

Overview of Reviews

Systematic reviews of bruising in relation to child abuse—what have we learnt: an overview of review updates

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Evidence-Based Child Health: a Cochrane Review Journal is now indexed by MEDLINE (<http://www.ncbi.nlm.nih.gov/pubmed>) and Scopus (<http://www.scopus.com>)

Background: Dogma has long prevailed regarding the ageing of bruises, and whether certain patterns of bruising are suggestive or diagnostic of child abuse.

Objectives: We conducted the first Systematic Reviews addressing these two issues, to determine the scientific basis for current clinical practice. There have been seven updates since 2004.

Methods: An all language literature search was performed across 13 databases, 1951–2004, using >60 key words, supplemented by ‘snowballing’ techniques. Quality standards included a novel confirmation of abuse scale. Updates used expanded key words, and a higher standard for confirmation of abuse.

Results: Of 1495 potential studies, only three met the inclusion criteria for ageing of bruises in 2004, confirming that it is inaccurate to do so with the naked eye. This was roundly rejected when first reported, generating a wave of new studies attempting to determine a scientifically valid method to age bruises, none of which are applicable in children yet. Regarding patterns of bruising that may be suggestive or diagnostic of abuse, we included 23 of 167 studies reviewed in 2004, although only 2 were comparative studies. Included studies noted that unintentional bruises occur predominantly on the front of the body, over bony prominences and their presence is directly correlated to the child’s level of independent mobility. Bruising patterns in abused children, differed in location (most common site being face, neck, ear, head, trunk, buttocks, arms), and tended to be larger. Updates have included a further 14 studies, including bruising in disabled children, defining distinguishing patterns in severely injured abused and non-abused children, and importance of petechiae.

Conclusions: Systematic Reviews of bruising challenged accepted wisdom regarding ageing of bruises, which had no scientific basis; stimulated higher quality research on patterns of bruises distinguishing abusive and non-abusive bruising patterns, and highlighted the benefits of regular updates of these reviews.

Keywords: ageing bruises, bruising, child abuse, review updates

Editors’ Note: Overviews of reviews, compiling evidence from multiple Cochrane reviews into one accessible and usable document, are a regular feature of this journal. Our aim for each overview is to focus on the treatment question. ‘which treatment should I use for this condition?’, and to highlight the Cochrane reviews and their results in doing so. It is our hope that the overview will serve as a ‘friendly front end’ to the Cochrane Library, allowing the reader a quick

overview (and an exhaustive list) of Cochrane reviews relevant to the clinical decision at hand.

Background

Bruising remains the most common manifestation of physical child abuse yet one whose true aetiology is most difficult to determine. With this in mind, the first systematic reviews that the Cardiff Child Protection Systematic Review group undertook (previously named Welsh Child Protection Systematic Review Group, www.core-info.cardiff.ac.uk) were related to bruising. The two questions reviewed were those

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which clinicians urgently wanted answers to, namely: Can you age bruises accurately in children? (1) Are there patterns of bruising in childhood which are either diagnostic or suggestive of abuse? (2) Since their original publication, each of these reviews has been updated at least bi-annually, with a number of interesting developments. In this article, we set out our methods, the revisions made over the past 8 years as these updates have been run and what the newer literature is adding to the original findings.

Methods

The review was conducted in compliance with a recognised methodology for undertaking systematic reviews (3). Prior to commencing the review, potential questions as well as possible terminology, search terms, dates, databases, key authors and key publications relating to the questions were discussed. Following this, a pilot search of relevant databases, MEDLINE, EMBASE and CINAHL was conducted; this generated over 3000 articles. The references were scanned for significance to ensure that all relevant terms were captured and irrelevant search terms excluded from the search strategy. At this stage the questions were refined and the final search strategy was developed in Ovid Medline.

Search

The search strategy was developed using the following keyword sets: child terms; child abuse and non-accidental injuries terms; and bruising terms. The search strategy was adapted to search the rest of the databases also (Appendix 1). An all-language literature search was performed across 13 databases, within the date range of 1951–2004. In addition, textbooks and conference abstracts were searched (Appendix 2).

