothers used BC when wanted to until baby was 6 months. Research nurse visit when babies 8 & 16 weeks. Questionnaire about BC at 6 months.	Views & use of the booklet	****
Anhang et al 2013	Two Children's EDs (United States)	Usability and safety of a web-based decision support tool for parents of children with flu-like illnesses	Pilot feasibility study	294 parents/carers of children \leq 18 years who had presented to	<i>Intervention:</i> Strategy for Off-site Rapid Triage (SORT) for Kids	Caregiver ratings of usability of tool, sensitivity & specificity of	*

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				an Emergency Department for an influenza-like illness	tool webbased parent survey & severity scoring tool.	SORT for Kids for identifying children needing ED	
Mixed methods studies							
Stockwell et al. 2010	Early Head Start Agency at Columbia University (United States)	Pilot evaluation of a community-based, culturally competent health literacy intervention on care of URI, with Latino Early Head Start parents.	Pre-test post-test pilot evaluation	11 parents of children 6 months to 3 years in full evaluation. 17 in interviews & 33 post-class evaluations.	Three education modules delivered in children's centre.	Parental knowledge, attitudes & care of URI before & 2 weeks after final module using Knowledge, Attitude, Practices instrument.	**

ED = Emergency department, DGH = District General Hospital, GP = general practitioner, URI = Upper respiratory infection, RCT/CT = Randomised controlled trial/controlled trial

*Quality assessment rating, between zero stars (lowest quality) and 4 stars (****, highest quality)

Table 2 Effectiveness of interventions on consultation rate

Authors (date)	Consultation rate (Significant results in bold)
Anhang et al. 2013	The algorithm correctly classified 93% of pediatric patients with Influenza like Illness who made necessary ED visits and all children who made a second ED visit for Influenza like Illness within the subsequent week.
Baker et al. 2009	No difference in re-attendance to ED. P=0.46 95% CI -0.06 to 0.16
Chande et al. 1996	No difference in contact with Primary Care Physician (p=0.37) or return visits to ED (p=0.68)
Francis et al. 2009	Non-significant reduction in re-consultation in first 2 weeks p=0.29 95% CI -2.7 to 9.3. Significant reduction in intention to consult in future for similar illness (55.3% intervention vs. 76.4% control) p<0.001 CI 0.20 to 0.57
Hansen 1990	Significant reduction in consultations in intervention group (Mean consultations 0.288 (2SD 0.315-0.252) intervention vs. 0.426 (0.461-0.390) control group). P value not given but states as significant.
Herman & Jackson 2010	Significant reduction in choosing to contact HCP first. Pre 69% Post 33% p<0.0001 Significant reduction in ED (by 58% p<0.001 95% CI 0.51 to 0.50) and doctor visits (by 42% p<0.001 95% CI 0.33 to 0.46)
Isaacman et al. 1992	Parent reported physician contact showed a non-significant reduction (22.8% control vs 13.2% intervention group) Return to ED rates by day 3 were significantly reduced in intervention groups (3.1% intervention versus 10.1% control group p=0.05)
Kai 1994	14 parents reported that on 19 occasions Baby Check influenced their decision not to contact a doctor.
O'Neill Murphy et al. 2001	High attrition to follow up resulted in no data on effect on consultation rate
Robbins et al. 2003	Significant reduction in visits to child health clinic (Median visits: intervention 4.5 vs. Control 5 p=0.039) No significant difference in GP, HV or minor illness nurse contacts.
Rosenberg & Pless 1993	Non-significant reduction in ED use in intervention group. Mean total medical visits/year: Control 0.87 (SD 1.5) Intervention 0.7 (SD 1.3)
Steelman et al. 1999	No significant differences in clinic or ED use between control and intervention groups, but parents with more than 1 child had significantly more 'inappropriate' visits (>1child control group = 5 'inappropriate' visits, intervention group = 7 such visits vs. 1 'inappropriate' visit for both intervention and control in families with 1 child only p=0.04)
Thomson et al. 1999	No significant difference in total consultations p=0.26, GP p=0.30, out of hours service use p=0.93 or referrals p=0.64
Usherwood 1991	No significant difference was found in the number of daytime health centre contacts. Significant decrease in home visits in the intervention group for households with one or two children (28% reduction, p<0.05) but not for larger families. Significant increase in out of hours contacts in the intervention group (Mean contacts: 1 child family Control 0.03 vs. Intervention 0.10; 2 child C:0.11 vs. I:0.23; 3 child C:0.06 vs. I:0.30 p<0.05)
Yoffe et al. 2011	Statistically significant reduction in ED use in intervention group p<0.001 . Reductions ranged from 55 to 81% compared to the same month in the previous year.
Summary	6/15 studies significant difference including 1 reduction in intention to consult, 1 reduction in home visits but with increase in OOHs

Table 3 Effectiveness of interventions on parents’ knowledge

Author (date)	Parent’s knowledge (Significant results in bold)
Baker et al. 2009	Significant reduction in knowledge scores: 54% reduction in responses that fever was dangerous (p<0.0001 , 95% CI 0.43-0.65) 28% reduction in responses that child with fever should be woken (p<0.0001 , 95% CI 0.19-0.39) 30% increase in responses identifying aspirin as inappropriate (p<0.0001 , 95% CI -0.42 to -0.16)
Broome et al. 2003	Knowledge increased significantly more in both groups than in control group at 24 to 72 hours and 1,3 & 6 months p<0.03 No information on the size of the effect provided. Those given individual instruction reported to have higher scores - no p value provided.
Isaacman et al. 1992	Parent recall of medication data higher in all groups than other items but with no significant differences between groups. Recall of signs of improvement increased significantly for both interventions groups compared to controls at exit interview, day 1 and 3 (Mean correct responses Exit int. Control 0.9, Verbal 25.3, Verbal & Written 56.9; Day 1 C 33.3, V 54.5, V&W 61.0; Day 3 C 44, V 60, V&W 73.2; all p<0.05). Recall of worrying signs improved significantly compared to controls at exit and on day 1 (Exit int. C 5.5, V 32, V&W 38.1 ; Day 1 C 19.1, V 37.5, V&W 44.5; Both p<0.5). The written and verbal intervention groups performed better than the verbal group at exit interview only for signs of improvement and recall of worrisome signs (p<0.05).
Kelly et al. 1996	Indirect measurement of knowledge: No significant difference in level of fever at which antipyretics were administered (p=0.91). A significant difference was found in accuracy of antipyretic dose (n=30 incorrect dose pre-intervention, 18/30 (60%) accurate doses post intervention p=0.04).
McCarthy et al 1990	Indirect measurement of knowledge: <i>Reliability of mother’s judgements:</i> intervention group were more likely to agree with clinician than control group: 91.7% versus 72.4% (Kappa 0.50 vs 0.26). <i>Specificity of mother’s judgements:</i> Mothers in the intervention group were less likely to score the child’s illness as more severe than the paediatrician than those in the control group (Intervention 90% vs. 59% control group p<0.0001) <i>Sensitivity of mother’s judgements:</i> Serious illness was the outcome used to measure sensitivity. No difference found between intervention and control group (80% versus 90% respectively).
Robbins et al. 2003	Non significant reduction in knowledge at 7 months in intervention group
Steelman et al. 1999	Significantly fewer incorrect responses in intervention group at 2 months (Intervention 10.4 vs. Control 11.8; p=0.006) and at 4 months (Intervention 8.5 vs. Control 10.3; p=0.002)
Stockwell et al. 2010	Significant increase in knowledge/attitude health literacy score (61% p<0.05)
Wassmer & Hanlon 1999	Significant increase in parental knowledge of febrile convulsion in the intervention group p<0.05 but these parents children had already had a febrile convulsion. See the original paper for details on size of the effect as these are reported per question asked of parents.
Summary	8/9 showed significant increase in knowledge, although implied in 2 studies and 1 study had high risk of bias. 1 paper showed reduction in knowledge at 7 months. 1 qualitative paper.

Table 4 Effectiveness of interventions on parents' anxiety or reassurance

Author (date)	Anxiety/Reassurance (Significant results in bold)
Francis et al. 2009	No significant difference in level of reassurance
Hansen 1990	Significant reduction in worry reported as the main reason for consulting the GP (19% vs. 31% p=0.0075)
Herman & Jackson 2010	Parents reporting being 'very worried' when their child is sick reduced by a third (no further statistics available).
Kai 1994	11 parents consulted despite low acuity scores to avoid consulting later 'out of hours', or because they wanted reassurance. Baby Check did not answer their questions or tell them how to manage minor illness.
Krantz 2001	Parents felt that the fever guide was reassuring and that the decision guide on what to do when was important to include.
O'Neill Murphy et al. 2001	At 2 weeks both groups were less anxious. Control 86% Intervention 50%
Thornton et al. 1991	In study A 46% found using Baby Check reassuring. 4% said it caused anxiety. In Study A 6/104 mothers reported that Baby Check helped them to decide whether or not to seek advice, 4 were reassured by a low score. Two with high scores were prompted to seek help.
Summary	1/7 significant reduction in worry. 3 reduced anxiety but descriptive statistics only. 2 qualitative papers.

Appendix 1 - Example Search Strategy Used (replicated in other literature databases)

1. MEDLINE; exp FAMILY/
2. MEDLINE; exp PARENTS/
3. MEDLINE; (family* OR caregiver* OR caretaker*).ti,ab
4. MEDLINE; families.ti,ab
5. MEDLINE; (parent OR parents OR parenting).ti,ab
6. MEDLINE; carer*.ti,ab
7. MEDLINE; (infant* OR baby OR babies OR newborn* OR pediatric* OR paediatric* OR child* OR neonat* OR toddler*).ti,ab
8. MEDLINE; exp CHILD/ OR exp INFANT/
9. MEDLINE; exp ACCESS TO INFORMATION/
10. MEDLINE; exp CONSUMER HEALTH INFORMATION/
11. MEDLINE; exp PAMPHLETS/
12. MEDLINE; "patient information".ti,ab,sh
14. MEDLINE; "fact sheet*".ti,ab,sh
15. MEDLINE; "factsheet*".ti,ab,sh.
16. MEDLINE; "help sheet*".ti,ab,sh.
17. MEDLINE; leaflet*.ti,ab,sh
18. MEDLINE; pamphlet*.ti,ab,sh
20. MEDLINE; "health education".ti,ab
21. MEDLINE; "information literacy".ti,ab
22. MEDLINE; "information resource*".ti,ab
23. MEDLINE; (webpage* OR website*).ti,ab
24. MEDLINE; (educat OR counsel*).ti,ab.
25. MEDLINE; "consultation behavior*".ti,ab
26. MEDLINE; "consultation behaviour*".ti,ab
27. MEDLINE; (booklet* OR brochure*).ti,ab
28. MEDLINE; exp ACUTE DISEASE/
29. MEDLINE; (acute adj2 illness*).ti,ab
30. MEDLINE; exp FEVER/
31. MEDLINE; (minor adj2 illness*).ti,ab
32. MEDLINE; (fever* OR febril*).ti,ab
33. MEDLINE; (cough* OR diarrh* OR rash* OR vomit* OR earache*).ti,ab
34. MEDLINE; bronchiolit*.ti,ab
35. MEDLINE; exp COUGH/ OR exp WHOOPING COUGH/
36. MEDLINE; exp DIARRHEA/
37. MEDLINE; exp EARACHE/
38. MEDLINE; exp VOMITING/
39. MEDLINE; exp RESPIRATORY TRACT INFECTIONS/
40. MEDLINE; (respirator* adj2 infection*).ti,ab
41. MEDLINE; exp OTITIS.
42. MEDLINE; (otitis OR croup OR seizure*).ti,ab
43. MEDLINE; exp CROUP.
44. MEDLINE; exp BRONCHIOLITIS/
45. MEDLINE; exp SEIZURES/
46. MEDLINE; exp EXANTHEMA/
47. MEDLINE; (rash OR rashes OR exanthem*).ti,ab
48. MEDLINE; exp MUCOCUTANEOUS LYMPH NODE SYNDROME/
49. MEDLINE; "MUCOCUTAn* LYMPH NODE*".ti,ab.

50. MEDLINE; kawasaki*.ti,ab
51. MEDLINE; exp CONJUNCTIVITIS/
52. MEDLINE; conjunctivit*.ti,ab
53. MEDLINE; "chicken pox".ti,ab
54. MEDLINE; exp CHICKENPOX/
55. MEDLINE; chickenpox.ti,ab
56. MEDLINE; exp EPIGLOTTITIS/
57. MEDLINE; epiglottit*.ti,ab
58. MEDLINE; exp TONSILLITIS/
59. MEDLINE; tonsillit*.ti,ab
60. MEDLINE; exp COMMON COLD/
61. MEDLINE; exp INFLUENZA, HUMAN/
62. MEDLINE; (influenza OR flu).ti,ab
63. MEDLINE; "sore throat*".ti,ab
64. MEDLINE; exp PHARYNGITIS/
65. MEDLINE; pharyngit*.ti,ab
66. MEDLINE; 28 OR 29 OR 30 OR 31 OR 32 OR 33 OR 34 OR 35 OR 36 OR 37 OR 38
OR 39 OR 40 OR 41 OR 42 OR 43 OR 44 OR 45 OR 46 OR 47 OR 48 OR 49 OR 50 OR 51
OR 52 OR 53 OR 54 OR 55 OR 56 OR 57 OR 58 OR 59 OR 60 OR 61 OR 62 OR 63 OR 64
OR 65
67. MEDLINE; 1 OR 2 OR 3 OR 4 OR 5 OR 6
68. MEDLINE; 7 OR 8
69. MEDLINE; "health information".ti,ab
70. MEDLINE; 9 OR 10 OR 11 OR 12 OR 14 OR 15 OR 16 OR 17 OR 18 OR 20 OR 21 OR
22 OR 23 OR 24 OR 25 OR 26 OR 27 OR 69
71. MEDLINE; 66 AND 67 AND 68 AND 70
72. MEDLINE; exp MENINGITIS/
73. MEDLINE; meningit*.ti,ab
74. MEDLINE; exp STATUS EPILEPTICUS/ OR exp EPILEPSY/
75. MEDLINE; epilepsy.ti,ab
76. MEDLINE; exp SEPSIS/
77. MEDLINE; sepsis.ti,ab
78. MEDLINE; epilept*.ti,ab
79. MEDLINE; 72 OR 73 OR 74 OR 75 OR 76 OR 77 OR 78
80. MEDLINE; 67 AND 68 AND 70 AND 79
81. MEDLINE; 71 OR 80
82. MEDLINE; (father* OR mother*).ti,ab
83. MEDLINE; 67 OR 82
84. MEDLINE; exp INTERNET/
85. MEDLINE; internet.ti,ab
86. MEDLINE; 67 OR 82.
87. MEDLINE; 70 OR 84 OR 85
88. MEDLINE; 66 OR 79
89. MEDLINE; 68 AND 86 AND 87 AND 88
90. MEDLINE; 89 [Limit to: Publication Year 1990-2014]

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Author, Year	Title	Inclusion Criteria (x = criteria not met)						
		Research articles (quantitative, qualitative or literature review)	Intervention= Information resources on acute child illness for parents	Parent outcome measured	Intervention concerns child up to 5 years of age	Intervention setting: home, primary care, A & E or ambulatory care	Published in English language January, 1990- October, 2011	UK, USA, Australia, Europe, New Zealand and Canada
2004, No authors listed on PubMed	Patient information. Understanding ear infections in your child. Advance for Nurse Practitioners. 12(7):44.	x						
Rideout ME and First LR 2001	Guide for parents: a brief but important talk on a "hot topic": your child's fever Contemporary Pediatrics ;18(5):42	x						
Ali M., Asefaw T., Byass P., Beyene H. and Pedersen F.K. 2005	Helping northern Ethiopian communities reduce childhood mortality: population-based intervention trial Bulletin of the World Health Organisation. 83(1):27-33.		x					x
Allen, J., Dyas, J. and Jones, M. 2002	Minor illness in children: parents' views and use of health services British Journal of Community Nursing. 7(9):462-8.		x	x				
American Academy of Family Physicians 2004	Information from your family doctor. Urinary tract infections in children American Family Physician. 1;69(1):155-6	x		x				
American Academy of Family Physicians 1998	Information from your family doctor. When your child has a UTI American Family Physician.15;74(2):313-4.	x		x				
Awasthi, S., Verma, T., and Agarwal, M. 2006	Danger signs of neonatal illnesses: perceptions of caregivers and health workers in northern India Bulletin of the World Health Organisation. 84(10):819-26			X				x

Barbara, S. 2009	First Contact: Effective Health Care for Children, Young People and Families Community Practitioner, 82(8), pp.18-21	x	x					
Bernhardt, J.M. and Felter, E.M. 2004	Online pediatric information seeking among mothers of young children: results from a qualitative study using focus groups Journal of Medical Internet Research. 1;6(1):e7		x	x				
Booth, M., Brown, T. and Richmand-Crum, M. 2004	Dialling for help: state telephone hotlines as vital resources for parents of young children Issue Brief (Commonw Fund). (787):1-12	x	x					
Bouche, G. and Migeot, V. 2008	Parental use of the Internet to seek health information and primary care utilisation for their child: a cross-sectional study BMC Public Health. 28;8:300		x	x				
Cals, J. W.L., Hood, K., Aaftink, N., Hopstaken, R.M., Francis, N.A., Dinant, G., and Butler, C.C. 2009	Predictors of patient-initiated re-consultation for lower respiratory tract infections in general practice The British Journal of General Practice. 59(567):761-4		X	x	x			
Charles JO, Udonwa NE, Ikoh MU, Ikpeme BI. 2008	The role of mothers in household health-seeking behavior and decision-making in childhood febrile illness in Okurikang/Ikot Effiong Otop community, Cross River State, Nigeria Health Care for Women International. 29(8):906-25		x					x
Considine, J. and Brennan, D. 2007	Effect of an evidence-based education programme on ED discharge advice for febrile children Journal of Clinical Nursing. 16(9):1687-94		x	x				

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Croghan, E. 2008	Preventing sickness absence from early years education British Journal of School Nursing, Vol. 3, Iss. 5: 230- 233		X	x		x		
Curry, M.D., Mathews, H.F., Daniel, H.J., Johnson, J.C., Mansfield, C.J. 2002	Beliefs about an responses to childhood ear infections: a study of parents in Eastern North Carolina Social Science Medicine. 54(8):1153-65		x	x				
DeWalt, D.A. and Hink, A. 2009	Health literacy and child health outcomes, a systematic review of the literature Pediatrics. 124 Suppl 3:S265-74	x	x	x				
Dixon-Woods, M. and Thornton, H. 2001	Written information for treating minor illness British Medical Journal. 1;323(7311):516-7	x	x	x				
Dyas, J., Bethea, J. and Jones, M. 2007	Identifying consensus on the appropriate advice for managing common childhood illnesses: a nominal group study Quality in Primary Care, Volume 15, Number 5 :285-292(8)		x	x				
Ebuehi OM, Adebajo S. 2010	Improving caregivers' home management of common childhood illnesses through community level interventions Journal of Child Health Care. 14(3):225-38.		x					x
Ertem, I.O., Atay, G., Bingoler, B.E., Dogan, D.G., Bayhan, A. and Sarica, D. 2006	Promoting child development at sick-child visits: a controlled trial Pediatrics. 118(1):e124-31		x	x				
Fickert, N.A. 2006	Taking a closer look at acute otitis media in kids Nursing. 36(4):20-1	x	x	x				
Fletcher, R., Russell, V. G. and Keatinge, D. 2008	The evaluation of tailored and web-based information for new fathers Child: Care, Health and Development. 34(4):439-46.		x	x				

Flury T, Aebi C, Donati F. 2001	Febrile seizures and parental anxiety: does information help Swiss Medical Weekly. 131(37-38):556-60		x	x				
Francis N., Wood, F., Simpson, S., Hood, K. and Butler, C.C. 2008	Developing an 'interactive' booklet on respiratory tract infections in children for use in primary care consultations Patient Education and Counseling. 73(2):286-93			x				
Francis, N., Crocker, J., Gamper, A., Brookes-Howell, L., Powell, C. and Butler, C. 2011	Missed opportunities for earlier treatment? A qualitative interview study with parents of children admitted to hospital with serious respiratory tract infections Archives of Disease in Childhood. 96(2):154-9. Epub 2010 Nov 2		X		X			
Franck LS, Cox S, Allen A, Winter I. 2004	Parental concern and distress about infant pain Archives of Disease in Childhood 89(1):F71-5		x			x		
van Ginneken, J.K., Lob-Levyt, J. and Gove, S. 1996	Potential interventions for preventing pneumonia among young children in developing countries: promoting material education Tropical Medicine & International Health. 1(3):283-94	x	X					x
Goldman RD, Antoon R, Tait G, Zimmer D, Viegas A, Mounstephen B. 2005	Culture results via the Internet: a novel way for communication after an emergency department visit The Journal of Pediatrics. 147(2):221-6		x					
Goldman, R.D. and Macpherson, A. 2006	Internet health information use and email access by parents attending a paediatric emergency department Emergency Medicine Journal. 23(5):345-8		x					
Goore Z, Mangione-Smith R, Elliott MN, McDonald L, Kravitz RL. 2001	How much explanation is enough? A study of parent requests for information and physician responses Ambulatory Pediatrics. 1(6):326-32		x					

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Haines, C. 2005	Parents' experiences of living through their child's suffering from and surviving severe meningococcal disease Nursing in Critical Care. 10(2):78-89		x			x		
Hariharan SL, Pohlgeers AP, Reeves SD. 2004	Doctor, my child needs some medicine Pediatric Emergency Care. 20(8):540-6	x	x	x				
Hartling, L., Scott, S., Pandya, R., Johnson, D. Bishop, T. and Klassen, T.P. 2010	Storytelling as a communication tool for health consumers: development of an intervention for parents of children with croup BMC Pediatrics. 2;10:64			x				
Hedin, K., Petersson, C., Cars, H., Beckman, A. and Hakansson, A. 2006	Infection prevention at day-care centres: feasibility and possible effects of intervention Scandinavian Journal of Primary Health Care. 24(1):44-9					x		
Hodgson C, Wong I. 2004	What do mothers of young children think of community pharmacists: a descriptive survey The Journal of Family Health Care. 14(3):73-4, 76-9		x					
Holloway, K.A., Karkee, S.B., Tamang, A., Gurung, Y.B., Kafle, K.K., Pradhan, R. and Reeves, B.C. 2009	Community intervention to promote rational treatment of acute respiratory infection in rural Nepal Tropical Medicine & International Health. 14(1):101-10					x		x
Houghton, J. 2005	Minor illness management: empowering parents through shared knowledge Paediatric Nursing. 17(1):24-5	x	x					
Houston, A.M. and Pickering, A.J. 2000	Do I don't I call the doctor': a qualitative study of parental perceptions of calling the GP out-of-hours Health Expectations. 3(4):234-242		x					

