Child abuse, neglect, and non-accidental injury: challenging diagnoses in paediatric emergency and critical care

KL Hon[1] *, MB, BS, MD, **TY Hui**[1,2], MB, BS, **Jennifer Li**[1], MB, ChB, MRCPCH, **YW Tan**[1], MB, BS, MRCPCH, **Karen KY Leung**[1], MB, BS, MRCPCH, **WF Hui**[1], MB, ChB, MRCPCH, **WL Cheung**[1], MB, BS, MRCPCH, **FS Chung**[1], MB, ChB, MRCPCH, **Patrick Ip**[3], MB, BS, MD, **Jason CS Yam**[4], MB, BS, FRCS

[1] *Department of Paediatrics and Adolescent Medicine, Hong Kong Children's Hospital, Hong Kong SAR, China*
[2] *Department of Pathology, Queen Elizabeth Hospital/Hong Kong Children's Hospital, Hong Kong SAR, China*
[3] *Department of Paediatrics and Adolescent Medicine, The University of Hong Kong, Hong Kong SAR, China*
[4] *Department of Ophthalmology and Visual Sciences, The Chinese University of Hong Kong, Hong Kong SAR, China*

* Corresponding author: ehon@hotmail.com

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Child abuse is underdiagnosed and underreported, presenting a substantial challenge to all physicians, especially frontline emergency and critical care physicians who must remain vigilant.[1-4] Alarm bells of suspicion should be raised in any cases involving unexplained collapse of an infant, a history that keeps changing or is incompatible with injury severity, the presence of injuries inconsistent with the child's developmental age, delayed presentation, and inappropriate interactions or levels of concern exhibited by the caregiver towards the child. Suspicion should also be raised in cases that involve physical findings of cerebral haemorrhages, fractures, retinal haemorrhages, bruises, or burns.

In our medical practice, we have managed several cases that encompassed intriguing and recurring issues related to child abuse, neglect, and non-accidental injury (NAI). Here, we highlight relevant diagnostic challenges and propose an approach for managing these cases.

Child abuse and non-accidental injury

Child abuse, or child maltreatment, includes physical, sexual, and/or psychological maltreatment or neglect of a child, typically by a parent or caregiver.[1-4] The two terms are often used interchangeably in the literature. Definitions of child abuse vary among professionals, across social and cultural groups, and over time. A consensus is difficult to establish because of variations in the line between punishment and abuse among parents, professionals, healthcare systems, and legal frameworks.[4-6] Additionally, many terms are used to describe injuries associated with maltreatment of a child, such as abusive head trauma (AHT) and NAI. Retinal haemorrhages and bone fractures are important clues in young children.[7] Although it is common for young children to have many bruises over bony surfaces, suspicion must arise if: (1) bruises are located on the buttocks, trunk, genitals, ears, or backs of the hands; (2) the bruises resemble the shape of an object; or (3) the bruises are bilateral or symmetrical. Retinal haemorrhages are suggestive but not pathognomonic of AHT or NAI.[7,8] They can occur in children with haematological conditions or infections (eg, malaria)[2] and rarely are the presenting conditions for bleeding disorders; in such cases, physicians should have a high index of suspicion and thoroughly investigate possible NAI.[2] The frequency, pattern, site, and severity of retinal bleeding can indicate an underlying cause. For example, retinal haemorrhages due to AHT are often diffuse and involve multiple retinal layers, as demonstrated in Case 1, who is an infant with an unexplained acute life-threatening event cared for by seemingly attentive parents of three children. A computed tomography scan showed subdural haemorrhages. Retinal haemorrhages and a subtle tibial fracture were present, and the domestic helper was suspected to be the perpetrator. On the other hand, retinal haemorrhages due to aplastic anaemia usually are focal and confined to a single retinal layer. In Case 2, a teenager developed severe aplastic anaemia with recurrent retinal haemorrhages. The mother was fearful of conventional Western medicine and relied on alternative therapies including Chinese herbal medicine, naturopathic treatment, supplements, and supportive transfusions during episodes of extremely low haemoglobin levels. In late adolescence, the teenager presented with a deltoid abscess and shock. Medical maltreatment and neglect were identified as issues contributing to the teenager's poor health.