Over the years, the search strategy was modified according to the improvement of searching capabilities of the databases. With the expansion of biomedical literature, new databases were added to the search, while others were excluded for a variety of reasons, such as not retrieving relevant studies. With further updates, our range of ‘snowballing’ techniques expanded to increase the sensitivity of the search, and included checking the references of reviewed articles, to see if they may be relevant to the review, liaising with experts and key authors, and searching websites and relevant journal sites.

Quality assessment

Although the traditional approach of evidence-based medicine is dominated by the randomized clinical trial as the ‘gold standard’, there are types of research questions that can only be addressed through observational

studies (4, 5). Clearly, in the context of discriminating abusive from non-abusive bruising in children, a randomized clinical trial would be impossible.

Critical appraisal forms were developed using questions which were adapted from validated sources (3, 6–8). Each study was appraised independently by two reviewers, and data was extracted by the lead reviewer. Our review panel consisted of trained reviewers, including child abuse paediatricians, specialist child abuse paediatric nurses and forensic pathologists.

One aspect that is always controversial when critically appraising the literature with regard to child abuse is the risk of circularity, that is, how do we know whether the injuries that are the subject of the review have not in fact been relied upon to conclude that the child was abused? Clearly, in this field, there is no ‘gold standard test’ for the confirmation of abuse, and there are a very small minority of cases where the abuse has been independently witnessed to provide ‘external confirmation’. To address this, and minimize the risk that the authors have based their decision regarding abuse solely on the injury in question, we have developed a ‘rank of abuse’ (Table I). Essentially, the higher ranked studies included either a multidisciplinary assessment of the case, taking into account social and historical factors beyond the presenting injury, or a perpetrator admission or independently witnessed abuse; whereas lower ranked studies used explicit criteria or a clinical confirmation of abuse. For the initial systematic reviews of bruising, we accepted studies where the rank was 1–4, that is, we excluded those studies where abuse had simply been ‘suspected’ owing to the very high risk of circularity. However, from 2008, we raised the cutoff to ranks 1–3 where the lowest ranking studies had used explicit stated criteria to confirm abuse, to bring it in line with our other systematic reviews.

Inclusion criteria

Ageing of bruises

We included studies that assessed the age of bruises clinically in children aged 0–18 years. We excluded post-mortem studies, single case studies, reviews and

Table I. Rank of abuse

Ranking	Criteria used to define abuse
1	Abuse confirmed during case conference, family, civil or criminal court proceedings, admitted by perpetrator, independently witnessed or described by victim
2	Abuse confirmed by stated/referenced criteria including multi-disciplinary assessment
3	Abuse defined by stated criteria
4	Abuse stated but no supporting detail given
5	Suspected abuse

expert opinion pieces, and studies of adults and children where the data relating to children could not be extracted.

Patterns of bruising

We included studies that defined the pattern of bruising found in abused and non-abused children aged 0–18 years. Bites were excluded as they form part of a separate systematic review. We also excluded cases where confirmation of abuse did not meet our required 'rank of confirmation of abuse', or medical conditions with bruising as a manifestation of disease.

Can you age bruises accurately in children?

At the time of the original review, many standard texts cited a precise timetable of colour changes that occur in bruises, by which you could date the injury (9). A particular significance was associated with yellowish appearance, which was deemed to be indicative of a bruise that was at least 18 hours old (10). Having identified 6831 abstracts, following scanning this was reduced to 1495 abstracts, of which 167 underwent two independent reviews. And to the dismay of the clinical and forensic community, the review identified that there were in fact only three primary studies (a qualitative study (11), a cross-sectional study (12) and a case series; 13) which had addressed this issue in children (Langlois and Gresham's study could not be included, as it had included subjects aged 10–100 years, with no separate data on children; 10). The obvious conclusion from this evidence was that one could *not* accurately age bruises in children, with the naked eye, either *in vivo* or from a photograph. When we consider that the appearance of a bruise will vary depending on the force that caused it, the body part affected (e.g. soft tissues, dependent part of body), skin colour, and that we perceive colour differently, in particular as we get older (14), it is not surprising that this is not an exact science.