Huang, M., Liu, C. and Huang, C. 1998	Effects of an educational program on parents with febrile convulsion children Pediatric Neurology. 18(2):150-5							x
Huang, M-C., Liu, C-C., Chi, Y.C., Huang, C-C., Cain, K. 2001	Parental concerns for the child with febrile convulsion: long-term effects of educational interventions Acta Neurologica Scandinavica. 103(5):288-93							x
Impicciatore, P., Violante, A. and Bonati, M. 1997	Helping parents to cope when their preschool children are acutely ill British Medical Journal. 314(7077):373		x	x				
Jackson, R.J., Baird, W., Davis-Reynolds, L., Smith, C., Blackburn, S. and Allsebrook, J. 2007	Qualitative analysis of parents' information needs and psychosocial experiences when supporting children with health care needs Health Information and Libraries Journal. 25(1):31-7		X					
Jensen, J.F., Tonnesen, L.L., Soderstrom, M., Thorsen, H. and Siersma, V. 2010	Paracetamol for feverish children: parental motives and experiences Scandinavian Journal of Primary Health Care. 28(2):115-20.		X					
Joanne Briggs Institute 2010	Review summaries: evidence for nursing practice Journal of Advanced Nursing. 66(4):738-42	x	x	x				
Kai, J. 1996	Parents' difficulties and information needs in coping with acute illness in preschool children: a qualitative study British Medical Journal. 313(7063):987-90.		x					
Kalister, H., Newman, R.D., Read, L., Walters, C., Hrachovec, J. and Graham, E.A. 1999	Pharmacy-based evaluation and treatment of minor illnesses in a culturally diverse pediatric clinic Archives Pediatrics & Adolescent Medicine. 153(7):731-5.		x	x				

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Kallestrup P and Bro, F. 2003	Parents' beliefs and expectations when presenting with a febrile child at an out-of-hours general practice clinic The British Journal of General Practice. 53(486):43-4.		x					
Kempe, A., Dempsey, C. and Poole, S.R. 1999	Introduction of a recorded health information line into a pediatric practice Archives Pediatrics & Adolescent Medicine. 153(6):604-10.		x	x	x			
KinyonMunch K. 2011	What do you tell parents when their child is sick with the common cold? Journal for Specialists in Pediatric Nursing. 16(1):8-15	x	x	x				
Kubba, H. 2000	An evidence-based patient information leaflet about otitis media with effusion Clinical Performance and Quality Health Care. 8(2):93-9			x		x		
Kyrkou, M., Harbord, M., Kyrkou, N., Kay, D and Coulthard, K. 2006	Community use of intranasal midazolam for managing prolonged seizures Journal of Intellectual & Developmental Disability. 31(3):131-8		x					
LeMay, S., Johnson, C., Choiniere, M., Fortin, C., Hubert, I., Frechette, G., Kudirka, D. and Murray, L. 2010	Pain management interventions with parents in the emergency department: a randomised trial Journal of Advanced Nursing. 66(11):2442-9		x	x				
Light, P.A., Hupcey, J.E. and Clark, M.B. 2005	Nursing telephone triage and its influence on parents' choice of care for febrile children Journal of Pediatric Nursing. 20(6):424-9		x	x				
Littlewood J. 1998	Mothers' understanding of their children's bodies Journal of Child Health Care. 2(3):118-21		x	x				

Lock C, Baker R, Brittain K. 2010	I've just taken you to see the man with the CD on his head': the experience and management of recurrent sore throat in children Journal of Child Health Care. 14(1):95-110		x					
McCann D., Longbottom H. and Nissen M. 2002	The home management and characteristics of children presenting to hospital with acute gastroenteritis Contemporary Nurse. 13(2-3):169-78.		x					
McConnochie, K.M., Wood, N.E., Kitzman, H.J., Herendeen, N.E., Roy, J. and Roghmann, K.J. 2005	Telemedicine reduces absence resulting from illness in urban child care: evaluation of an innovation Pediatrics. 115(5):1273-82.		x	x				
Menghini, K.G. 2005	Designing and evaluating parent educational materials Advances in Neonatal Care. 5(5):273-83.	x	x			x		
Moon, R.Y., Cheng, T.L., Patel, K.M., Baumhaft, K. and Scheidt, P.C. 1998	Parental literacy level and understanding of medical information Pediatrics. 102(2):e25		x					
Murphy, K.A. and Liebman, M. 1995	Fever care: does nursing instruction make a difference? Journal of Emergency Nursing. 21(5):461-3.	x		x				
Neill, S.J. 2010	Containing acute childhood illness within family life: a substantive grounded theory Journal of Child Health Care. 14(4):327-44		x					
Ng, C-J., Chia, Y-C., Teng, C-L. and Nik-Sherina, H. 2007	Factors influencing parental decision to consult for children with upper respiratory tract infection Journal of Paediatrics and Child Health. 44(4):208-13.		x					x

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Oermann, M.H., Lowery, F.N.F. and Thornley 2003	Evaluation of web sites on management of pain in children Pain Management Nursing. 4(3):99-105		x	x				
Olaogun, A., Ayandiran, O., Olalumade, O. Obiajunwa, P., Adeyemo, F. 2008	Knowledge and management of infants' pain by mothers in Ile Ife, Nigeria International Journal of Nursing Practice. 14(4):273-8		x	x				x
Pandolfini C, Impicciatore P, Bonati M. 2000	Parents on the web: risks for quality management of cough in children Pediatrics. 105(1):e1		x	x				
Paul F, Jones MC, Hendry C, Adair PM. 2007	The quality of written information for parents regarding the management of a ferible convulsion: a randomised controlled trial Journal of Clinical Nursing. 16(12):2308-22.					x		
Per Lagerløv, Sølvi Helsetha and Tanja Holager2003	Childhood illnesses and the use of paracetamol (acetaminophen): a qualitative study of parents' management of common childhood illnesses Family Practice. 20(6):717-23		x					
Persaud J. 1997	Patient booklets can cut GP workload Medeconomics 1997 June:47.	x		x				
Pitts M, McMaster J, Hartmann T, Mausezahl D.1996	Lay beliefs about diarrhoeal diseases: their role in health education in a developing country Social Science & Medicine. 43(8):1223-8		x					x
Power, N., Liossi, C and Franck, L. 2007	Helping parents to help their child with procedural and everyday pain: practical, evidence-based advice Journal of Specialists in Pediatric Nursing. 12(3):203-9	x		x				

Rollins, J.A. 2008	UCLA research shows dramatic savings for medicaid when head start parents learn to care for kids' illnesses Pediatric Nursing May 1, 2008	X						
Sanders, M.R., Markie-Dadds, C., Rinaldis, M., Firman, D. and Baig, N. 2007	Using household survey data to inform policy decisions regarding the delivery of evidence-based parenting interventions Child: Care, Health and Development. 33(6):768-83.		x		x			
Sanghavi DM. 2005	Taking well-child care into the 21st century: a novel, effective method for improving parent knowledge using computerized tutorials Archives of Pediatrics & Adolescent Medicine. 159(5):482-5.		x					
Sarrella, M. and Kahanb, E. 2002	Impact of a single-session education program on parental knowledge of and approach to childhood fever Patient Education and Counseling. 51(1):59-63.							x
Schlaudecker, E.P. and Steinhoff, M.C. 2010	Helping mothers prevent influenza illness in their infants . Pediatrics. 126(5):1008-11	x	x					
Småbrekke L, Berild D, Gjaever A, Myrbakk T, Fuskevåg A, Ericson JU, Flaegstad T, Olsvik O, Ringertz SH.2002	Educational intervention for parents and healthcare providers leads to reduced antibiotic use in acute otitis media. Scandinavian Journal of Infectious Diseases. 34(9):657-9.		X					
Sorlie, V., Melbye, H. and Norberg, A. 1996	Counselling parents of children with acute illness: a task for nurses in an emergency clinic Journal of Pediatric Nursing. 11(5):337-41		x					

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Srinivas, S., Poole, F., Redpath, J. and Underhill, T.J. 1996	Review of a computer based telephone helpline in an A&E department Journal of Accident & Emergency Medicine. 13(5):330-3.		x	x				
Trajanovska, M., Manias, E., Cranswick, N. and Johnston, L. 2010	Parental management of childhood complaints: over-the-counter medicine use and advice-seeking behaviours Journal of Clinical Nursing. 19(13-14):2065-75		x	x				
Tuffrey, C. and Finlay, F. 2002	Use of the internet by parents of paediatric outpatients Archives of Disease in Childhood. 87(6):534-6.		x					
Ulione, M.S. 1997	Health promotion and injury prevention in a child development center Journal of Pediatric Nursing. 12(3):148-54			x				
Vitolo MR, Bortolini GA, Dal Bó Campagnolo P, Feldens CA. 2008	Effectiveness of a nutrition program in reducing symptoms of respiratory morbidity in children: A randomized field trial Preventive Medicine. 47(4):384-8.		x					x
Wahl, H., Banerjee, J., Manikam, L. Parylo, C. and Lakhanpaul, M. 2011	Health information needs of families attending the paediatric emergency department Archives of Disease in Childhood. 96(4):335-9.		x					
Walsh A, Edwards H, Fraser J. 2007	Influences on parents' fever management: beliefs, experiences and information sources Journal of Clinical Nursing. 16(12):2331-40.		x	x				
Walsh, A. and Edwards, H. 2006	Management of childhood fever by parents: literature review Journal of Advanced Nursing. 54(2):217-27	x						

Walsh, A., Edwards, H. and Fraser, J. 2008	Parents' childhood fever management: community survey and instrument development Journal of Advanced Nursing. 63(4):376-88.		x					
Wiener, L., Leyden, C.G., Pizzo, P.A., Ognibebe, F.P., Rosenthal, C., and Schubert, W. 1992	Pneumocystis Carinii Pneumonia (PCP) and your child: a parent information booklet Oncology Nursing Forum. 19(3):507-9.	x	x					
Williams A, Noyes J; Information Matters Project (IMP) Team. 2009	The information matters project: Health, medicines and self-care choices made by children, young people and their families: Information to support decision-making. study protocol. Journal of Advanced Nursing;65(9):1807-16	X Study protocol	x					

Appendix 3 Quality assessment of studies included in the review

Type of study	Quality criteria*	Anhang 2013	Thornton et al. 1991	Kai 1994	Krantz 2001	Baker et al. 2009	Broome et al. 2003	Chande et al. 1996	Francis et al. 2009	Hansen 1990	McCarthy et al. 1990	Robbins et al. 2003	Thomson et al. 1999	Usherwood 1991	Herman & Jackson 2010	Isaacman et al. 1992	Kelly et al. 1996	O'Neill-Murphy et al. 2001	Rosenberg & Pless 1993	Steelman et al. 1999	Wassmer & Hanlon 1999	Yoffe et al., 2011	Stockwell et al. 2010
Qualitative	Relevant sources			Y	Y																		Y
	Relevant data analysis			U	U																		U
	Consideration of context			Y	N																		Y
	Consideration of researchers' influence			U	N																		N
Randomized controlled trials	Randomization					Y	U	Y	Y	U	U	U	Y	U									
	Allocation concealment					U	U	U	Y	N	N	Y	U	N									
	Outcome data (≥80%)					Y	Y	N	Y	Y	U	Y	Y	U									
	Drop-out (<20%)					Y	N	N	Y	Y	Y	Y	Y	Y									
Non randomized trials	Minimized selection bias														Y	U	Y	Y	U	N	N	N	U
	Appropriate measurements														Y	U	Y	N	U	U	U	U	Y
	Comparable groups														Y	Y	U	U	U	U	N	U	U
	Outcome (≥80%) + response rate (≥60%)														N	Y	N	N	N	N	U	U	U
Quantitative descriptive	Relevant sampling strategy	N	Y																				
	Representative sample	U	Y																				
	Appropriate measurements	Y	Y																				
	Response rate (≥60%)	U	Y																				
Mixed methods	Relevant design																						U
	Relevant integration of data																						N
	Consideration of limitations																						N

Y=Yes; N=No; U=Unclear

* Quality criteria according to Mixed Methods Appraisal Tool (Pluye P et al., 2011)

Pluye P, Robert E, Cargo M, Bartlett G, O'Cathain A, Griffiths F, Boardman F, Gagnon MP and MC, R. (2011). "Proposal: A mixed methods appraisal tool for systematic mixed studies reviews. Archived by WebCite® at <http://www.webcitation.org/5tTRTc9yJ>." Retrieved Sept 2013, from <http://mixedmethodsappraisaltoolpublic.pbworks.com>.

BMJ Open

Information resources to aid parental decision making on when to seek medical care for their acutely sick child: A narrative systematic review

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Primary Subject Heading:	Patient-centred medicine
Secondary Subject Heading:	Paediatrics, Public health
Keywords:	PUBLIC HEALTH, PAEDIATRICS, Paediatric A&E and ambulatory care < PAEDIATRICS

SCHOLARONE™
Manuscripts

Information resources to aid parental decision making on when to seek medical care for their acutely sick child: A narrative systematic review

Sarah Neill¹, Damian Roland^{2,3}, Caroline HD Jones⁴, Matthew Thompson⁴ Monica Lakhanpaul⁶ on behalf of the ASK SNIFF study group

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⁶Population, Policy and Practice, Institute of Child Health, University College London

Information resources to aid parental decision making on when to seek medical care for their acutely sick child: What does the literature tell us about what works?

Abstract

Objective

To identify the effectiveness of information resources to help parents decide when to seek medical care for an acutely sick child under 5 years of age, including the identification of factors influencing effectiveness, by systematically reviewing the literature

Methods

Five databases and five websites were systematically searched using a combination of terms on children, parents, education, acute childhood illness. A narrative approach, assessing quality via the Mixed Methods Appraisal Tool, was used due to non-comparable research designs.

Results

Twenty-two studies met the inclusion criteria: 9 Randomised Control Trials, 8 Non-randomised intervention studies, 2 Qualitative Descriptive studies, 2 qualitative studies and 1 mixed method study. Consultation frequency (15 studies), knowledge (9 studies), anxiety/reassurance (7 studies), confidence (4 studies) satisfaction (4 studies) and antibiotic prescription (4 studies) were used as measures of effectiveness. Quality of the studies was variable but themes supported information needing to be relevant and comprehensive to enable parents to manage an episode of minor illness Interventions addressing a range of symptoms along with assessment and management of childhood illness, appeared to have the greatest impact on the reported measures. The majority of interventions had limited impact on consultation frequencies, No conclusive evidence can be drawn from studies measuring other outcomes.

Conclusion

Findings confirm that information needs to be relevant and comprehensive to enable parents to manage an episode of minor illness. Incomplete information leaves parents still needing to seek help and irrelevant information appears to reduce parents' trust in the intervention. Interventions are more likely to be effective if they are also delivered in non-stressful environments such as the home and are co-produced with parents.

Key words

Parent information, acute childhood illness, integrative review, measures of effectiveness, health education

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Strengths and Limitations

- This is the first review of the outcome of information resources which aid parental decision making utilising systematic search and quality assessment criteria.
- The findings are limited by the quality of the studies and not being able to control for the impact of different healthcare delivery systems.

For peer review only

BACKGROUND

Acute illness is a universal experience for children and families and represents the most common type of illness in childhood, particularly in 0-5 year olds. Acute illness includes short term illnesses, predominantly infections such as coughs, colds, diarrhoea, vomiting and ear infections. Home management is often supported by consultations in primary care, where children under 5 years old constitute 40% of General Practitioner (GP) workload [1], with most consultations for acute illness [2, 3]. Under 1 year olds are seen more often than all other age groups other than the over 75s [2] and urgent care and emergency department service use by young children appears to be rising [4-6].

Parents' anxiety about acute childhood illness leads them to seek information to help them decide whether or not to seek help from a healthcare professional [7-11]. A wide range of information is available for families, such as written leaflets or via websites much of which is either unknown to parents[5, 7] or does not seem to be making any impact on service use when children are acutely sick at home [11-14]. The increase in consultation rates for non-urgent care [4-6] suggests more effective information sources are needed.

We aimed to systematically review the literature to identify the effectiveness of information resources to help parents decide when to seek medical care for an acutely sick child under 5 years of age, including the identification of factors influencing effectiveness.

Our research questions were:

- What measures of effectiveness have been used to evaluate such interventions?
- How effective are existing interventions in helping parents know when to seek help for an acutely sick child at home?
- What factors influence effectiveness of information provision to help parents know when to seek help for an acutely sick child at home?

METHODS

Search Strategy

We systematically searched five electronic databases (Medline, CINAHL, PsycNET, ASSIA Web of Knowledge) and five websites (Centre for Review and Dissemination York, National Institute for Health and Care Excellence, Health Technology Assessment programme, NHS Evidence, the Cochrane Library) using a combination of terms on children, parents/carers, education, acute childhood illness (see Appendix 1). We scanned reference lists of key articles, and attempted to contact authors when further information was required to determine eligibility and inform quality assessment.

Selection Criteria

Studies which met all the following criteria were included:

1. Studies which included children from 0-14 years with research participants being their parents or caregivers. Initial pilot searches aimed solely at children under five years yielded minimal results.

2. An educational intervention on acute childhood illness was provided to parents/caregivers in any form (written, visual, verbal or electronic) designed to help with decision making about whether or not to seek medical help
3. The study was conducted in primary care, emergency departments, ambulatory settings or in the home, in high income countries as defined by Organisation for Economic Co-operation and Development (OECD). We included all study types.

Studies were excluded if they focused on chronically ill children, hospital in-patient settings, , or educational interventions designed for health professionals. We limited our search to papers published in the English language, between January 1990 and June 2014 (inclusive). The decision to search from 1990 was taken pragmatically as health services have evolved considerably since the latter half of the twentieth century. We did not exclude studies on the basis of quality alone but have noted the quality of studies when discussing their impact. To have excluded low quality studies would have reduced the comprehensiveness of the review, especially given the likely heterogeneity of study design.

The titles and abstracts of studies identified in the search were retrieved and assessed by one reviewer who excluded those that were clearly not relevant. The full text of remaining studies was assessed for inclusion by two reviewers; discrepancies were resolved by discussion between all authors. Reasons for exclusion were recorded (Appendix 2).

Data Extraction & Quality Assessment

Data from included studies were extracted by one reviewer and checked by a second reviewer. All studies which met the inclusion criteria were included regardless of quality, which was assessed independently by two other reviewers using the Mixed Methods Appraisal Tool (MMAT)[15]. This gives a rating between zero stars (lowest quality) and 4 stars (****, highest quality)

Evidence Synthesis: Synthesizing qualitative and quantitative research

Narrative review was used to summarize and explain findings across studies [16, 17]. Meta-analysis was inappropriate due to non-comparable research designs.

RESULTS

The search identified 7,863 studies, of which 22 were included (Figure 1). Table 1 shows the characteristics of included studies of which there were nine randomised controlled trials, eight non-randomised intervention studies, two qualitative descriptive studies, two qualitative studies and one mixed method study. Thirteen were conducted in the United States (US), six in the UK, two in Canada and one in Denmark. Parents/caregivers of children aged 0-14 years were included across all studies, with 12 studies limiting inclusion to parents of children under the age of 6 years. Studies were conducted in primary care (9), Emergency department/hospital (7), child health clinics (3) and children’s health centres (3).

Interventions involved written information in all but one study, which used video alone [20]. Written information was augmented by video/slide presentations [21-25], home visits [12, 26], reinforcement within consultations [21, 25, 27-30] or was part of a structured educational programme [31-33]. Three separate studies reported on the same ‘Baby Check’ intervention in different settings/populations [26, 34, 35].

Quality of included studies is summarized in Table 1, and detailed in Appendix 3. Only two studies were given the highest quality score, with many being given low scores, often due to insufficient reporting of methods.

Measures of effectiveness

The most frequently used measures of effectiveness were: consultation frequency (15 studies), parent knowledge (9 studies), parent anxiety/reassurance (7 studies), parent satisfaction (4 studies), parent confidence and clinician antibiotic prescribing (both 4 studies).

Consultation frequency

Six of the fifteen studies which measured this outcome showed a significant reduction in either actual consultation rates or intention to consult in the future (see Table 2). Three of these studies evaluated effects on consultation rates over a longer (1 to 3 year) period post intervention and found persistence of effect. [19, 31, 36] (2 low and 1 high quality). One study (low quality) showed a reduction in home visits but with an increase in out-of-hours visits [36]. The 8 remaining studies on consultant frequency showed no difference on consultation rates with the specified intervention.

Knowledge

Nine studies assessed the effect of interventions on parental knowledge of childhood illnesses including fever, upper respiratory infections, febrile convulsion and otitis media (see Table 3). Most interventions used multiple methods to provide information, such as written materials supported by verbal explanations (one high quality study) [12, 21, 24, 25, 29, 30, 37]. Timing of outcome measurement ranged from immediately to 32 months later. Eight studies (one high quality) found a significant increase in parental knowledge after interventions [20, 21, 24, 25, 30, 33, 37, 38] with a spread of 24 hours to 12 months for post intervention re-assessment. One (high quality) study showed reduction in knowledge at 7 months [12].

Anxiety/Reassurance

Of the seven randomized controlled studies that reported this outcome, only one reported significantly reduced concern compared with control group following intervention [28] (2* quality rating). Using Baby Check to score their baby's illness reassured 41% (14/34) [34] and 46% [26] of parents respectively. In Herman and Jackson's [31] (high quality) study the percentage of parents reporting that they were 'very worried' when their child was sick reduced by one third

Satisfaction

Four studies assessed the effects of interventions on parent's satisfaction with their communication with health professionals [21, 27], and with the educational information received [29, 39]. Two studies reported non-significantly increased satisfaction in both control and interventions groups [21, 27] (one high quality), while another reported significantly increased satisfaction for both intervention groups compared to controls [29] (2* quality). The fourth study suggested a web-based self-triage tool would be well received by parents [39] (low quality).

Confidence

Two of four studies [12, 21] (one high quality) measuring the effect of interventions on parents' confidence in managing childhood illness at home did not show an increase in levels of confidence. However Thornton et al's (high quality) [26] field trials of 'Baby Check' found parents' confidence in

the tool itself increased over time, whilst Kai's [34] (2* quality) qualitative exploration found that parents felt 'Baby Check' had increased their confidence to monitor their child and given them 'moral support' for their decision to consult a doctor .

Antibiotic prescription

Four studies assessed the effect of interventions on antibiotic prescription. Francis et al (high quality)[27] found a significant reduction in In antibiotic prescriptions given by clinicians in the intervention group (19.5% intervention vs. 40.8% control (95% confidence interval 13.7 to 28.9, P<0.001)); and Stockwell et al [33] showed a reduction in the number of parents who sought antibiotics without a prescription or used over the counter medication inappropriately; however this small study (11 parents) failed to report effects on antibiotics sought by parents from health professionals. Two other studies (both high quality) [12, 35] found no significant differences in antibiotic prescribing.

