A systematic review of treatments for settling problems and night waking in young children

Paul Ramchandani, Luci Wiggs, Vicky Webb, Gregory Stores

Abstract

Objectives To assess the efficacy of treatments for settling problems and night waking in young children.
Design A systematic review of randomised controlled trials of interventions for settling problems and night waking in young children.
Setting Electronic bibliographic databases and references on identified papers, hand searches, and personal contact with specialists.
Subjects Children aged 5 years or less who had established settling problems or night waking.
Interventions Interventions had to be described and a placebo, waiting list, or another intervention needed to have been used as a comparison. Interventions comprised drug trials or non-drug trials.
Main outcome measures Number of wakes at night, time to settle, or number of nights in which these problems occurred.
Results Drugs seemed to be effective in treating night waking in the short term, but long term efficacy was questionable. In contrast, specific behavioural interventions showed both short term efficacy and possible longer term effects for dealing with settling problems and night waking.
Conclusions Given the prevalence and persistence of childhood sleep problems and the effects they can have on children and families, treatments that offer long lasting benefits are appealing and these are likely to be behavioural interventions.

Introduction

Problems of settling to sleep and night waking are the most common sleep problems in young children, affecting about 20% of children aged 1-3 years[1-3] and about 10% of children aged 4.5 years.[4] Such problems are frequently persistent[3] and are associated with behavioural difficulties.[2] They also adversely affect families, being linked with maternal ill health and marital discord.[5]

Sedation is the most frequently used treatment for childhood sleep problems[6 7] despite concerns about its effectiveness. However, a wide range of other interventions (usually psychological) are available, including behavioural programmes guided by a therapist,[8] parent educational groups,[9] and self help booklets.[10] Recent reviews give different advice as to the most effective forms of treatment.[7 11–13] Parents often express dissatisfaction with drugs[14] and some behavioural treatments, such as extinction (leaving the child to cry),[15] which can be distressing as well as impractical for some parents. Both professionals and parents would benefit from a greater understanding of the effectiveness of treatments for childhood sleep problems.

We aimed to assess the evidence of efficacy for treatments for settling problems and night waking in healthy young children by systematically reviewing all randomised controlled trials in this area. We considered settling problems and night waking together as they often coexist,[2] and programmes that target one tend to have a beneficial effect on the other.

Methods

Search protocol

Two of the authors (LW and PR) independently searched for trials from Medline (1966 to September 1998), EMBASE (1980 to June 1998), PsycLIT journals (1974 to September 1998), Biological Abstracts (1985 to June 1998), CINAHL (1982 to September 1998), SIGLE (1980 to June 1998), and the Cochrane database (including the Cochrane Controlled Trials Register (issue 2, 1998). The search terms child*, infan*, toddler*, sleep*, settling, wake*, treatment*, medication*, therapy, intervention* were used as well as the names of authors. No language restrictions were applied. Available abstracts were reviewed, and suitable papers were requested along with those that we could not judge adequately from the abstract.

This search was supplemented by tracking all references in these papers and those cited in reviews,[7 11–13] books,[16 17] and a personal bibliography as well as handsearching the *Journal of Child Psychology and Psychiatry* for the past five years. To identify additional unpublished and published studies we contacted authors of identified studies where possible and the current manufacturers of trimeprazine.

Inclusion criteria

We included studies of young children (aged 5 and under) with an established sleep problem that was recognised as problematic by their parents or carers, either a settling problem (refusing or taking a long time to settle at night or tantrums at bedtime) or night waking (waking frequently or waking for long periods, or both); randomised controlled trials only (cross over or parallel design); studies not specifically of children

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A table detailing the methodological quality of the trials appears on the BMJ's website

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Table 1 Randomised controlled trials of drug treatments for children's sleep problems

