Swedish Guidelines for
“Whole-Body CT for Trauma” (WBCT-T)

Final version 1.0
March 23, 2020

Contents

Background

In a Nordic questionnaire study in 2014, all Swedish hospitals were asked about present routines for computed tomography in trauma patients (WBCT-T) [1]. The study revealed obvious differences in how the examination was performed, and a large majority was saw a need for, and was positive towards, national guidelines. Indications for WBCT-T vary [2].

Within a Swedish trauma care improvement project, a decision has been taken to develop national guidelines for WBCT-T, with the aim to provide as safe a care as possible. The authors, coming from different disciplines, have been asked to develop guidelines that are as evidence-based as possible, but also, when evidence is missing or weak, develop guidelines based on experience and best practice.

We have in these guidelines chosen to use the term WBCT-T for a whole-body examination with computed tomography in trauma patients. As technical equipment differs widely in Swedish hospitals, we have judged it impossible to provide detailed technical recommendations. Instead, we have developed quality measures that can be used as references for locally adjusted protocols. Thus, we provide proposals for protocols, which may need local adaptation, but have also cooperated with manufacturers of CT scanners so that in a near future, ready-made protocols will be available for installation on most CT-installations.

This document provides recommendations for how CT is best used for examination of trauma patients. The document states today´s best practice for a Swedish setting but has no legal status. Neither the authors, nor NORDTER, can in any way be held legally responsible for the content.

Authors

Hampus Eklöf	Swedish Society of Radiology
Johan Ljungqvist	Swedish Neurosurgical Society
Eva-Corina Caragounis	Swedish Society for Emergency Surgery and Trauma
Lars Lundberg	Swedish Trauma Registry SweTrau
Martin Salö	Swedish Society of Pediatric Surgery
Fredrik Stålhammar	Swedish Society of Pediatric Radiology
Sebastian Schonberger	Swedish Society of Radiographers
Anders Persson	Swedish Society of Radiology
Erik Wiklund	MD. Resident in Surgery
Philipp Martin	Swedish Society for Emergency Medicine
Bjarni Arnasson	Swedish Society of Anesthesiology and Intensive Care Medicine

General comments

- Radiological diagnostics must never delay life-saving measures and actions
- When a decision is taken to perform a WBCT-T, there is no indication for additional imaging, i.e. e-FAST and/or conventional X-rays
- Radiology staff should be included in hospital trauma alerts
- It is advantageous if radiology staff is present in the trauma bay already when injured patients arrive
- CT equipment should be located as close to the trauma bay as possible
- Transfer of seriously injured patients from the trauma bay to the CT should be done with a minimum of disconnection and reconnection of equipment and medical gases

Preparations, transfer and exercises

- The routines of the hospital should include patient monitoring during transfer to and from the CT room and during examination. The quality of the monitoring should be the same as in the trauma bay
- The trauma committee should include representatives of the radiology department
- Radiology should regularly be part of trauma exercises, including transfer to and from the CT room, and a scenario where a patient deteriorates in the scanner
- Equipment for prehospital spinal motion restriction should be replaced with an intrahospital trauma mattress (Traumatransfer®) before WBCT-T, this to reduce radiation dose and improve image quality [3].
- Metal items should if possible be removed from the patient before WBCT-T
- Penetrating injuries should be indicated with radiopaque skin markers such as paperclips, ECG-electrodes, vitamin E-capsules or dedicated arrows on tape.
- Intravenous access, preferably 20G or larger in the right arm, should be secured before examination
- An intraosseous needle may be used for injection of contrast media [4]

Indications for WBCT-T

A large, prospective and randomized study could not detect lower mortality when WBCT-T was compared to targeted CT-examinations [5], however, several retrospective studies show benefits with WBCT-T as compared to targeted CT-examination(s) [6].

Indications to perform a WBCT-T include:

- Clinical findings and/or patient history indicating serious injuries in multiple body regions
- There is suspected or definitive serious trauma with altered level of consciousness in combination with affected circulation and/or breathing [7 – 9]. Patients fulfilling criteria for Level 1 alert in the Swedish National Trauma Alert Criteria normally belong to this category
- Compromised circulation is not a definitive contraindication for WBCT-T, but a CT-examination must never delay emergency surgery [10 – 12]

If the patient does not display signs of serious injury in more than one body region, continued monitoring, surveillance and repeated clinical examinations are recommended. If radiological

examination is needed, targeted CT-examinations could be performed, rather than WBCT-T. In mass casualty situations, wider indications for WBCT-T could be used, this to enhance patient flow.