Although the significance of this review was acknowledged within the scientific literature (15), its conclusions were roundly disputed by clinicians and forensic scientists. This prompted others to conduct primary work to disprove it. A recent study attempting to determine the accuracy of forensic examiners ageing bruises generated in adults showed that only 48% of the age estimates were correct to within 24 hours (16). Over time, there has been a gradual acceptance of the review findings (17).

Since 2004, when the original literature search and systematic review was performed, we have updated our literature search seven times, most recently in July 2012 (Appendix 1). Over that time, we have identified a further 23 studies potentially addressing this question, yet none have met our inclusion criteria. This is not to suggest that there has been no valid scientific

work in the field, on the contrary, there have been assiduous attempts to identify a more scientific method to age bruises. Some authors have explored the use of reflectance spectroscopy (18–20) while others have tried to combine a stochastic photon transport model in multilayer skin tissue combined with reflectance spectroscopy measurements (21). Although promising, to date however, these techniques are not applicable in clinical practice for children. Other techniques explored have included an evaluation of chromophore concentrations to determine age, but this technique was found to be unreliable (22). The most recent work has investigated the use of ultrasound to aid the assessment of bruises in post-mortem cases (23), as it was felt that a limiting feature in the potential application of spectrophotometry techniques may be the degree to which bruises vary depending on their depth and extent, which ultrasound may delineate (24). Thus, in conclusion, for practitioners this review appeared to make a negative contribution to the field of child abuse initially, but it has brought a more evidence-based approach to the assessment of abusive bruises, and importantly has stimulated a wave of scientific studies aiming to address this important clinical question.

Are there patterns of bruising in childhood which are either diagnostic or suggestive of abuse?

This review was originally conducted in 2004, and of the 167 studies undergoing review, 23 met the inclusion criteria (3 case–control, 5 cross-sectional, 15 case series; 2). Here the quality of evidence was better; however, only two studies included comparative data on bruising, one of which explicitly set out to identify distinguishing features between the two populations, abused and non-abused children (25). The other study containing comparative data was primarily aimed at assessing fractures, but noted bruises within this population (26). The primary findings of this original review were related to the described pattern of bruising in non-abused children, highlighting that *bruising* in children is directly correlated to their development, specifically to their degree of *independent mobility*. Those infants that are not independently mobile rarely sustain non-abusive bruises during day to day activities (12, 27, 28). In addition, it was noted that accidental bruises occur predominantly on the front of the body and over bony prominences (12, 27). The typical sites of non-abusive bruises were described consistently in the included studies, namely the knees and shins, head and forehead (27, 29, 30). It was clear that some sites were rarely bruised during day to day activities (2), namely the hands in children younger than 4 years, and back, buttocks, forearm, foot and abdomen (Figure I; 31). These findings were supported by the applied quality standards.

