

표 1 . 소아 핵심질문2 근거표

핵심질문 2

문헌정보	연구유형	대상자 수	문헌 질 KCIG
Pinto PS, Poretti A, Meoded A, Tekes A, Huisman T A. The unique features of traumatic brain injury in children. Review of the characteristics of the pediatric skull and brain, mechanisms of trauma, patterns of injury, complications and their imaging findings--part 1. J Neuroimaging. 2012;22(2):e1-e17.	Review/Other-D x	N/A	2
Faul M, Xu L, Wald MM, Coronado VG. Traumatic Brain Injury in the United States: Emergency Department Visits, Hospitalizations and Deaths 2002-2006. Atlanta (GA): Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. 2010; http://www.cdc.gov/traumaticbraininjury/tbi_ed.html . Accessed September 16, 2013.	Review/Other-D x	N/A	2
Schnadower D, Vazquez H, Lee J, Dayan P, Roskind C G. Controversies in the evaluation and management of minor blunt head trauma in children. Curr Opin Pediatr. 2007;19(3):258-264.	Review/Other-D x	N/A	2
Willis AP, Latif SA, Chandratre S, Stanhope B, Johnson K. Not a NICE CT protocol for the acutely head injured child. Clin Radiol. 2008;63(2):165-169.	Review/Other-D x	1,428 children	2
Schutzman SA, Greenes DS. Pediatric minor head trauma. Ann Emerg Med. 2001;37(1):65-74.	Review/Other-D x	N/A	2
Haydel MJ, Shembekar AD. Prediction of intracranial injury in children aged five years and older with loss of consciousness after minor head injury due to nontrivial mechanisms. Ann Emerg Med. 2003;42(4):507-514.	Observational-D x	175 patients	2
Kuppermann N, Holmes JF, Dayan PS, et al. Identification of children at very low risk of clinically-important brain injuries after head trauma: a prospective cohort study. Lancet. 2009;374(9696):1160-1170.	Observational-D x	42,412 children	2
Tavarez MM, Atabaki SM, Teach SJ. Acute evaluation of pediatric patients with minor traumatic brain injury. Curr Opin Pediatr. 2012;24(3):307-313.	Review/Other-D x	N/A	2
Maguire JL, Boutis K, Uleryk EM, Laupacis A, Parkin PC. Should a headinjured child receive a head CT scan? A systematic review of clinical prediction rules. Pediatrics. 2009;124(1):e145-154.	Review/Other-D x	3,357 titles and abstracts assessed and 8 clinical prediction rules identified	2

Halley MK, Silva PD, Foley J, Rodarte A. Loss of consciousness: when to perform computed tomography? <i>Pediatr Crit Care Med.</i> 2004;5(3):230–233.	Observational–D x	98 patients	3
Pearce MS, Salotti JA, Little MP, et al. Radiation exposure from CT scans in childhood and subsequent risk of leukaemia and brain tumours: a retrospective cohort study. <i>Lancet.</i> 2012;380(9840):499–505.	Observational–D x	178,604 individuals in leukemia analyses and 176,587 in brain tumor analyses	3
Brenner DJ, Hall EJ. Computed tomography— an increasing source of radiation exposure. <i>N Engl J Med.</i> 2007;357(22):2277–2284.	Review/Other–D x	N/A	2
How to Develop CT Protocols for Children. Available at: http://spr.affiniscape.com/associations/5364/files/Protocols.pdf . Accessed September 16, 2013.	Review/Other–D x	N/A	2
Datta S, Stoodley N, Jayawant S, Renowden S, Kemp A. Neuroradiological aspects of subdural haemorrhages. <i>Arch Dis Child.</i> 2005;90(9):947–951.	Review/Other–D x	74 children	2
Kemp AM, Rajaram S, Mann M, et al. What neuroimaging should be performed in children in whom inflicted brain injury (iBI) is suspected? A systematic review. <i>Clin Radiol.</i> 2009;64(5):473–483.	Review/Other–D x	18 studies	2
Hunter JV, Wilde EA, Tong KA, Holshouser BA. Emerging imaging tools for use with traumatic brain injury research. <i>J Neurotrauma.</i> 2012;29(4):654–671.	Review/Other–D x	N/A	2
Skandsen T, Kvistad KA, Solheim O, Strand IH, Folvik M, Vik A. Prevalence and impact of diffuse axonal injury in patients with moderate and severe head injury: a cohort study of early magnetic resonance imaging findings and 1–year outcome. <i>J Neurosurg.</i> 2010;113(3):556–563.	Observational–D x	106 patients	2
Tong KA, Ashwal S, Holshouser BA, et al. Hemorrhagic shearing lesions in children and adolescents with posttraumatic diffuse axonal injury: improved detection and initial results. <i>Radiology.</i> 2003;227(2):332–339.	Observational–D x	7 children and adolescents	3
Holmes JF, Borgianni DA, Nadel FM, et al. Do children with blunt head trauma and normal cranial computed tomography scan results require hospitalization for neurologic observation? <i>Ann Emerg Med.</i> 2011;58(4):315–322.	Observational–D x	13,543 patients	3
Reed MJ, Browning JG, Wilkinson AG, Beattie T. Can we abolish skull x rays for head injury? <i>Arch Dis Child.</i> 2005;90(8):859–864.	Observational–D x	1,535 patients	2
Nakahara K, Shimizu S, Utsuki S, et al. Linear fractures occult on skull radiographs: a pitfall at radiological screening for mild head injury. <i>J Trauma.</i> 2011;70(1):	Observational–D x	278 patients	2