Main considerations behind protocols

These guidelines describe 3 protocols, 2 for adults and 1 for children. The protocols should:

- Identify serious injuries
- Be simple enough to permit use 24/7 in all hospitals receiving trauma patients
- Be optimized as regards image quality and radiation dose
- WBCT-T can later be supplemented by targeted CT-examinations for assessment of potential specific injuries, such as perforation of intestines, pseudoaneurysm in the spleen or urinary bladder injury

Adult protocol 1 is uncomplicated, robust and gives a lower radiation dose. It can be used both in newer and older CT scanners. The protocol uses slow injection of intravenous contrast media, which allows for use of peripheral or central venous access and intraosseous access. It is also less sensitive to timing between when injection of contrast media begins, and imaging starts.

Adult protocol 2 is optimized for seriously injured patients. It requires better CT and experienced radiology staff. The protocol gives optimal imaging of arteries from head to feet, and potential pseudoaneurysms in the spleen. The radiation dose is higher, as some parts of the body are examined twice.

Pseudoaneurysms and arterio-venous fistulas are best imaged with protocol 2. Cervical and lower extremity arteries are routinely examined in protocol 2, but in protocol 1 only if requested. The facial skeleton is included in both protocols, as are proximal thighs.

The pediatric protocol is uncomplicated and robust. It clearly specifies how intravenous contrast media should be given to children of different age and size.

Contrast media

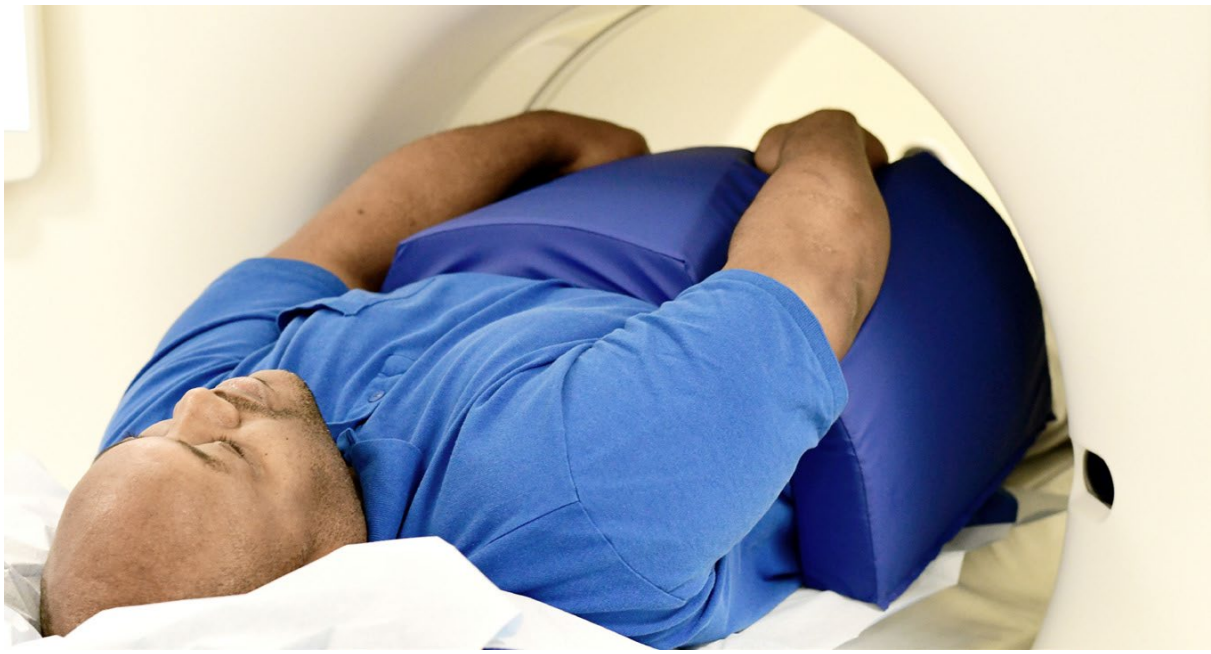
- WBCT-T without intravenous contrast media should not be performed [13]. Targeted examinations are instead recommended in this situation
- Oral or rectal contrast media have no place in seriously wounded patients undergoing WBCT-T
- In a situation where clear and obvious indications for WBCT-T exist, there is no need to take the risk of contrast media nephropathy or contrast media allergy into consideration, as these risks are minimal compared to benefits of performing the WBCT-T.