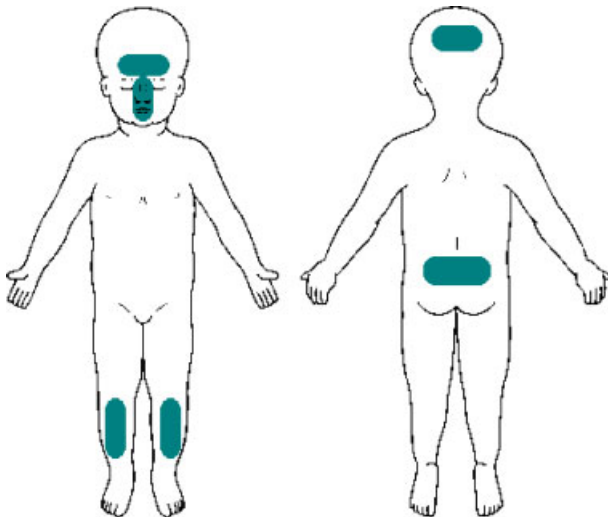


Figure I. Patterns of accidental bruising

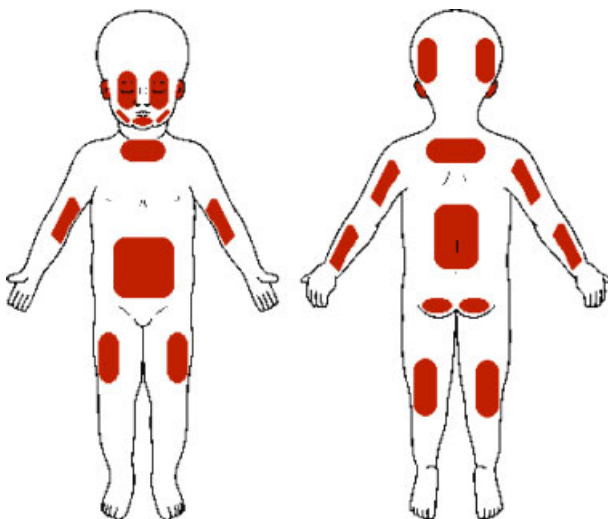


Figure II. Patterns of abusive bruising

The quality of studies relating to abusive bruising was weaker, as 13 of 16 studies included here were highly selective case series, written to describe specific patterns of abusive bruising, for example, vertical cleft bruising where the child had been hit horizontally (32). However, acknowledging the different populations studied, some stark differences were evident between the pattern of bruising found amongst the abused children and the non-abused; specifically, the most common site of bruising in the abused children was the head, including the face. The comparative study (25), which had a high 'ranking of abuse' thus minimizing circularity, highlighted certain sites that were bruised significantly more often amongst the abused children, namely the ear, neck, face, head, trunk, buttocks and arms. The abusive bruises also tended to be *larger* (25) and were frequently found amongst other soft tissue injuries (33, 34) (Figure II; 31).

Another notable feature of the abusive bruises, not commented on amongst the non-abused children, was the presence of *clusters* of bruises (34), some of which were *defensive* (i.e. where the children had wrapped their arms around their flexed legs in an attempt to protect themselves, thus sustaining bruises to the upper arms or outer thigh) (33). Other features of note were directly linked to the implement used to inflict these injuries, for example, bruises interspersed with abrasions where a rope has been used (33, 34).

The gaps in the literature that were highlighted following this review included the need for large case-control studies of bruising patterns amongst abused and non-abused children, specifically encompassing a wide range of developmental stages, representing broad cultural and ethnic diversity, and studies addressing the specific patterns of bruising sustained from known accidental mechanisms. We also highlighted that there was not a single study of bruising patterns in disabled children, which was a significant gap, given their increased vulnerability to abuse.

Since 2005, we have reviewed an additional 23 studies, resulting in 14 new included studies (Table II) (35–48). Of these, there were two case-control studies (41, 45), one cross-sectional study (42) and the remainder case series or studies. To place this in context, the original review spanned 53 years, generating 23 studies, and the last 7 years have provided more than half this number again. More importantly, the quality of these studies has also been higher, with some specifically addressing the gaps identified in existing literature. Overall, the original findings hold true with regard to able-bodied children. Importantly, there have now been two studies conducted to determine the pattern of bruising in *disabled* children (37, 42). These have identified specific features, namely that in common with able-bodied children, the knees were frequently bruised, but contrary to these children, the feet, thighs, hands, arms and abdomen were also bruised. Some of this is attributed to the use of mobility aids. However, just as certain sites were rarely bruised accidentally amongst able-bodied children, specifically the ears, neck, anterior chest and genitalia were rarely bruised amongst the disabled. In stark contrast to the able-bodied, however, the chin and the