Retinal haemorrhages in bleeding disorders usually involve all retinal layers and may extend into the vitreous. Case 3 clearly illustrates the need to perform a coagulation profile and establish a diagnosis of haemophilia or any bleeding diathesis, ensuring timely bleeding control via clotting factor

infusion and avoiding erroneous accusations that involve innocent parents. In this case, an infant who presented with recurrent seizures and an acute life-threatening event was diagnosed with left frontoparietal subdural haemorrhages. Child abuse was suspected, but the activated partial thromboplastic time was prolonged. The child was subsequently diagnosed with haemophilia B, characterised by low factor IX activity, and not NAI.

A complete workup should also include a skeletal survey (in accordance with national guidelines[9]) with particular attention to posterior rib and metaphyseal fractures, which are the most common injuries in cases of AHT and NAI associated with child abuse. The presence of a femur or tibia fracture in a non-ambulatory child is also highly suggestive of intentional injury and warrants immediate intervention to protect the child.

Brief, resolved, unexplained event

An apparent life-threatening event—renamed and redefined in 2016 as a brief, resolved, unexplained event (BRUE)—is a term describing a group of alarming symptoms that can occur in infants.[10] A BRUE involves the sudden appearance of respiratory symptoms (eg, apnoea), change in colour or muscle tone, and/or altered responsiveness. The caregiver may fear that the child is dead or that the child's life is in jeopardy. Such events typically occur in children aged <1 year, with peak incidence at 10 to 12 weeks. Although some of these events are unexplained (and thus considered BRUEs), others result from numerous possible causes including digestive, neurologic, respiratory, infectious, cardiac, metabolic, or traumatic origins. It is important to perform risk stratification in each case and fully investigate all potential causes. Treatment should be directed at specific causes when they are identified.

Medical maltreatment or neglect

Case 2, involving a teenager who presented with septic shock due to suboptimal management of aplastic anaemia, was considered a case of medical maltreatment or neglect. The patient had been deprived of medical treatment, leading to a prolonged state of poor health.[11,12] This form of 'medical neglect' of a teenager with resultant poor health and life-threatening sepsis was the result of long-term misconceptions regarding Western medicine and complementary and alternative medicine. In some Eastern societies, many patients and parents express scepticism or fear regarding Western medicine.

Additionally, we managed two infants with severe eczema who had been deprived of medical treatment. In Case 4, an infant who developed eczema presented with a generalised rash, cardiac arrest, and septic shock. Kwashiorkor-like protein-energy malnutrition was noted due to misguided dietary practices and extreme alternative therapies, which led to the infant's demise.[3] The infant died of malnutrition and infection despite the use of multivitamins and supplements.[3] Another child in the family was also at risk. The family was monitored by a medical social worker. In Case 5, a critically ill infant was admitted to the paediatric intensive care unit with shock, multiorgan dysfunction, extreme failure to thrive, and developmental delay. The mother, sceptical of topical emollient and steroid usage, indirectly administered herbal medicine to the child via breastfeeding. The child survived; however, the mother remained sceptical of conventional medicine and refused formal referral to a registered Chinese medicine practitioner. Both cases represent medical maltreatment and neglect. Childhood eczema is among the most common conditions in patients who have been deprived of medical treatment. Suicides and homicides have been reported.[13] Physicians must remain aware of contemporary forms of complementary and alternative medicine; such awareness facilitates timely counselling for these challenging patient populations and their families.[14] Complementary medicine is used in combination with conventional medicine, whereas alternative medicine is used as a replacement for conventional medicine; it is especially dangerous in cases of severe sepsis and cancer. In these critical situations, physicians should prioritise treatment for life-threatening medical conditions and discourage the use of alternative medicine. When the patient is stabilised, other management strategies can be considered. Physicians must utilise empathetic, non-judgemental, and jargon-free communication to establish rapport with patients and their families. It is important for physicians to familiarise themselves with the underlying principles of alternative medicine, thus ensuring effective communication and mutual understanding.

