



Safety Considerations in Immobilizing Pediatric Clients for Radiographic Procedures



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A B S T R A C T

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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.

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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 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 fastened 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



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



Figure 3. Images of papoose board use. www.quickmedical.com

holding still” with that view, and there is “only one more x-ray” that needs to be obtained before the child’s restraint will be removed, and the child placed back into the parent’s arms.

Radiology nurses need to make sure that they are making careful and judicious use of restraint and immobilization techniques in their nursing practice. Both the Joint Commission (TJC) and Centers for Medicare & Medicaid Services have guidelines for use of restraint in health care settings (Box 1). Most radiology procedures are completely quickly enough that immobilization is required for only a few minutes. Longer examinations may require client sedation. Nurses must align their day-to-day activities working in the radiology department with these current practice guidelines.

Pediatric client safety

It should be emphasized that manual and/or mechanical restraints should only be used when absolutely necessary when the infant or young child cannot cooperate with verbal direction to stay

motionless during an x-ray examination. Restraint should be used only for a very short time, such as 5- to 10-min duration. Examinations that require a long time to complete, such as computerized tomography scans and magnetic resonance imaging studies, often require the use of sedating drugs for infants and children who cannot avoid movement for these longer time frames necessary for diagnostic imaging. Both the American Academy of Pediatrics (AAP) and the Society of Anesthesiologists (ASA) have published practice guidelines for nurses administering conscious sedation and monitoring the client who has received sedation medication (Box 2). Health care agency’s policies and procedures should be regularly reviewed to assure personnel that the policies are congruent with the current practice recommendations. The pediatric client’s vital signs, respirations, oxygen saturation, and level of consciousness must be monitored carefully when sedation is used. Emergency drugs, oxygen, suction, airway management, and resuscitation equipment must be readily available in case of respiratory depression or distress (American Academy of Pediatrics, 2006; Society of Anesthesiologists, 2002).

Box 1

Organizations that provide guidance to health care workers on use of restraints/client immobilization in the health care setting

- The Joint Commission (2016)
www.jointcommission.org
- Department of Health and Human Services, Centers for Medicare & Medicaid Services (2016)
www.cms.gov

Box 2

Guidelines for nurses administering/monitoring pediatric clients receiving conscious sedation

- American Academy of Pediatrics (2006)
www.aap.org
- American Society of Anesthesiologists (2016)
www.asahq.org

Client safety is paramount for an infant or child in restraints, and the least restrictive method should be used. For example, if the foot or ankle area needs to be immobilized, it would be prudent to use only a foot immobilizer and not restrain the entire body to examine the foot or ankle area (Wilson & Hockenberry, 2012).

When there is need for use of a restraint device, the parents and child should be given a thorough explanation. The nurse should explain that the device will be used to keep the child motionless which is necessary to obtain the radiograph. Although it is expected that an infant or young child in restraint will cry and protest, it should be emphasized that the restraint will not harm the child and is not painful. Crying and deep breathing are sometimes beneficial for chest x-ray images exposure (Bushong, 2013; Carver et al., 2016). 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 should also be explained to the parent.

Care should be taken to ensure that the airway remains open and patent during restraint. Health care providers should assess that the child's condition is stable by obtaining vital signs and assessments before restraint application. During restraint, continuous and vigilant monitoring of color, level of consciousness, and respiration is required, and the child must never be left alone or unattended, even for a moment. Respiratory excursion should be observed. The head should be kept elevated at least 30° unless contraindicated to prevent aspiration. Restraints should be removed as soon as possible to allow therapeutic hugging, reassurance, and comforting of the child. After restraint removal, the skin areas that may have been compressed by the restraint device should be carefully inspected. Use of any immobilizing device can result in a mechanical injury to the skin. Skin injuries can be caused by pressure, friction, and shearing forces, as well as epidermal stripping, as in pulling tape off the skin. Any areas of skin redness or loss of skin integrity should be carefully documented (Wilson & Hockenberry, 2012).

Conclusion

Diagnostic imaging can be an integral part of health care for the pediatric client. Working together, the radiology department personnel can provide precise radiograph images with careful attention to minimizing radiation dose to the pediatric client. Radiology nurses can help to make the experience of visiting the radiology department less stressful and less frightening for the child and family. The nurse can promote parent–child togetherness, provide education and support, and provide necessary care in the safest and least restrictive way possible.

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