180–182.			
Crowe L, Anderson V, Babl FE. Application of the CHALICE clinical prediction rule for intracranial injury in children outside the UK: impact on head CT rate. <i>Arch Dis Child</i> . 2010;95(12):1017–1022.	Observational–D x	1,065 ca ses	3
Dunning J, Daly JP, Lomas JP, Lecky F, Batchelor J, Mackway–Jones K. Derivation of the children's head injury algorithm for the prediction of important clinical events decision rule for head injury in children. <i>Arch Dis Child</i> . 2006;91(11):885–891.	Observational–D x	22,772 p atients	3
Oman JA, Cooper RJ, Holmes JF, et al. Performance of a decision rule to predict need for computed tomography among children with blunt head trauma. <i>Pediatrics</i> . 2006;117(2):e238–246.	Observational–D x	1,666 pe diatric pa tients	3
Schachar JL, Zampolin RL, Miller TS, Farinhas JM, Freeman K, Taragin BH. External validation of the New Orleans Criteria (NOC), the Canadian CT Head Rule (CCHR) and the National Emergency X–Radiography Utilization Study II (NEXUS II) for CT scanning in pediatric patients with minor head injury in a non–trauma center. <i>Pediatr Radiol</i> . 2011;41(8):971–979.	Observational–D x	2,101 pa tients	3
Bainbridge J, Khirwadkar H, Hourihan MD. Vomiting–is this a good indication for CT head scans in patients with minor head injury? <i>Br J Radiol</i> . 2012;85(1010):183–186.	Observational–D x	151 CT head sca ns (124 adults, 2 7 childre n)	2
Nigrovic LE, Lee LK, Hoyle J, et al. Prevalence of clinically important traumatic brain injuries in children with minor blunt head trauma and isolated severe injury mechanisms. <i>Arch Pediatr Adolesc Med</i> . 2012;166(4):356–361.	Review/Other–D x	42,099 p atients	2
Pickering A, Harnan S, Fitzgerald P, Pandor A, Goodacre S. Clinical decision rules for children with minor head injury: a systematic review. <i>Arch Dis Child</i> . 2011;96(5):414–421.	Review/Other–D x	16 public ations, re presentin g 14 coh orts, wit h 79,740 patients	2
Mannix R, Meehan WP, Monuteaux MC, Bachur RG. Computed tomography for minor head injury: variation and trends in major United States pediatric emergency departments. <i>J Pediatr</i> . 2012;160(1):136–139 e131.	Review/Other–D x	8,976,37 8 pediatri c emerg ency dep artment visits	2
Gorelick MH, Atabaki SM, Hoyle J, et al. Interobserver agreement in assessment of clinical variables in children with blunt head trauma. <i>Acad Emerg Med</i> . 2008;15(9):812–818.	Observational–D x	1,500 su bjects	2