Positioning of the patient

- The patient should be placed feet first into the CT apparatus, this to simplify handling of iv lines, catheters and endotracheal/chest tubes and giving optimal access to the patient [14].

- Arms should be positioned:
    - In adult protocol 1 along the body during examination of head and neck. Thereafter they are moved up towards the head during the contrast media phase. If this is not possible, the whole examination should be done with the arms positioned on a cushion ventral to the thorax, or where they are. It is advantageous with one arm over the head in contrast to having both arms in the radiation field [15]
    - In adult protocol 2 positioned on a cushion ventral to the thorax or the trunk.

Arms in front of thorax



Arms in front of thorax/abdomen

Radiation dose

- During scout imaging, the arms should be positioned in the same position as during the actual examination, as the scout images controls the automatic radiation dose modulation
- Techniques to decrease the radiation dose with intact image quality should be used
- The radiation dose should be adjusted to the patient and kV-optimized
- Use of CT with dual energy has not shown significant improvement of diagnosing in trauma as compared to single energy. Dual energy may, however, improve diagnosis of certain injuries and may also decrease the radiation dose [14, 16].

Evaluation/reports

- Standardized reports are of large value
- Grading of injuries should be done according to national/international guidelines
- Initial report WBCT-T
    - An initial report, focusing on life-threatening/serious injuries should be ready and conveyed to the physician in charge as soon as possible, see example
- Preliminary report WBCT-T
    - Should be ready at the latest within 1 hour
- Definitive report WBCT-T
    - An experienced radiologist should read the examination as soon as possible, and a definitive answer should be ready within 16 hours and at the latest 08.00 the following morning
    - Grading of injuries should be done according to national/international guidelines
    - Double reading (reading of the study by 2 radiologists) is of most importance in examinations with injuries in two or more body regions, patients older than 30 years, and in patients with serious organ injuries [17]. It is advantageous to double read large examinations written under time pressure, such as WBCT-T. It is therefore recommended that the whole examination is double read, even if a certified radiologist has written the definitive answer and signed it off [18]
- The hospital should have routines that assures that the report reaches the physician in charge. This must hold true also for corrections of reports.

Examples of report and reading templates

At the end of this document, examples of report templates with various degree of detail and layout are presented. These could serve as guidelines for development of regional- or hospital specific templates.

Furthermore, an example of a reading template is presented, that may give guidance in which injuries should be looked for and reported in the different types of answers.

Pregnant trauma patients

- The mother’s life and health have priority over radiation dose to the fetus

- Abdominal CT cannot be replaced by abdominal ultrasound
- Plain pelvic x-rays should not replace CT of the pelvis
- Eventual deviations from the protocol should be done in cooperation between the trauma team leader and the radiologist
- Consider targeted CT-examination instead of WBCT-T

Kidney function and allergy

- Decreased kidney function does not contra-indicate a WBCT-T
- Previous reactions to intravenous contrast media are not an absolute contra-indication for intravenous contrast media in a seriously injured patient

Image reconstruction

We recommend that thin sections (≤1 mm in thickness) (with soft and bone algorithms) are sent to PACS, which allows individually suited reconstructions and 4 mm ax-cor-sag reconstructions of the injured body region for quick assessment.

Possible reconstructions are:

- Axial, coronal and sagittal reconstructions of brain, facial skeleton, cervical spine, spine with numbering of vertebrae, thorax, abdomen and pelvis
- 3D-reconstruction of costae with numbering of costae
- 3D-reconstruction of cervical arteries and intracranial vessels

Quality parameters for local assessment

- Radiation dose: mean value <20 mSv or total DLP <2 200
- Contrast enhancement:
  - Aortic arch, femoral artery >200 HU
  - Liver, spleen >100 HU
- Optimization of radiation dose should be done locally [19].

