CRD summary
The authors concluded that evidence indicated that pain management during retinopathy of prematurity examination was inadequate and further research was needed. The unclear quality of the available evidence and the small number of studies for each intervention make the authors’ caution warranted.

Authors' objectives
To evaluate the effectiveness of pain-management interventions during examinations for retinopathy of prematurity (ROP).

Searching
MEDLINE, The Cochrane Library, NLM Gateway, CINAHL, Nursing Consult, Health Source: Nursing/Academic Edition, HealthStar and BIOSIS Previews were searched between January 1985 and November 2008 for English-Language articles. Search terms were reported. Conference and symposia proceedings, abstracts and dissertations were searched. Bibliographies of retrieved articles were handsearched for further articles.

Study selection
Studies that investigated the impact of pain management and comfort measures during retinopathy of prematurity were eligible for inclusion.

 Included studies investigated 24% or 33% oral sucrose compared to sterile water, proparacaine HCL ophthalmic 0.5% drops compared to saline drops, RetCam screening compared to indirect ophthalmoscope or BIO examination, nesting compared to standard care or NIDCAP (Newborn Individualized Developmental Care and Assessment Program) compared to standard care. Participants in most included studies received topical anaesthetic eye drops as a cointervention. Where stated, mean gestational age ranged from 26 weeks to 29.3 weeks. Outcomes reported in the review were heart rate, oxygen saturation (SaO$_2$), blood pressure, respiratory rate, Premature Infant Pain Profile (PIPP), percentage crying time, body movements, salivary cortisol and facial responses.

Retrieved articles were classified: Category 1, experimental or quasi-experimental studies; Category 2, research articles that did not meet Effective Practice and Organisation of Care Group criteria for acceptable experimental study design; and Category 3, reviews, case reports, dissertations and meeting abstracts.

The authors did not state how many reviewers performed the study selection.

Assessment of study quality
The authors did not state that they formally assessed validity, but they extracted information on blinding.

Data extraction
The authors stated neither how data were extracted for the review nor how many reviewers performed the data extraction.

Methods of synthesis
The studies were combined in a narrative synthesis.

Results of the review
Thirteen studies were included for review (n=467). Eleven were category 1 studies (n=439): five randomised controlled trials (RCTs) (n=187); four randomised cross-over trials (n=128); and two prospective non-randomised controlled studies (n=124). Two were category 3 studies; both published in abstract form (n=28). Two RCTs and two cross-over studies were double-blinded. Three RCTs were blinded. Blinding was not reported for the remaining studies.
Oral Sucrose (five studies, n=155): Two studies found significantly lower PIPP scores in the oral sucrose group compared with the placebo group (p=0.01 and p=0.08). Three trials reported no significant differences between groups. All studies used topical anaesthetic eye drops as a co-intervention in both intervention and control groups.

Topical Eye Drops (two studies, n=77): One study reported significantly lower PIPP scores during speculum insertion in the group that received proparacaine HCL ophthalmic solution compared with controls. The other study reported no significant difference between groups.

RetCam Screening (two studies, n=101): RetCam screening significantly increased the examination time compared to indirect opthalmoscope or BIO examination (two studies, 14.5 minutes versus 9 minutes and 7.8 minutes versus 3.9 minutes) and decreased SaO$_2$ (one study, no statistics) compared to baseline.

Nesting (one study, n=28): Nesting was associated with less body movement (p<0.001) and shorter crying time (p<0.01) compared with infants placed on a standard cot (one study, n=28). Heart rate and SaO$_2$ did not differ significantly between groups.

NIDCAP (one study, n=68): NIDCAP was associated with a faster recovery time in cortisol levels (statistical data not reported) compared with a standard care control group. There were no differences between groups in PIPP scores, heart rate, SaO$_2$ or oxygen requirements.

The results from two category 3 abstracts reported that nesting and topical anaesthesia had no significant impact on pain management during retinopathy of prematurity.

Authors’ conclusions
Evidence indicated that pain management during retinopathy of prematurity examination was inadequate at the time of the review. Further research was needed.

CRD commentary
The review addressed a clear question with well-defined inclusion criteria for participants and interventions. Inclusion criteria for study design and outcomes were not stated. The search was restricted to studies in English, which introduced a risk of language bias. Some attempts were made to identify unpublished data, which minimised the risk of publication bias. It was unclear whether appropriate steps were taken in the review process to minimise reviewer error and bias. It appeared that no validity assessment was carried out and so it was not possible to determine the quality of the included studies. A lack of randomisation and double-blinding for some studies undermined the reliability of data. The decision to combine studies in a narrative synthesis was appropriate given the clinical heterogeneity between studies. In light of the unclear quality of the available evidence and the small number of studies for each intervention, the authors' caution is warranted.

Implications of the review for practice and research
Practice: A combination of pain relief strategies should be used. Neonatal intensive care units should have in place clear and standardised protocols for the assessment and management of pain during retinopathy of prematurity and caregiver perceptions of pain should be taken into account.

Research: Further research was needed to investigate pain management techniques during retinopathy of prematurity using standardised protocols and outcome measures sensitive and specific to pain changes in preterm infants. Studies were needed to evaluate pain management techniques specifically with RetCam screening methods. Research was also needed to investigate the impact of mydriatic drops on pain levels and whether pain management should be implemented prior to administering mydriatic drops.

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