ABSTRACT
Bruises in active children are common and often are considered "normal" childhood injuries. However, bruises also may be the result of physical abuse or other conditions. The evaluation of a child with bruising should include a thorough history and physical examination to determine the cause. When abuse is suspected, prompt reporting is necessary to protect the child from further injury. This article provides information intended to assist nurse practitioners and other pediatric health care providers in their decision making when assessing a child with bruises.

KEY WORDS
Bruises, children, child abuse

Bruises are commonly found in active, healthy children. However, bruises can also be a common finding in abused children (Thompson, 2005). Distinguishing between normal and abnormal bruising can be challenging and requires careful assessment by the practitioner. Physical abuse and mimickers of abuse should be included in the differential when evaluating a child with bruises.

In 2006, child protective service agencies in the United States received an estimated 3.3 million referrals concerning the welfare of 6 million children (Child Welfare Information Gateway, 2008). Nearly two thirds of the referrals were accepted for investigation. Approximately 905,000 children were verified victims of abuse in 2006. More than half the referrals alleging abuse and neglect were made by professionals, including health care providers, educators, law enforcement, and social service personnel.

Primary care providers are increasingly relied upon by child protective services to determine whether an injury is the result of abuse (Mudd & Findlay, 2004). Determining the cause of a bruise in a child can be a challenge. A misdiagnosis of child abuse can have serious consequences for a child and family. However, a child who is the victim of unreported abuse is at risk for further abuse and even death (American Academy of Pediatrics [AAP], 2002). Given these serious implications, when performing an assessment on a child who presents with bruises, providers must obtain a careful history and perform a thorough physical examination prior to arriving at conclusions.

THE BRUISING OF SKIN
Bruising of the skin occurs after blunt trauma, which disrupts underlying blood vessels and causes leaking and collection of blood in the dermal layers (Barciak, Plint, Gaboury, & Bennett, 2003; Sibert, 2004). The breakdown of hemoglobin and blood cells results in a sequence of colors including red, purple, black, blue, yellow, green, and brown. Health care providers often are asked to date bruises to aid in the investigation of child abuse; however, it is not an exact science (Schwartz & Ricci, 1996). Langlois and Gresham (1991) studied the visual aging of bruises. The authors analyzed 369 photographs of bruises taken of 89 patients and staff in an emergency department to determine if the age of bruises could be estimated accurately. The age range of the patients and staff was 10 to 100 years. The authors concluded the following: (a) a bruise with any yellow is likely older than 18 hours; (b) the colors red, blue, purple, or black can occur any time from within 1 hour of bruising until resolution; (c) red can be present in a bruise regardless of the age; and (d) bruises of identical age and cause on the same
The evaluation of a child with bruises should begin with a detailed history. The history should include the current problem and the medical history of the child and family, specifically addressing bleeding disorders, psychosocial history, and review of systems (Mayer & Burns, 2000). The parent or guardian accompanying the child should be asked to provide a detailed history of the current problem. The history should begin with the last time the child appeared to be bruise free and should include information about who was present when the child was injured (Hornor, 2005). Next, depending on age and developmental level, the child should be questioned directly about the injury. Direct, open-ended questions should be used (Herendeen, 2002). If possible, this questioning should occur outside of the presence of the parent or caregiver. Red flags that should alert the provider to possible abuse include a history that is inconsistent with the injury, no explanation offered for the injury, history that is inconsistent with the child’s developmental level, and/or injury blamed on another child or sibling.

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**EVALUATION OF THE CHILD WITH BRUISING**

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**DEVELOPMENTAL CONSIDERATIONS**

The age of a child with bruising is an important consideration (Chadwick, 1992). Bruises in very young infants in any location are uncommon. In infants less than 9 months without a known medical condition, bruises are suspicious for abuse (Sugar, Taylor, & Feldman, 1999). The developmental level of young children also must be considered when distinguishing accidental versus non-accidental bruises. As children begin to cruise and walk, bruises are seen more frequently. After 9 months of age, bruises commonly are seen on the bony prominences of the limbs (Carpenter, 1999; Labbe & Caouette, 2001; Sugar et al, 1999). Between 9 months and 4 years of age, the forehead is also a common site of injury in normal children. Sites rarely affected in normal children of any age but common in abused children include the face, head, neck, trunk, and buttocks (Labbe & Caouette; Maguire, Mann, Sibert, & Kemp, 2005).