Table II. Additional studies identified through updates

Year	Total number of studies reviewed	Number of studies included (patterns of bruising only)
2005	1	1 (38)
2006	1	1 (41)
2007	6	3 (35, 40, 48)
2008	4	3 (43, 44, 47)
2009	4	3 (36, 37, 39)
2010	6	3 (42, 45, 46)
2012	1	0

lower legs were rarely bruised amongst disabled children. Clearly, these specific patterns need to be borne in mind by clinicians assessing possible abuse in disabled children, particularly in those with significant communication disorders. One study which separated the children according to their maximum level of mobility, namely unrestricted walker, restricted walker and wheelchair dependent, showed a clear correlation between increasing independent mobility and increased bruising ($p = 0.001$) (42). It would be beneficial if future studies of disabled and able-bodied children used this stratification by levels of mobility. There are still significant gaps in the literature with regard to disability; for example, there are no studies detailing accidental bruising patterns in visually impaired children, who may exhibit patterns very different from either the able-bodied or the physically disabled, owing to their innate caution in exploring their surroundings.

Addressing the other major gap in the literature identified in the original review is a new study by Mary Clyde Pierce and colleagues, a case-control study of bruising patterns amongst abused and non-abused children younger than 4 years, admitted to a Paediatric Intensive Care Unit with trauma (45). The basis on which cases were classified as abused or non-abused was clearly detailed in this study, as mixed ranks 2 and 3. They devised a clinical rule to distinguish abusive from non-abusive bruises in this population, by creating a regression tree through binary recursive partitioning. They noted that characteristics predictive of abuse were bruising on the torso, ear or neck (TEN) for a child up to 4 years of age and bruising in any region for an infant <4 months of age. They determined that this clinical rule had a sensitivity of 97% and a specificity of 84% for predicting abuse. Future work needs to validate this clinical rule, and determine if it holds true for children presenting with bruising in other settings, that is, those with minor injuries as opposed to major trauma.

Another valuable study conducted since the original review relates to the patterns of injuries found following slips, trips and falls amongst 750 children younger than 12 years (35). The peak age for 'slips and trips' was 1–2 years, and it is noted that the bruises that resulted from these injuries occurred predominantly in a T-shape across the forehead, nose, upper lip, and chin as well as over the occiput. A more detailed breakdown by age bands would have been valuable.

Two of the newly included studies feature 'cautionary tales', each highlighting three young infants in whom bruising was a critical finding, related to child abuse or haemophilia A (one case) (36, 46). Each author wished to draw attention to the *rarity* of accidental bruising in young *infants*, as we had identified in our original review.

The remaining studies highlight new features, which were not addressed prior to the first review. These include an important comparative study by Nayak *et al.* suggesting that the presence of *petechiae*

in a child with bruising may be an indicator of an abusive origin (41).

These authors examined retrospective records pertaining to 190 children referred with suspected abuse and compared these to 263 children attending the emergency department recruited prospectively, all aged 0–17 years. They then 'confirmed' abuse by an independent assessment of the multidisciplinary information available. They also chose to take a conservative approach by combining the 'inconclusive' cases with the 'confirmed abuse' cases. Petechiae were noted in conjunction with bruising in 22% [95% confidence interval (CI) 15.6, 29.8] of the abused children versus 2.3% (95% CI 1.1, 5.0) of the non-abused. It was notable that in 23 of 28 abused children, the petechiae were found on the head and neck. Amongst the seven children with non-abusive injuries, the petechiae were on the limbs and trunk. Overall, they determined that the likelihood ratio of petechiae for abuse was 6.0 (95% CI 2.5, 14.1). However, the likelihood ratio for the absence of petechiae was not significant at 0.9 (95% CI 0.8, 1.0), thus when present in association with bruising, petechiae are a strong indicator of abusive aetiology, but their absence has no value in excluding abuse. This important piece of work needs to be validated in future studies.