Factors influencing the effectiveness of an intervention

Factors which may have influenced the effectiveness of interventions were identified from a comparison of study populations and/or the setting of the study and the content, format and delivery of the educational interventions.

Content of interventions: Range of topics addressed by the interventions

Eleven studies assessed interventions which focused on a single symptom or type of childhood illness alone (such as fever, febrile convulsions, respiratory tract infection, otitis media), whilst ten provided information on a range of different childhood illnesses.

Three single-topic studies measured consultation behavior, of which Francis et al [27] found reduced intention to consult in the intervention compared to control group whilst two did not [20, 24]. Two single-topic studies assessed anxiety/reassurance, one found no effect [27] and the other a reduction in both intervention and control groups [32]. Confidence was assessed in one single-topic study [21] which found no effect. Antibiotic prescribing was assessed in two respiratory focused studies [27, 33], one of which showed a significant reduction in prescribing in the intervention group in the first two weeks post intervention [27] and the other a non-significant reduction in seeking antibiotics without prescription after the intervention [33] (only Francis et al. studied rated as high quality).

Four of the ten studies evaluating the effects of providing information on multiple childhood illnesses or symptoms showed trends towards reduction in consultation rates or intention to consult [19, 28, 31, 36] (one high quality). Four multi-topic intervention studies reported a reduction in anxiety or increased reassurance [26, 28, 31, 34] (one high quality). Confidence improved in two of the 'Baby Check' studies [26, 34] (one high quality) but in another (high quality) study, there was no effect on confidence [12]. Neither of two high quality multi-topic studies demonstrated a significant reduction in antibiotic prescribing [12, 35].

In summary, reduction in consultation rates, reduction in anxiety and increases in confidence appeared more common in multi-topic compared to single-topic interventions, whilst reduction in antibiotic prescribing was more effective with single illness focused interventions.

Content of interventions: Information on assessment and/or management of childhood illness

Four interventions specifically intended to enable parents to assess the severity of their baby's illness and know when to seek medical attention for their child [25, 26, 34, 35] (two high quality). One of these interventions (a low quality study) informed parents about fever and home management of fever and found that 90% of parents rated the information helpful in decision making and as a communication tool [21]. In contrast, nearly one third of parents did not think the 'Baby Check' educational tool was useful [26], and a qualitative study of the same tool [34] revealed that even when parents scored their child's illness as minor they still consulted for the illness within 24 hours after the assessment, because they wanted practical advice on management.

Content of the interventions: Accessibility of the information

Many of the papers provided brief descriptions of the strategies used to make interventions easy to understand for parents. Three (one high quality) designed their interventions specifically for parents with low levels of health literacy [31, 33, 40]. The language used in the 'Baby Check' score card was simplified to accommodate low health literacy through the translation of professional terms such as 'reduced tone' as 'floppiness' [26] and a further three studies reported that their interventions were designed for age 11-12 year old reading level [19, 32, 41]. One study specifically mentioned using cartoons and humor to increase the accessibility of information [19]. There was no identifiable relationship on outcomes between studies which did or did not design interventions for easy reading. However, Krantz's qualitative study evaluating parents' views of a fever guide found that parents liked the one page, easy-to-read style, the use of simple diagrams such as a thermometer showing both Fahrenheit and Celsius, and pictures of how to measure a child's temperature. Parents felt that these pictures were likely to enhance recall of the information.

Delivery method for interventions: Interactive or one-way flow

Six studies provided educational interventions to parents in an interactive manner, i.e. the parent could engage with the intervention rather than just receiving information [21, 25, 27, 31-33, 37]: two (high quality studies) showed significant reductions in consultation rates or intention to consult [27, 31] and four significantly improved parental knowledge [21, 25, 33, 37] (low to 2* quality).

Two additional but low to 2* quality studies [19, 28] used a relatively simple non-discursive method to provide information to parents, showing significant reductions in consultations of up to 88% in a comparison of attendances to an Emergency Department per month one year following the intervention. . These shared a common feature: when health professionals gave their booklets to parents, they emphasized that the content was important and would help them to look after their acutely sick child. These findings intimate that educational interventions can be successful even when they are provided using a simple method, but clearly further studies are needed to demonstrate this.

Intervention setting

None of the four interventions which were delivered in the waiting room of an emergency department [20, 22, 23, 32] (one high quality) had significant effects on consultation rates, anxiety or parental knowledge. These studies involved both single topic and multi-topic interventions with varying delivery mechanisms and suggest that it is the environment in which the intervention was delivered which is associated with effectiveness, rather than the content of the intervention itself.

Two US studies [31, 33] took place in children’s health centres: one high quality study reduced consultation rates in local emergency departments and primary care [31] and the other improved parental knowledge [33]. Peer support and a trustworthy environment were two important factors suggested by the authors as related to this success.

Parent involvement in intervention development or evaluation

One high quality study involved parents in the development [27] and four in the evaluation of the educational intervention [19, 28, 31, 36]. Four showed reduction in consultation rates, intention to consult, or improved parental knowledge [19, 27, 28, 31],. In comparison, studies using existing educational materials as their intervention, without modification and evaluation by its target population, were less successful [12, 35] (both high quality).

DISCUSSION

This systematic review and synthesis of information resources intending to help parents decide when to seek medical help for an acutely sick child identified measures of effectiveness used to evaluate interventions, as well as factors which appear to influence the effectiveness of interventions. Unlike previous reviews which focused on interventions specifically for respiratory tract infections [42] or acute pediatric hospital admissions [43], our review was broader as we identified factors influencing effectiveness of interventions on parents’ help seeking behavior for all common acute illnesses at home.

Measures of effectiveness

Consultation frequency, knowledge, reassurance/anxiety, satisfaction, confidence and antibiotic prescribing were used as measures of effectiveness. Studies which found reductions in consultation rates [19, 29, 31] were all conducted in the US, which may reflect differences in health service delivery systems and possible financial costs associated with unscheduled consultations. These differences in parental motivations may limit applicability in other countries such as the UK where direct parent-incurred health service costs are less relevant.

Results from studies measuring parents’ knowledge of acute childhood illness indicate that when both verbal and written information were provided, parents were more likely to retain knowledge in the long term than when only given written information [21, 24, 25, 30, 33, 37, 38]. Verbal reinforcement may signal to parents that health professionals endorse the information.

Providing information did not seem to be directly linked to increased satisfaction, although it is not clear whether the studies we found used a valid measurement tool. Limited information was available about the methods used to measure parent satisfaction, which included a question over the phone [29], or using one or two items within a rating scale administered by phone [21, 27]. Satisfaction is a complex phenomenon and it is therefore unlikely that such simple measures will

elucidate factors which influence it. No conclusions can be drawn regarding the impact of interventions on parents' confidence to care for their child.

The effectiveness of interventions at reducing antibiotic prescriptions mirror those of Andrews et al.'s [2] review of interventions specifically focused on reducing consultation and antibiotic use in respiratory tract infection, which found that educational materials reduced consultation rates by up to 40%. The two respiratory focused studies which we identified, one from the UK and one from the USA, both indicated a reduction in antibiotic use, whilst neither of the less focused interventions demonstrated any effect on antibiotic use.

We were unable to easily identify an intervention which works consistently to reduce consultation rates, to improve parents' knowledge, confidence or satisfaction.

Factors influencing the effectiveness of an intervention

Interventions providing information on multiple childhood illnesses or symptoms appeared to be more effective (e.g. reduction in consultation rates or intention to consult, reduction in anxiety or increased reassurance), compared to interventions addressing single symptoms. This may be because common childhood symptoms, such as fever, cough, sore throat, vomiting and diarrhoea, often occur simultaneously. Therefore, although parents receiving fever education may feel more competent in managing fever, they may continue to seek a medical consultation for other symptoms about which they have less knowledge or confidence. Moreover, educational material which addressed the assessment of illness severity as well as management of minor illness appear to be more effective in supporting parents to care for their children and seek help when necessary: if information is only provided on assessment this may still leave parents needing advice about how to manage, even minor, illness.

Parents' involvement in the development of educational interventions may improve effectiveness. These findings support the general trend towards involving patients and the public in research [4], emphasizing the importance of working collaboratively with the end users of interventions.

O'Neill-Murphy et al [32] argued that information provided in an interactive method is more effective in improving knowledge than non-interactive methods. However, our findings do not clearly support this position as we noted significant effects for interventions delivered with, and without, interaction. Involving health professionals in the *distribution* of booklets, with or without an interactive discussion, may increase the perceived value and reliability of the information and motivate parents to read the booklets, trust the home management strategies suggested and, finally, impact on their behavior. Parents have previously been found to trust information from doctors more than that from other sources [9].

Studies in the review were conducted in a range of settings; those conducted in emergency departments were the least effective [20, 22, 23, 32]. Having an acutely sick child is a stressful time for parents, generating considerable anxiety and uncertainty about when to seek medical help [9, 11, 5]. Stress can impair learning [46], therefore it is not surprising that in Chande et al's study only 65% of participants in the intervention group remembered the video in the emergency department. However, two US studies [31, 33] conducted in children's health centres showed reduction in consultation rates in local emergency departments and in primary care [31] and improved parental knowledge [33]. We do not know whether interventions delivered in children's centres would

similarly work in the UK, although community education on childhood illness has been suggested in a recent UK survey of parents’ first contact choices [47].

Strengths and limitations

The strengths of our review lie in its inclusiveness. Given the non-comparable research designs, we used an integrative narrative approach, recognized as an effective method for summarizing and synthesizing findings across multiple study designs [16, 17]. This approach enabled us to identify influences on effectiveness across a wider range of studies and topics than would have been possible with a single study type or topic focused review. This comprehensive strategy does result in the inclusion of low quality studies whose impact may be questioned and means our recommendations need to confirmed in further studies.

It is possible some studies were missed as the screening of titles and abstracts for inclusion was performed by only one person. The highly heterogeneous nature of the included studies in terms of design, as well as interventions, outcomes measured, populations and settings limited our ability to perform more quantitative syntheses. The literature search was of papers published in English since January 1990. However, it was evident that some of the earlier included studies are already of limited direct relevance to contemporary health services. For example, the ‘Baby Check’ tool used in three studies included a requirement for parents to measure rectal temperature, which is no longer recommended practice. Also no studies compared differing healthcare delivery systems; health systems are likely to have implications on the impact of different interventions.

Recommendations for clinical practice: How best to provide information to help parents decide when to seek help for an acutely sick child

Our findings indicate that interventions with the following characteristics are more likely to be effective:

- Comprehensive information on childhood illness
- Information on assessment of children’s need for a medical consultation *and* on how to manage minor illness at home
- Reinforcement or support by local health care professionals
- Delivery away from the stressful environment of the emergency department. This could be in primary care, in the home or in social care settings.
- Co-production with parents.

Even without the development of new materials for parents of acutely ill children, there are messages here for clinicians using existing materials. Clinicians need to select resources which provide information on multiple common symptoms of childhood illness. Evidence from focus groups parents indicates development with parents is good practice. Interventions in this area can have unexpected consequences which need to be considered prior to implementation, as for example one primary care based intervention which resulted in shifting consultation from day time home visits to the out of hours service [36].

Information is best provided in primary care or social care settings. Community centres such as SureStart Children's Centres in the UK provide a potential route for the delivery of health information by health professionals, such as health visitors.

Directions for future research

Most of the studies included in the review were quantitative, providing valuable information on the effects of educational interventions. More qualitative studies are needed, which are able to provide in-depth understanding about what, how, and why interventions affect parents' abilities to assess and manage acute childhood illnesses. This information should be underpinned by research which identifies both parents' and health professionals' current use of information resources, and their views on how these resources need to be developed. Finally it is important that any future interventions for parents should be co-developed with parents themselves [48,49]. Given the rising rates of consultations and the considerable impact this is having on the health service in the UK, as well as on parents, there is a pressing need for larger scale implementation studies taking into account the findings of this review.

Conclusion

Overall, the majority of reviewed interventions had limited effects on consultation rates. Although many studies showed an improvement in parental knowledge of childhood illness, this did not necessarily lead to more confidence and less anxiety in parents when looking after their child at home. Interventions providing comprehensive information on childhood illness which can be used for both assessing children's need for a medical consultation and for managing minor illness at home were more effective in reducing consultation rates than those focused on a single symptom/ illness or only on assessing the child's level of acuity. Interventions also appeared more effective if parents were involved in their development or evaluation.

Contributorship statement

Sarah Neil, Monica Lakhanpaul, Caroline Jones and Matthew Thompson conceived the original idea. Initial data searching was performed by Sarah Neil and quality analysis undertaken by all authors. Sarah Neil prepared an initial manuscript which Damian Roland revised. All authors contributed to the final version.

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Competing interests

The authors have no competing interests to declare.

Data Sharing

Additional data in the form of two appendices can be made freely available

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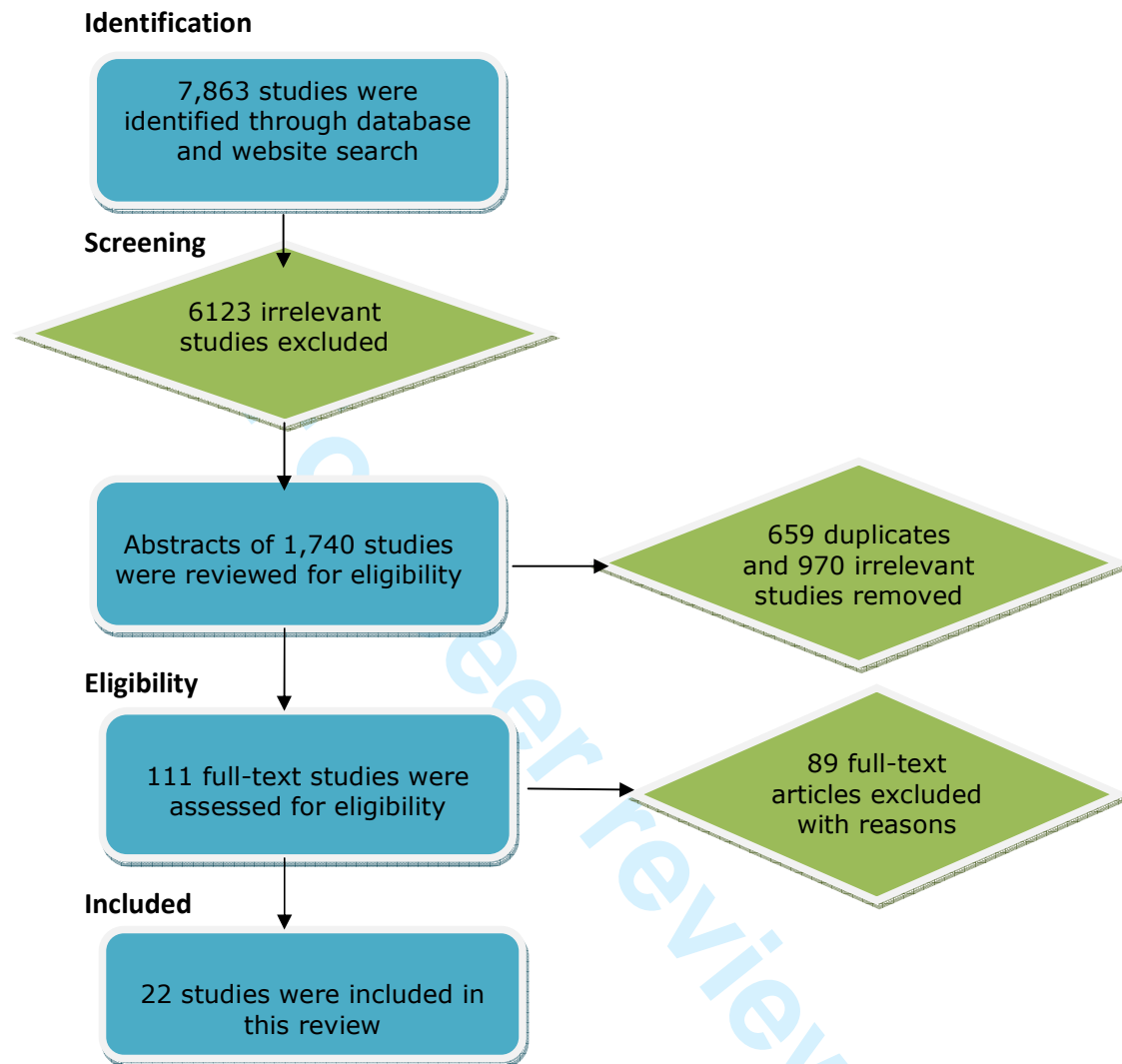


Figure 1 Flow of information through the phases of the selection process (Using PRISMA Flow Diagram structure (Moher et al., 2009))

Refer to appendix 2 for reasons for exclusion

Table 1 Characteristics and quality assessment of studies included

Author(s)/Date	Setting	Aim	Design	Sample	Intervention	Main Outcomes	Quality Assessment*
Qualitative studies							
Kai 1994	Health Visitor & General Practitioner baby clinics (United Kingdom)	To explore disadvantaged parents' perceptions & use of the Baby Check booklet.	Qualitative interview & records of consultations	Parents of 34 babies < 6 months attending weekly baby clinic in GP in disadvantaged area.	Parents were given a copy of Baby Check. Unstructured 30-90 minute interviews with parents until baby was 6 months.	Perceptions, use of the booklet & consultations for illness among disadvantage parents.	**
Krantz 2001	Parent Resource Centre. Children's Hospital Ontario (Canada)	To describe the development of, & pilot, a fever anticipatory guidance tool for parents.	Qualitative interview	15 first-time parents with children aged 2 months to 4 years from inner city Parent Resource Centre.	The Fever Anticipatory Guidance Tool.	Views on, & use of, the booklet.	*
Randomised controlled trials							
Baker et al. 2009	ED (United States)	Effect of a brief educational video during ED visit for minor febrile illnesses.	RCT	280 parents of children aged 3 months to 3 years presenting to with febrile illness	Intervention: 11 minute video on home management of fever. Control: 8 minute video on home & automobile safety.	Knowledge, attitudes, & return ED visits for minor febrile illnesses within 2 years	***
Broome et al. 2003	6 clinics in 6 states (United States)	Effect of a structured education program on parents'/grandparents'	RCT	216 children from 3/12 to 6 years of age &	Intervention 1: video & brochure on	Knowledge, confidence, & satisfaction in	*

		knowledge, confidence, & satisfaction in assessing & managing a child's fever.		their parents /grandparents. 183 followed up at 3 months & 145 at 6 months.	childhood fever in clinic; <i>Intervention 2:</i> brochure & video in clinic, plus health professional reinforced content & answered parents' questions during consultation; <i>Control:</i> 'usual' care.	assessing & managing child's fever at 48 hours, 1, 3, & 6 months post intervention;	
Chande et al. 1996	Urban paediatric ED (United States)	Effect of educational intervention on common childhood illness on ED visits	RCT	130 parents of children with minor illnesses in ED.	<i>Intervention:</i> 10 minute video on paediatric health care issues plus information booklet on common paediatric ailments. <i>Control:</i> standard ED discharge instructions.	Return visits to ED over 6-months.	*
Francis et al. 2009	General practice (United Kingdom)	Effect of interactive booklet on respiratory tract infections on re-consultation for same illness episode, antibiotic use, future consultation	Cluster RCT	61 practices in Wales & England. 558 parents of children (6 months to 14 years) with a	<i>Intervention:</i> Eight page booklet on childhood respiratory tract infections within	Re-consultation within 2 weeks, antibiotic prescribing & consumption, future consultation	****

		intentions, & parental satisfaction.		respiratory tract infection.	consultations & as a take home resource. <i>Control:</i> 'usual' consultation.	intentions, parent satisfaction & usefulness of information received, reassurance & enablement.	
Hansen 1990	General practice (Denmark)	Effect of booklet on families' minor illness-behaviour for children < 8 years.	RCT	100 young families with min. one child < 8 years in one practice.	<i>Intervention:</i> Booklet on common childhood problems, presented by GP. Parent recorded illnesses. <i>Control:</i> Unclear. ?'usual care' plus diary completion.	Consultation frequency & anxiety over 6 months.	**
McCarthy et al. 1990	US Private practice and primary care centre	Effect of Acute Illness Observation Scales (AIOS) on mother's judgements about acute illness in children under 24 months.	RCT	369 mothers with 2 week old baby.	<i>Intervention:</i> AIOS film plus fever scenario scoring. Film shown again at 6 & 15 months. AIOS used to score illness prior to & with doctor during consultation. <i>Control:</i> Routine advice about fever. Illness scored on 3 point	Reliability, specificity and sensitivity of mother's judgements compared to clinician assessment from 2 weeks of age, for 32 months.	*

					scale.		
Robbins et al. 2003	Primary care (United Kingdom)	Effect of home visit & infant minor illness booklet on parent's illness management & consultation rates.	RCT	Single GP practice: 103 parents of babies born in 6-month birth cohort.	<i>Intervention:</i> Postal booklet on common childhood illnesses. Research nurse visit when baby 6 weeks old. <i>Control:</i> Routine health visiting service.	Confidence, knowledge, home care activities & desire to contact professionals. Prescription & consultation rates tracked for 6 months.	***
Thomson et al. 1999	General Practice (United Kingdom)	Effect of Baby Check, an illness scoring system for babies ≤ 6/12, on parents' use of health services for their baby.	RCT	997 mothers with new babies	<i>Intervention:</i> Baby Check plus an accident prevention leaflet. <i>Control:</i> accident prevention leaflet alone.	Consultation behaviour tracked for 6 months	***
Usherwood 1991	General practice (United Kingdom)	Effect of a children's symptom booklet on GP consultations.	RCT	419 households with 634 children born 1975 to 1984 registered with one practice	<i>Intervention:</i> Postal booklet on cough, fever, sore throat, diarrhoea & vomiting. <i>Control:</i> No intervention. Baseline data gathered for 2 months prior to intervention.	Consultation rates for 12 months post intervention.	*

Non-randomised trials							
Herman & Jackson 2010	Head Start agencies (United States)	Effect of educational intervention on health utilisation for acute illness in children ≤ 5 years.	Cohort study (prospective)	9,240 parents with one child enrolled in Head Start. 7,281 completed the training. 581 tracked annually for 2 years.	Health training programs using reference guide 'What to Do When Your Child Gets Sick' by Mayer & Kuklierus (2007) in 55 Head Start agencies in 35 states. Tracked for 3 months, trained in 4th month, follow up for 6 months. Annual visits for 581 parents.	ED & primary care consultation rates for 3-year period	***
Isaacman et al. 1992	Paediatric ED (United States)	Effect of two standardized simplified discharge instructions on parents information recall.	CT (Non-randomised control)	197 parents of children discharged with otitis media (OM).	<i>Intervention 1:</i> standardised verbal discharge information on OM from HCPs in ED <i>Intervention 2:</i> as above + typewritten information from health professionals in ED. <i>Control:</i> 'usual' discharge information.	Knowledge & management of OM before leaving ED, at 24 & 72 hours post intervention. Return visits to ED & parent reported physician contact within 72 hours.	**