**CHARACTERISTICS OF ABUSIVE BRUISING**

When evaluating children with bruises, the location, shape, and pattern of the bruising should be noted...
Bruises that are most likely accidental are commonly seen over bony areas such as the knees, elbow, and forehead (Herendeen, 2002). Areas that are uncommon for accidental bruising include the cheeks, neck, genitals, buttocks, and back (Herendeen; Sugar et al., 1999) (Figure 1). Bruises in these areas should be considered suspicious for inflicted injury and may indicate a more serious underlying condition such as fractures, intracranial injury, and intra-abdominal injuries, especially in children younger than 2 years of age (Thompson, 2005).

The pattern and shape of a bruise are also important when distinguishing accidental versus inflicted bruising. Inflicted bruises often are shaped like the object that caused it (Jenny, 2001). The hand commonly is used to injure children and can leave a negative imprint when capillaries break between the fingers as blood is pushed away from the point of impact (Figure 2). Additional objects commonly used to inflict injury on children include belts, cords, shoes, and kitchen utensils (Figures 3 and 4). Generally, patterned injuries do not occur during normal play and should be considered inflicted until proven otherwise.

Bite marks also can be an abusive injury that leaves a patterned bruise. They typically appear as ovoid or elliptical bruises or abrasions that may have central clearing or bruising (AAP, 1999). When evaluating a child with a bruise that may be a bite mark, it is important to determine if the bruise is from a human or animal. If the bite is human in origin, it must be determined whether an adult or a child caused it. Bites from dogs or other animals tend to tear flesh and cause puncture wounds; human bites rarely tear flesh (AAP, 1999). Adult bite marks can be differentiated from
a child’s bite mark by the maxillary canine distance. The normal maxillary canine distance in adults is 2.5 to 4.0 cm. If the intercanine distance is less than 2.5 cm, a child probably caused the bite. If the intercanine distance is greater than 3.0 cm, the bite probably was caused by an adult.

CONDITIONS MISTAKEN FOR ABUSE
Mongolian spots are congenital lesions that often are mistaken for bruises and reported as abuse (Bays, 2001). They appear as blue-gray areas of pigmentation and commonly are found on the sacral area and the buttocks (Figure 5). However, mongolian spots also have been seen on the back, legs, shoulders, upper arms, and scalp. Mongolian spots are predominately found in African American, Asian, Latino, and American Indian infants and tend to fade during childhood (Bays). Mongolian spots can be distinguished from bruises in that they do not fade or change color as bruises do. In uncertain cases, re-evaluating the child in 1 week can assist in distinguishing a mongolian spot from a bruise.

Another skin lesion that may be mistaken for bruising is a capillary hemangioma. Hemangiomas are benign vascular malformations that occur in about 10% of infants (Tanner, Dechert, & Frieden, 1998). They usually develop during the first few weeks of life, with dramatic growth during the first few months followed by slower growth and involution. Hemangiomas typically have an erythematous or bruised appearance and commonly occur on the face, but also may be seen elsewhere on the body (Figure 6). These lesions can be distinguished from bruises in that they blanch with pressure and exhibit a classic pattern of growth and involution.

Erythema multiforme minor is an acute reactive erythema thought to be caused by a reaction to drugs or infections (Mudd & Findlay, 2004). The sudden appearance of ecchymotic lesions can be mistaken for bruises. A complete medical history including recent medications and illnesses can aid the provider in distinguishing this disorder from abuse. Henoch-Schönlein purpura (HSP) can also be mistaken for non-accidental bruising, especially early in the disease. HSP is a fairly common pediatric disease that typically presents as symmetrical bruises on the buttocks and extensor surfaces of the arms and legs (Daly & Siegel, 1998; Mudd & Findlay). HSP should be suspected in a child with a history of a recent upper respiratory infection.

