

Implementing scientific evidence to improve the quality of Child Protection

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Abstract

In contrast to other areas of medical practice, there was a lack of a clear, concise and accessible synthesis of scientific literature to aid the recognition and investigation of suspected child abuse, and no national training program or evidence based guidelines for clinicians. The project's aim was to identify the current scientific evidence for the recognition and investigation of suspected child abuse and neglect and to disseminate and introduce this into clinical practice.

Since 2003 a comprehensive program of Systematic Reviews of all aspects of physical abuse, emotional abuse, and neglect of children, has been developed. Based on NHS Centre for Reviews and Dissemination standards, methodology was devised and reviewers trained. Dissemination was via peer reviewed publications, a series of leaflets highlighting key points in a Question and Answer format, and a website.

To date, 21 systematic reviews have been completed, generating 28 peer reviewed publications, and six leaflets around each theme (eg fractures, bruising). More than 250,000 have been distributed to date. Our website generates more than 10,000 hits monthly. It hosts primary reviews that are updated annually, links to all included studies, publications, and detailed methodology. The reviews have directly informed five national clinical guidelines, and the first evidence based training in Child Maltreatment.

Child abuse is every health practitioner's responsibility, and it is vital that the decisions made are evidence based, as it is expected in all other fields of medicine. Although challenging, this project demonstrates that it is possible to conduct high quality systematic reviews in this field. For the first time a clear concise synthesis of up to date scientific evidence is available to all practitioners in a range of accessible formats. This has underpinned high quality national guidance and training programs. It ensures all professionals have the appropriate knowledge base in this difficult and challenging field.

Problem

By 2002 Child Protection in the UK was in crisis and clinicians were losing confidence in offering opinions in either clinical or legal arenas. One survey of GP registrars showed 76% felt they lacked sufficient expertise for future Child Protection work (1), whilst a later study of paediatric trainees demonstrated that only 38% were willing to get involved with Child Protection cases (2).

The 2003 Laming Report followed the death of Victoria Climbié where health professionals had missed sentinel signs of abuse. The report drew national attention to the issue and highlighted the need for the development of a national training programme to improve the understanding and skills of the child health workforce (3). At the same time, three high profile criminal cases involving the prosecution of mothers for causing the deaths of their babies created public consternation, and clinicians were being vilified in the media for misrepresenting scientific evidence in Court and were becoming regularly reported to the GMC for suspected malpractice (4).

Although few of these cases were upheld, clinicians lost confidence in the field of child protection. The Kennedy Report in 2004 (5) insisted that expert medical opinion presented in Court must be supported scientifically. In 2006 the Chief Medical Officer's report 'Bearing good witness: proposals for reforming the delivery of medical expert evidence in family law cases' (6) recommended that there should be a National Knowledge Service to support expert

witnesses.

At this time, there were no evidence-based standards or clinical guidelines to inform the clinical assessment of suspected child abuse or neglect. Expert medical opinions in Court were provided by a handful of clinicians, relying on their own clinical experience, and personal reviews of the literature. There were no Systematic Reviews relating to the recognition or investigation of suspected abuse or neglect, in contrast to medical practice in other fields.

Background

All medical practitioners encounter Child Protection within their practice, either directly by those with clinical care of children, or indirectly by those whose adult patients may have access to, or responsibility for, children.

On average, one child a week is killed in England and Wales at the hands of another person (7) and those who survive childhood abuse or neglect experience long lasting complications, both physical and psychological. There is increasing evidence that such adverse early childhood experiences contribute to the burden of adult health problems and increased utilisation of adult health services (8). However, while there is clearly an imperative to recognise such children and act to protect them from further abuse or neglect, false accusations cause enormous distress to the family concerned, and the public has expressed their discontent when these suspicions are not substantiated (9).

As such, it is essential that all practitioners are up to date with the current scientific literature informing their recognition of child maltreatment, and have access to clear guidelines as to what action to take in the event that they suspect a child is being abused or neglected (10). In reality, however, many practitioners feel overwhelmed at the prospect of reading all of the emerging scientific articles on the subject, and determining which of these are of sufficient quality to inform their practice.