Study	Subjects and problems	Intervention	Controls	Outcomes	Results
Richman 1985[14]	22 children aged 12-24 months recruited from community survey, with night waking	Trimeprazine (30-60 mg)	Placebo	Sleep disturbance score (number of night wakes and settling)	12.1 with placebo 8.6 with treatment (P<0.01)
Simonoff and Stores 1987[18]	20 children aged 12-36 months referred for study, with night waking	Trimeprazine (45-90 mg)	Placebo	Night waking (frequency and duration)	2.4 wakes per night with placebo 1.4 wakes per night with treatment (P<0.001)
France et al 1991[19]	30 children aged 7-27 months as referrals to sleep programme, with sleep disturbance	Extinction plus trimeprazine (30 mg)	Extinction plus placebo	Night waking (frequency and duration)	Intervention group improved quicker than placebo group (P<0.01) No difference shown in longer term
Montanari et al 1992[20]	60 children aged 1-36 months selected from paediatric outpatients, with sleep disturbance	Niaprazine	Chlordesmethyl diazepam	Night waking (frequency)	23/26 (88%) improved with desmethyldiazepam 26/26 (100%) improved with niaprazine No significant difference

with a learning disability or those with a particular physical or mental health problem; studies that described the intervention package, with placebo, waiting list, or another intervention as control; and studies with outcome measures that included number of night wakes, time to settle, or number of nights in which these problems occurred.

Critical appraisal of methodological quality

The quality of the trials was assessed independently and in an open (non-blinded) manner by two reviewers (PR and VW) using the criteria of Jadad et al.[21] Disagreements were resolved by discussion. This system considers randomisation, blinding, and withdrawals (drop outs) from trials. A higher score indicates greater methodological rigour. These criteria have high interrater reliability and good criterion related validity when compared with longer scoring systems.[21] This system, however, only assessed the studies as described by the authors. Additional information was extracted on the numbers and age range of participants in each trial, the referral source, the sleep problem, the intervention and control procedures, the outcome scores and measures, and measurement times.

Results

Overall, 44 studies were located. Ten of these were thought to meet the inclusion criteria but one could not be appraised fully as it did not contain sufficient detail of the methodology. Nine studies were finally included: four on drugs, [14 18 20 21] four on behavioural treatments (one also with a booklet component),[8 10 15 22] and one on a general non-directive educational approach (delivered by booklet).[23] It would have been inappropriate to perform a meta-analysis because of the heterogeneity of the subjects, treatments, and outcome measures.

Methodological quality

There was initial agreement between the assessors for 78% of the time. The average quality score of the trials was low (2.1; see table on website). The mean quality score of the trials of behavioural treatment was lower than the drug trials (1.6 (SD 0.6) *v* 2.8 (1.3)).

Drug trials

Table 1 gives the details of the trials. The drugs used were trimeprazine and niaprazine. Two trials were of drug only versus placebo—either up to 60 mg[14] or 90 mg.[18] Both showed a statistically significant positive effect of drugs in the short term. The clinical significance is less clear as in both trials even the children receiving treatment continued to wake at night, and up to one third did not improve with drugs. The picture is less convincing concerning a longer lasting effect. The same two studies[14 18] included a follow up period. In one study[14] the sleep score dropped marginally from 12.4 at baseline to 10.1 at six months' follow up. One third of the subjects had, however, withdrawn from the study at this stage. In the second study,[18] with a shorter follow up period, there was a reduction in number of wakes at night from 2.8 at baseline to 1.6 at four weeks' follow up. As both studies