Approach to the management of brief, resolved, unexplained events and suspected child abuse

We propose a medical practice flowchart to guide physicians in the diagnosis and care of children and adolescents who present with unexplained BRUE (Fig). For patients who present with BRUE, initial resuscitation and stabilisation are essential. The attending physician must meticulously collect a thorough history focusing on anything that preceded the BRUE, such as feeding details (eg, quantity), environmental setting (eg, car seat, cot, and sofa), duration and severity of symptoms, speed of recovery, general health in the past week, any notable medical history, prematurity status, family history (eg, previous instance of sudden infant

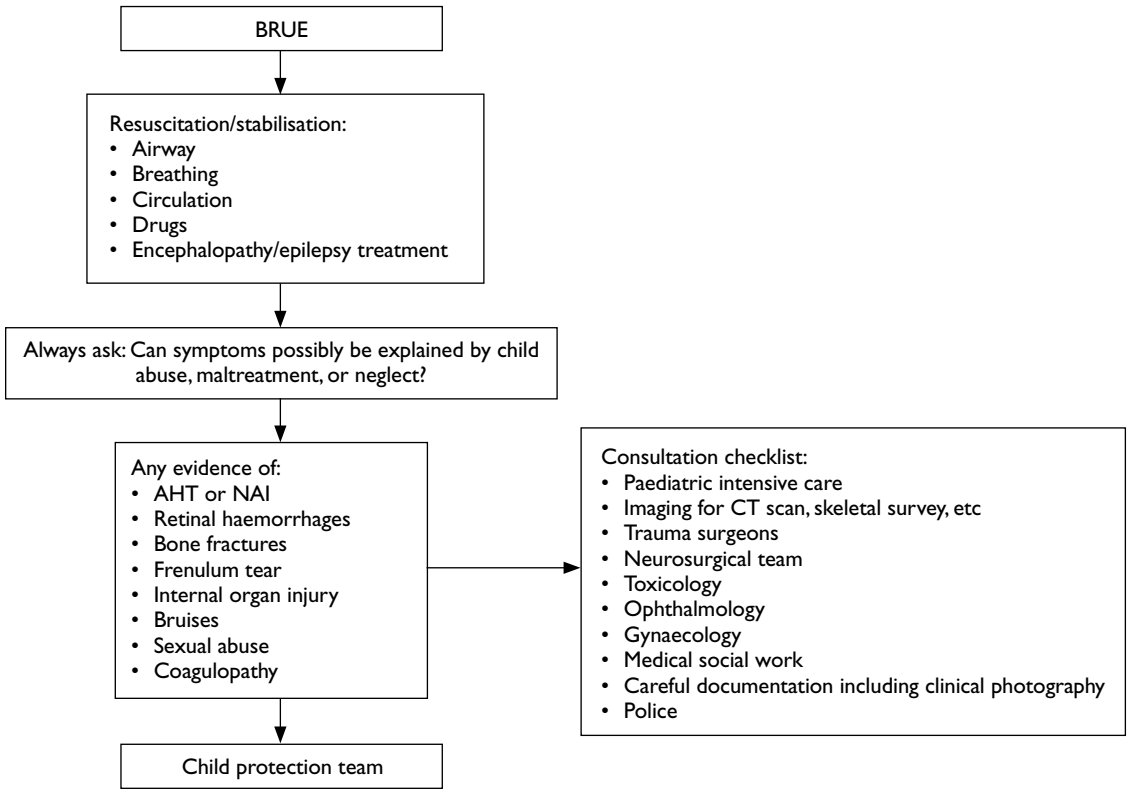

FIG. Medical practice flowchart

Abbreviations: AHT = abusive head trauma; BRUE = brief, resolved, unexplained event; CT = computed tomography; NAI = non-accidental injury

death), and any previous child protection issues. This history collection should be accompanied by a comprehensive head-to-toe examination with observations of vital signs and blood glucose levels. If there is any suspicion that the symptoms could be explained by child abuse, maltreatment, or neglect, it is imperative to search for clinical evidence of AHT or NAI (eg, retinal haemorrhages, bone fractures, frenulum tearing, internal organ injury, bruises, signs of sexual abuse, and coagulopathy). Relevant subspecialty experts should be consulted to ensure optimal care in these often complex cases.