Kelly et al. 1996	Private paediatrician's office, 4 Primary care centres (United States)	Effect of educational intervention on knowledge & management of fever	Pre-test post-test cohort study	86 caretakers of children 2 months to 5 years presenting for routine health care or acute minor illness. 50 follow up interviews.	Printed fever management sheet at end of initial interview. Identified knowledge deficits addressed.	Questionnaire on fever knowledge & management before & 2 to 4 weeks after intervention.	**
O'Neill Murphy et al. 2001	Urban ED Children's Hospital of Philadelphia (United States)	Effects of educational programme on parents' anxiety about fever, home management & consultation behaviour.	Quasi-experimental, pre-test post-test pilot study	87 parents with children aged 3 months to 5 years with fever > 38.4	<i>Intervention:</i> Interactive Fever Program <i>Control:</i> Standard Fever Education Programme	Anxiety, consultation behaviour, home management before & after HCP consultation, 2 & 8 weeks after the intervention.	*
Rosenberg & Pless 1993	Montreal Children's hospital ED (Canada)	Effect of ED based parent education on future ED visit rates.	Non-randomised CT	300 parents of children > 6 months in ED.	<i>Intervention:</i> educational pamphlet on common childhood illness plus video in waiting room. <i>Control:</i> 'usual' care. (Sequential recruitment to intervention then control)	Consultation behaviour 4 & 12 months post intervention.	
Steelman et al. 1999	Military Paediatric Clinic (United States)	Effect of educational intervention on parent's childhood	Pre-test post-test CT	93 parents attending 2, 4, & 6 month	<i>Intervention:</i> standardised slide	Knowledge of fever, clinic & ED usage at	

	States)	fever knowledge & consultation rates.		well-infant visits.	presentation on well-infant care + 10 minute presentation on fever & mail out at 1 & 3 months. <i>Control:</i> standardised slide presentation on well-infant care.	enrolment, 2 & 4 months post intervention.	
Wassmer & Hanlon 1999	Worcester Royal Infirmary DGH (United Kingdom)	Effect of information for parents on febrile convulsions on parent's knowledge.	Non-Randomised CT	Intervention: 50 parents of children with 1st febrile convulsion May to Dec 1996. <i>Control:</i> 50 parents of children at community health clinic with no febrile convulsion.	<i>Intervention:</i> verbal & written information on febrile convulsions during consultation. <i>Control:</i> no information provided. Assume 'usual care'.	Parental knowledge of febrile convulsion 1yr post intervention.	
Yoffe et al. 2011	Primary care clinic (United States)	Effect of parent-focused educational intervention on non-urgent ED visits.	Realistic evaluation	Parents of all children ≤ 10 years attending 3 primary care clinics. Number receiving the booklet was not provided.	<i>Intervention:</i> booklet on common childhood illness to the parents with children registered with one primary care clinic.	ED consultation rates Nov.2007 to Apr.2009	

					<i>Control:</i> Parents of children registered with two other clinics not receiving the booklet.		
Quantitative descriptive studies							
Thornton et al. 1991	Conducted in the home (United Kingdom)	Use of Baby Check (BC), an illness scoring system for babies \leq 6/12, by mothers at home	Two field trials	Study A: 104 mothers of term babies, randomly selected from the birth register Study B: 70 mothers of term babies born on selected days	<i>Study A:</i> Mothers used BC daily for a week & recorded contacts with HCPs. Research nurse visit to grade mother's competence in booklet use. <i>Study B:</i> Mothers used BC when wanted to until baby was 6 months. Research nurse visit when babies 8 & 16 weeks. Questionnaire about BC at 6 months.	Views & use of the booklet	****
Anhang et al 2013	Two Children's EDs (United States)	Usability and safety of a web-based decision support tool for parents of children with flu-like illnesses	Pilot feasibility study	294 parents/carers of children \leq 18 years who had presented to	<i>Intervention:</i> Strategy for Off-site Rapid Triage (SORT) for Kids	Caregiver ratings of usability of tool, sensitivity & specificity of	*

				an Emergency Department for an influenza-like illness	tool webbased parent survey & severity scoring tool.	SORT for Kids for identifying children needing ED	
Mixed methods studies							
Stockwell et al. 2010	Early Head Start Agency at Columbia University (United States)	Pilot evaluation of a community-based, culturally competent health literacy intervention on care of URI, with Latino Early Head Start parents.	Pre-test post-test pilot evaluation	11 parents of children 6 months to 3 years in full evaluation. 17 in interviews & 33 post-class evaluations.	Three education modules delivered in children's centre.	Parental knowledge, attitudes & care of URI before & 2 weeks after final module using Knowledge, Attitude, Practices instrument.	**

ED = Emergency department, DGH = District General Hospital, GP = general practitioner, URI = Upper respiratory infection, RCT/CT = Randomised controlled trial/controlled trial

*Quality assessment rating, between zero stars (lowest quality) and 4 stars (****, highest quality)

Table 2 Effectiveness of interventions on consultation rate

Authors (date)	Consultation rate (Significant results in bold)	Quality
Anhang et al. 2013	The algorithm correctly classified 93% of pediatric patients with Influenza like Illness who made necessary ED visits and all children who made a second ED visit for Influenza like Illness within the subsequent week.	*
Baker et al. 2009	No difference in re-attendance to ED. P=0.46 95% CI -0.06 to 0.16	***
Chande et al. 1996	No difference in contact with Primary Care Physician (p=0.37) or return visits to ED (p=0.68)	*
Francis et al. 2009	Non-significant reduction in re-consultation in first 2 weeks p=0.29 95% CI -2.7 to 9.3. Significant reduction in intention to consult in future for similar illness (55.3% intervention vs. 76.4% control) p<0.001 CI 0.20 to 0.57	****
Hansen 1990	Reported significant reduction in consultations in intervention group (Mean consultations 0.288 (2SD 0.315-0.252) intervention vs. 0.426 (0.461-0.390) control group). P value not given but states as significant.	**
Herman & Jackson 2010	Significant reduction in choosing to contact HCP first. Pre 69% Post 33% p<0.0001 Significant reduction in ED (by 58% p<0.001 95% CI 0.51 to 0.50) and doctor visits (by 42% p<0.001 95% CI 0.33 to 0.46)	***
Isaacman et al. 1992	Parent reported physician contact showed a non-significant reduction (22.8% control vs 13.2% intervention group) Return to ED rates by day 3 were significantly reduced in intervention groups (3.1% intervention versus 10.1% control group p=0.05)	**
Kai 1994	14 parents reported that on 19 occasions Baby Check influenced their decision not to contact a doctor.	**
O'Neill Murphy et al. 2001	High attrition to follow up resulted in no data on effect on consultation rate	*
Robbins et al. 2003	Significant reduction in visits to child health clinic (Median visits: intervention 4.5 vs. Control 5 p=0.039) No significant difference in GP, HV or minor illness nurse contacts.	***
Rosenberg & Pless 1993	Non-significant reduction in ED use in intervention group. Mean total medical visits/year: Control 0.87 (SD 1.5) Intervention 0.7 (SD 1.3)	
Steelman et al. 1999	No significant differences in clinic or ED use between control and intervention groups, but parents with more than 1 child had significantly more 'inappropriate' visits (>1child control group = 5 'inappropriate' visits, intervention group = 7 such visits vs. 1 'inappropriate' visit for both intervention and control in families with 1 child only p=0.04)	
Thomson et al. 1999	No significant difference in total consultations p=0.26, GP p=0.30, out of hours service use p=0.93 or referrals p=0.64	***
Usherwood 1991	No significant difference was found in the number of daytime health centre contacts. Significant decrease in home visits in the intervention group for households with one or two children (28% reduction, p<0.05) but not for larger families. Significant increase in out of hours contacts in the intervention group (Mean contacts: 1 child family Control 0.03 vs. Intervention 0.10; 2 child C:0.11 vs. I:0.23; 3 child C:0.06 vs. I:0.30 p<0.05)	*
Yoffe et al. 2011	Statistically significant reduction in ED use in intervention group p<0.001 . Reductions ranged from 55 to 81% compared to the same month in the previous year.	
Summary	6/15 studies significant difference including 1 reduction in intention to consult, 1 reduction in home visits but with increase in out of hours services	

*Quality assessment rating, between zero stars (lowest quality) and 4 stars (****, highest quality)

Table 3 Effectiveness of interventions on parents’ knowledge

Author (date)	Parent’s knowledge (Significant results in bold)	Quality
Baker et al. 2009	Significant reduction in knowledge scores: 54% reduction in responses that fever was dangerous (p<0.0001 , 95% CI 0.43-0.65) 28% reduction in responses that child with fever should be woken (p<0.0001 , 95% CI 0.19-0.39) 30% increase in responses identifying aspirin as inappropriate (p<0.0001 , 95% CI -0.42 to -0.16)	***
Broome et al. 2003	Knowledge increased significantly more in both groups than in control group at 24 to 72 hours and 1,3 & 6 months p<0.03 No information on the size of the effect provided. Those given individual instruction reported to have higher scores - no p value provided.	*
Isaacman et al. 1992	Parent recall of medication data higher in all groups than other items but with no significant differences between groups. Recall of signs of improvement increased significantly for both interventions groups compared to controls at exit interview, day 1 and 3 (Mean correct responses Exit int. Control 0.9, Verbal 25.3, Verbal & Written 56.9; Day 1 C 33.3, V 54.5, V&W 61.0; Day 3 C 44, V 60, V&W 73.2; all p<0.05). Recall of worrying signs improved significantly compared to controls at exit and on day 1 (Exit int. C 5.5, V 32, V&W 38.1 ; Day 1 C 19.1, V 37.5, V&W 44.5; Both p<0.5). The written and verbal intervention groups performed better than the verbal group at exit interview only for signs of improvement and recall of worrisome signs (p<0.05).	**
Kelly et al. 1996	Indirect measurement of knowledge: No significant difference in level of fever at which antipyretics were administered (p=0.91). A significant difference was found in accuracy of antipyretic dose (n=30 incorrect dose pre-intervention, 18/30 (60%) accurate doses post intervention p=0.04).	**
McCarthy et al 1990	Indirect measurement of knowledge: <i>Reliability of mother’s judgements:</i> intervention group were more likely to agree with clinician than control group: 91.7% versus 72.4% (Kappa 0.50 vs 0.26). <i>Specificity of mother’s judgements:</i> Mothers in the intervention group were less likely to score the child’s illness as more severe than the paediatrician than those in the control group (Intervention 90% vs. 59% control group p<0.0001) <i>Sensitivity of mother’s judgements:</i> Serious illness was the outcome used to measure sensitivity. No difference found between intervention and control group (80% versus 90% respectively).	*
Robbins et al. 2003	Non significant reduction in knowledge at 7 months in intervention group	***
Steelman et al. 1999	Significantly fewer incorrect responses in intervention group at 2 months (Intervention 10.4 vs. Control 11.8; p=0.006) and at 4 months (Intervention 8.5 vs. Control 10.3; p=0.002)	
Stockwell et al. 2010	Significant increase in knowledge/attitude health literacy score (61% p<0.05)	**
Wassmer & Hanlon 1999	Significant increase in parental knowledge of febrile convulsion in the intervention group p<0.05 but these parents children had already had a febrile convulsion. See the original paper for details on size of the effect as these are reported per question asked of parents.	
Summary	8/9 showed significant increase in knowledge, although implied in 2 studies and 1 study had high risk of bias. 1 paper showed reduction in knowledge at 7 months.1 qualitative paper.	

*Quality assessment rating, between zero stars (lowest quality) and 4 stars (****, highest quality)

Table 4 Effectiveness of interventions on parents' anxiety or reassurance

Author (date)	Anxiety/Reassurance (Significant results in bold)	Quality
Francis et al. 2009	No significant difference in level of reassurance	****
Hansen 1990	Significant reduction in worry reported as the main reason for consulting the GP (19% vs. 31% p=0.0075)	**
Herman & Jackson 2010	Parents reporting being 'very worried' when their child is sick reduced by a third (no further statistics available).	***
Kai 1994	11 parents consulted despite low acuity scores to avoid consulting later 'out of hours', or because they wanted reassurance. Baby Check did not answer their questions or tell them how to manage minor illness.	**
Krantz 2001	Parents felt that the fever guide was reassuring and that the decision guide on what to do when was important to include.	*
O'Neill Murphy et al. 2001	At 2 weeks both groups were less anxious. Control 86% Intervention 50%	*
Thornton et al. 1991	In the first part of the study 46% of mothers found using Baby Check reassuring and 4% said it caused anxiety. 6% of mothers reported that Baby Check helped them to decide whether or not to seek advice, 4% were reassured by a low score. Two with high scores were prompted to seek help.	****
Summary	1/7 significant reduction in worry. 3 reduced anxiety but descriptive statistics only. 2 qualitative papers.	

*Quality assessment rating, between zero stars (lowest quality) and 4 stars (****, highest quality)

Appendix 1 - Example Search Strategy Used (replicated in other literature databases)

1. MEDLINE; exp FAMILY/
2. MEDLINE; exp PARENTS/
3. MEDLINE; (family* OR caregiver* OR caretaker*).ti,ab
4. MEDLINE; families.ti,ab
5. MEDLINE; (parent OR parents OR parenting).ti,ab
6. MEDLINE; carer*.ti,ab
7. MEDLINE; (infant* OR baby OR babies OR newborn* OR pediatric* OR paediatric* OR child* OR neonat* OR toddler*).ti,ab
8. MEDLINE; exp CHILD/ OR exp INFANT/
9. MEDLINE; exp ACCESS TO INFORMATION/
10. MEDLINE; exp CONSUMER HEALTH INFORMATION/
11. MEDLINE; exp PAMPHLETS/
12. MEDLINE; "patient information".ti,ab,sh
14. MEDLINE; "fact sheet*".ti,ab,sh
15. MEDLINE; "factsheet*".ti,ab,sh.
16. MEDLINE; "help sheet*".ti,ab,sh.
17. MEDLINE; leaflet*.ti,ab,sh
18. MEDLINE; pamphlet*.ti,ab,sh
20. MEDLINE; "health education".ti,ab
21. MEDLINE; "information literacy".ti,ab
22. MEDLINE; "information resource*".ti,ab
23. MEDLINE; (webpage* OR website*).ti,ab
24. MEDLINE; (educat OR counsel*).ti,ab.
25. MEDLINE; "consultation behavior*".ti,ab
26. MEDLINE; "consultation behaviour*".ti,ab
27. MEDLINE; (booklet* OR brochure*).ti,ab
28. MEDLINE; exp ACUTE DISEASE/
29. MEDLINE; (acute adj2 illness*).ti,ab
30. MEDLINE; exp FEVER/
31. MEDLINE; (minor adj2 illness*).ti,ab
32. MEDLINE; (fever* OR febril*).ti,ab
33. MEDLINE; (cough* OR diarrh* OR rash* OR vomit* OR earache*).ti,ab
34. MEDLINE; bronchiolit*.ti,ab
35. MEDLINE; exp COUGH/ OR exp WHOOPING COUGH/
36. MEDLINE; exp DIARRHEA/
37. MEDLINE; exp EARACHE/
38. MEDLINE; exp VOMITING/
39. MEDLINE; exp RESPIRATORY TRACT INFECTIONS/
40. MEDLINE; (respirator* adj2 infection*).ti,ab
41. MEDLINE; exp OTITIS.
42. MEDLINE; (otitis OR croup OR seizure*).ti,ab
43. MEDLINE; exp CROUP.
44. MEDLINE; exp BRONCHIOLITIS/
45. MEDLINE; exp SEIZURES/
46. MEDLINE; exp EXANTHEMA/
47. MEDLINE; (rash OR rashes OR exanthem*).ti,ab
48. MEDLINE; exp MUCOCUTANEOUS LYMPH NODE SYNDROME/
49. MEDLINE; "MUCOCUTAn* LYMPH NODE*".ti,ab.

50. MEDLINE; kawasaki*.ti,ab
51. MEDLINE; exp CONJUNCTIVITIS/
52. MEDLINE; conjunctivit*.ti,ab
53. MEDLINE; "chicken pox".ti,ab
54. MEDLINE; exp CHICKENPOX/
55. MEDLINE; chickenpox.ti,ab
56. MEDLINE; exp EPIGLOTTITIS/
57. MEDLINE; epiglottit*.ti,ab
58. MEDLINE; exp TONSILLITIS/
59. MEDLINE; tonsillit*.ti,ab
60. MEDLINE; exp COMMON COLD/
61. MEDLINE; exp INFLUENZA, HUMAN/
62. MEDLINE; (influenza OR flu).ti,ab
63. MEDLINE; "sore throat*".ti,ab
64. MEDLINE; exp PHARYNGITIS/
65. MEDLINE; pharyngit*.ti,ab
66. MEDLINE; 28 OR 29 OR 30 OR 31 OR 32 OR 33 OR 34 OR 35 OR 36 OR 37 OR 38
OR 39 OR 40 OR 41 OR 42 OR 43 OR 44 OR 45 OR 46 OR 47 OR 48 OR 49 OR 50 OR 51
OR 52 OR 53 OR 54 OR 55 OR 56 OR 57 OR 58 OR 59 OR 60 OR 61 OR 62 OR 63 OR 64
OR 65
67. MEDLINE; 1 OR 2 OR 3 OR 4 OR 5 OR 6
68. MEDLINE; 7 OR 8
69. MEDLINE; "health information".ti,ab
70. MEDLINE; 9 OR 10 OR 11 OR 12 OR 14 OR 15 OR 16 OR 17 OR 18 OR 20 OR 21 OR
22 OR 23 OR 24 OR 25 OR 26 OR 27 OR 69
71. MEDLINE; 66 AND 67 AND 68 AND 70
72. MEDLINE; exp MENINGITIS/
73. MEDLINE; meningit*.ti,ab
74. MEDLINE; exp STATUS EPILEPTICUS/ OR exp EPILEPSY/
75. MEDLINE; epilepsy.ti,ab
76. MEDLINE; exp SEPSIS/
77. MEDLINE; sepsis.ti,ab
78. MEDLINE; epilept*.ti,ab
79. MEDLINE; 72 OR 73 OR 74 OR 75 OR 76 OR 77 OR 78
80. MEDLINE; 67 AND 68 AND 70 AND 79
81. MEDLINE; 71 OR 80
82. MEDLINE; (father* OR mother*).ti,ab
83. MEDLINE; 67 OR 82
84. MEDLINE; exp INTERNET/
85. MEDLINE; internet.ti,ab
86. MEDLINE; 67 OR 82.
87. MEDLINE; 70 OR 84 OR 85
88. MEDLINE; 66 OR 79
89. MEDLINE; 68 AND 86 AND 87 AND 88
90. MEDLINE; 89 [Limit to: Publication Year 1990-2014]

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Author, Year	Title	Inclusion Criteria (x = criteria not met)						
		Research articles (quantitative, qualitative or literature review)	Intervention= Information resources on acute child illness for parents	Parent outcome measured	Intervention concerns child up to 5 years of age	Intervention setting: home, primary care, A & E or ambulatory care	Published in English language January, 1990- October, 2011	UK, USA, Australia, Europe, New Zealand and Canada
2004, No authors listed on PubMed	Patient information. Understanding ear infections in your child. Advance for Nurse Practitioners. 12(7):44.	x						
Rideout ME and First LR 2001	Guide for parents: a brief but important talk on a "hot topic": your child's fever Contemporary Pediatrics ;18(5):42	x						
Ali M., Asefaw T., Byass P., Beyene H. and Pedersen F.K. 2005	Helping northern Ethiopian communities reduce childhood mortality: population-based intervention trial Bulletin of the World Health Organisation. 83(1):27-33.		x					x
Allen, J., Dyas, J. and Jones, M. 2002	Minor illness in children: parents' views and use of health services British Journal of Community Nursing. 7(9):462-8.		x	x				
American Academy of Family Physicians 2004	Information from your family doctor. Urinary tract infections in children American Family Physician. 1;69(1):155-6	x		x				
American Academy of Family Physicians 1998	Information from your family doctor. When your child has a UTI American Family Physician.15;74(2):313-4.	x		x				
Awasthi, S., Verma, T., and Agarwal, M. 2006	Danger signs of neonatal illnesses: perceptions of caregivers and health workers in northern India Bulletin of the World Health Organisation. 84(10):819-26			X				x

Barbara, S. 2009	First Contact: Effective Health Care for Children, Young People and Families Community Practitioner, 82(8), pp.18-21	x	x					
Bernhardt, J.M. and Felter, E.M. 2004	Online pediatric information seeking among mothers of young children: results from a qualitative study using focus groups Journal of Medical Internet Research. 1;6(1):e7		x	x				
Booth, M., Brown, T. and Richmand-Crum, M. 2004	Dialling for help: state telephone hotlines as vital resources for parents of young children Issue Brief (Commonw Fund). (787):1-12	x	x					
Bouche, G. and Migeot, V. 2008	Parental use of the Internet to seek health information and primary care utilisation for their child: a cross-sectional study BMC Public Health. 28;8:300		x	x				
Cals, J. W.L., Hood, K., Aaftink, N., Hopstaken, R.M., Francis, N.A., Dinant, G., and Butler, C.C. 2009	Predictors of patient-initiated re-consultation for lower respiratory tract infections in general practice The British Journal of General Practice. 59(567):761-4		X	x	x			
Charles JO, Udonwa NE, Ikoh MU, Ikpeme BI. 2008	The role of mothers in household health-seeking behavior and decision-making in childhood febrile illness in Okurikang/Ikot Effiong Otop community, Cross River State, Nigeria Health Care for Women International. 29(8):906-25		x					x
Considine, J. and Brennan, D. 2007	Effect of an evidence-based education programme on ED discharge advice for febrile children Journal of Clinical Nursing. 16(9):1687-94		x	x				