A search across three bibliographic databases (MEDLINE, Embase and PsycINFO) for the terms 'child abuse', 'child neglect', 'child maltreatment' and 'child sexual abuse' generated 2107 articles published in 2012 alone (searched on 11th April 2013). A clear need for evidence-based training of health professionals, and national guidelines for practitioners across all disciplines has been identified.

Our aim therefore was to identify, critically appraise and synthesise all of the quality published scientific literature relevant to the recognition and investigation of physical abuse and neglect, to disseminate this in an accessible way to all practitioners, and to provide the data which could underpin national guidance, clinical practice, expert evidence in the Courts and national training programs.

Baseline Measurement

In 2002 there were no national guidelines on the recognition of physical abuse or neglect, nor was there any standardised evidence based training for all paediatricians, or other health professionals such as dental practitioners. Training was offered on an ad hoc basis around the country, and only 6% of trainee paediatricians felt inclined to take on a key role in Child Protection (2). The judiciary had identified a lack of agreement between medical experts providing opinions to the courts for child abuse (11). No systematic reviews into the recognition or investigation of suspected physical abuse or neglect had been conducted.

See supplementary file: ds1719.pptx - "Flow Diagram"

Design

To address these deficiencies, with funding from the NSPCC the Welsh Child Protection Systematic Review Group (renamed Cardiff Child Protection Systematic Reviews in 2012) was established. The team consists of a Program Director, Principal Investigator, two researchers, a research administrator and an information specialist, with input from a statistician and a varying team of reviewers drawn from paediatrics, medical and dental subspecialties (eg forensic pathology, radiology, psychology), social care and education, as dictated by the review topic. To date, 21 Systematic Reviews have been completed. These reviews critically appraise the world literature relating to the recognition and investigation of child abuse.

This work enables professionals to apply scientific evidence to assist in distinguishing unintentional from abusive injuries, across ten themes: bites and oral injuries, dental neglect, bruising,

fractures, burns, neurological injuries, retinal injuries, visceral injuries, spinal injuries, emotional abuse, and neglect. A rolling programme of annual updates ensures that the systematic reviews remain contemporaneous.

Each systematic review begins with the formulation of a research question, from which a search strategy is developed to identify relevant peer-reviewed world literature. The initial search strategy is developed across OVID Medline databases using keywords and Medical Subject Headings (MeSH headings) and assessed for accuracy and relevance. The definitive all-language search is conducted across approximately 15 databases, dependent upon review topic. The search sensitivity is supplemented by a range of 'snowballing techniques' including consultation with subject experts and relevant organisations, hand searching selected websites, non-indexed journals and the references of all full-text articles. Abstracts and selected full-text articles are scanned by the Principal Investigator and eligible studies identified for review. For relevant foreign studies, English language versions are sourced from the author where available or appraised by foreign language reviewers or translations outsourced.

Each systematic review involves a national panel of reviewers, comprising paediatricians, child protection specialists, pathologists and is supplemented by specific specialities according to the review. These include neurologists, radiologists, ophthalmologists, dentists, educationalists, social workers, psychologists, and psychiatrists. At the start of each review, reviewers attend customised critical appraisal training and receive ongoing support throughout the review, including online resources and monthly meetings, to discuss progress and results.

Reviews are undertaken using standardized critical appraisal forms, based on criteria defined by the National Health Service's Centre for Reviews and Dissemination Centre for Reviews and Dissemination, (12) and supplemented by systematic review advisory articles (13, 14, 15, 16, 17). Each study undergoes two independent reviews, with disagreement resolved by a third review. If needed, authors are contacted for further detail. Reviews are administered through a purpose built Microsoft Access database, used to co-ordinate and collate critical appraisal data. To date, the database holds more than 40,000 citations.

Central to the review process is the assessment of the security of diagnosis of abuse or neglect. In the absence of a gold standard diagnostic test for child abuse or neglect, it is essential to minimise the risk of circularity, namely that the authors 'diagnose' abuse or neglect simply by the presence of the injury or feature under review. A unique ranking system was established for reviews relating to physical abuse (18) to ensure that the security of diagnosis was not based entirely on the clinical features of interest. These 'rank of abuse' criteria have been adapted for reviews relating to neglect (19), and adopted by other systematic review groups (20).