Table 2 Randomised controlled trials of psychological treatments

Study	Subjects and problems	Interventions	Controls	Outcomes	Results
Rickert and Johnson 1988[15]	33 children aged 6-54 months recruited through newspaper advertisements, with night waking	Scheduled wakes or extinction	Sleep diary only	No of night wakes per week	5 with scheduled wakes 2 with extinction 8 with controls Both interventions better than control (P<0.05)
Scott and Richards 1990[23]	90 children aged 1-18 months referred for study, with night waking	Booklet and support visits or booklet only	Sleep diary only	No of night wakes per night	1.7 both types of intervention 1.9 with control No difference between treatment groups or control
Adams and Rickert 1989[8]	36 children aged 18-48 months recruited through newspaper advertisements, with settling problems	Positive routines or graduated extinction	Sleep diary only	No of bedtime tantrums per week (frequency and duration)	1 per week with both interventions 3 per week with controls Both interventions better than control (P<0.001)
Pritchard and Appleton 1988[22]	31 children aged 9-42 months referred for study, with night waking and settling	Modified extinction programme and support visits	Modified extinction programme only	No of night wakes per night	No difference between groups—both showed reduced night waking
Seymour et al 1989[10]	45 children aged 9-60 months, attenders at family counselling agency with sleep problem	Sleep programme (behavioural advice booklet and support) or behavioural advice booklet only	Waiting list	No of night wakes per week	6.9 with sleep programme 4.9 with booklet only 11.7 with control Both interventions better than control (P<0.05)

were of a cross over design there was no matched untreated group with which to compare these rates.

The two remaining drug trials require separate consideration. Montanari et al[20] compared two different drugs for sleep problems and found them broadly comparable, although niaprazine (an antihistamine) was marginally better than chlordesmethyldiazepam for night waking. France et al[19] used trimeprazine as an adjunct to an extinction programme (ignoring a child's crying) rather than as a treatment in its own right. Although trimeprazine (plus extinction) did reduce night waking during the first 10 days of the trial more than placebo (plus extinction), there was no difference between the two groups at the end of treatment and at four weeks' follow up.

Non-drug trials

Table 2 details the non-drug trials. Several techniques were used in the studies.

Positive routines—A 20 minute winding down bedtime routine was established, initially close to the time that the child fell asleep, which was brought forward by 5-10 minutes per week to an appropriate bedtime. After completion of the routine, any resistance from the child was dealt with by parents saying, "It's time for sleep" and placing the child back in bed if necessary.

Graduated extinction—Parents ignored bedtime tantrums for preset time intervals, the duration of which increased each week. At the end of the interval parents entered the room, put the child back in bed if necessary, and told them it was time for sleep before leaving the room again after a maximum of 15 seconds.

Scheduled wakes—After the collection of baseline data parents were instructed to wake their child 15-60 minutes before the child usually woke spontaneously and to resettle them to sleep in their usual manner. Number and timing of scheduled wakes were modified on a semiweekly basis, depending on the child's sleep patterns during the previous few nights.

Extinction or systematic ignoring—Parents went to their children when they were first heard to cry, checked that they were not ill, and changed nappies in the cot if necessary but did not pick the children up or soothe, feed, or interact with them in any way. Once reassured that the child was not ill, parents left the room and did not return for the duration of that crying episode. Further crying episodes each night were dealt with in the same way.

Modified extinction—This involved parents ignoring their child for 20 minutes then checking that the child was not ill but they did not pick up, soothe, interact with, or feed the child. Having reassured themselves, parents left the room and returned only after the child had displayed a settling problem or night waking for a further 20 minutes. This 20 minute checking interval was maintained throughout treatment. "Support visits," used in conjunction with modified extinction, consisted of a visit from the therapist every two or three days during the first three weeks of treatment.

Educational booklet—This gave parents general information about children's sleep, described the advantages and disadvantages of the range of treatments for children's sleep problems, and emphasised that there was no one solution. Supportive visits, used in conjunction with the booklet, consisted of non-directive discussion with an untrained counsellor about the children's sleep.

Sleep programme—This consisted of individually tailored behavioural programmes (using a variety of techniques which were also described in the accompanying booklet) with daily support telephone calls at first, decreasing in frequency over time, accompanied by a behavioural advice booklet. The booklet gave advice about the importance of consistent bedtime routines, the need to reward appropriate night time behaviour, and specific advice about ways of removing parental attention at bedtime or during night wakings.