Attention was drawn to a specific form of abusive injury; *scalping* which may present with a boggy swelling over the forehead or eyes (47, 48). Here the aponeurosis is effectively torn away, leading to extensive sub-aponeurotic bleeding, with tracking of the blood over the forehead resulting in the visible bruise. It is postulated that the children in question may have been swung by their hair. A further study of this condition reminds readers to actively screen for an underlying skull fracture (44). A similar injury has, however, been noted in Afro-Caribbean children who have their hair braided, and where excessive force has been used in combing the child's hair back (49). Further included studies address issues such as the clearly established fact that an *absence of bruising* does not mean that there is no underlying *fracture* (44). In this large case series, 58% of children with abusive fractures had no bruising, in fact when skull fractures are omitted, only 9% of fractures had nearby bruising. It is well recognized that rib fractures as a consequence of abuse, rarely have associated bruising to the skin, as the fracture occurs predominantly on the inner portion of the rib, thus any bruising present is sub-pleural, and will in fact only be seen on post-mortem examination if the pleura is reflected off the rib. Similarly, a fracture caused by a force applied distal to the site of the fracture may not result in bruising overlying the fracture itself. This has a very specific connotation in child protection, from the level of false reassurance that clinicians may have, whereby the absence of visible bruising discourages them from conducting a skeletal survey in suspected abuse, to ensuring that the courts understand

that a fracture is no less significant when bruising is absent.

Conclusion

Despite bruising being a key indicator of physical abuse, there was very little pertinent literature addressing the most frequently asked clinical questions when the original systematic review was conducted in 2004. That review caused consternation by highlighting that there was no evidence to support the common practice of clinicians estimating the age of a bruise from its appearance, and most specifically its colour. Since that time, there is increasing acceptance of this, and although no further studies have met our inclusion criteria for this question, it is clear that a number of research groups are exploring a variety of scientific methods to address this question, thus potentially overcoming the limitations of subjective assessments by clinicians. With regard to the pattern of bruises in a child that may aid in distinguishing abuse from accidental injury, there was more evidence at the time of the original review (23 included studies); however disappointingly only two were comparative studies, one of which simply noted bruising patterns, although the main aim of the study was to compare fracture patterns. It is reassuring to note, however, that some of the gaps identified in the literature at the time of publication of this systematic review (2005) have been addressed subsequently, specifically the first studies examining accidental bruising patterns in children with disability, and have been published. There have also been further studies reiterating some of the original messages, that is, the clear link between a child's level of independent mobility and increasing levels of accidental bruises. Some important additional features have also been reported, such as the correlation between the presence of petechiae in association with bruising as indicative of abuse.

The subsequent research in this field highlights the need to constantly update systematic reviews, while continuing to apply rigorous standards of inclusion/exclusion criteria (ours actually became more rigorous, as we demanded a higher confirmation of abuse in the more recent updates), as new data may become available which can enhance or alter the findings originally reported. In a field which is as sensitive and contentious as child abuse, it is even more vital that health practitioners, social care workers and those involved in law enforcement are kept updated with the latest research findings, if they are to truly serve the best interests of all children.

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Appendix I. Search strategy

Original search strategy—OVID Medline 1951–October 2004

1. child.mp.
2. child abuse.mp.
3. child protection.mp.
4. 1 or 2 or 3
5. bruise:.mp.
6. contusion.mp.
7. physical abuse.mp.
8. serial abuse.mp.
9. non-accidental injury.mp.
10. non-accidental trauma.mp.
11. (nonaccidental:and injur:).mp.
12. (hematoma or haematoma).mp.
13. physical punishment.mp.
14. or/5–13
15. (battered child or shaken baby or battered baby).mp.
16. (dat: adj3 bruise:).mp.
17. (bruise: adj3 child:).mp.
18. (pattern: adj3 bruise:).mp.
19. (ag: adj3 bruise:).mp.
20. (hemosid: adj3 bruise:).mp.
21. (petechiae adj3 child abuse).mp.
22. (ecchymoses adj3 child abuse:).mp.
23. ((petechiae or ecchymoses) and child abuse:).mp.
24. ((petechiae or ecchymoses) and child protection:).mp.
25. or/15–24
26. 4 and 14
27. 25 or 26

Update search strategy—OVID Medline 2012 (update July 2, 2012)

28. child*.mp.
29. baby.mp.
30. (infant\$ or baby or babies or toddler\$).mp.
31. exp child/
32. 1 or 3 or 4
33. child abuse.mp.
34. child protection.mp.
35. child maltreatment.mp.
36. (battered child or shaken baby or battered baby).mp.
37. or/6–9
38. soft tissue injur\$.mp.