Example flow diagram of different phases of systematic review (from review relating to dental neglect and following PRISMA guidance (21).

(See supplementary files for an example flowchart)

Strategy

The results of each systematic review are disseminated via peer-reviewed publications, summary Core Info leaflets (<http://www.core-info.cardiff.ac.uk/category/leaflets>), on the project website (www.core-info.cardiff.ac.uk), and national and international presentations (approximately 15 per year). All reviews are submitted to peer review journals of different subspecialties, depending on the review concerned or the primary target audience.

In collaboration with the NSPCC staff, we aimed to produce a themed Core Info leaflet around each review topic, printed in both English and Welsh. These leaflets have been written in a question and answer format and are designed for non paediatric health professionals or non health professionals, including but not limited to: nursery nurses, social workers, refuge workers, and the police. They are available for purchase for a nominal sum, or free to download from the NSPCC website (<http://www.nspcc.org.uk>).

The Core Info website (free to all users) features not only the results of our main reviews, but also those of the annual updates, the specific review methodology and critical appraisal forms used, our publications and Core Info leaflets, and news of any upcoming presentations on the topics reviewed. Citations and hyperlinks to the abstracts of all included studies provide a unique resource for practitioners who are advised to read the source studies when presenting scientific evidence in Family and Criminal Court Child Protection cases. This ensures that the research is promoted to a wide audience, can be accessed by international colleagues, and is easily accessible to improve the quality of clinical practice.

A principal target is to complete each systematic review within 18 months of the initial start date. After completion, the results are uploaded onto the project website as soon as possible. Due to the lengthy peer-review process, each review question is updated immediately prior to publication with a recent literature search and relevant studies reviewed. Market penetration is determined by analysing website usage data using Google Analytics and international surveys, tracking citations of publications using Google Scholar Citations, and monitoring downloads and sales of the leaflets.

Results

The research programme has changed the recognition and investigation of suspected child abuse and neglect from clinical practice based largely on experience (pre-2002) to clinical practice built on scientific evidence. Professionals involved in child protection cases can now base their diagnoses, conclusions and Court evidence on scientifically informed and clinically validated models and practices.

The 21 systematic-reviews (updated annually), and related primary studies have produced 28 peer-reviewed publications, across subspecialty journals such as Eye and Burns, as well as more

broad journals such as the BMJ and Pediatrics. In collaboration with the NSPCC, we have produced six Core Info leaflets (Bruises, Fractures, Neurological injuries, Thermal injuries, Oral injuries and Bites, Emotional Neglect and Emotional Abuse of the Pre-school child) of which more than 250,000 have been sold or downloaded by allied professionals nationally. Through the Core Info website, our systematic reviews are accessed each month with more than 10,000 hits. The program has also informed five national clinical guidelines including the first NICE guideline on child maltreatment and the National Child Protection training program (22,23,24,25,26). Gaps in the evidence base have been identified and stimulated a primary research program that is ongoing within the department.

The systematic reviews have challenged some longstanding views in child protection, and reiterated others. Examples of some of the findings into clinical approaches and practices regarding suspected cases of child abuse and neglect are summarised below:

Ageing of injuries: In 2005 Maguire et al concluded that it is not possible to age bruises in children accurately with the naked eye (27). However in 2012, informed by the paucity of scientific evidence identified by the systematic review of fracture dating (28), a primary study by the group concluded that it is possible to age fractures within broad time frames (29).

Characteristics of abusive bruises: While bruising patterns in non-abused children (rare in non-mobile infants, predominantly on the front of the body, over bony prominences and in a 'T' pattern on the face) were reasonably described in the literature, those in abused children (most commonly on face/ head, multiple or patterned) were only recorded in case series, with few large scale comparative studies (18). This review underpinned the group's successful application for the first MRC-funded large comparative longitudinal study (£1.4 Million, 2007-2012) on bruising in children (abused, non-abused, those with pre-existing coagulation disorders).