Primary care interventions to prevent child maltreatment are often inconclusive.[15] All physicians, including emergency medicine physicians, have a professional and legal obligation to report any behaviour suggestive of child maltreatment to local authorities and adhere to national protection laws. To appropriately advocate for children and protect them from further physical and emotional trauma, physicians must recognise signs of child maltreatment and sexual abuse.[4,16] Cases of child maltreatment are sometimes missed because of provider bias and corresponding under-evaluation, or because physicians lack experience or an understanding of appropriate evaluation protocols.[6]

Filicides

Occasionally, children do not survive instances of child abuse or NAI. A case of filicide occurred in Hong Kong at the beginning of 2021, during the coronavirus disease 2019 (COVID-19) pandemic. In this unfortunate situation, a businesswoman and her 5-month-old daughter fell from their upscale residential penthouse in an apparent murder-suicide. Initial investigations suggested that postnatal depression was involved.[17,18] During the COVID-19 pandemic in 2020, a 21-year-old individual with learning difficulties was strangled to death by his 46-year-old mother.[18] In the first case of COVID-19–related infanticide-suicide,[17] financial distress and fear of COVID-19 were identified as causative factors.[19] Currently, there are no accurate local statistics regarding filicide in Hong Kong, and limited information is available concerning the physical and psychosocial well-being of the affected children. Despite the recurrent nature of filicide, little is done in Hong Kong to address this issue. There is a mistaken belief that the incidence of maternal filicide is low in Hong Kong,[20] but our observations indicate that this belief is incorrect.[20,21] We have summarised cases from 2017 to 2018 involving filicide and possible risk factors relevant to Hong Kong.[21] These cases

involved children of parents of both sexes; most affected children were aged <12 years. These cases were linked to multidimensional factors; nevertheless, psychosocial risk factors are potential indicators of the need for intervention.[22,23] Psychosocial factors (eg, parental psychiatric morbidity and postpartum depression) and adverse life situations such as marital discord, single parenthood, unwanted pregnancy, or financial strain are issues commonly associated with filicide in Hong Kong.[21-23] Reported methods of filicide have predominantly included jumping from height, burning charcoal, poisoning, dumping the infant's body in a rubbish bin, and—occasionally—stabbing or strangulation. Our observations in recent years suggest that poverty is not the precipitating factor; key contributing factors include psychosocial issues and the ability to jump from high-rise buildings.

Systematic nationwide collection of filicide-related data has provided new insights. Depression might be a prevalent psychological condition among parents or caregivers who commit filicide.[20,22,23] In our densely populated city, mental health services and social support networks remain sparse.[21] During the global COVID-19 pandemic, most countries experienced an increase in child abuse cases. The compounded pressures on parents (eg, financial strain and home schooling), along with greater vulnerability among children (to online abuse, abuse within the home, and heightened risks of criminal and sexual exploitation) and the reduction of standard protective services (such as schools and social supports), created a 'near-perfect storm' that could exacerbate abuse.[24]

In Hong Kong, most people are unaware of the significance and impacts of mental health. Furthermore, concerns about social stigmatisation may hinder efforts to seek help in times of need. Many individuals may choose to cope with emotional disturbances through suppression, distraction, and avoidance. It is recommended that medical professionals work closely with social workers and psychological counsellors to best serve the interests of children and families by adopting a systemic healthcare perspective. Despite professional diligence, recent reports of child abuse within the Children's Residential Home operated by the Hong Kong Society for the Protection of Children have revealed that at least 18 children (aged 2 to 3.5 years) were affected, and four staff members are suspected of involvement.[25]

In Hong Kong, there have been several reported cases of filicide each year. Considering the low birth rates and declining population in the region, we cannot afford to continue losing apparently healthy children to tragic deaths. As paediatricians, we urge our government to establish a registry or task force that explore relevant preventive measures. An official registry could be created to understand local factors and changing patterns related to filicide, and to enable the implementation of preventive measures. A multidimensional and systemic screening tool that assesses filicide risk is urgently needed to better characterise cases requiring prevention efforts. Healthcare providers should be vigilant of the emotional states of parents or caregivers and address their psychosocial needs to prevent future tragedies. Hong Kong needs a strong community nurse system to supervise community child healthcare, psychiatric and mental health services, and the early detection of problems. Despite the accumulation of important statistics, we are already far behind in terms of alertness, and there is no margin for delay.

Author contributions

All authors contributed to the concept or design, acquisition of data, analysis or interpretation of data, drafting of the manuscript, and critical revision of the manuscript for important intellectual content. All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of interest

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Ethics approval

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