39. physical abuse.mp.
40. physical punishment.mp.
41. serial abuse.mp.
42. non-accidental injur\$.mp.
43. nonaccidental injur\$.mp.
44. non-accidental trauma.mp.
45. nonaccidental trauma.mp.
46. (nonaccidental: and injur:).mp.
47. wound:.mp.
48. "Wounds and Injuries"/
49. *Skin/in [Injuries]
50. "Soft Tissue Injuries"/di [Diagnosis]
51. (or/11–23) and 5
52. 10 or 24
53. exp Contusions/
54. exp Purpura/
55. Bruis*.mp.
56. (hematoma or haematoma).mp.
57. Hematoma/
58. exp Scalp/
59. (contusion or scalping).mp.
60. or/26–31
61. (bruise: adj3 child:).mp.
62. (petechiae adj3 child abuse).mp.
63. (ecchymoses adj3 child abuse:).mp.
64. ((petechiae or ecchymoses) and child abuse:).mp.
65. ((petechiae or ecchymoses) and child maltreatment).mp.
66. ((petechiae or ecchymoses) and child protection).mp.
67. ((petechiae or ecchymoses) and injur\$).mp.
68. ((petechiae or ecchymoses) adj3 injur\$).mp.
69. (hemosid: adj3 bruise:).mp.
70. or/34–40
71. 33 or 43
72. (dat: adj3 bruise:).mp.
73. (pattern: adj3 bruise:).mp.
74. (age: adj3 bruise:).mp.
75. exp Time Factors/
76. exp Color/
77. exp Spectrophotometry/
78. or/45–50
79. 5 and 51 and 33
80. 25 and 44 and 51
81. limit 53 to yr="2010 – 2012"

Appendix 2. Electronic databases searched

Databases—original search	Time period searched
ASSIA (Applied Social Sciences Index and Abstracts)	1987–2004
Caredata	1980–2004
Child Data	1958–2004
CINAHL (Cumulative Index to Nursing and Allied Health Literature)	1982–2004
EMBASE	1980–2012
MEDLINE	1951–2004
Pre-MEDLINE	2004
SIGLE (System for Information on Grey Literature in Europe)	1980–2004
PsycINFO	1987–2004
Trip Plus	1997–2004
Web of Knowledge—ISI Proceedings	1990–2004
Web of Knowledge—ISI Science Citation Index	1981–2004
Web of Knowledge—ISI Social Science Citation Index	1981–2004

Databases update search	Time period searched
ASSIA (Applied Social Sciences Index and Abstracts)	1987–2012
Child Data	1996–2009*
CINAHL (Cumulative Index to Nursing and Allied Health Literature)	1982–2012
Cochrane Central Register of Controlled Trials	1960–2012
EMBASE	1980–2012
HMIC (Health Management Information Consortium)	1979–2012
MEDLINE	1951–2012
MEDLINE In-Process and Other Non-Indexed Citations	1951–2012
Open SIGLE (System for Information on Grey Literature in Europe)	1980–2005†
PsycINFO	1987–2004‡
Scopus	2009–2012
Social Care online (previously Caredata)	1970–2012
Trip Plus	1997–2012
Web of Knowledge—ISI Proceedings	1990–2012
Web of Knowledge—ISI Science Citation Index	1981–2012
Web of Knowledge—ISI Social Science Citation Index	1981–2012

Journals 'hand searched'	
Child Abuse and Neglect	1977–2012
Child Abuse Review	1992–2012

Websites searched	Date accessed
Child Welfare Information Gateway (formerly National Clearinghouse on Child Abuse and Neglect)	July 2012
National Center on Shaken Baby Syndrome (NCSBS)	July 2012

*Institutional access terminated.

†Ceased indexing.

‡No yield so ceased searching.

If you would like to make a comment on the above article, you are invited to submit a letter to the Editor by email (child@ualberta.ca). Selected letters may be edited and published in future issues of the journal.