Pediatric CT Scan Protocol Resources: Decision to Scan & Scan Technique to Reduce Radiation Exposure

Resources to support the *decision* to scan a pediatric patient:

- The Pediatric Emergency Care Applied Research Network (PECARN) is a great resource for current practices in pediatric emergency care.

- **Pediatric head CT** decision scheme is included in the 2009 PECARN article by Kupperman: the decision scheme may be printed as a badge-sized card to remind clinicians about the protocol (click image to right to see original version).

- **Having a pediatric c-spine clearance** protocol in place has been associated with a significant reduction in radiation exposure among children; consider an institutional policy based on the 2013 article by Sun, et al.

- **General CT** guidance by the American College of Radiology details recommendations regarding other CT procedures, here.

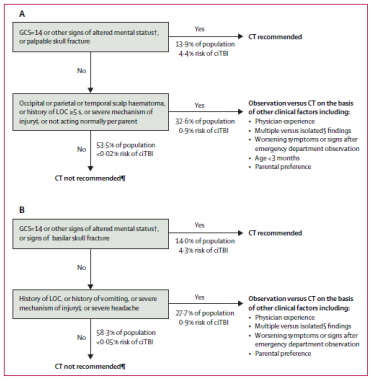

Figure 3: Suggested CT algorithm for children younger than 2 years (A) and for those aged 2 years and older (B) with GCS scores of 14-15 after head trauma*

GCS=Glasgow Coma Scale. ciTBI=clinically-important traumatic brain injury. LOC=loss of consciousness. *Data are from the combined derivation and validation populations. †Other signs of altered mental status: agitation, somnolence, repetitive questioning, or slow response to verbal communication. ‡Severe mechanism of injury: motor vehicle crash with patient ejection, death of another passenger, or rollover; pedestrian or bicyclist without helmet struck by a motorised vehicle; falls of more than 0·9 m (3 feet) (or more than 1·5 m [5 feet] for panel B); or head struck by a high-impact object. §Patients with certain isolated findings (ie, with no other findings suggestive of traumatic brain injury), such as isolated LOC,[35,40] isolated headache,[41] isolated vomiting,[41] and certain types of isolated scalp haematomas in infants older than 3 months,[35,40] have a risk of ciTBI substantially lower than 1%. ¶Risk of ciTBI exceedingly low, generally lower than risk of CT-induced malignancies. Therefore, CT scans are not indicated for most patients in this group.

Resources to inform *scanning technique* to reduce radiation exposure among pediatric patients:

- The Image Gently website is a very good resource for pediatric scanning protocols. They have spreadsheets that can help hospitals determine what dose to use for specific scans for pediatrics, may be viewed here.

- Another in-depth resource is the ACR (American College of Radiology) website. These are the standards that guide pediatric imaging procedures for many facilities, it can be quite lengthy, but outlines appropriate pediatric scanning: click here.

- The last resource to keep in mind is the CT scanner manufacturer. All manufacturers have up to date pediatric protocols for their individual scanners. That might be the easiest route to consider.

Resources:

The Alliance for Radiation Safety in Pediatric Imaging. (2014). *Image Gently Development of Pediatric CT Protocols 2014.* Retrived from http://imagegently.org/Portals/6/Procedures/IG%20CT%20Protocols%20111714.pdf

American College of Radiology, American Society of Emergency Radiology, Society of Computed Body Tomography and Magnetic Resonance, and Society for Pediatric Radiology. (2014). *ACR-ASER-SCBT-MR-SPR Practice Parameters for the Performance of Pediatric Computed Tomagraphy (CT) (*Revised 2014, Resolution 3). Retrieved from http://www.acr.org/~/media/5446aa324cac4722a5d62dda5f549244.pdf

Kuppermann, N., Holmes, J. F., Dayan, P. S., Hoyle, J. D., Atabaki, S. M., Holubkov, R., ... & Wootton-Gorges, S. L. (2009). Identification of children at very low risk of clinically-important brain injuries after head trauma: a prospective cohort study. *The Lancet*, *374*(9696), 1160-1170.

Sun, R., Skeete, D., Wetjen, K., Lilienthal, M., Liao, J., Madsen, M., ... & Choi, K. (2013). A pediatric cervical spine clearance protocol to reduce radiation exposure in children. *Journal of Surgical Research*, *183*(1), 341-346.