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Safety Considerations in Immobilizing Pediatric Clients for Radiographic Procedures

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A B S T R A C T

Infants and children require special attention when receiving care in the radiology department. Manual restraint techniques and commercial immobilizer devices may be used to keep the pediatric client motionless during the radiograph. Decreasing client motion helps improve image quality, thus decreasing the need for repeat x-rays. Minimizing the radiation dose is particularly important for the pediatric client. This article presents safe and effective care measures and management for pediatric immobilization techniques in the radiology department.

Radiographic imaging of infants and young children requires the special attention of nurses and personnel in the radiology department. With exception of children's hospitals, most radiology department personnel are not specialists in pediatric imaging or pediatric nursing. There is need for practical education for those engaged in pediatric radiography (Morrison et al., 2011). Anxiety, fear, and distress are common responses to imaging procedures in the pediatric population. In the radiology department, the child undergoing radiographic examination is exposed to unfamiliar people, technical equipment, noises, and sometimes darkened rooms. They may be separated from their parent or a loved object, such as a special blanket or toy. Efforts to restrain them to prevent movement during the x-ray can be perceived as very frightening and cause discomfort. These stressors can result in the common pediatric responses and expressions of fear, anxiety, pain, and protest (Bjorkman, Golsater, & Enskar, 2014). It is important to elicit the cooperation of the child, if the child is developmentally capable of cooperating with the examination. Providing support during the examination can aid the child's ability to cooperate and hold still. Nurses should approach children with a positive attitude and give positive, specific instruction, such as “Keep your leg still” rather than “Do not move.” After the radiograph, the child should be reassured and praised that they did well and allowed to reunite with the parent as soon as possible, so the parent can comfort the child (Wilson & Hockenberry, 2012).

For infants and children who cannot cooperate, follow direction, or control their body motion during a procedure, immobilization and/or sedation techniques may be used to facilitate the examination. Judicious use of these techniques is important; decreased radiation exposure can be achieved by decreasing the need for repeat x-rays due to poor image quality resultant from the child's motion during the examination.

The pediatric client is at risk for injury

Infants and young children are at risk for injury from adverse effects of radiation. Rapid growth of infants and young children causes their cells and tissues to be more sensitive to damage from radiation. They are smaller and thinner than adults, so not as much radiation is required for imaging. Radiology personnel should take care to reduce exposure and use the minimum radiation doses possible to protect the pediatric client. This includes obtaining radiographs using less exposure time, precise collimation, and protection/shielding of reproductive organs during radiation exposure (Bushong, 2013; Carver, Franceschi, & Thies, 2016; Carlton & Adler, 2013).

Parental presence

Parents should be encouraged to stay with their infant or young child if possible during radiographic examination. Most parents have a desire to stay with their child during procedures. The presence of the familiar and loving parent is comforting to a child and can lessen anxiety and protest. If the radiology department does not permit parents to stay with their child during a radiology procedure, then consideration should be given to developing such policy to allow parents to be continuously present with their child. The parent can be given a lead apron and allowed to assist in gently

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restraining the child, while avoiding direct radiation beam. Often the father of the child, if present, is asked to assist with positioning and manual restraint. This is to avoid potential and unnecessary radiation exposure of the mother who might be pregnant. In cases where a parent/guardian cannot assist, or chooses not to assist, with gentle manual restraint during a radiology procedure, there are still opportunities for them to be present and helpful. The parent can be positioned near the child's head so that the child can see their familiar parent's face. The parent is able to verbally reassure and comfort the child during the procedure. It can be a positive experience for the parent, also, to remain with their child. Parents who witness their child's procedure know exactly what the child has experienced; their fears of relinquishing the child to unknown caregivers and imagining the worst can be allayed (Carver et al., 2016). Older children and adolescents may be given a choice of whether they wish to be accompanied by a family member for their radiology procedure.

Immobilization to achieve the best image on the first attempt

Because a client's uncontrolled body motion presents a great problem with imaging and causes blurring of the radiograph, skillful use of immobilization techniques and devices is commonly used with pediatric clients in the radiology department. Recording the image correctly on the first attempt prevents need for repeated x-rays and keeps radiation dose to a minimum. There are several commercially available immobilization devices used to help minimize motion in the pediatric client. These include the Pigg-O-Stat body immobilizer and Pigg-O-Stat foot immobilizer (piggostat.com, 2016; Modern Way Immobilizers, Clifton, TN; Figure 1), Velcro compression bands, and papoose boards.

When the parent is present, an explanation of the immobilization device should be provided to the parent before the x-ray examination. It should be explained that the device will not harm the child and is not painful. The benefit of the device should be communicated to the parent, so they will understand the goal of eliminating the child's movement to capture the best image and prevent the need for repeated x-rays and additional radiation exposure.

Figure 1. Image of Pigg-O-Stat. www.cmxmedicalimaging.com

Figure 2. Image of young child in Pigg-O-Stat. www.inquisitor.com

The Pigg-O-Stat immobilizer is useful for infants and young children undergoing brief x-ray examination (piggostat.com, 2016; Modern Way Immobilizers, Clifton, TN; Figure 2). It can help control motion of the head, arms, and trunk of the child. With the use of the Pigg-O-Stat immobilizer, the child should be undressed but may keep their diaper on. The immobilizer is useful to restrain the child during abdominal, chest, and back x-rays. The client sits on the immobilizer seat with their buttocks and is assisted to hold their arms in a vertical position above and on each side of their head, touching the arms to the ears, and firmly immobilizing their head between their two arms. Then two adjustable plexiglass supports are placed snugly around the child's body to support the chest and abdomen, and leather straps are fasted in place. The child's mouth is kept at the level of the opening in front of the body supports (piggostat.com, 2016; Modern Way Immobilizers, Clifton, TN). The child's head position and airway patency are important considerations when using this restraint. The child in immobilization should never be left unattended and requires constant monitoring. The Pigg-O-Stat foot immobilizer is used similarly in infants and children to immobilize the foot and ankle for radiologic examinations of short duration (piggostat.com, 2016; Modern Way Immobilizers, Clifton, TN; Carver et al., 2016).

The papoose board and Velcro compression band may also be used to temporarily immobilize or restrain infants and young children for radiographic examinations. Each can be used alone or in combination to achieve immobilization for brief radiology procedures in young children and infants. The papoose board or compression band is snugly wrapped around the infant or child's body and secured to decrease movement of arms, legs, and trunk (Figure 3). Linens, such as bedsheets and pillowcases, are sometimes used in the radiology department to wrap around arms or legs to decrease movement. Sometimes, medical grade adhesive tape is used to secure the wraps in place or prevent the child's movement for a short time. Tape can be placed on body parts to prevent movement temporarily, but care should be taken to prevent injury to the skin when tape is removed. Medical grade adhesive tape can be stretched across the x-ray table and the child to secure the body part and help them to hold still temporarily (Bushong, 2013; Carver et al., 2016).

Infants can be soothed with pacifiers, and young children can be engaged with distraction by use of toys or objects that provide familiarity and comfort, such as a security blanket. Personnel working with these families should take care to approach the child and family in a calm and confident manner, with expectation of success. The client and the parents should be provided with pertinent information about the procedure and kept informed about the progress of the x-ray examination. For example, the nurse could state that the child did a “great job