Holmes JF, Palchak MJ, MacFarlane T, Kuppermann N. Performance of the pediatric glasgow coma scale in children with blunt head trauma. Acad Emerg Med. 2005;12(9):814–819.	Observational–D x	2,043 children; 327 were 2 years and younger	2
Margulies SS, Thibault KL. Infant skull and suture properties: measurements and implications for mechanisms of pediatric brain injury. J Biomech Eng. 2000;122(4):364–371.	Review/Other–D x	N/A	2
Claret Teruel G, Palomeque Rico A, Cambra Lasaosa FJ, Catala Temprano A, Noguera Julian A, Costa Clara JM. Severe head injury among children: computed tomography evaluation as a prognostic factor. J Pediatr Surg. 2007;42(11):1903–1906.	Review/Other–D x	156 pediatric patients	2
Sigmund GA, Tong KA, Nickerson JP, Wall CJ, Oyoyo U, Ashwal S. Multimodality comparison of neuroimaging in pediatric traumatic brain injury. Pediatr Neurol. 2007;36(4):217–226.	Observational–D x	40 children and adolescents	2
Ball WS, Jr. Nonaccidental craniocerebral trauma (child abuse): MR imaging. Radiology. 1989;173(3):609–610.	Review/Other–D x	N/A	2
Ashwal S, Wycliffe ND, Holshouser BA. Advanced neuroimaging in children with nonaccidental trauma. Dev Neurosci. 2010;32(5–6):343–360.	Review/Other–D x	N/A	2
Duhaime AC, Gennarelli TA, Thibault LE, Bruce DA, Margulies SS, Wiser R. The shaken baby syndrome. A clinical, pathological, and biomechanical study. J Neurosurg. 1987;66(3):409–415.	Review/Other–D x	48 cases	2
Jenny C, Hymel KP, Ritzen A, Reinert SE, Hay TC. Analysis of missed cases of abusive head trauma. JAMA. 1999;281(7):621–626.	Review/Other–D x	173 children	2
Rubin DM, Christian CW, Bilaniuk LT, Zazyczny KA, Durbin DR. Occult head injury in high-risk abused children. Pediatrics. 2003;111(6 Pt 1):1382–1386.	Review/Other–D x	65 patients	2
Laskey AL, Holsti M, Runyan DK, Socolar RR. Occult head trauma in young suspected victims of physical abuse. J Pediatr. 2004;144(6):719–722.	Review/Other–D x	51 patients	2
Mogbo KI, Slovis TL, Canady AI, Allasio DJ, Arfken CL. Appropriate imaging in children with skull fractures and suspicion of abuse. Radiology. 1998;208(2):521–524.	Observational–D x	87 children	3
Brown RL, Brunn MA, Garcia VF. Cervical spine injuries in children: a review of 103 patients treated consecutively at a level 1 pediatric trauma center. J Pediatr Surg. 2001;36(8):1107–1114.	Review/Other–D x	103 injuries	2
Ghatan S, Ellenbogen RG. Pediatric spine and spinal cord injury after inflicted trauma. Neurosurg Clin N Am. 2002;13(2):227–233.	Review/Other–D x	N/A	2
Davis PC, Wippold FL II, Cornelius RS, et al. America	Review/Other–D	N/A	2