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Croghan, E. 2008	Preventing sickness absence from early years education British Journal of School Nursing, Vol. 3, Iss. 5: 230- 233		X	x		x		
Curry, M.D., Mathews, H.F., Daniel, H.J., Johnson, J.C., Mansfield, C.J. 2002	Beliefs about an responses to childhood ear infections: a study of parents in Eastern North Carolina Social Science Medicine. 54(8):1153-65		x	x				
DeWalt, D.A. and Hink, A. 2009	Health literacy and child health outcomes, a systematic review of the literature Pediatrics. 124 Suppl 3:S265-74	x	x	x				
Dixon-Woods, M. and Thornton, H. 2001	Written information for treating minor illness British Medical Journal. 1;323(7311):516-7	x	x	x				
Dyas, J., Bethea, J. and Jones, M. 2007	Identifying consensus on the appropriate advice for managing common childhood illnesses: a nominal group study Quality in Primary Care, Volume 15, Number 5 :285-292(8)		x	x				
Ebuehi OM, Adebajo S. 2010	Improving caregivers' home management of common childhood illnesses through community level interventions Journal of Child Health Care. 14(3):225-38.		x					x
Ertem, I.O., Atay, G., Bingoler, B.E., Dogan, D.G., Bayhan, A. and Sarica, D. 2006	Promoting child development at sick-child visits: a controlled trial Pediatrics. 118(1):e124-31		x	x				
Fickert, N.A. 2006	Taking a closer look at acute otitis media in kids Nursing. 36(4):20-1	x	x	x				
Fletcher, R., Russell, V. G. and Keatinge, D. 2008	The evaluation of tailored and web-based information for new fathers Child: Care, Health and Development. 34(4):439-46.		x	x				

Flury T, Aebi C, Donati F. 2001	Febrile seizures and parental anxiety: does information help Swiss Medical Weekly. 131(37-38):556-60		x	x				
Francis N., Wood, F., Simpson, S., Hood, K. and Butler, C.C. 2008	Developing an 'interactive' booklet on respiratory tract infections in children for use in primary care consultations Patient Education and Counseling. 73(2):286-93			x				
Francis, N., Crocker, J., Gamper, A., Brookes-Howell, L., Powell, C. and Butler, C. 2011	Missed opportunities for earlier treatment? A qualitative interview study with parents of children admitted to hospital with serious respiratory tract infections Archives of Disease in Childhood. 96(2):154-9. Epub 2010 Nov 2		X		X			
Franck LS, Cox S, Allen A, Winter I. 2004	Parental concern and distress about infant pain Archives of Disease in Childhood 89(1):F71-5		x			x		
van Ginneken, J.K., Lob-Levyt, J. and Gove, S. 1996	Potential interventions for preventing pneumonia among young children in developing countries: promoting material education Tropical Medicine & International Health. 1(3):283-94	x	X					x
Goldman RD, Antoon R, Tait G, Zimmer D, Viegas A, Mounstephen B. 2005	Culture results via the Internet: a novel way for communication after an emergency department visit The Journal of Pediatrics. 147(2):221-6		x					
Goldman, R.D. and Macpherson, A. 2006	Internet health information use and email access by parents attending a paediatric emergency department Emergency Medicine Journal. 23(5):345-8		x					
Goore Z, Mangione-Smith R, Elliott MN, McDonald L, Kravitz RL. 2001	How much explanation is enough? A study of parent requests for information and physician responses Ambulatory Pediatrics. 1(6):326-32		x					

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Haines, C. 2005	Parents' experiences of living through their child's suffering from and surviving severe meningococcal disease Nursing in Critical Care. 10(2):78-89		x			x		
Hariharan SL, Pohlgeers AP, Reeves SD. 2004	Doctor, my child needs some medicine Pediatric Emergency Care. 20(8):540-6	x	x	x				
Hartling, L., Scott, S., Pandya, R., Johnson, D. Bishop, T. and Klassen, T.P. 2010	Storytelling as a communication tool for health consumers: development of an intervention for parents of children with croup BMC Pediatrics. 2;10:64			x				
Hedin, K., Petersson, C., Cars, H., Beckman, A. and Hakansson, A. 2006	Infection prevention at day-care centres: feasibility and possible effects of intervention Scandinavian Journal of Primary Health Care. 24(1):44-9					x		
Hodgson C, Wong I. 2004	What do mothers of young children think of community pharmacists: a descriptive survey The Journal of Family Health Care. 14(3):73-4, 76-9		x					
Holloway, K.A., Karkee, S.B., Tamang, A., Gurung, Y.B., Kafle, K.K., Pradhan, R. and Reeves, B.C. 2009	Community intervention to promote rational treatment of acute respiratory infection in rural Nepal Tropical Medicine & International Health. 14(1):101-10					x		x
Houghton, J. 2005	Minor illness management: empowering parents through shared knowledge Paediatric Nursing. 17(1):24-5	x	x					
Houston, A.M. and Pickering, A.J. 2000	Do I don't I call the doctor': a qualitative study of parental perceptions of calling the GP out-of-hours Health Expectations. 3(4):234-242		x					

Huang, M., Liu, C. and Huang, C. 1998	Effects of an educational program on parents with febrile convulsion children Pediatric Neurology. 18(2):150-5							x
Huang, M-C., Liu, C-C., Chi, Y.C., Huang, C-C., Cain, K. 2001	Parental concerns for the child with febrile convulsion: long-term effects of educational interventions Acta Neurologica Scandinavica. 103(5):288-93							x
Impicciatore, P., Violante, A. and Bonati, M. 1997	Helping parents to cope when their preschool children are acutely ill British Medical Journal. 314(7077):373		x	x				
Jackson, R.J., Baird, W., Davis-Reynolds, L., Smith, C., Blackburn, S. and Allsebrook, J. 2007	Qualitative analysis of parents' information needs and psychosocial experiences when supporting children with health care needs Health Information and Libraries Journal. 25(1):31-7		X					
Jensen, J.F., Tonnesen, L.L., Soderstrom, M., Thorsen, H. and Siersma, V. 2010	Paracetamol for feverish children: parental motives and experiences Scandinavian Journal of Primary Health Care. 28(2):115-20.		X					
Joanne Briggs Institute 2010	Review summaries: evidence for nursing practice Journal of Advanced Nursing. 66(4):738-42	x	x	x				
Kai, J. 1996	Parents' difficulties and information needs in coping with acute illness in preschool children: a qualitative study British Medical Journal. 313(7063):987-90.		x					
Kalister, H., Newman, R.D., Read, L., Walters, C., Hrachovec, J. and Graham, E.A. 1999	Pharmacy-based evaluation and treatment of minor illnesses in a culturally diverse pediatric clinic Archives Pediatrics & Adolescent Medicine. 153(7):731-5.		x	x				

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Kallestrup P and Bro, F. 2003	Parents' beliefs and expectations when presenting with a febrile child at an out-of-hours general practice clinic The British Journal of General Practice. 53(486):43-4.		x					
Kempe, A., Dempsey, C. and Poole, S.R. 1999	Introduction of a recorded health information line into a pediatric practice Archives Pediatrics & Adolescent Medicine. 153(6):604-10.		x	x	x			
KinyonMunch K. 2011	What do you tell parents when their child is sick with the common cold? Journal for Specialists in Pediatric Nursing. 16(1):8-15	x	x	x				
Kubba, H. 2000	An evidence-based patient information leaflet about otitis media with effusion Clinical Performance and Quality Health Care. 8(2):93-9			x		x		
Kyrkou, M., Harbord, M., Kyrkou, N., Kay, D and Coulthard, K. 2006	Community use of intranasal midazolam for managing prolonged seizures Journal of Intellectual & Developmental Disability. 31(3):131-8		x					
LeMay, S., Johnson, C., Choiniere, M., Fortin, C., Hubert, I., Frechette, G., Kudirka, D. and Murray, L. 2010	Pain management interventions with parents in the emergency department: a randomised trial Journal of Advanced Nursing. 66(11):2442-9		x	x				
Light, P.A., Hupcey, J.E. and Clark, M.B. 2005	Nursing telephone triage and its influence on parents' choice of care for febrile children Journal of Pediatric Nursing. 20(6):424-9		x	x				
Littlewood J. 1998	Mothers' understanding of their children's bodies Journal of Child Health Care. 2(3):118-21		x	x				

Lock C, Baker R, Brittain K. 2010	I've just taken you to see the man with the CD on his head': the experience and management of recurrent sore throat in children Journal of Child Health Care. 14(1):95-110		x					
McCann D., Longbottom H. and Nissen M. 2002	The home management and characteristics of children presenting to hospital with acute gastroenteritis Contemporary Nurse. 13(2-3):169-78.		x					
McConnochie, K.M., Wood, N.E., Kitzman, H.J., Herendeen, N.E., Roy, J. and Roghmann, K.J. 2005	Telemedicine reduces absence resulting from illness in urban child care: evaluation of an innovation Pediatrics. 115(5):1273-82.		x	x				
Menghini, K.G. 2005	Designing and evaluating parent educational materials Advances in Neonatal Care. 5(5):273-83.	x	x			x		
Moon, R.Y., Cheng, T.L., Patel, K.M., Baumhaft, K. and Scheidt, P.C. 1998	Parental literacy level and understanding of medical information Pediatrics. 102(2):e25		x					
Murphy, K.A. and Liebman, M. 1995	Fever care: does nursing instruction make a difference? Journal of Emergency Nursing. 21(5):461-3.	x		x				
Neill, S.J. 2010	Containing acute childhood illness within family life: a substantive grounded theory Journal of Child Health Care. 14(4):327-44		x					
Ng, C-J., Chia, Y-C., Teng, C-L. and Nik-Sherina, H. 2007	Factors influencing parental decision to consult for children with upper respiratory tract infection Journal of Paediatrics and Child Health. 44(4):208-13.		x					x

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Oermann, M.H., Lowery, F.N.F. and Thornley 2003	Evaluation of web sites on management of pain in children Pain Management Nursing. 4(3):99-105		x	x				
Olaogun, A., Ayandiran, O., Olalumade, O. Obiajunwa, P., Adeyemo, F. 2008	Knowledge and management of infants' pain by mothers in Ile Ife, Nigeria International Journal of Nursing Practice. 14(4):273-8		x	x				x
Pandolfini C, Impicciatore P, Bonati M. 2000	Parents on the web: risks for quality management of cough in children Pediatrics. 105(1):e1		x	x				
Paul F, Jones MC, Hendry C, Adair PM. 2007	The quality of written information for parents regarding the management of a ferible convulsion: a randomised controlled trial Journal of Clinical Nursing. 16(12):2308-22.					x		
Per Lagerløv, Sølvi Helsetha and Tanja Holager2003	Childhood illnesses and the use of paracetamol (acetaminophen): a qualitative study of parents' management of common childhood illnesses Family Practice. 20(6):717-23		x					
Persaud J. 1997	Patient booklets can cut GP workload Medeconomics 1997 June:47.	x		x				
Pitts M, McMaster J, Hartmann T, Mausezahl D.1996	Lay beliefs about diarrhoeal diseases: their role in health education in a developing country Social Science & Medicine. 43(8):1223-8		x					x
Power, N., Liossi, C and Franck, L. 2007	Helping parents to help their child with procedural and everyday pain: practical, evidence-based advice Journal of Specialists in Pediatric Nursing. 12(3):203-9	x		x				

Rollins, J.A. 2008	UCLA research shows dramatic savings for medicaid when head start parents learn to care for kids' illnesses Pediatric Nursing May 1, 2008	X						
Sanders, M.R., Markie-Dadds, C., Rinaldis, M., Firman, D. and Baig, N. 2007	Using household survey data to inform policy decisions regarding the delivery of evidence-based parenting interventions Child: Care, Health and Development. 33(6):768-83.		x		x			
Sanghavi DM. 2005	Taking well-child care into the 21st century: a novel, effective method for improving parent knowledge using computerized tutorials Archives of Pediatrics & Adolescent Medicine. 159(5):482-5.		x					
Sarrella, M. and Kahanb, E. 2002	Impact of a single-session education program on parental knowledge of and approach to childhood fever Patient Education and Counseling. 51(1):59-63.							x
Schlaudecker, E.P. and Steinhoff, M.C. 2010	Helping mothers prevent influenza illness in their infants . Pediatrics. 126(5):1008-11	x	x					
Småbrekke L, Berild D, Gjaever A, Myrbakk T, Fuskevåg A, Ericson JU, Flaegstad T, Olsvik O, Ringertz SH.2002	Educational intervention for parents and healthcare providers leads to reduced antibiotic use in acute otitis media. Scandinavian Journal of Infectious Diseases. 34(9):657-9.		X					
Sorlie, V., Melbye, H. and Norberg, A. 1996	Counselling parents of children with acute illness: a task for nurses in an emergency clinic Journal of Pediatric Nursing. 11(5):337-41		x					

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Srinivas, S., Poole, F., Redpath, J. and Underhill, T.J. 1996	Review of a computer based telephone helpline in an A&E department Journal of Accident & Emergency Medicine. 13(5):330-3.		x	x				
Trajanovska, M., Manias, E., Cranswick, N. and Johnston, L. 2010	Parental management of childhood complaints: over-the-counter medicine use and advice-seeking behaviours Journal of Clinical Nursing. 19(13-14):2065-75		x	x				
Tuffrey, C. and Finlay, F. 2002	Use of the internet by parents of paediatric outpatients Archives of Disease in Childhood. 87(6):534-6.		x					
Ullione, M.S. 1997	Health promotion and injury prevention in a child development center Journal of Pediatric Nursing. 12(3):148-54			x				
Vitolo MR, Bortolini GA, Dal Bó Campagnolo P, Feldens CA. 2008	Effectiveness of a nutrition program in reducing symptoms of respiratory morbidity in children: A randomized field trial Preventive Medicine. 47(4):384-8.		x					x
Wahl, H., Banerjee, J., Manikam, L. Parylo, C. and Lakhanpaul, M. 2011	Health information needs of families attending the paediatric emergency department Archives of Disease in Childhood. 96(4):335-9.		x					
Walsh A, Edwards H, Fraser J. 2007	Influences on parents' fever management: beliefs, experiences and information sources Journal of Clinical Nursing. 16(12):2331-40.		x	x				
Walsh, A. and Edwards, H. 2006	Management of childhood fever by parents: literature review Journal of Advanced Nursing. 54(2):217-27	x						

Walsh, A., Edwards, H. and Fraser, J. 2008	Parents' childhood fever management: community survey and instrument development Journal of Advanced Nursing. 63(4):376-88.		x					
Wiener, L., Leyden, C.G., Pizzo, P.A., Ognibebe, F.P., Rosenthal, C., and Schubert, W. 1992	Pneumocystis Carinii Pneumonia (PCP) and your child: a parent information booklet Oncology Nursing Forum. 19(3):507-9.	x	x					
Williams A, Noyes J; Information Matters Project (IMP) Team. 2009	The information matters project: Health, medicines and self-care choices made by children, young people and their families: Information to support decision-making. study protocol. Journal of Advanced Nursing;65(9):1807-16	X Study protocol	x					

Appendix 3 Quality assessment of studies included in the review

Type of study	Quality criteria*	Anhang 2013	Thornton et al. 1991	Kai 1994	Krantz 2001	Baker et al. 2009	Broome et al. 2003	Chande et al. 1996	Francis et al. 2009	Hansen 1990	McCarthy et al. 1990	Robbins et al. 2003	Thomson et al. 1999	Usherwood 1991	Herman & Jackson 2010	Isaacman et al. 1992	Kelly et al. 1996	O'Neill-Murphy et al. 2001	Rosenberg & Pless 1993	Steelman et al. 1999	Wassmer & Hanlon 1999	Yoffe et al., 2011	Stockwell et al. 2010
Qualitative	Relevant sources			Y	Y																		Y
	Relevant data analysis			U	U																		U
	Consideration of context			Y	N																		Y
	Consideration of researchers' influence			U	N																		N
Randomized controlled trials	Randomization					Y	U	Y	Y	U	U	U	Y	U									
	Allocation concealment					U	U	U	Y	N	N	Y	U	N									
	Outcome data (≥80%)					Y	Y	N	Y	Y	U	Y	Y	U									
	Drop-out (<20%)					Y	N	N	Y	Y	Y	Y	Y	Y									
Non randomized trials	Minimized selection bias														Y	U	Y	Y	U	N	N	N	U
	Appropriate measurements														Y	U	Y	N	U	U	U	U	Y
	Comparable groups														Y	Y	U	U	U	U	N	U	U
	Outcome (≥80%) + response rate (≥60%)														N	Y	N	N	N	N	U	U	U
Quantitative descriptive	Relevant sampling strategy	N	Y																				
	Representative sample	U	Y																				
	Appropriate measurements	Y	Y																				
	Response rate (≥60%)	U	Y																				
Mixed methods	Relevant design																						U
	Relevant integration of data																						N
	Consideration of limitations																						N

Y=Yes; N=No; U=Unclear

* Quality criteria according to Mixed Methods Appraisal Tool (Pluye P et al., 2011)

Pluye P, Robert E, Cargo M, Bartlett G, O’Cathain A, Griffiths F, Boardman F, Gagnon MP and MC, R. (2011). "Proposal: A mixed methods appraisal tool for systematic mixed studies reviews. Archived by WebCite® at <http://www.webcitation.org/5tTRTc9yJ>." Retrieved Sept 2013, from <http://mixedmethodsappraisaltoolpublic.pbworks.com>.

Explanation of decision to use the Mixed Methods Appraisal tool

The MMAT tool uniquely allows you to appraise the quality of qualitative papers, quantitative papers, and mixed methods papers, using a single process¹. For each type of qualitative or quantitative (RCT, non-randomised trial, descriptive) study design, there are 4 questions to answer. For a mixed methods study, you answer the questions for the qualitative strand and the appropriate quantitative strand and then additional questions about the mixed component.

We appreciate it is as not as well validated as other tools for critical appraisal e.g. systematic reviews or RCT but we wanted to include all study designs for comprehensiveness. The nature of our narrative review resulted in a number of mixed methodologies as the MMAT approach represented the most coherent and valid way of structuring the review process while minimising bias.

1. Pace R, Pluye P, Bartlett G, Macaulay AC, Salsberg J, Jagosh J, Seller R Testing the reliability and efficiency of the pilot Mixed Methods Appraisal Tool (MMAT) for systematic mixed studies review. Int J Nurs Stud. 2012 Jan;49(1):47-53



PRISMA 2009 Checklist

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Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	4
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	4
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	N/A
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	4 and 5
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	4
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Appendix 1
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	4 and 5
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	5
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	Appendix 3
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	Page 5 and Appendix 3
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	Page 5



PRISMA 2009 Checklist

Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	Page 5 and Appendix 3
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Page 1 of 2

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	Page 5 and 11
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	N/A

RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	Figure 1 and Appendix 2
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	Table 1
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	Table 1 and Appendix 3
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	Table 1, Appendix 3 and Pages 5 to 9
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	N/A
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	N/A
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	N/A
DISCUSSION			

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PRISMA 2009 Checklist

Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	9 and 10
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	11
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	12
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	12

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit: www.prisma-statement.org.

BMJ Open

Information resources to aid parental decision making on when to seek medical care for their acutely sick child: A narrative systematic review

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Manuscript ID	bmjopen-2015-008280.R2
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Date Submitted by the Author:	01-Oct-2015
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Primary Subject Heading:	Patient-centred medicine
Secondary Subject Heading:	Paediatrics, Public health
Keywords:	PUBLIC HEALTH, PAEDIATRICS, Paediatric A&E and ambulatory care < PAEDIATRICS

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Manuscripts

Information resources to aid parental decision making on when to seek medical care for their acutely sick child: A narrative systematic review

Sarah Neill¹, Damian Roland^{2,3}, Caroline HD Jones⁴, Matthew Thompson⁴ Monica Lakhanpaul⁶ on behalf of the ASK SNIFF study group

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Information resources to aid parental decision making on when to seek medical care for their acutely sick child: What does the literature tell us about what works?

Abstract

Objective

To identify the effectiveness of information resources to help parents decide when to seek medical care for an acutely sick child under 5 years of age, including the identification of factors influencing effectiveness, by systematically reviewing the literature

Methods

Five databases and five websites were systematically searched using a combination of terms on children, parents, education, acute childhood illness. A narrative approach, assessing quality via the Mixed Methods Appraisal Tool, was used due to non-comparable research designs.

Results

Twenty-two studies met the inclusion criteria: 9 Randomised Control Trials, 8 Non-randomised intervention studies, 2 Qualitative Descriptive studies, 2 qualitative studies and 1 mixed method study. Consultation frequency (15 studies), knowledge (9 studies), anxiety/reassurance (7 studies), confidence (4 studies) satisfaction (4 studies) and antibiotic prescription (4 studies) were used as measures of effectiveness. Quality of the studies was variable but themes supported information needing to be relevant and comprehensive to enable parents to manage an episode of minor illness Interventions addressing a range of symptoms along with assessment and management of childhood illness, appeared to have the greatest impact on the reported measures. The majority of interventions had limited impact on consultation frequencies, No conclusive evidence can be drawn from studies measuring other outcomes.

Conclusion

Findings confirm that information needs to be relevant and comprehensive to enable parents to manage an episode of minor illness. Incomplete information leaves parents still needing to seek help and irrelevant information appears to reduce parents' trust in the intervention. Interventions are more likely to be effective if they are also delivered in non-stressful environments such as the home and are co-produced with parents.

Key words

Parent information, acute childhood illness, integrative review, measures of effectiveness, health education

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Strengths and Limitations

- This is the first review of the outcome of information resources which aid parental decision making utilising systematic search and quality assessment criteria.
- The findings are limited by the quality of the studies and not being able to control for the impact of different healthcare delivery systems.

For peer review only

BACKGROUND

Acute illness is a universal experience for children and families and represents the most common type of illness in childhood, particularly in 0-5 year olds. Acute illness includes short term illnesses, predominantly infections such as coughs, colds, diarrhoea, vomiting and ear infections. Home management is often supported by consultations in primary care, where children under 5 years old constitute 40% of General Practitioner (GP) workload [1], with most consultations for acute illness [2, 3]. Under 1 year olds are seen more often than all other age groups other than the over 75s [2] and urgent care and emergency department service use by young children appears to be rising [4-6].

Parents' anxiety about acute childhood illness leads them to seek information to help them decide whether or not to seek help from a healthcare professional [7-11]. A wide range of information is available for families, such as written leaflets or via websites much of which is either unknown to parents[5, 7] or does not seem to be making any impact on service use when children are acutely sick at home [11-14]. The increase in consultation rates for non-urgent care [4-6] suggests more effective information sources are needed.

We aimed to systematically review the literature to identify the effectiveness of information resources to help parents decide when to seek medical care for an acutely sick child under 5 years of age, including the identification of factors influencing effectiveness.

Our research questions were:

- What measures of effectiveness have been used to evaluate such interventions?
- How effective are existing interventions in helping parents know when to seek help for an acutely sick child at home?
- What factors influence effectiveness of information provision to help parents know when to seek help for an acutely sick child at home?

METHODS

Search Strategy

We systematically searched five electronic databases (Medline, CINAHL, PsycNET, ASSIA Web of Knowledge) and five websites (Centre for Review and Dissemination York, National Institute for Health and Care Excellence, Health Technology Assessment programme, NHS Evidence, the Cochrane Library) using a combination of terms on children, parents/carers, education, acute childhood illness (see Appendix 1). We scanned reference lists of key articles, and attempted to contact authors when further information was required to determine eligibility and inform quality assessment.