Children with conditions such as idiopathic thrombocytopenic purpura and leukemia may present with unexplained bruises in different stages of healing that can be mistaken for abuse (Bays, 2001). The parents may give a history that the child bruises easily. A complete blood cell count with differential, prothrombin time, activated partial prothrombin time, and bleeding time should be done to distinguish these disorders from abusive bruising. It is important to remember that the diagnosis of a bleeding disorder does not exclude non-accidental injury, and children with bleeding disorders are at increased risk for bleeding and bruises due to trauma (Thomas, 2004).

CULTURAL PRACTICES
Some cultural practices used to treat illness produce petechiae and purpura that can mimic abuse. Coining or Cao gio is a form of dermabrasion commonly used in Southeast Asian cultures to rid the body of “bad winds” by bringing bad blood to the surface (Davis, 2000). The process of Cao gio involves applying ointment to the skin and using a coin or spoon to firmly rub the skin until petechiae or purpura appear. The result is a distinct, symmetrical pattern of bruises typically on the back, shoulders, chest, temples, and forehead that resolve without residual effects (Figure 7).

Cupping is another cultural practice used to treat illness. Cupping has been practiced by Russian, Asian, and Mexican cultures (Bays, 2001). A heated cup is applied to the skin, which creates suction on the skin, causing bruises that have been mistaken for abuse.
Providers’ knowledge of cultural practices along with a consistent history can aid in the diagnosis and avoid accusations of child abuse.

LEGAL ISSUES
Laws exist in all 50 states regarding reporting suspected child abuse. Nurse practitioners and other health care providers are mandated by law to report suspected abuse; however, the provider is not required to prove that the abuse occurred prior to reporting. Health care providers report most but not all cases of child abuse (Flaherty, Sege, Binns, Mattson, & Christoffel, 2000). Flaherty & Sege (2005) cite several barriers to recognizing and reporting abuse, including lack of knowledge, psychological barriers, family racial and socioeconomic factors, and prior experience with child protective services. Education regarding the identification, management, and outcomes of child maltreatment can help overcome these barriers and increase medical providers’ reporting of child abuse. Providers should be aware of local reporting laws and child protective service contacts, and all suspected abuse should be reported immediately. A summary of specific state laws is available at www.childwelfare.gov/systemwide/laws_policies/statutes/manda.cfm (U.S. Department of Health and Human Services, 2008).

Health care providers may be required to testify in court regarding their involvement in a case of suspected child abuse, which often causes a great deal of stress and concern. Thoroughly reviewing the medical record and meeting with the requesting attorney in advance can help to minimize this stress. The role of the provider is to testify to the facts of the case based on his or her knowledge, experience, and expertise in pediatrics and/or child abuse (Kellogg & American Academy of Pediatrics [AAP], 2007).

CONCLUSION
Determining the cause of a bruise in a child can be a challenge for health care providers. It is very important for providers to be able to distinguish accidental versus abusive injury to provide for the safety of a child and prevent further injury. A complete history and physical can aid in the diagnosis. In all cases, but especially in cases of suspected abuse, documentation must be objective and complete. Finally, health care providers are mandated to report abuse. Suspected abuse should be reported immediately to local child protective service agencies. Prompt recognition and reporting of abuse is important for the child’s safety and well-being.

REFERENCES

COMMUNICATING WITH THE FAMILY
When performing an assessment to determine the cause of a bruise, it is important to be sensitive to the needs of the child and family. The family should be approached in an objective, non-judgmental manner regardless of the cause of the injury. Additionally, the extent and purpose of the examination should be explained. If abuse is suspected, caregivers should be informed and told that information obtained will be reported to child protective services. This information often provokes strong feelings in the family and child. Providing information regarding mandated state child abuse reporting laws may help caregivers understand why reporting is necessary. Health care providers should be knowledgeable about local child protective services agencies and their role in cases of suspected child abuse, and this information should be explained to the family in detail. If abuse is not suspected, the family should be informed of possible causes of the bruising based on the history, physical examination, and any additional medical work-up.