Abusive fractures: Rib fractures, in the absence of major trauma or underlying bone disease have a high probability of abuse (positive predictive value (PPV) for abuse 71% (95% CI 42% to 91%). It is clear that the fracture type is of significance for some fractures (eg non-supracondylar fractures of the humerus have strong correlation with abuse whereas for others the child's developmental stage is a key variable, eg femoral fractures where the probability of abuse for non-mobile children is significantly greater than in mobile children) (30).

Abusive head trauma (AHT): This has been the subject of recent controversy in the press, however our systematic reviews into this topic confirmed clinical associations between Intracranial injuries in a child less than three years and associated clinical features such as Retinal Haemorrhages PPV for AHT of 71% (CI 48-86%), Apnoea (PPV 93% (CI 73-98%), Rib fractures (PPV 73% (CI 5-88%). Furthermore, our unique 'individual patient data analysis' of six international studies (31), proposed a model to assist in the estimation of the probability of AHT from combined clinical features.

Retinal haemorrhages (RH) have long been recognised as an important feature of AHT, however, more recently a number of other

conditions have been proposed as causing RH (Cardiopulmonary Resuscitation [CPR], Seizure, immunisations etc). Our systematic review of this topic confirmed the association between bilateral, multilayered, numerous and extensive RH with AHT while noting their rarity in non-abusive head trauma, where, if present, they are more likely to be unilateral, few in number and predominantly in the posterior pole. We identified no valid evidence to support the presence of RH following immunisations or CPR. This review highlighted a lack of internationally recognised reporting standards for haemorrhagic retinopathy in cases of AHT. We have now developed and validated such a tool (32).

The quality of the group's work on bruising has been discussed in a Lancet editorial (33): 'The conclusions are clinically intuitive, but provide a more empiric literature-based review that provides an essential framework for any clinician attempting to determine the cause of bruising.' Furthermore, since its publication in 2005, the Systematic Review on the patterns of bruising in childhood (18) has been cited 123 times (Google Scholar citations, accessed 12th April 2013), and while the original review only identified 23 studies over a 53 year period, there have been a further 14 quality studies published in the seven years since the original review was conducted (34).

Six Core Info leaflets developed jointly by the Cardiff team and the NSPCC (2007-2013) translate key research findings into practice for allied professionals in child protection. The Core Info leaflets are regularly updated to reflect the latest evidence and are widely used for national training (Levels 1-2) and as a quick reference source for health visitors, social services, general practitioners and police.

The work of the Cardiff group informs the work of Child Protection clinicians and academics internationally. For example, the novel ranking system for the security of diagnosis of child abuse has been adopted internationally by Child Protection research groups, and in 2008 the Core Info website was launched, which has proved to be an invaluable resource for professionals worldwide. The website is used by over 1,000 health professionals, social workers, law enforcement, the judiciary and researchers from 40 countries monthly (Google Analytics accessed 21st March 2013). A recent survey of Child Protection paediatricians in the UK and Australia confirms that Core-Info is used by 60% of paediatricians surveyed to inform clinical decisions, provide continuing professional development and education material, inform legal reports, and give scientific validation to expert opinion presented.

Finally, the Systematic Reviews have directly informed five National Child Protection Guidelines and a National compulsory training program. The first NICE evidence-based maltreatment guidance (2008) drew upon eight of the systematic reviews which directly informed the recognition of physical abuse due to bruising, fractures, oral injury and bites, abusive head trauma and haemorrhagic retinopathy (22). The first joint guidelines published by Royal College of Radiology and Royal College of Paediatrics and Child Health in 2008 utilised the evidence base from the fractures reviews; 'Which radiological investigation should be performed to identify fractures in suspected child abuse?'. Skeletal surveys now routinely include oblique views of the ribs for all

children in UK under the age of two years where physical abuse is suspected (23). The second edition of RCPCH Child Protection Companion (2013) has been updated to incorporate the evidence-base from all 21 systematic reviews (24). Following an evidence gap identified in the retinal haemorrhages review (25) the Core-info researchers in conjunction with the lead Paediatric Ophthalmologist in this review, have completed a primary-study which devised and validated standards for retinal examination of children with suspected AHT (32). This systematic review and standardised recording has fed directly into the newly revised national standards for ophthalmological examination in suspected child abuse, which are due to be published shortly. The systematic review of oral injuries in children informed the 2009 guide to safeguarding children in dental practice (26). This publication informs all dental practitioners about their role and responsibility and how to recognise and act upon cases of suspected child abuse or neglect.