Selection Criteria

Studies which met all the following criteria were included:

1. Studies which included children from 0-14 years with research participants being their parents or caregivers. Initial pilot searches aimed solely at children under five years yielded minimal results.

2. An educational intervention on acute childhood illness was provided to parents/caregivers in any form (written, visual, verbal or electronic) designed to help with decision making about whether or not to seek medical help
3. The study was conducted in primary care, emergency departments, ambulatory settings or in the home, in high income countries as defined by Organisation for Economic Co-operation and Development (OECD). We included all study types.

Studies were excluded if they focused on chronically ill children, hospital in-patient settings, , or educational interventions designed for health professionals. We limited our search to papers published in the English language, between January 1990 and June 2014 (inclusive). The decision to search from 1990 was taken pragmatically as health services have evolved considerably since the latter half of the twentieth century. We did not exclude studies on the basis of quality alone but have noted the quality of studies when discussing their impact. To have excluded low quality studies would have reduced the comprehensiveness of the review, especially given the likely heterogeneity of study design.

The titles and abstracts of studies identified in the search were retrieved and assessed by one reviewer who excluded those that were clearly not relevant. The full text of remaining studies was assessed for inclusion by two reviewers; discrepancies were resolved by discussion between all authors. Reasons for exclusion were recorded (Appendix 2).

Data Extraction & Quality Assessment

Data from included studies were extracted by one reviewer and checked by a second reviewer. All studies which met the inclusion criteria were included regardless of quality, which was assessed independently by two other reviewers using the Mixed Methods Appraisal Tool (MMAT)[15]. This gives a rating between zero stars (lowest quality) and 4 stars (****, highest quality)

Evidence Synthesis: Synthesizing qualitative and quantitative research

Narrative review was used to summarize and explain findings across studies [16, 17]. Meta-analysis was inappropriate due to non-comparable research designs.

RESULTS

The search identified 7,863 studies, of which 22 were included (Figure 1). Table 1 shows the characteristics of included studies of which there were nine randomised controlled trials, eight non-randomised intervention studies, two qualitative descriptive studies, two qualitative studies and one mixed method study. Thirteen were conducted in the United States (US), six in the UK, two in Canada and one in Denmark. Parents/caregivers of children aged 0-14 years were included across all studies, with 12 studies limiting inclusion to parents of children under the age of 6 years. Studies were conducted in primary care (9), Emergency department/hospital (7), child health clinics (3) and children’s health centres (3).

Interventions involved written information in all but one study, which used video alone [18]. Written information was augmented by video/slide presentations [19-23], home visits [12, 24], reinforcement within consultations [19, 23, 25-28] or was part of a structured educational programme [29-31]. Three separate studies reported on the same ‘Baby Check’ intervention in different settings/populations [24, 32, 33].

Table 1 Characteristics and quality assessment of studies included

Author(s)/Date	Setting	Aim	Design	Sample	Intervention	Main Outcomes	Quality Assessment*
Qualitative studies							
Kai 1994	Health Visitor & General Practitioner baby clinics (United Kingdom)	To explore disadvantaged parents' perceptions & use of the Baby Check booklet.	Qualitative interview & records of consultations	Parents of 34 babies < 6 months attending weekly baby clinic in GP in disadvantaged area.	Parents were given a copy of Baby Check. Unstructured 30-90 minute interviews with parents until baby was 6 months.	Perceptions, use of the booklet & consultations for illness among disadvantage parents.	**
Krantz 2001	Parent Resource Centre. Children's Hospital Ontario (Canada)	To describe the development of, & pilot, a fever anticipatory guidance tool for parents.	Qualitative interview	15 first-time parents with children aged 2 months to 4 years from inner city Parent Resource Centre.	The Fever Anticipatory Guidance Tool.	Views on, & use of, the booklet.	*
Randomised controlled trials							
Baker et al. 2009	ED (United States)	Effect of a brief educational video during ED visit for minor febrile illnesses.	RCT	280 parents of children aged 3 months to 3 years presenting to with febrile illness	<i>Intervention:</i> 11 minute video on home management of fever. <i>Control:</i> 8 minute video on home & automobile safety.	Knowledge, attitudes, & return ED visits for minor febrile illnesses within 2 years	***
Broome et al. 2003	6 clinics in 6 states (United	Effect of a structured education program on	RCT	216 children from 3/12 to 6	<i>Intervention 1:</i> video &	Knowledge, confidence, &	*

	States)	parents’/grandparents’ knowledge, confidence, & satisfaction in assessing & managing a child’s fever.		years of age & their parents /grandparents. 183 followed up at 3 months & 145 at 6 months.	brochure on childhood fever in clinic; <i>Intervention 2:</i> brochure & video in clinic, plus health professional reinforced content & answered parents’ questions during consultation; <i>Control:</i> ‘usual’ care.	satisfaction in assessing & managing child’s fever at 48 hours, 1, 3, & 6 months post intervention;	
Chande et al. 1996	Urban paediatric ED (United States)	Effect of educational intervention on common childhood illness on ED visits	RCT	130 parents of children with minor illnesses in ED.	<i>Intervention:</i> 10 minute video on paediatric health care issues plus information booklet on common paediatric ailments. <i>Control:</i> standard ED discharge instructions.	Return visits to ED over 6-months.	*
Francis et al. 2009	General practice (United Kingdom)	Effect of interactive booklet on respiratory tract infections on re-consultation for same	Cluster RCT	61 practices in Wales & England. 558 parents of	<i>Intervention:</i> Eight page booklet on childhood	Re-consultation within 2 weeks, antibiotic prescribing &	****

		illness episode, antibiotic use, future consultation intentions, & parental satisfaction.		children (6 months to 14 years) with a respiratory tract infection.	respiratory tract infections within consultations & as a take home <i>resource</i> . <i>Control</i> : 'usual' consultation.	consumption, future consultation intentions, parent satisfaction & usefulness of information received, reassurance & enablement.	
Hansen 1990	General practice (Denmark)	Effect of booklet on families' minor illness-behaviour for children < 8 years.	RCT	100 young families with min. one child < 8 years in one practice.	<i>Intervention</i> : Booklet on common childhood problems, presented by GP. Parent recorded illnesses. <i>Control</i> : Unclear. ?'usual care' plus diary completion.	Consultation frequency & anxiety over 6 months.	**
McCarthy et al. 1990	US Private practice and primary care centre	Effect of Acute Illness Observation Scales (AIOS) on mother's judgements about acute illness in children under 24 months.	RCT	369 mothers with 2 week old baby.	<i>Intervention</i> : AIOS film plus fever scenario scoring. Film shown again at 6 & 15 months. AIOS used to score illness prior to & with doctor during consultation.	Reliability, specificity and sensitivity of mother's judgements compared to clinician assessment from 2 weeks of age, for 32 months.	*

					<i>Control:</i> Routine advice about fever. Illness scored on 3 point scale.		
Robbins et al. 2003	Primary care (United Kingdom)	Effect of home visit & infant minor illness booklet on parent's illness management & consultation rates.	RCT	Single GP practice: 103 parents of babies born in 6-month birth cohort.	<i>Intervention:</i> Postal booklet on common childhood illnesses. Research nurse visit when baby 6 weeks old. <i>Control:</i> Routine health visiting service.	Confidence, knowledge, home care activities & desire to contact professionals. Prescription & consultation rates tracked for 6 months.	***
Thomson et al. 1999	General Practice (United Kingdom)	Effect of Baby Check, an illness scoring system for babies ≤ 6/12, on parents' use of health services for their baby.	RCT	997 mothers with new babies	<i>Intervention:</i> Baby Check plus an accident prevention leaflet. <i>Control:</i> accident prevention leaflet alone.	Consultation behaviour tracked for 6 months	***
Usherwood 1991	General practice (United Kingdom)	Effect of a children's symptom booklet on GP consultations.	RCT	419 households with 634 children born 1975 to 1984 registered with one practice	<i>Intervention:</i> Postal booklet on cough, fever, sore throat, diarrhoea & vomiting.	Consultation rates for 12 months post intervention.	*

					Control: No intervention. Baseline data gathered for 2 months prior to intervention.		
Non-randomised trials							
Herman & Jackson 2010	Head Start agencies (United States)	Effect of educational intervention on health utilisation for acute illness in children ≤ 5 years.	Cohort study (prospective)	9,240 parents with one child enrolled in Head Start. 7,281 completed the training. 581 tracked annually for 2 years.	Health training programs using reference guide 'What to Do When Your Child Gets Sick' by Mayer & Kuklierus (2007) in 55 Head Start agencies in 35 states. Tracked for 3 months, trained in 4th month, follow up for 6 months. Annual visits for 581 parents.	ED & primary care consultation rates for 3-year period	***
Isaacman et al. 1992	Paediatric ED (United States)	Effect of two standardized simplified discharge instructions on parents information recall.	CT (Non-randomised control)	197 parents of children discharged with otitis media (OM).	<i>Intervention 1:</i> standardised verbal discharge information on OM from HCPs in ED <i>Intervention 2:</i> as above +	Knowledge & management of OM before leaving ED, at 24 & 72 hours post intervention. Return visits to ED & parent reported	**

					typewritten information from health professionals in ED. <i>Control:</i> 'usual' discharge information.	physician contact within 72 hours.	
Kelly et al. 1996	Private paediatrician's office, 4 Primary care centres (United States)	Effect of educational intervention on knowledge & management of fever	Pre-test post-test cohort study	86 caretakers of children 2 months to 5 years presenting for routine health care or acute minor illness. 50 follow up interviews.	Printed fever management sheet at end of initial interview. Identified knowledge deficits addressed.	Questionnaire on fever knowledge & management before & 2 to 4 weeks after intervention.	**
O'Neill Murphy et al. 2001	Urban ED Children's Hospital of Philadelphia (United States)	Effects of educational programme on parents' anxiety about fever, home management & consultation behaviour.	Quasi-experimental, pre-test post-test pilot study	87 parents with children aged 3 months to 5 years with fever > 38.4	<i>Intervention:</i> Interactive Fever Program <i>Control:</i> Standard Fever Education Programme	Anxiety, consultation behaviour, home management before & after HCP consultation, 2 & 8 weeks after the intervention.	*
Rosenberg & Pless 1993	Montreal Children's hospital ED (Canada)	Effect of ED based parent education on future ED visit rates.	Non-randomised CT	300 parents of children > 6 months in ED.	<i>Intervention:</i> educational pamphlet on common childhood illness plus video in waiting	Consultation behaviour 4 & 12 months post intervention.	

					room. <i>Control:</i> 'usual' care. (Sequential recruitment to intervention then control)		
Steelman et al. 1999	Military Paediatric Clinic (United States)	Effect of educational intervention on parent's childhood fever knowledge & consultation rates.	Pre-test post-test CT	93 parents attending 2, 4, & 6 month well-infant visits.	<i>Intervention:</i> standardised slide presentation on well-infant care + 10 minute presentation on fever & mail out at 1 & 3 months. <i>Control:</i> standardised slide presentation on well-infant care.	Knowledge of fever, clinic & ED usage at enrolment, 2 & 4 months post intervention.	
Wassmer & Hanlon 1999	Worcester Royal Infirmary DGH (United Kingdom)	Effect of information for parents on febrile convulsions on parent's knowledge.	Non-Randomised CT	<i>Intervention:</i> 50 parents of children with 1st febrile convulsion May to Dec 1996. <i>Control:</i> 50 parents of children at community health clinic	<i>Intervention:</i> verbal & written information on febrile convulsions during consultation. <i>Control:</i> no information provided. Assume 'usual	Parental knowledge of febrile convulsion 1yr post intervention.	

				with no febrile convulsion.	care’.		
Yoffe et al. 2011	Primary care clinic (United States)	Effect of parent- focused educational intervention on non- urgent ED visits.	Realistic evaluation	Parents of all children ≤ 10 years attending 3 primary care clinics. Number receiving the booklet was not provided.	<i>Intervention:</i> booklet on common childhood illness to the parents with children registered with one primary care clinic. <i>Control:</i> Parents of children registered with two other clinics not receiving the booklet.	ED consultation rates Nov.2007 to Apr.2009	
Qualitative Descriptive Studies							
Thornton et al. 1991	Conducted in the home (United Kingdom)	Use of Baby Check (BC), an illness scoring system for babies ≤ 6/12, by mothers at home	Two field trials	Study A: 104 mothers of term babies, randomly selected from the birth register Study B: 70 mothers of term babies born on selected days	<i>Study A:</i> Mothers used BC daily for a week & recorded contacts with HCPs. Research nurse visit to grade mother’s competence in booklet use. <i>Study B:</i> Mothers used BC when wanted to until	Views & use of the booklet	****

					baby was 6 months. Research nurse visit when babies 8 & 16 weeks. Questionnaire about BC at 6 months.		
Anhang et al 2013	Two Children's EDs (United States)	Usability and safety of a web-based decision support tool for parents of children with flu-like illnesses	Pilot feasibility study	294 parents/carers of children ≤18 years who had presented to an Emergency Department for an influenza-like illness	<i>Intervention:</i> Strategy for Off-site Rapid Triage (SORT) for Kids tool webbased parent survey & severity scoring tool.	Caregiver ratings of usability of tool, sensitivity & specificity of SORT for Kids for identifying children needing ED	*
Mixed methods studies							
Stockwell et al. 2010	Early Head Start Agency at Columbia University (United States)	Pilot evaluation of a community-based, culturally competent health literacy intervention on care of URI, with Latino Early Head Start parents.	Pre-test post-test pilot evaluation	11 parents of children 6 months to 3 years in full evaluation. 17 in interviews & 33 post-class evaluations.	Three education modules delivered in children's centre.	Parental knowledge, attitudes & care of URI before & 2 weeks after final module using Knowledge, Attitude, Practices instrument.	**

ED = Emergency department, DGH = District General Hospital, GP = general practitioner, URI = Upper respiratory infection, RCT/CT = Randomised controlled trial/controlled trial

*Quality assessment rating, between zero stars (lowest quality) and 4 stars (****, highest quality)

Quality of included studies is summarized in Table 1, and detailed in Appendix 3. Only two studies were given the highest quality score, with many being given low scores, often due to insufficient reporting of methods.

Measures of effectiveness

The most frequently used measures of effectiveness were: consultation frequency (15 studies), parent knowledge (9 studies), parent anxiety/reassurance (7 studies), parent satisfaction (4 studies), parent confidence and clinician antibiotic prescribing (both 4 studies).

Consultation frequency

Six of the fifteen studies which measured this outcome showed a significant reduction in either actual consultation rates or intention to consult in the future (see Table 2). Three of these studies evaluated effects on consultation rates over a longer (1 to 3 year) period post intervention and found persistence of effect. [34,29 ,35] (2 low and 1 high quality). One study (low quality) showed a reduction in home visits but with an increase in out-of-hours visits [35]. The 8 remaining studies on consultant frequency showed no difference on consultation rates with the specified intervention.

Knowledge

Nine studies assessed the effect of interventions on parental knowledge of childhood illnesses including fever, upper respiratory infections, febrile convulsion and otitis media (see Table 3). Most interventions used multiple methods to provide information, such as written materials supported by verbal explanations (one high quality study) [12, 19, 22, 23, 27, 28, 36]. Timing of outcome measurement ranged from immediately to 32 months later. Eight studies (one high quality) found a significant increase in parental knowledge after interventions [18, 19, 22, 23, 27, 28, 31, 36,] with a spread of 24 hours to 12 months for post intervention re-assessment. One (high quality) study showed reduction in knowledge at 7 months [12].

Anxiety/Reassurance

Of the seven randomized controlled studies that reported this outcome (table 4), only one reported significantly reduced concern compared with control group following intervention [26] (2* quality rating). Using Baby Check to score their baby’s illness reassured 41% (14/34) [32] and 46% [24] of parents respectively. In Herman and Jackson’s [29] (high quality) study the percentage of parents reporting that they were ‘very worried’ when their child was sick reduced by one third

Satisfaction

Four studies assessed the effects of interventions on parent’s satisfaction with their communication with health professionals [19, 25], and with the educational information received [27, 37]. Two studies reported non-significantly increased satisfaction in both control and interventions groups [19, 25](one high quality) , while another reported significantly increased satisfaction for both intervention groups compared to controls [27] (2* quality). The fourth study suggested a web-based self-triage tool would be well received by parents [37] (low quality).

Table 2 - Effectiveness of interventions on consultation rate

Authors (date)	Consultation rate (Significant results in bold)	Quality
Anhang et al. 2013	The algorithm correctly classified 93% of pediatric patients with Influenza like Illness who made necessary ED visits and all children who made a second ED visit for Influenza like Illness within the subsequent week.	*
Baker et al. 2009	No difference in re-attendance to ED. P=0.46 95% CI -0.06 to 0.16	***
Chande et al. 1996	No difference in contact with Primary Care Physician (p=0.37) or return visits to ED (p=0.68)	*
Francis et al. 2009	Non-significant reduction in re-consultation in first 2 weeks p=0.29 95% CI -2.7 to 9.3. Significant reduction in intention to consult in future for similar illness (55.3% intervention vs. 76.4% control) p<0.001 CI 0.20 to 0.57	****
Hansen 1990	Reported significant reduction in consultations in intervention group (Mean consultations 0.288 (2SD 0.315-0.252) intervention vs. 0.426 (0.461-0.390) control group). P value not given but states as significant.	**
Herman & Jackson 2010	Significant reduction in choosing to contact HCP first. Pre 69% Post 33% p<0.0001 Significant reduction in ED (by 58% p<0.001 95% CI 0.51 to 0.50) and doctor visits (by 42% p<0.001 95% CI 0.33 to 0.46)	***
Isaacman et al. 1992	Parent reported physician contact showed a non-significant reduction (22.8% control vs 13.2% intervention group) Return to ED rates by day 3 were significantly reduced in intervention groups (3.1% intervention versus 10.1% control group p=0.05)	**
Kai 1994	14 parents reported that on 19 occasions Baby Check influenced their decision not to contact a doctor.	**
O'Neill Murphy et al. 2001	High attrition to follow up resulted in no data on effect on consultation rate	*
Robbins et al. 2003	Significant reduction in visits to child health clinic (Median visits: intervention 4.5 vs. Control 5 p=0.039) No significant difference in GP, HV or minor illness nurse contacts.	***
Rosenberg & Pless 1993	Non-significant reduction in ED use in intervention group. Mean total medical visits/year: Control 0.87 (SD 1.5) Intervention 0.7 (SD 1.3)	
Steelman et al. 1999	No significant differences in clinic or ED use between control and intervention groups, but parents with more than 1 child had significantly more 'inappropriate' visits (>1child control group = 5 'inappropriate' visits, intervention group = 7 such visits vs. 1 'inappropriate' visit for both intervention and control in families with 1 child only p=0.04)	
Thomson et al. 1999	No significant difference in total consultations p=0.26, GP p=0.30, out of hours service use p=0.93 or referrals p=0.64	***
Usherwood 1991	No significant difference was found in the number of daytime health centre contacts. Significant decrease in home visits in the intervention group for households with one or two children (28% reduction, p<0.05) but not for larger families. Significant increase in out of hours contacts in the intervention group (Mean contacts: 1 child family Control 0.03 vs. Intervention 0.10; 2 child C:0.11 vs. I:0.23; 3 child C:0.06 vs. I:0.30 p<0.05)	*
Yoffe et al. 2011	Statistically significant reduction in ED use in intervention group p<0.001 . Reductions ranged from 55 to 81% compared to the same month in the previous year.	
Summary	6/15 studies significant difference including 1 reduction in intention to consult, 1 reduction in home visits but with increase in out of hours services Quality assessment rating between zero stars (lowest) quality and four stars (highest)	

Table 3 – Effectiveness of interventions on parents’ knowledge

Author (date)	Parent’s knowledge (Significant results in bold)	Quality
Baker et al. 2009	Significant reduction in knowledge scores: 54% reduction in responses that fever was dangerous (p<0.0001 , 95% CI 0.43-0.65) 28% reduction in responses that child with fever should be woken (p<0.0001 , 95% CI 0.19-0.39) 30% increase in responses identifying aspirin as inappropriate (p<0.0001 , 95% CI - 0.42 to -0.16)	***
Broome et al. 2003	Knowledge increased significantly more in both groups than in control group at 24 to 72 hours and 1,3 & 6 months p<0.03 No information on the size of the effect provided. Those given individual instruction reported to have higher scores - no p value provided.	*
Isaacman et al. 1992	Parent recall of medication data higher in all groups than other items but with no significant differences between groups. Recall of signs of improvement increased significantly for both interventions groups compared to controls at exit interview, day 1 and 3 (Mean correct responses Exit int. Control 0.9, Verbal 25.3, Verbal & Written 56.9; Day 1 C 33.3, V 54.5, V&W 61.0; Day 3 C 44, V 60, V&W 73.2; all p<0.05). Recall of worrying signs improved significantly compared to controls at exit and on day 1 (Exit int. C 5.5, V 32, V&W 38.1 ; Day 1 C 19.1, V 37.5, V&W 44.5; Both p<0.5). The written and verbal intervention groups performed better than the verbal group at exit interview only for signs of improvement and recall of worrisome signs (p<0.05).	**
Kelly et al. 1996	Indirect measurement of knowledge: No significant difference in level of fever at which antipyretics were administered (p=0.91). A significant difference was found in accuracy of antipyretic dose (n=30 incorrect dose pre-intervention, 18/30 (60%) accurate doses post intervention p=0.04).	**
McCarthy et al 1990	Indirect measurement of knowledge: <i>Reliability of mother’s judgements:</i> intervention group were more likely to agree with clinician than control group: 91.7% versus 72.4% (Kappa 0.50 vs 0.26). <i>Specificity of mother’s judgements:</i> Mothers in the intervention group were less likely to score the child’s illness as more severe than the paediatrician than those in the control group (Intervention 90% vs. 59% control group p<0.0001) <i>Sensitivity of mother’s judgements:</i> Serious illness was the outcome used to measure sensitivity. No difference found between intervention and control group (80% versus 90% respectively).	*
Robbins et al. 2003	Non significant reduction in knowledge at 7 months in intervention group	***
Steelman et al. 1999	Significantly fewer incorrect responses in intervention group at 2 months (Intervention 10.4 vs. Control 11.8; p=0.006) and at 4 months (Intervention 8.5 vs. Control 10.3; p=0.002)	
Stockwell et al. 2010	Significant increase in knowledge/attitude health literacy score (61% p<0.05)	**
Wassmer & Hanlon 1999	Significant increase in parental knowledge of febrile convulsion in the intervention group p<0.05 but these parents children had already had a febrile convulsion. See the original paper for details on size of the effect as these are reported per question asked of parents.	
Summary	8/9 showed significant increase in knowledge, although implied in 2 studies and 1 study had high risk of bias. 1 paper showed reduction in knowledge at 7 months.1 qualitative paper.	

