Strategies to Improve Pediatric Patient Experiences in Diagnostic Imaging

Introduction

Improving the pediatric patient experience in diagnostic imaging (DI) will improve the patient's health outcome and the quality of the images produced. Medical radiation technologists (MRT) must provide quality care and help patients develop a healthy relationship with medical procedures as they age. DI procedures can be distressing and painful for patients. Patient and family-centred care is a priority for MRTs. MRTs can use non-invasive and pharmacological strategies to improve patient experience.

Patient & Family-Centred Care

Patient and family-centred care is an essential part of the MRT professions ^[1]. Creating a welcoming environment, using effective communication, and involving certified child-life specialists (CCLS), as well as guardians, allows procedures to be completed with ease while providing quality care ^[2].



Figure 1: Decorated CT gantry ^[3] **Environment Preparation**^[2]

- Welcoming environment
- Illustrations make clinical settings inviting and provide visual distraction
- Adequate space to accommodate families

Communication^[2]

- The use of developmentally appropriate language and proper terminology
- Acquiring language interpreters

Role of CCLS^[5]

- Develop specific plans for children and families to support them through medical procedures
- Establish effective coping strategies related to patient behaviour and interests
- Reconstruct past medical experiences

Caregiver Involvement

- Preparation for guardians and children ^[4]
- Reduces stress ^[6]
- Develops confidence ^[5]
- Improves compliance^[2]



Figure 2: Pediatric mobile x-ray unit ^[4]



Figure 4: CCLS^[8]



Figure 5: Guardian Involvement ^[9]

Non-Invasive Strategies

Motion artifacts are a concern for pediatric imaging. Immobilization improves image quality but may be distressing. Patient and guardian stress levels can be managed with non-invasive strategies.



Figure 6: Axial CT brain with severe motion artifacts ^[10]



Figure 7: CT 3D reconstruction of skull with motion ^[10]

Patient & Family Preparation

Providing the patient and family with information on the procedure greatly improves the patient experience, which leads to better short-term and long-term outcomes. Evidence shows that preparation reduces procedural anxiety and increases satisfaction of care ^[11].

- **Technology** virtual reality (VR) headsets, simulation videos, educational application^[11, 12]
- **Books** colouring book, photo-diary/booklet, storybook
- **Facilitated play** mock scanners (toy or full-sized) ^[11] & gamified practice procedure ^[2]
- Feed & Swaddle infants are fed and allowed to sleep prior to imaging ^[13]
- Visit the DI department ^[11]





Figure 8: VR set ^[14]

A social script is a step-by-step narrative with photos to outline expected behaviours for children. This strategy is particularly useful for working with patients with Autism Spectrum Disorder and other patients who have difficulty reading facial expressions. This tool promotes self-regulation for neurodivergent children during DI procedures ^[12].

Figure 9: Toy MRI set ^[15]



Figure 10: Social Script ^[16]





Figure 11: Colour light show device projects Figure 12: MRI goggles & colourful lights onto a CT gantry ^[20]



Distraction

Distractions serve as a valuable tool for pediatric patients in DI, especially for longer scans such as MRI, CT, and nuclear medicine.

- **Audio** preferred music^[17] & music therapy^[18]
- The use of headphones can also help protect ears from loud noises during MR imaging ^[2]
- **Visual** colour light show devices ^[2]

Combined A/V systems – allows patients to watch movies during the exam ^[19]



headphone system ^[21]

Hypnosis used for voiding cystourethrography was shown to promote relaxation and reduce the length of exam. It can also alter the perception of pain ^[22].

Incentives

Incentives such as stickers are commonly used in the clinical environment for pediatric patients to increase cooperation. This strategy is particularly effective for younger children because the areas of the brain that are responsible for reward-driven behaviour develops earlier than those that are responsible for logical behaviour ^[2].

Figure 13: Stickers ^[23]



Figure 14: Teddy bear ^[24]

Pharmacological Strategies

The use of sedation and anaesthetic are effective strategies to reduce motion during radiology procedures. This helps to achieve diagnostic images and prevent repeat scans ^[25]. Administration of analgesia can be intimidating for patients and families and should only be used when necessary ^[19, 26]. Each patient must be assessed for the use of pharmacological interventions. Parents and caretakers are ideal references to know if a patient will require sedation ^[2].



To reduce patient stress levels in DI, patient and family-centred care as well as non-invasive and pharmacological strategies should be implemented. Involving patients and families throughout their care provides comfort within clinical settings. The use of non-invasive strategies is preferred to pharmacological methods as it poses less risk to the patient. Non-invasive techniques can also be used alongside pharmacological strategies to improve patient experience. Consideration of these strategies can guide MRT practice to provide the best quality of care to pediatric patients and families while producing diagnostic images.