n College of Radiology. ACR Appropriateness Criteria ® head trauma. Available at: http://www.acr.org/~media/ACR/Documents/AppCriteria/Diagnostic/HeadTrauma.pdf . 2012. Accessed July 29, 2013.	x		
Keiper MD, Zimmerman RA, Bilaniuk LT. MRI in the assessment of the supportive soft tissues of the cervical spine in acute trauma in children. <i>Neuroradiology</i> . 1998;40(6):359–363.	Review/Other–D x	52 children	2
Kadom N, Khademian Z, Vezina G, Shalaby–Rana E, Rice A, Hinds T. Usefulness of MRI detection of cervical spine and brain injuries in the evaluation of abusive head trauma. <i>Pediatr Radiol</i> . 2014:[E–pub ahead of print].	Review/Other–D x	74 children	2
Hobbs CJ. Skull fracture and the diagnosis of abuse. <i>Arch Dis Child</i> . 1984;59(3):246–252.	Review/Other–D x	89 children	2
Prabhu SP, Newton AW, Perez–Rossello JM, Kleinman PK. Three–dimensional skull models as a problem–solving tool in suspected child abuse. <i>Pediatr Radiol</i> . 2013;43(5):575–581.	Review/Other–D x	73 children	2
Chen CY, Chou TY, Zimmerman RA, Lee CC, Chen FH, Faro SH. Pericerebral fluid collection: differentiation of enlarged subarachnoid spaces from subdural collections with color Doppler US. <i>Radiology</i> . 1996;201(2):389–392.	Review/Other–D x	18 infants	2
Amodio J, Spektor V, Pramanik B, Rivera R, Pinkney L, Fefferman N. Spontaneous development of bilateral subdural hematomas in an infant with benign infantile hydrocephalus: color Doppler assessment of vessels traversing extraaxial spaces. <i>Pediatr Radiol</i> . 2005;35(11):1113–1117.	Review/Other–D x	1 infant	2
Jaspan T, Narborough G, Punt JA, Lowe J. Cerebral contusional tears as a marker of child abuse—detection by cranial sonography. <i>Pediatr Radiol</i> . 1992;22(4):237–245.	Review/Other–D x	6 infants	2
Kemp AM, Jaspan T, Griffiths J, et al. Neuroimaging: what neuroradiological features distinguish abusive from nonabusive head trauma? A systematic review. <i>Arch Dis Child</i> . 2011;96(12):1103–1112.	Review/Other–D x	18 studies	2
Pinto PS, Meoded A, Poretti A, Tekes A, Huisman TA. The unique features of traumatic brain injury in children. review of the characteristics of the pediatric skull and brain, mechanisms of trauma, patterns of injury, complications, and their imaging findings—part 2. <i>J Neuroimaging</i> . 2012;22(2):e18–41.	Review/Other–D x	N/A	2
Hamilton M, Mrazik M, Johnson DW. Incidence of delayed intracranial hemorrhage in children after uncomplicated minor head injuries. <i>Pediatrics</i> . 2010;126(1):e33–39.	Review/Other–D x	17,962 children	2
Hollingworth W, Vavilala MS, Jarvik JG, et al. The use of repeated head computed tomography in pediatric	Review/Other–D x	257 patients	2

blunt head trauma: factors predicting new and worsening brain injury. <i>Pediatr Crit Care Med.</i> 2007;8(4):348–356; CEU quiz 357.			
Stence NV, Fenton LZ, Goldenberg NA, Armstrong–Wells J, Bernard TJ. Craniocervical arterial dissection in children: diagnosis and treatment. <i>Curr Treat Options Neurol.</i> 2011;13(6):636–648.	Review/Other–D x	N/A	2
Sepelyak K, Gailloud P, Jordan LC. Athletics, minor trauma, and pediatric arterial ischemic stroke. <i>Eur J Pediatr.</i> 2010;169(5):557–562.	Review/Other–D x	3 cases	2
Jones TS, Burlew CC, Kornblith LZ, et al. Blunt cerebrovascular injuries in the child. <i>Am J Surg.</i> 2012;204(1):7–10.	Review/Other–D x	45 patients	2
Kopelman TR, Berardoni NE, O'Neill PJ, et al. Risk factors for blunt cerebrovascular injury in children: do they mimic those seen in adults? <i>J Trauma.</i> 2011;71(3):559–564; discussion 564.	Review/Other–D x	128 patients	2
Mortazavi MM, Verma K, Tubbs RS, Harrigan M. Pediatric traumatic carotid, vertebral and cerebral artery dissections: a review. <i>Childs Nerv Syst.</i> 2011;27(12):2045–2056.	Review/Other–D x	26 case studies from 70 pediatric patients	2
Aoki Y, Inokuchi R, Gunshin M, Yahagi N, Suwa H. Diffusion tensor imaging studies of mild traumatic brain injury: a meta-analysis. <i>J Neurol Neurosurg Psychiatry.</i> 2012;83(9):870–876.	Review/Other–D x	28 studies	2
Munson S, Schroth E, Ernst M. The role of functional neuroimaging in pediatric brain injury. <i>Pediatrics.</i> 2006;117(4):1372–1381.	Review/Other–D x	N/A	2
Wilde EA, McCauley SR, Hunter JV, et al. Diffusion tensor imaging of acute mild traumatic brain injury in adolescents. <i>Neurology.</i> 2008;70(12):948–955.	Observational–D x	10 adolescents with mild TBI and 10 controls	3
Worley G, Hoffman JM, Paine SS, et al. 18–Fluorodeoxyglucose positron emission tomography in children and adolescents with traumatic brain injury. <i>Dev Med Child Neurol.</i> 1995;37(3):213–220.	Observational–D x	22 children and adolescents	3
Goshen E, Zwas ST, Shahar E, Tadmor R. The role of 99Tcm–HMPAO brain SPET in paediatric traumatic brain injury. <i>Nucl Med Commun.</i> 1996;17(5):418–422.	Observational–D x	28 patients	3
Ewing–Cobbs L, Prasad MR, Swank P, et al. Arrested development and disrupted callosal microstructure following pediatric traumatic brain injury: relation to neurobehavioral outcomes. <i>Neuroimage.</i> 2008;42(4):1305–1315.	Review/Other–D x	41 children	2
Ashwal S, Babikian T, Gardner–Nichols J, Freier MC, Tong KA, Holshouser BA. Susceptibility–weighted im	Review/Other–D x	N/A	2