Results

Both scheduled wakenings and extinction reduced night waking compared with a control group in the trial conducted by Rickert and Johnson.[15] Extinction seemed marginally more effective than scheduled wakenings, although it was unacceptable to some parents. Adams and Rickert found that both positive routines and graduated extinction were effective for settling problems.[8] There were no significant differences in outcome between the two treatment groups but both compared favourably with the control group.

Pritchard and Appleton failed to show any effect of adding additional support (in the form of visits) to their modified extinction programme.[22] However, the modified extinction procedure, with or without this support, resulted in large reductions in night waking over the course of the trial. Unfortunately there was no untreated control group with which to compare the results.

Similarly, Seymour et al found no effect of adding telephone support to their trial of a booklet giving specific advice about behavioural techniques.[10] However, the booklet, with or without the telephone support, showed superior outcome compared with the waiting list. In contrast, the study examining a non-directive educational booklet failed to show any benefit over a control procedure.[23]

Three of the trials provided follow up data for either six weeks[8 15] or three months[10] after treatment. All three showed that treatment effects had been maintained, although only two[8 15] were able to compare with a control procedure as the control group in the study by Seymour et al[10] went on to receive the intervention. The effect of positive routines and graduated extinction on settling problems was maintained,[8] with parents continuing the treatments, where necessary, over this time. The effect was similarly maintained by both scheduled wakening and extinction for night waking.[15] There are some methodological concerns with this longer term follow up data as no information was given about numbers dropping out of the study during follow up, and only small numbers took part in the trials. However the data are suggestive of continuing clinically significant treatment effects for these particular behavioural interventions.

Discussion

Overall, drug treatment seemed to be a comparatively effective short term measure for some children, but specific behavioural treatments were more likely to have both short and longer term efficacy.

There seems to be evidence that drugs are effective in the short term treatment of night waking in young children (particularly trimeprazine from 30-90 mg nightly). There is, however, only patchy and contradictory evidence of a long term effect, showing that drugs cannot be viewed as a cure but rather as an effective short term intervention, perhaps particularly for use as a relief for parents before or while embarking on other forms of treatment. The problems of side effects, such as daytime drowsiness, raised by France et al,[19] and parental resistance to giving drugs to their child are also important issues.[24]

In contrast, some non-drug interventions may be effective in both the short term and the longer term. Both a positive routine programme and graduated extinction produced a benefit for settling problems compared with no treatment. Extinction and scheduled waking had a beneficial effect on night waking compared with control groups. Extinction seems to have achieved clinically useful effects more quickly. All these treatments maintained their effectiveness in the longer term (up to six weeks), offering an important advantage when compared with drugs. France et al showed no long term benefit of adding drugs to a behavioural programme such as extinction, but noted less night waking initially when it was used.[19] This may increase the acceptability of extinction to some parents and suggests a role for novel combinations of approaches, not necessarily with a view to increasing efficacy but perhaps addressing issues such as compliance and acceptability to parents.

Specific behavioural advice in a written form,[10] as with conventional delivery guided by a therapist, had a beneficial effect on a night waking group compared with a waiting list control group. A non-directive educational approach with a booklet was ineffective, even though the written material was combined with supportive visits from an (untrained) counsellor. This suggests that the content of any advice, rather than the method of delivery, may be the more important predictor of effectiveness.

Conclusion

Conclusions drawn from our review should be considered tentative as most trials conducted thus far have been small and the methodological quality (particularly of the non-drug trials) generally poor. The possibility of a positive publication bias should be considered. The acceptability to parents and children of the various interventions (which would influence compliance and outcome) is not fully addressed by our study. It can be concluded, however, that a variety of treatment options are available to healthcare professionals when faced with the common problem of childhood sleep problems. Trimeprazine is an effective short term option but longer term and probably greater overall benefit is likely to be achieved by the use of psychological treatments. These, therefore, are the treatments of choice for parents. The lack of a single most effective behavioural programme or method of delivery shows that further research is necessary to evaluate the various treatments (or combination of treatments) for this common and often distressing problem. As no single psychological treatment is clearly more efficacious than the others, choice of treatment needs to be based on the families' preferences and circumstances.