Table 4 – Effectiveness of interventions on parents' anxiety of reassurance

Author (date)	Anxiety/Reassurance (Significant results in bold)	Quality
Francis et al. 2009	No significant difference in level of reassurance	****
Hansen 1990	Significant reduction in worry reported as the main reason for consulting the GP (19% vs. 31% p=0.0075)	**
Herman & Jackson 2010	Parents reporting being 'very worried' when their child is sick reduced by a third (no further statistics available).	***
Kai 1994	11 parents consulted despite low acuity scores to avoid consulting later 'out of hours', or because they wanted reassurance. Baby Check did not answer their questions or tell them how to manage minor illness.	**
Krantz 2001	Parents felt that the fever guide was reassuring and that the decision guide on what to do when was important to include.	*
O'Neill Murphy et al. 2001	At 2 weeks both groups were less anxious. Control 86% Intervention 50%	*
Thornton et al. 1991	In the first part of the study 46% found using Baby Check reassuring and 4% said it caused anxiety. 6% of mothers reported that Baby Check helped them to decide whether or not to seek advice, 4% were reassured by a low score. Two with high scores were prompted to seek help.	****
Summary	1/7 significant reduction in worry. 3 reduced anxiety but descriptive statistics only. 2 qualitative papers.	

Confidence

Two of four studies [12, 19] (one high quality) measuring the effect of interventions on parents' confidence in managing childhood illness at home did not show an increase in levels of confidence. However Thornton et al's (high quality) [24] field trials of 'Baby Check' found parents' confidence in the tool itself increased over time, whilst Kai's [32] (2* quality) qualitative exploration found that parents felt 'Baby Check' had increased their confidence to monitor their child and given them 'moral support' for their decision to consult a doctor.

Antibiotic prescription

Four studies assessed the effect of interventions on antibiotic prescription. Francis et al (high quality)[25] found a significant reduction in antibiotic prescriptions given by clinicians in the intervention group (19.5% intervention vs. 40.8% control (95% confidence interval 13.7 to 28.9, $P<0.001$)); and Stockwell et al [31] showed a reduction in the number of parents who sought antibiotics without a prescription or used over the counter medication inappropriately; however this small study (11 parents) failed to report effects on antibiotics sought by parents from health professionals. Two other studies (both high quality) [12, 33] found no significant differences in antibiotic prescribing.

Factors influencing the effectiveness of an intervention

Factors which may have influenced the effectiveness of interventions were identified from a comparison of study populations and/or the setting of the study and the content, format and delivery of the educational interventions.

Content of interventions: Range of topics addressed by the interventions

Eleven studies assessed interventions which focused on a single symptom or type of childhood illness alone (such as fever, febrile convulsions, respiratory tract infection, otitis media), whilst ten provided information on a range of different childhood illnesses.

Three single-topic studies measured consultation behavior, of which Francis et al [25] found reduced intention to consult in the intervention compared to control group whilst two did not [18,22]. Two single-topic studies assessed anxiety/reassurance, one found no effect [25] and the other a reduction in both intervention and control groups [30]. Confidence was assessed in one single-topic study [19] which found no effect. Antibiotic prescribing was assessed in two respiratory focused studies [25, 31], one of which showed a significant reduction in prescribing in the intervention group in the first two weeks post intervention [25] and the other a non-significant reduction in seeking antibiotics without prescription after the intervention [31] (only Francis et al. studied rated as high quality).

Four of the ten studies evaluating the effects of providing information on multiple childhood illnesses or symptoms showed trends towards reduction in consultation rates or intention to consult [34, 26, 29, 35] (one high quality). Four multi-topic intervention studies reported a reduction in anxiety or increased reassurance [24, 26, 29, 32] (one high quality). Confidence improved in two of the 'Baby Check' studies [24, 32] (one high quality) but in another (high quality) study, there was no effect on confidence [12]. Neither of two high quality multi-topic studies demonstrated a significant reduction in antibiotic prescribing [12, 33].

In summary, reduction in consultation rates, reduction in anxiety and increases in confidence appeared more common in multi-topic compared to single-topic interventions, whilst reduction in antibiotic prescribing was more effective with single illness focused interventions.

Content of interventions: Information on assessment and/or management of childhood illness

Four interventions specifically intended to enable parents to assess the severity of their baby's illness and know when to seek medical attention for their child [23, 24, 32,33](two high quality). One of these interventions (a low quality study) informed parents about fever and home management of fever and found that 90% of parents rated the information helpful in decision making and as a communication tool [19]. In contrast, nearly one third of parents did not think the 'Baby Check' educational tool was useful [24], and a qualitative study of the same tool [32] revealed that even when parents scored their child's illness as minor they still consulted for the illness within 24 hours after the assessment, because they wanted practical advice on management.

Content of the interventions: Accessibility of the information

Many of the papers provided brief descriptions of the strategies used to make interventions easy to understand for parents. Three (one high quality) designed their interventions specifically for parents

with low levels of health literacy [29, 31,38]. The language used in the 'Baby Check' score card was simplified to accommodate low health literacy through the translation of professional terms such as 'reduced tone' as 'floppiness' [24] and a further three studies reported that their interventions were designed for age 11-12 year old reading level [30, 34, 39]. One study specifically mentioned using cartoons and humor to increase the accessibility of information [34]. There was no identifiable relationship on outcomes between studies which did or did not design interventions for easy reading. However, Krantz's qualitative study [38] evaluating parents' views of a fever guide found that parents liked the one page, easy-to-read style, the use of simple diagrams such as a thermometer showing both Fahrenheit and Celsius, and pictures of how to measure a child's temperature. Parents felt that these pictures were likely to enhance recall of the information.

Delivery method for interventions: Interactive or one-way flow

Six studies provided educational interventions to parents in an interactive manner, i.e. the parent could engage with the intervention rather than just receiving information [19, 23, 25, 29-31, 36]: two (high quality studies) showed significant reductions in consultation rates or intention to consult [25, 29] and four significantly improved parental knowledge [19, 23, 31, 36] (low to 2* quality).

Two additional but low to 2* quality studies [19, 26] used a relatively simple non-discursive method to provide information to parents, showing significant reductions in consultations of up to 88% in a comparison of attendances to an Emergency Department per month one year following the intervention. . These shared a common feature: when health professionals gave their booklets to parents, they emphasized that the content was important and would help them to look after their acutely sick child. These findings intimate that educational interventions can be successful even when they are provided using a simple method, but clearly further studies are needed to demonstrate this.

Intervention setting

None of the four interventions which were delivered in the waiting room of an emergency department [18, 20, 21, 30] (one high quality) had significant effects on consultation rates, anxiety or parental knowledge. These studies involved both single topic and multi-topic interventions with varying delivery mechanisms and suggest that it is the environment in which the intervention was delivered which is associated with effectiveness, rather than the content of the intervention itself.

Two US studies [29, 31] took place in children's health centres: one high quality study reduced consultation rates in local emergency departments and primary care [29] and the other improved parental knowledge [31]. Peer support and a trustworthy environment were two important factors suggested by the authors as related to this success.

Parent involvement in intervention development or evaluation

One high quality study involved parents in the development [25] and four in the evaluation of the educational intervention [19, 26, 29, 35]. Four showed reduction in consultation rates, intention to consult, or improved parental knowledge [19, 25, 26, 29],. In comparison, studies using existing educational materials as their intervention, without modification and evaluation by its target population, were less successful [12, 33] (both high quality).

1
2
3 **DISCUSSION**
4

5 This systematic review and synthesis of information resources intending to help parents decide
6 when to seek medical help for an acutely sick child identified measures of effectiveness used to
7 evaluate interventions, as well as factors which appear to influence the effectiveness of
8 interventions. Unlike previous reviews which focused on interventions specifically for respiratory
9 tract infections [40] or acute pediatric hospital admissions [41], our review was broader as we
10 identified factors influencing effectiveness of interventions on parents’ help seeking behavior for all
11 common acute illnesses at home.
12

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14 **Measures of effectiveness**
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16 Consultation frequency, knowledge, reassurance/anxiety, satisfaction, confidence and antibiotic
17 prescribing were used as measures of effectiveness. Studies which found reductions in consultation
18 rates [34, 27, 29] were all conducted in the US, which may reflect differences in health service
19 delivery systems and possible financial costs associated with unscheduled consultations. These
20 differences in parental motivations may limit applicability in other countries such as the UK where
21 direct parent-incurred health service costs are less relevant.
22

23
24 Results from studies measuring parents’ knowledge of acute childhood illness indicate that when
25 both verbal and written information were provided, parents were more likely to retain knowledge in
26 the long term than when only given written information [19,22,23,28,31,33,37]. Verbal
27 reinforcement may signal to parents that health professionals endorse the information.
28

29
30 Providing information did not seem to be directly linked to increased satisfaction, although it is not
31 clear whether the studies we found used a valid measurement tool. Limited information was
32 available about the methods used to measure parent satisfaction, which included a question over
33 the phone [27], or using one or two items within a rating scale administered by phone [19, 25].
34 Satisfaction is a complex phenomenon and it is therefore unlikely that such simple measures will
35 elucidate factors which influence it. No conclusions can be drawn regarding the impact of
36 interventions on parents’ confidence to care for their child.
37

38
39 The effectiveness of interventions at reducing antibiotic prescriptions mirror those of Andrews et
40 al.’s [2] review of interventions specifically focused on reducing consultation and antibiotic use in
41 respiratory tract infection, which found that educational materials reduced consultation rates by up
42 to 40%. The two respiratory focused studies which we identified, one from the UK and one from the
43 USA, both indicated a reduction in antibiotic use, whilst neither of the less focused interventions
44 demonstrated any effect on antibiotic use.
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47 We were unable to easily identify an intervention which works consistently to reduce consultation
48 rates, to improve parents’ knowledge, confidence or satisfaction.
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51 **Factors influencing the effectiveness of an intervention**
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53 Interventions providing information on multiple childhood illnesses or symptoms appeared to be
54 more effective (e.g. reduction in consultation rates or intention to consult, reduction in anxiety or
55 increased reassurance), compared to interventions addressing single symptoms. This may be
56 because common childhood symptoms, such as fever, cough, sore throat, vomiting and diarrhoea,
57 often occur simultaneously. Therefore, although parents receiving fever education may feel more
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competent in managing fever, they may continue to seek a medical consultation for other symptoms about which they have less knowledge or confidence. Moreover, educational material which addressed the assessment of illness severity as well as management of minor illness appear to be more effective in supporting parents to care for their children and seek help when necessary: if information is only provided on assessment this may still leave parents needing advice about how to manage, even minor, illness.

Parents' involvement in the development of educational interventions may improve effectiveness. These findings support the general trend towards involving patients and the public in research [4], emphasizing the importance of working collaboratively with the end users of interventions.

O'Neill-Murphy et al [30] argued that information provided in an interactive method is more effective in improving knowledge than non-interactive methods. However, our findings do not clearly support this position as we noted significant effects for interventions delivered with, and without, interaction. Involving health professionals in the *distribution* of booklets, with or without an interactive discussion, may increase the perceived value and reliability of the information and motivate parents to read the booklets, trust the home management strategies suggested and, finally, impact on their behavior. Parents have previously been found to trust information from doctors more than that from other sources [9].

Studies in the review were conducted in a range of settings; those conducted in emergency departments were the least effective [18, 20, 21, 30]. Having an acutely sick child is a stressful time for parents, generating considerable anxiety and uncertainty about when to seek medical help [9, 11, 5]. Stress can impair learning [42,43], therefore it is not surprising that in Chande et al's study only 65% of participants in the intervention group remembered the video in the emergency department. However, two US studies [29, 31] conducted in children's health centres showed reduction in consultation rates in local emergency departments and in primary care [29] and improved parental knowledge [31]. We do not know whether interventions delivered in children's centres would similarly work in the UK, although community education on childhood illness has been suggested in a recent UK survey of parents' first contact choices [43].

Strengths and limitations

The strengths of our review lie in its inclusiveness. Given the non-comparable research designs, we used an integrative narrative approach, recognized as an effective method for summarizing and synthesizing findings across multiple study designs [16, 17]. This approach enabled us to identify influences on effectiveness across a wider range of studies and topics than would have been possible with a single study type or topic focused review. This comprehensive strategy does result in the inclusion of low quality studies whose impact may be questioned and means our recommendations need to be confirmed in further studies.

It is possible some studies were missed as the screening of titles and abstracts for inclusion was performed by only one person. The highly heterogeneous nature of the included studies in terms of design, as well as interventions, outcomes measured, populations and settings limited our ability to perform more quantitative syntheses. The literature search was of papers published in English since January 1990. However, it was evident that some of the earlier included studies are already of limited direct relevance to contemporary health services. For example, the 'Baby Check' tool used in

three studies included a requirement for parents to measure rectal temperature, which is no longer recommended practice. Also no studies compared differing healthcare delivery systems; health systems are likely to have implications on the impact of different interventions.

Recommendations for clinical practice: How best to provide information to help parents decide when to seek help for an acutely sick child

Our findings indicate that interventions with the following characteristics are more likely to be effective:

- Comprehensive information on childhood illness
- Information on assessment of children’s need for a medical consultation *and* on how to manage minor illness at home
- Reinforcement or support by local health care professionals
- Delivery away from the stressful environment of the emergency department. This could be in primary care, in the home or in social care settings.
- Co-production with parents.

Even without the development of new materials for parents of acutely ill children, there are messages here for clinicians using existing materials. Clinicians need to select resources which provide information on multiple common symptoms of childhood illness. Evidence from focus groups parents indicates development with parents is good practice. Interventions in this area can have unexpected consequences which need to be considered prior to implementation, as for example one primary care based intervention which resulted in shifting consultation from day time home visits to the out of hours service [35].

Information is best provided in primary care or social care settings. Community centres such as SureStart Children’s Centres in the UK provide a potential route for the delivery of health information by health professionals, such as health visitors.

Directions for future research

Most of the studies included in the review were quantitative, providing valuable information on the effects of educational interventions. More qualitative studies are needed, which are able to provide in-depth understanding about what, how, and why interventions affect parents’ abilities to assess and manage acute childhood illnesses. This information should be underpinned by research which identifies both parents’ and health professionals’ current use of information resources, and their views on how these resources need to be developed. Finally it is important that any future interventions for parents should be co-developed with parents themselves [44,45]. Given the rising rates of consultations and the considerable impact this is having on the health service in the UK, as well as on parents, there is a pressing need for larger scale implementation studies taking into account the findings of this review.

Conclusion

Overall, the majority of reviewed interventions had limited effects on consultation rates. Although many studies showed an improvement in parental knowledge of childhood illness, this did not necessarily lead to more confidence and less anxiety in parents when looking after their child at home. Interventions providing comprehensive information on childhood illness which can be used for both assessing children's need for a medical consultation and for managing minor illness at home were more effective in reducing consultation rates than those focused on a single symptom/ illness or only on assessing the child's level of acuity. Interventions also appeared more effective if parents were involved in their development or evaluation.

Contributorship statement

Sarah Neil, Monica Lakhnapaul, Caroline Jones and Matthew Thompson conceived the original idea. Initial data searching was performed by Sarah Neil and quality analysis undertaken by all authors. Sarah Neil prepared an initial manuscript which Damian Roland revised. All authors contributed to the final version.

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Competing interests

The authors have no competing interests to declare.

Data Sharing

Additional data is available by emailing the corresponding author.

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For peer review only

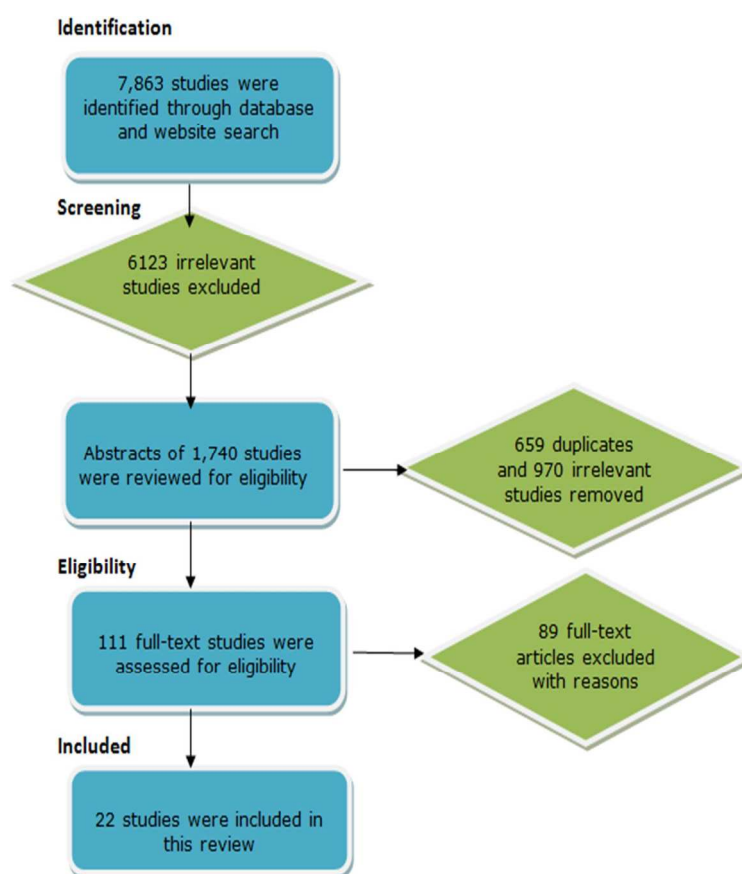


Figure 1 Flow of information through the phases of the selection process (Using PRISMA

Flow Diagram structure (Moher et al., 2009))

Refer to appendix 2 for reasons for exclusion

BMJ Open Figure 1 Flow of information through the phases of the selection process REVISION.doc
190x254mm (300 x 300 DPI)

Appendix 1 - Example Search Strategy Used (replicated in other literature databases)

1. MEDLINE; exp FAMILY/
2. MEDLINE; exp PARENTS/
3. MEDLINE; (family* OR caregiver* OR caretaker*).ti,ab
4. MEDLINE; families.ti,ab
5. MEDLINE; (parent OR parents OR parenting).ti,ab
6. MEDLINE; carer*.ti,ab
7. MEDLINE; (infant* OR baby OR babies OR newborn* OR pediatric* OR paediatric* OR child* OR neonat* OR toddler*).ti,ab
8. MEDLINE; exp CHILD/ OR exp INFANT/
9. MEDLINE; exp ACCESS TO INFORMATION/
10. MEDLINE; exp CONSUMER HEALTH INFORMATION/
11. MEDLINE; exp PAMPHLETS/
12. MEDLINE; "patient information".ti,ab,sh
14. MEDLINE; "fact sheet*".ti,ab,sh
15. MEDLINE; "factsheet*".ti,ab,sh.
16. MEDLINE; "help sheet*".ti,ab,sh.
17. MEDLINE; leaflet*.ti,ab,sh
18. MEDLINE; pamphlet*.ti,ab,sh
20. MEDLINE; "health education".ti,ab
21. MEDLINE; "information literacy".ti,ab
22. MEDLINE; "information resource*".ti,ab
23. MEDLINE; (webpage* OR website*).ti,ab
24. MEDLINE; (educat OR counsel*).ti,ab.
25. MEDLINE; "consultation behavior*".ti,ab
26. MEDLINE; "consultation behaviour*".ti,ab
27. MEDLINE; (booklet* OR brochure*).ti,ab
28. MEDLINE; exp ACUTE DISEASE/
29. MEDLINE; (acute adj2 illness*).ti,ab
30. MEDLINE; exp FEVER/
31. MEDLINE; (minor adj2 illness*).ti,ab
32. MEDLINE; (fever* OR febril*).ti,ab
33. MEDLINE; (cough* OR diarrh* OR rash* OR vomit* OR earache*).ti,ab
34. MEDLINE; bronchiolit*.ti,ab
35. MEDLINE; exp COUGH/ OR exp WHOOPING COUGH/
36. MEDLINE; exp DIARRHEA/
37. MEDLINE; exp EARACHE/
38. MEDLINE; exp VOMITING/
39. MEDLINE; exp RESPIRATORY TRACT INFECTIONS/
40. MEDLINE; (respirator* adj2 infection*).ti,ab
41. MEDLINE; exp OTITIS.
42. MEDLINE; (otitis OR croup OR seizure*).ti,ab
43. MEDLINE; exp CROUP.
44. MEDLINE; exp BRONCHIOLITIS/
45. MEDLINE; exp SEIZURES/
46. MEDLINE; exp EXANTHEMA/
47. MEDLINE; (rash OR rashes OR exanthem*).ti,ab
48. MEDLINE; exp MUCOCUTANEOUS LYMPH NODE SYNDROME/
49. MEDLINE; "MUCOCUTAn* LYMPH NODE*".ti,ab.