aging and proton magnetic resonance spectroscopy in assessment of outcome after pediatric traumatic brain injury. Arch Phys Med Rehabil. 2006;87(12 Suppl 2): S50-58.			
Walz NC, Cecil KM, Wade SL, Michaud LJ. Late proton magnetic resonance spectroscopy following traumatic brain injury during early childhood: relationship with neurobehavioral outcomes. J Neurotrauma. 2008;25(2):94-103.	Review/Other-D x	10 children and 10 controls	2
Quayle K, Jaffe D, Kupperman N, et al. Diagnostic testing for acute head injury in children: when are head computed tomography and skull radiographs indicated? Pediatrics. 1997;99:1-8	Observational-D x	322 children	2
Gruskin K, Schutzman S. Head trauma in children younger than 2 years: are there predictors for complications? [published erratum appears in Arch Pediatr Adolesc Med. 1999 May;153(5):453]. Arch Pediatr Adolesc Med. 1999;153:15-20	Observational-D x	278 children	2
Ramundo M, McKnight T, Kempf J, Satkowiak L. Clinical predictors of computed tomographic abnormalities following pediatric traumatic brain injury. Pediatr Emerg Care. 1995;11:27-30	Observational-D x	300 children	2
Greenes D, Schutzman S. Clinical indicators of intracranial injury in head-injured infants. Pediatrics. 1999;104:861-867	Observational-D x	608 children	2
Schunk J, Rodgerson J, Woodward G. The utility of head computed tomographic scanning in pediatric patients with normal neurologic examination in the emergency department. Pediatr Emerg Care. 1996;12: 160-165	Observational-D x	313 patients	2
Shane S, Fuchs S. Skull fracture in infants and predictors of associated intracranial injury. Pediatr Emerg Care. 1997;132:1-6	Observational-D x	112 children	2
Kadish H, Schunk J. Pediatric basilar skull fracture: do children with normal neurological findings and no intracranial injury require hospitalization? Ann Emerg Med. 1995;26:37-41	Observational-D x	239 patients	2
Duhaime A, Alario A, Lewander W, et al. Head injury in very young children: mechanisms, injury types, and ophthalmologic findings in 100 hospitalized patients younger than 2 years of age. Pediatrics. 1992;90: 179-185	Observational-D x	100 children	2
Greenes D, Schutzman S. Clinical significance of scalp abnormalities in asymptomatic head-injured infants. Pediatr Emerg Care. 2001;17:88-92	Observational-D x	422 children	2
Osmond MH, Klassen TP, Wells GA, et al. CATCH: a clinical decision rule for the use of computed tomography in children with minor head injury. Can Med Assoc J 2010;182:341-8	Observational-D x	3866 patients	2
Head Injury (Triage, assessment, investigation and early	Guideline	N/A	1

y management of head injury in children, young people and adults. NICE clinical guideline 176			
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