The ultimate beneficiaries of this work are the children who are being abused. Through the adoption of national guidelines and the implementation of standardised evidence based practice across the UK, we anticipate that it is now far more likely that abuse will be recognised and appropriately investigated. Improved evidence presented in Court means that abused children are more likely to be protected from future harm and with a sound evidence base for expert witnesses to draw upon there are likely to be fewer miscarriages of justice.

Lessons and Limitations

Systematic reviewing is a lengthy and involved process, and very costly. Aside from the co-ordination of reviews, collation of critical appraisal data and analysis of included studies, the initial identification, screening and sourcing of relevant studies is a logistical challenge in its own right, requiring substantial administrative and IT resources. Proprietary packages exist for co-ordinating and tracking the various stages of a Systematic Review; for example, RevMan (35) can be used for the reviewing and analysis phase, and reference management software, such as Reference Manager or Endnote can be adapted to record the selection and location of relevant studies and even tracking review data. (36) We opted to design a purpose built sophisticated relational database in Microsoft Access which tracks all phases from screening and sourcing to review and dissemination, along with the collation of critical appraisal data. This has enabled the design and ongoing modification of a system adapted precisely to need, but does require a level of in-house expertise and maintenance, which other proprietary packages do not. We initially assumed that we could train sufficient clinicians / practitioners to undertake the reviews for each topic, but over the past five years, with increasing demands on consultants' time, we have found that it is necessary for our 'in house' research administrators to absorb a larger percentage of the primary reviews, to ensure that we can complete the reviews within the allotted time frames.

The biggest issue is that the program relies upon charitable funding, with only one review (Neurological Injuries) receiving any statutory funding, whilst the output from this programme is used by a broad base of statutory agencies.

A further challenge is keeping the results up-to-date. Annual updates of reviews have been integral to the program, ensuring that the results remain relevant and applicable to Child Protection policy and practice; one new study could potentially alter the over-arching recommendations and thus impact upon a child's welfare. However this task becomes progressively more difficult as the number of topics increases. Our original dissemination strategy included scientific presentations, peer reviewed publications and the production of a series of leaflets summarising key findings and aimed at professionals other than paediatricians. However, it became apparent early on that the time taken from submission of a manuscript until publication (average 9-15 months) creates a significant delay in transmitting the results. Thus we created our own website, www.core-info.cf.ac.uk, which hosts all key results and links to the primary studies that are included. It is also an invaluable tool for presenting the findings of updates, since it is unrealistic to disseminate all of these in peer review publications. It also became apparent following the widespread awareness of our work, that professionals were relying on us as a resource to identify studies relating to, although not directly included in, our primary Systematic Review questions. We have been able to address this by adding 'other useful references' to our website pages, expanding themes as people corresponded with us.

With the digital world advancing apace, it will be crucial to continually improve the website's functionality, and offer additional resources via a dedicated member's area and educational resources by podcasts. A mobile Application is also under consideration, along with the development of a social media account to disseminate news and results in a timely fashion.

Conclusion

Child Protection is every health care professional's responsibility, with enormous consequences for the child and family if a mistaken diagnosis is made either way. In the absence of mandatory reporting in the UK, and with prevailing media hostility toward practitioners in this field, there is a demand from all sides for an 'evidence based' practice in this field. Despite the considerable challenges the Cardiff Child Protection Systematic Review team have developed an internationally recognised format for conducting systematic reviews of this difficult area, and have highlighted the current scientific evidence to underpin the recognition and investigation of suspected physical abuse and neglect. Through a multimedia approach, this has been disseminated to professionals and practitioners who come into contact with children, to ensure they have immediate access to an up to date source of published scientific evidence in the field. This has underpinned the first national guidance on the topic across disciplines, raised the clinical standards of the recognition of abuse, and stimulated a higher quality of research in the field.

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Declaration of interests

Nothing to declare.

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