50. MEDLINE; kawasaki*.ti,ab
51. MEDLINE; exp CONJUNCTIVITIS/
52. MEDLINE; conjunctivit*.ti,ab
53. MEDLINE; "chicken pox".ti,ab
54. MEDLINE; exp CHICKENPOX/
55. MEDLINE; chickenpox.ti,ab
56. MEDLINE; exp EPIGLOTTITIS/
57. MEDLINE; epiglottit*.ti,ab
58. MEDLINE; exp TONSILLITIS/
59. MEDLINE; tonsillit*.ti,ab
60. MEDLINE; exp COMMON COLD/
61. MEDLINE; exp INFLUENZA, HUMAN/
62. MEDLINE; (influenza OR flu).ti,ab
63. MEDLINE; "sore throat".ti,ab
64. MEDLINE; exp PHARYNGITIS/
65. MEDLINE; pharyngit*.ti,ab
66. MEDLINE; 28 OR 29 OR 30 OR 31 OR 32 OR 33 OR 34 OR 35 OR 36 OR 37 OR 38
OR 39 OR 40 OR 41 OR 42 OR 43 OR 44 OR 45 OR 46 OR 47 OR 48 OR 49 OR 50 OR 51
OR 52 OR 53 OR 54 OR 55 OR 56 OR 57 OR 58 OR 59 OR 60 OR 61 OR 62 OR 63 OR 64
OR 65
67. MEDLINE; 1 OR 2 OR 3 OR 4 OR 5 OR 6
68. MEDLINE; 7 OR 8
69. MEDLINE; "health information".ti,ab
70. MEDLINE; 9 OR 10 OR 11 OR 12 OR 14 OR 15 OR 16 OR 17 OR 18 OR 20 OR 21 OR
22 OR 23 OR 24 OR 25 OR 26 OR 27 OR 69
71. MEDLINE; 66 AND 67 AND 68 AND 70
72. MEDLINE; exp MENINGITIS/
73. MEDLINE; meningit*.ti,ab
74. MEDLINE; exp STATUS EPILEPTICUS/ OR exp EPILEPSY/
75. MEDLINE; epilepsy.ti,ab
76. MEDLINE; exp SEPSIS/
77. MEDLINE; sepsis.ti,ab
78. MEDLINE; epilept*.ti,ab
79. MEDLINE; 72 OR 73 OR 74 OR 75 OR 76 OR 77 OR 78
80. MEDLINE; 67 AND 68 AND 70 AND 79
81. MEDLINE; 71 OR 80
82. MEDLINE; (father* OR mother*).ti,ab
83. MEDLINE; 67 OR 82
84. MEDLINE; exp INTERNET/
85. MEDLINE; internet.ti,ab
86. MEDLINE; 67 OR 82.
87. MEDLINE; 70 OR 84 OR 85
88. MEDLINE; 66 OR 79
89. MEDLINE; 68 AND 86 AND 87 AND 88
90. MEDLINE; 89 [Limit to: Publication Year 1990-2014]

Author, Year	Title	Inclusion Criteria (x = criteria not met)						
		Research articles (quantitative, qualitative or literature review)	Intervention= Information resources on acute child illness for parents	Parent outcome measured	Intervention concerns child up to 5 years of age	Intervention setting: home, primary care, A & or ambulatory care	Published in English language January, 1990- October, 2011	UK, USA, Australia, Europe, New Zealand and Canada
2004, No authors listed on PubMed	Patient information. Understanding ear infections in your child. Advance for Nurse Practitioners. 12(7):44.	x						
Rideout ME and First LR 2001	Guide for parents: a brief but important talk on a "hot topic": your child's fever Contemporary Pediatrics ;18(5):42	x						
Ali M., Asefaw T., Byass P., Beyene H. and Pedersen F.K. 2005	Helping northern Ethiopian communities reduce childhood mortality: population-based intervention trial Bulletin of the World Health Organisation. 83(1):27-33.		x					x
Allen, J., Dyas, J. and Jones, M. 2002	Minor illness in children: parents' views and use of health services British Journal of Community Nursing. 7(9):462-8.		x	x				
American Academy of Family Physicians 2004	Information from your family doctor. Urinary tract infections in children American Family Physician. 1;69(1):155-6	x		x				
American Academy of Family Physicians 1998	Information from your family doctor. When your child has a UTI American Family Physician.15;74(2):313-4.	x		x				
Awasthi, S., Verma, T., and Agarwal, M. 2006	Danger signs of neonatal illnesses: perceptions of caregivers and health workers in northern India Bulletin of the World Health Organisation. 84(10):819-26			X				x

Barbara, S. 2009	First Contact: Effective Health Care for Children, Young People and Families Community Practitioner, 82(8), pp.18-21	x	x					
Bernhardt, J.M. and Felter, E.M. 2004	Online pediatric information seeking among mothers of young children: results from a qualitative study using focus groups Journal of Medical Internet Research. 1;6(1):e7		x	x				
Booth, M., Brown, T. and Richmand-Crum, M. 2004	Dialling for help: state telephone hotlines as vital resources for parents of young children Issue Brief (Commonw Fund). (787):1-12	x	x					
Bouche, G. and Migeot, V. 2008	Parental use of the Internet to seek health information and primary care utilisation for their child: a cross-sectional study BMC Public Health. 28;8:300		x	x				
Cals, J. W.L., Hood, K., Aaftink, N., Hopstaken, R.M., Francis, N.A., Dinant, G., and Butler, C.C. 2009	Predictors of patient-initiated re-consultation for lower respiratory tract infections in general practice The British Journal of General Practice. 59(567):761-4		X	x	x			
Charles JO, Udonwa NE, Ikoh MU, Ikpeme BI. 2008	The role of mothers in household health-seeking behavior and decision-making in childhood febrile illness in Okurikang/Ikot Effiong Otop community, Cross River State, Nigeria Health Care for Women International. 29(8):906-25		x					x
Considine, J. and Brennan, D. 2007	Effect of an evidence-based education programme on ED discharge advice for febrile children Journal of Clinical Nursing. 16(9):1687-94		x	x				

Croghan, E. 2008	Preventing sickness absence from early years education British Journal of School Nursing, Vol. 3, Iss. 5: 230- 233		X	x		x		
Curry, M.D., Mathews, H.F., Daniel, H.J., Johnson, J.C., Mansfield, C.J. 2002	Beliefs about an responses to childhood ear infections: a study of parents in Eastern North Carolina Social Science Medicine. 54(8):1153-65		x	x				
DeWalt, D.A. and Hink, A. 2009	Health literacy and child health outcomes, a systematic review of the literature Pediatrics. 124 Suppl 3:S265-74	x	x	x				
Dixon-Woods, M. and Thornton, H. 2001	Written information for treating minor illness British Medical Journal. 1;323(7311):516-7	x	x	x				
Dyas, J., Bethea, J. and Jones, M. 2007	Identifying consensus on the appropriate advice for managing common childhood illnesses: a nominal group study Quality in Primary Care, Volume 15, Number 5 :285-292(8)		x	x				
Ebuehi OM, Adebajo S. 2010	Improving caregivers' home management of common childhood illnesses through community level interventions Journal of Child Health Care. 14(3):225-38.		x					x
Ertem, I.O., Atay, G., Bingoler, B.E., Dogan, D.G., Bayhan, A. and Sarica, D. 2006	Promoting child development at sick-child visits: a controlled trial Pediatrics. 118(1):e124-31		x	x				
Fickert, N.A. 2006	Taking a closer look at acute otitis media in kids Nursing. 36(4):20-1	x	x	x				
Fletcher, R., Russell, V. G. and Keatinge, D. 2008	The evaluation of tailored and web-based information for new fathers Child: Care, Health and Development. 34(4):439-46.		x	x				

Flury T, Aebi C, Donati F. 2001	Febrile seizures and parental anxiety: does information help Swiss Medical Weekly. 131(37-38):556-60		x	x				
Francis N., Wood, F., Simpson, S., Hood, K. and Butler, C.C. 2008	Developing an 'interactive' booklet on respiratory tract infections in children for use in primary care consultations Patient Education and Counseling. 73(2):286-93			x				
Francis, N., Crocker, J., Gamper, A., Brookes-Howell, L., Powell, C. and Butler, C. 2011	Missed opportunities for earlier treatment? A qualitative interview study with parents of children admitted to hospital with serious respiratory tract infections Archives of Disease in Childhood. 96(2):154-9. Epub 2010 Nov 2		X		X			
Franck LS, Cox S, Allen A, Winter I. 2004	Parental concern and distress about infant pain Archives of Disease in Childhood 89(1):F71-5		x			x		
van Ginneken, J.K., Lob-Levyt, J. and Gove, S. 1996	Potential interventions for preventing pneumonia among young children in developing countries: promoting material education Tropical Medicine & International Health. 1(3):283-94	x	X					x
Goldman RD, Antoon R, Tait G, Zimmer D, Viegas A, Mounstephen B. 2005	Culture results via the Internet: a novel way for communication after an emergency department visit The Journal of Pediatrics. 147(2):221-6		x					
Goldman, R.D. and Macpherson, A. 2006	Internet health information use and email access by parents attending a paediatric emergency department Emergency Medicine Journal. 23(5):345-8		x					
Goore Z, Mangione-Smith R, Elliott MN, McDonald L, Kravitz RL. 2001	How much explanation is enough? A study of parent requests for information and physician responses Ambulatory Pediatrics. 1(6):326-32		x					

Haines, C. 2005	Parents' experiences of living through their child's suffering from and surviving severe meningococcal disease Nursing in Critical Care. 10(2):78-89		x			x		
Hariharan SL, Pohlgeers AP, Reeves SD. 2004	Doctor, my child needs some medicine Pediatric Emergency Care. 20(8):540-6	x	x	x				
Hartling, L., Scott, S., Pandya, R., Johnson, D. Bishop, T. and Klassen, T.P. 2010	Storytelling as a communication tool for health consumers: development of an intervention for parents of children with croup BMC Pediatrics. 2;10:64			x				
Hedin, K., Petersson, C., Cars, H., Beckman, A. and Hakansson, A. 2006	Infection prevention at day-care centres: feasibility and possible effects of intervention Scandinavian Journal of Primary Health Care. 24(1):44-9					x		
Hodgson C, Wong I. 2004	What do mothers of young children think of community pharmacists: a descriptive survey The Journal of Family Health Care. 14(3):73-4, 76-9		x					
Holloway, K.A., Karkee, S.B., Tamang, A., Gurung, Y.B., Kafle, K.K., Pradhan, R. and Reeves, B.C. 2009	Community intervention to promote rational treatment of acute respiratory infection in rural Nepal Tropical Medicine & International Health. 14(1):101-10					x		x
Houghton, J. 2005	Minor illness management: empowering parents through shared knowledge Paediatric Nursing. 17(1):24-5	x	x					
Houston, A.M. and Pickering, A.J. 2000	Do I don't I call the doctor': a qualitative study of parental perceptions of calling the GP out-of-hours Health Expectations. 3(4):234-242		x					

Huang, M., Liu, C. and Huang, C. 1998	Effects of an educational program on parents with febrile convulsion children Pediatric Neurology. 18(2):150-5							x
Huang, M-C., Liu, C-C., Chi, Y.C., Huang, C-C., Cain, K. 2001	Parental concerns for the child with febrile convulsion: long-term effects of educational interventions Acta Neurologica Scandinavica. 103(5):288-93							x
Impicciatore, P., Violante, A. and Bonati, M. 1997	Helping parents to cope when their preschool children are acutely ill British Medical Journal. 314(7077):373		x	x				
Jackson, R.J., Baird, W., Davis-Reynolds, L., Smith, C., Blackburn, S. and Allsebrook, J. 2007	Qualitative analysis of parents' information needs and psychosocial experiences when supporting children with health care needs Health Information and Libraries Journal. 25(1):31-7		X					
Jensen, J.F., Tonnesen, L.L., Soderstrom, M., Thorsen, H. and Siersma, V. 2010	Paracetamol for feverish children: parental motives and experiences Scandinavian Journal of Primary Health Care. 28(2):115-20.		X					
Joanne Briggs Institute 2010	Review summaries: evidence for nursing practice Journal of Advanced Nursing. 66(4):738-42	x	x	x				
Kai, J. 1996	Parents' difficulties and information needs in coping with acute illness in preschool children: a qualitative study British Medical Journal. 313(7063):987-90.		x					
Kalister, H., Newman, R.D., Read, L., Walters, C., Hrachovec, J. and Graham, E.A. 1999	Pharmacy-based evaluation and treatment of minor illnesses in a culturally diverse pediatric clinic Archives Pediatrics & Adolescent Medicine. 153(7):731-5.		x	x				

Kallestrup P and Bro, F. 2003	Parents' beliefs and expectations when presenting with a febrile child at an out-of-hours general practice clinic The British Journal of General Practice. 53(486):43-4.		x					
Kempe, A., Dempsey, C. and Poole, S.R. 1999	Introduction of a recorded health information line into a pediatric practice Archives Pediatrics & Adolescent Medicine. 153(6):604-10.		x	x	x			
KinyonMunch K. 2011	What do you tell parents when their child is sick with the common cold? Journal for Specialists in Pediatric Nursing. 16(1):8-15	x	x	x				
Kubba, H. 2000	An evidence-based patient information leaflet about otitis media with effusion Clinical Performance and Quality Health Care. 8(2):93-9			x		x		
Kyrkou, M., Harbord, M., Kyrkou, N., Kay, D and Coulthard, K. 2006	Community use of intranasal midazolam for managing prolonged seizures Journal of Intellectual & Developmental Disability. 31(3):131-8		x					
LeMay, S., Johnson, C., Choiniere, M., Fortin, C., Hubert, I., Frechette, G., Kudirka, D. and Murray, L. 2010	Pain management interventions with parents in the emergency department: a randomised trial Journal of Advanced Nursing. 66(11):2442-9		x	x				
Light, P.A., Hupcey, J.E. and Clark, M.B. 2005	Nursing telephone triage and its influence on parents' choice of care for febrile children Journal of Pediatric Nursing. 20(6):424-9		x	x				
Littlewood J. 1998	Mothers' understanding of their children's bodies Journal of Child Health Care. 2(3):118-21		x	x				

Lock C, Baker R, Brittain K. 2010	I've just taken you to see the man with the CD on his head': the experience and management of recurrent sore throat in children Journal of Child Health Care. 14(1):95-110		x					
McCann D., Longbottom H. and Nissen M. 2002	The home management and characteristics of children presenting to hospital with acute gastroenteritis Contemporary Nurse. 13(2-3):169-78.		x					
McConnochie, K.M., Wood, N.E., Kitzman, H.J., Herendeen, N.E., Roy, J. and Roghmann, K.J. 2005	Telemedicine reduces absence resulting from illness in urban child care: evaluation of an innovation Pediatrics. 115(5):1273-82.		x	x				
Menghini, K.G. 2005	Designing and evaluating parent educational materials Advances in Neonatal Care. 5(5):273-83.	x	x			x		
Moon, R.Y., Cheng, T.L., Patel, K.M., Baumhaft, K. and Scheidt, P.C. 1998	Parental literacy level and understanding of medical information Pediatrics. 102(2):e25		x					
Murphy, K.A. and Liebman, M. 1995	Fever care: does nursing instruction make a difference? Journal of Emergency Nursing. 21(5):461-3.	x		x				
Neill, S.J. 2010	Containing acute childhood illness within family life: a substantive grounded theory Journal of Child Health Care. 14(4):327-44		x					
Ng, C-J., Chia, Y-C., Teng, C-L. and Nik-Sherina, H. 2007	Factors influencing parental decision to consult for children with upper respiratory tract infection Journal of Paediatrics and Child Health. 44(4):208-13.		x					x

Oermann, M.H., Lowery, F.N.F. and Thornley 2003	Evaluation of web sites on management of pain in children Pain Management Nursing. 4(3):99-105		x	x			
Olaogun, A., Ayandiran, O., Olalumade, O. Obiajunwa, P., Adeyemo, F. 2008	Knowledge and management of infants' pain by mothers in Ile Ife, Nigeria International Journal of Nursing Practice. 14(4):273-8		x	x			x
Pandolfini C, Impicciatore P, Bonati M. 2000	Parents on the web: risks for quality management of cough in children Pediatrics. 105(1):e1		x	x			
Paul F, Jones MC, Hendry C, Adair PM. 2007	The quality of written information for parents regarding the management of a febrile convulsion: a randomised controlled trial Journal of Clinical Nursing. 16(12):2308-22.					x	
Per Lagerløv, Sølvi Helseth and Tanja Holager 2003	Childhood illnesses and the use of paracetamol (acetaminophen): a qualitative study of parents' management of common childhood illnesses Family Practice. 20(6):717-23		x				
Persaud J. 1997	Patient booklets can cut GP workload Medeconomics 1997 June:47.	x		x			
Pitts M, McMaster J, Hartmann T, Mausezahl D. 1996	Lay beliefs about diarrhoeal diseases: their role in health education in a developing country Social Science & Medicine. 43(8):1223-8		x				x
Power, N., Lioffi, C and Franck, L. 2007	Helping parents to help their child with procedural and everyday pain: practical, evidence-based advice Journal of Specialists in Pediatric Nursing. 12(3):203-9	x		x			

Rollins, J.A. 2008	UCLA research shows dramatic savings for medicaid when head start parents learn to care for kids' illnesses Pediatric Nursing May 1, 2008	X						
Sanders, M.R., Markie-Dadds, C., Rinaldis, M., Firman, D. and Baig, N. 2007	Using household survey data to inform policy decisions regarding the delivery of evidence-based parenting interventions Child: Care, Health and Development. 33(6):768-83.		X		X			
Sanghavi DM. 2005	Taking well-child care into the 21st century: a novel, effective method for improving parent knowledge using computerized tutorials Archives of Pediatrics & Adolescent Medicine. 159(5):482-5.		X					
Sarrella, M. and Kahanb, E. 2002	Impact of a single-session education program on parental knowledge of and approach to childhood fever Patient Education and Counseling. 51(1):59-63.							X
Schlaudecker, E.P. and Steinhoff, M.C. 2010	Helping mothers prevent influenza illness in their infants . Pediatrics. 126(5):1008-11	X	X					
Småbrekke L, Berild D, Giaever A, Myrbakk T, Fuskevåg A, Ericson JU, Flaegstad T, Olsvik O, Ringertz SH.2002	Educational intervention for parents and healthcare providers leads to reduced antibiotic use in acute otitis media. Scandinavian Journal of Infectious Diseases. 34(9):657-9.		X					
Sorlie, V., Melbye, H. and Norberg, A. 1996	Counselling parents of children with acute illness: a task for nurses in an emergency clinic Journal of Pediatric Nursing. 11(5):337-41		X					

Srinivas, S., Poole, F., Redpath, J. and Underhill, T.J. 1996	Review of a computer based telephone helpline in an A&E department Journal of Accident & Emergency Medicine. 13(5):330-3.		x	x			
Trajanovska, M., Manias, E., Cranswick, N. and Johnston, L. 2010	Parental management of childhood complaints: over-the-counter medicine use and advice-seeking behaviours Journal of Clinical Nursing. 19(13-14):2065-75		x	x			
Tuffrey, C. and Finlay, F. 2002	Use of the internet by parents of paediatric outpatients Archives of Disease in Childhood. 87(6):534-6.		x				
Ulione, M.S. 1997	Health promotion and injury prevention in a child development center Journal of Pediatric Nursing. 12(3):148-54			x			
Vitolo MR, Bortolini GA, Dal Bó Campagnolo P, Feldens CA. 2008	Effectiveness of a nutrition program in reducing symptoms of respiratory morbidity in children: A randomized field trial Preventive Medicine. 47(4):384-8.		x				x
Wahl, H., Banerjee, J., Manikam, L. Parylo, C. and Lakhanpaul, M. 2011	Health information needs of families attending the paediatric emergency department Archives of Disease in Childhood. 96(4):335-9.		x				
Walsh A, Edwards H, Fraser J. 2007	Influences on parents' fever management: beliefs, experiences and information sources Journal of Clinical Nursing. 16(12):2331-40.		x	x			
Walsh, A. and Edwards, H. 2006	Management of childhood fever by parents: literature review Journal of Advanced Nursing. 54(2):217-27	x					

Walsh, A., Edwards, H. and Fraser, J. 2008	Parents' childhood fever management: community survey and instrument development Journal of Advanced Nursing. 63(4):376-88.		x					
Wiener, L., Leyden, C.G., Pizzo, P.A., Ognibebe, F.P., Rosenthal, C., and Schubert, W. 1992	Pneumocystis Carinii Pneumonia (PCP) and your child: a parent information booklet Oncology Nursing Forum. 19(3):507-9.	x	x					
Williams A, Noyes J; Information Matters Project (IMP) Team. 2009	The information matters project: Health, medicines and self-care choices made by children, young people and their families: Information to support decision-making. study protocol. Journal of Advanced Nursing;65(9):1807-16	X Study protocol	x					

Appendix 3 Quality assessment of studies included in the review

Type of study	Quality criteria*	Anhang 2013	Thornton et al. 1991	Kai 1994	Krantz 2001	Baker et al. 2009	Broome et al. 2003	Chande et al. 1996	Francis et al. 2009	Hansen 1990	McCarthy et al. 1990	Robbins et al. 2003	Thomson et al. 1999	Herman & Jackson 2010	Isaacman et al. 1992	Kelly et al. 1996	O'Neill-Murphy et al. 2001	Rosenberg & Pless 1993	Steelman et al. 1999	Wassmer & Hanlon 1999	Yoffe et al., 2011	Stockwell et al. 2010
Qualitative	Relevant sources			Y	Y																	Y
	Relevant data analysis			U	U																	U
	Consideration of context			Y	N																	Y
	Consideration of researchers' influence			U	N																	N
Randomized controlled trials	Randomization					Y	U	Y	Y	U	U	U	Y									
	Allocation concealment					U	U	U	Y	N	N	Y	U									
	Outcome data (≥80%)					Y	Y	N	Y	Y	U	Y	Y									
	Drop-out (<20%)					Y	N	N	Y	Y	Y	Y	Y									
Non randomized trials	Minimized selection bias													Y	U	Y	Y	U	N	N	N	U
	Appropriate measurements													Y	U	Y	N	U	U	U	U	Y
	Comparable groups													Y	Y	U	U	U	N	N	U	U
	Outcome (≥80%) + response rate (≥60%)													N	Y	N	N	N	N	U	U	U
Quantitative descriptive	Relevant sampling strategy	N	Y																			
	Representative sample	U	Y																			
	Appropriate measurements	Y	Y																			
	Response rate (≥60%)	U	Y																			
Mixed methods	Relevant design																					U
	Relevant integration of data																					N
	Consideration of limitations																					N

Y=Yes; N=No; U=Unclear

* Quality criteria according to Mixed Methods Appraisal Tool (Pluye P et al., 2011)

Pluye P, Robert E, Cargo M, Bartlett G, O’Cathain A, Griffiths F, Boardman F, Gagnon MP and MC, R. (2011). "Proposed A mixed methods appraisal tool for systematic mixed studies reviews. Archived by WebCite® at <http://www.webcitation.org/5tTRTc9yJ>." Retrieved Sept 2013, from <http://mixedmethodsappraisaltoolpublic.pbworks.com>.

Explanation of decision to use the Mixed Methods Appraisal tool

The MMAT tool uniquely allows you to appraise the quality of qualitative papers, quantitative papers, and mixed methods papers, using a single process¹. For each type of qualitative or quantitative (RCT, non-randomised trial, descriptive) study design, there are 4 questions to answer. For a mixed methods study, you answer the questions for the qualitative strand and the appropriate quantitative strand and then additional questions about the mixed component.

We appreciate it is as not as well validated as other tools for critical appraisal e.g. systematic reviews or RCT but we wanted to include all study designs for comprehensiveness. The nature of our narrative review resulted in a number of mixed methodologies as the MMAT approach represented the most coherent and valid way of structuring the review process while minimising bias.

1. Pace R, Pluye P, Bartlett G, Macaulay AC, Salsberg J, Jagosh J, Seller R Testing the reliability and efficiency of the pilot Mixed Methods Appraisal Tool (MMAT) for systematic mixed studies review. Int J Nurs Stud. 2012 Jan;49(1):47-53



PRISMA 2009 Checklist

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Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	4
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	4
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	N/A
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	4 and 5
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	4
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Appendix 1
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	4 and 5
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	5
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	Appendix 3
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	Page 5 and Appendix 3
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	Page 5



PRISMA 2009 Checklist

Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	Page 5 and Appendix 3
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Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	Page 5 and 11
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	N/A

RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	Figure 1 and Appendix 2
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	Table 1
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	Table 1 and Appendix 3
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	Table 1, Appendix 3 and Pages 5 to 9
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	N/A
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	N/A
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	N/A
DISCUSSION			

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PRISMA 2009 Checklist

Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	9 and 10
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	11
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	12
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	12

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

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