Over/underdiagnosis

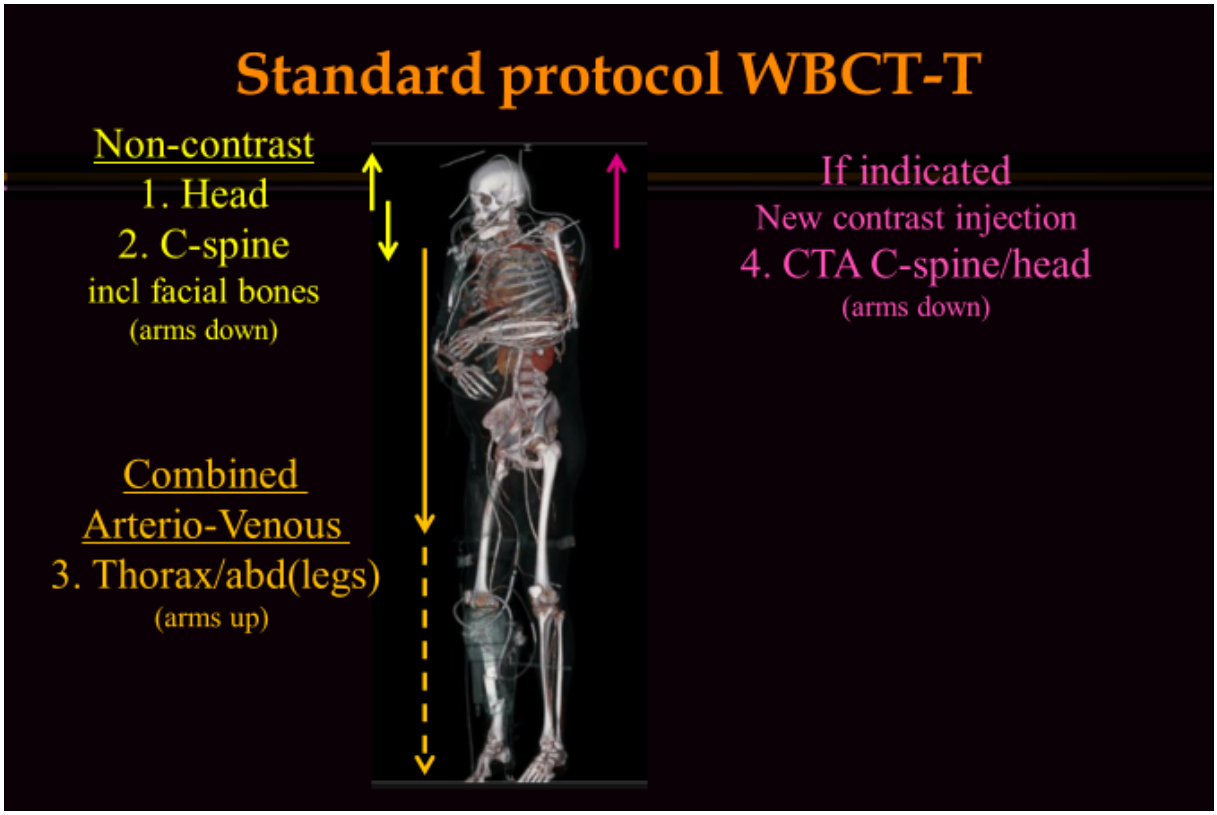
This document does not address over- or underdiagnosis because of WBCT-T, a risk that always is present in every examination. Focus in reading a WBCT-T should primarily be on quick finding or exclusion of serious injuries, thus a certain risk for (initial) misclassification of minor or less serious injuries must be accepted and handled. The table ”Example of template for reading of WBCT-T” gives guidance in which injuries that should have priority in respective phase of reading (initial report, preliminary report and definitive report).