Administration of Anaesthetic

To improve patient experiences during administration of anaesthetic, the following information should be considered:

Inhalation

• Masks and cannulas are less distressing for patients ^[27].

Intravenous (IV)

• Administration by highly qualified personnel improves cooperation ^[25]

• Local anaesthetic gels reduce pain and fear ^[2]

Figure 15: Inhalation mask ^[28]



Figure 16: Pediatric IV^[29]

Conclusion

References

[2] Oztek, M. A., Noda, S., Beauchemin, E. A., & Otto, R. K. (2020). Non-invasive approaches to improve patient comfort and cooperation for pediatric maging. Topics in Magnetic Resonance Imaging. 29(4), 187-195. 3] Niklaus Children's Hospital. (n.d.). *Children's radiology.*

[4] Siemens Healthineers. (n.d.) *Radiography for Pediatrics*. [5] McGee, K. (2003). The role of a child life specialist in a pediatric radiology department. *Pediatric Radiology, 33*, 467-474.

6] Alexander, M. (2012). Managing patient stress in pediatric radiology. *Radiologic Technology,* 83(6), 549-560. Translation free icon. Flatico

[1] CAMRT. (2015). Patient and family-centred care in practice.

8] Child Life Council. (n.d.). Medical/therapeutic play. Pinterest. 占] Diekema, D. S. (n.d.) Parental decision making. UW Medicine Department of Bioethics and Humanities

[10] Cuete, D. (n.d.). CT brain with severe motion artifact. Radiopaedia.

[11] Bray, L., Booth, L., Gray, V., Maden, M., Thompson, J., & Saron, H. (2022). Interventions and methods to prepare, educate or familiarise children and young people for radiological procedures:a scoping review. Insights into Imaging, 13(146), [12] Johnson, N., Bree, O., Lalley, E. E., Rettler, K., Grande, P., Gani, M. O., & Ahamed, S. (2014). Effect of a social script iPad application for children with autism going to imaging. Journal of Pediatric Nursing, 29(6), 651-659. [13] Templeton, L. B., Norton, M. J., Goenaga-Diaz, E. J., McLaughlin, D. H., Zapadka, M. E., & Templeton, T. W. (2019). Experience with a "Feed and Swaddle" program in infants up to six months of age. *Acta Anaesthesiologica Scandinavica, 64*(1), 63-68. [14] Amelia Virtual Care. (n.d.). *Virtual reality distracts kids from pain*.

[15] Treasure Island Toys. (n.d.). *Playmobil city life hospital radiologist*. [16] Pathfinders for Autism. (n.d.). Sample social story - going to the hospital. [17] Barry, P., O'Callaghan, C., Wheeler, G., & Grocke, D. (2010). Music therapy CD creation for initial pediatric radiation therapy: A mixed methods

analysis. Journal of Music Therapy, 47(3), 233-263. [18] Hewis, J. (2018). Music and music therapy in the medical radiation sciences. Journal of Medical Imaging and Radiation Sciences, 49(4), 360-364.

[19] Hallowell, L. M., Stewart, S. E., Amorim e Silva, C. T., Ditchfield, M. R. (2007). Reviewing the process of preparing children. Pediatric Radiology, 38, [20] Nicklaus Children's Hospital. (n.d.). CT scan (computed tomography). [21] Northern Nevada Business Weekly. (2017). Renown Health brings CinemaVision goggles to Nevada to improve comfort for MRI

[22] Butler, L. D., Symons, B. K., Henderson, S. L., Shortliffe, L. D., Spiegal, D. (2005). Hypnosis reduces distress and duration of an invasive medical procedure for children. American Academy of Pediatrics, 115(1), e77-e85. 23] SmileMakers. (n.d.). Sticker roll rack.

[24] iStock. (n.d.). *Kid with teddy bear pictures, images and stock photos.* [25] Train, H., Colvilles, G., Allan, R., Thurlbeck, S. (2016). Paediatric 99mTc-DMSA imaging: Reducing distress and rate of sedation using a psychological approach. Clinical Radiology, 61(10), 868-874. [26] Khan, J. J., Donnelly, L. F., Koch, B. L., Curtwright, L. A., Dickerson, J. M., Hardin, J. L. (2007). A program to decrease the need for pediatric sedation for CT and MRI. The Journal of Practical Medical Imaging and Management.

[27] Yip, P., Middleton, P., Cyna, A. M. Carlyle, A. V. (2011). Cochrane review: Non-pharmacological interventions for assisting the induction of anaesthesia children. Evidence-Based Child Health: A Cochrane Review Journal, 6(1), 71-134. [28] Norton Children's. (n.d.). Anesthesiology services at Norton Children's.

[29] Edward-Elmhurst Health. (2016). No more multiple needle sticks: IVs now easier on kids (and adults too). Healthy Driven Blogs.