What is already known on this topic

Settling problems and night waking are both common and can be persistent in young children

A range of treatments for these problems exists, which include various drugs (the most frequently used form of treatment for sleep problems) and also non-drug interventions (primarily behavioural)

What this paper adds

Drugs are effective in the short term for some children, but behavioural interventions are more likely to be both effective in the short term and to have continuing benefit in the longer term

Of these behavioural interventions, extinction has a more immediate effect, but over a longer period no single behavioural treatment has yet been identified as being more effective than the others

Choice of treatment should be based on individual families' preferences and circumstances, as these will affect their willingness and ability to adhere to the chosen treatment

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Contributors: PR and VW conceived the idea for the study, which was developed along with LW and GS. LW and PR undertook the literature searches, and PR and VW critically appraised the studies. PR and LW wrote the initial draft of the manuscript, to which all four authors contributed. PR and LW will act as guarantors for the paper.

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Bacteraemia and antibiotic resistance of its pathogens reported in England and Wales between 1990 and 1998: trend analysis

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Abstract

Objectives Determination of causes, trends, and antibiotic resistance in reports of bacterial pathogens isolated from blood in England and Wales from 1990 to 1998.

Design Description of bacterial isolates from blood, judged to be clinically significant by microbiology staff, reported to the Communicable Disease Surveillance Centre.

Setting Microbiology laboratories in England and Wales.

Subjects Patients yielding clinically significant isolates from blood.

Main outcome measures Frequency and Poisson regression analyses for trend of reported causes of bacteraemia and proportions of antibiotic resistant isolates.

Results There was an upward trend in total numbers of reports of bacteraemia. The five most cited organisms accounted for over 60% of reports each year. There was a substantial increase in the proportion of reports of *Staphylococcus aureus* resistant to methicillin, *Streptococcus pneumoniae* resistance to penicillin and erythromycin, and *Enterococcus faecalis* and *Enterococcus faecium* resistance to vancomycin. No increase was seen in resistance of *Escherichia coli* to gentamicin.

Conclusions Reports from laboratories provide valuable information on trends and antibiotic resistance in bacteraemia and show a worrying increase in resistance to important antibiotics.

Introduction

Culture of blood is a fundamental investigation in infection. Illness associated with bacteraemia ranges from self limiting infection to life threatening sepsis that requires rapid and aggressive antimicrobial treatment,[1] which is complicated by increasing antibiotic resistance worldwide.[2–5] Information on trends and antibiotic resistance in bacteraemia is needed to inform prescribing and infection control policy and to guide development of new antibiotics and vaccines.[1 3–7]

Since 1989 blood isolates judged to be clinically significant by microbiologists working in laboratories in England and Wales have been reported to the Public Health Laboratory Service Communicable Disease Surveillance Centre; this moved from paper to electronic transmission with EpiBase[8] then CoSurv.[9] Trends in resistance to key antibiotics have been published for *Staphylococcus aureus*,[10 11] *Streptococcus pneumoniae*,[12] and *Escherichia coli*.[13] Here we present the first overall description of the system and causative organisms with further information on antibiotic resistance.

Methods

Blood isolates reported to the surveillance centre from 1990 to 1998 were entered on a computer database (LabBase).[8] Replicate reports were identified by matching on date of birth, sex, specimen date, organism, antibiotic susceptibility, and source laboratory and merged if the specimen dates were less than eight days apart. This was undertaken manually from 1990 to 1994 and then by computer program.

We identified laboratories in England and Wales that reported blood isolates to the surveillance centre in 1998 from the Directory of the Association of Medical Microbiologists.[14] Annual total bacteraemias and annual counts for each of 34 "categories" of bacteraemia defined by causative organism[15] were analysed by Poisson regression analysis.[16] Categories showing a year on year proportional increase were further analysed within age groups. The causes of bacteraemia between age groups were examined.

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