WBCT-T, Adult protocol no 1 (standard protocol)

Position: Supine, feet first into the CT

- Native phase
  - arms positioned along body
  - brain
  - cervical spine including facial skeleton and mandibula
- Contrast media phase
  - arms over head or on a cushion ventral to the thorax
  - intravenous contrast media 320 – 350 mg iodine/ml, 125 ml injected at 2,5 ml/s. Thereafter, 50 ml 0.9 % sodium chloride solution is injected at same rate as contrast media
  - if a routine for split-bolus technique exists, this can be used [8, 20 – 22]
  - combined arterio-venous phase: thorax-abdomen-mid-thigh
    - IF INDICATED
      - Extend scan to include lower extremities if suspicion of skeletal or vascular injury
      - CT-angio of the cervical spine and brain
        - Add extra serie with new contrast injection
        - Directly or later depending on clinical situation

Radiation dose: individualized and kV-adjusted



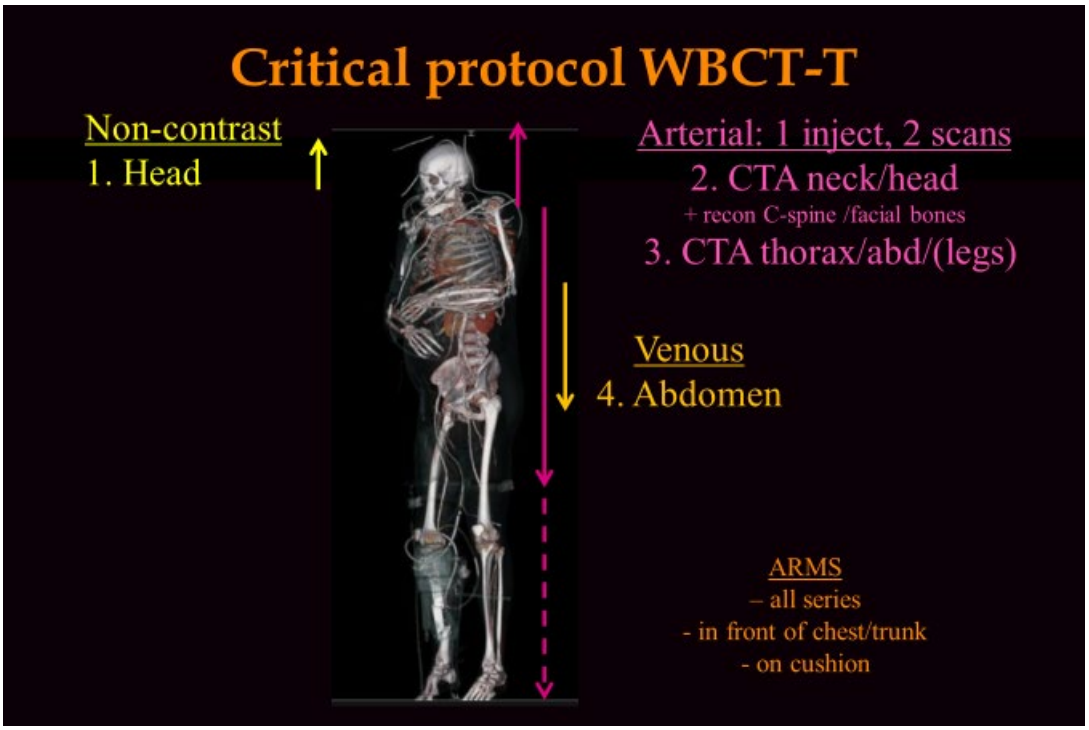
WBCT-T, Adult protocol 2 (Critical protocol)

Position: Supine, feet first into the CT, arms on a cushion ventral to the thorax/trunk

- Native phase
  - brain
- Contrast media phase
  - Arterial phase (one injection 2 scan series)[22 – 24]
    - CTA neck-brain
      - Images for angio, c-spine and facial bones
    - CTA thorax-abdomen-lower extremities
      - Images for soft tissue and skeleton
    - (if a routine for single scan head-toe exists, this may be used; faster but lower image quality)
  - Venous phase
    - Abdomen: diaphragm to symphysis
      - Soft tissue images

  - Intravenous contrast media 320 – 350 mg iodine/ml, 125 ml injected at 5 ml/s. Thereafter, 50 ml 0.9 % sodium chloride solution is injected at same rate as contrast media. Bolus tracking in aorta (arcus or proximal descending part)
- Radiation dose: individualized and kV-adjusted

If lower extremities clinically free from suspicion of injury, the examination could stop at mid-thigh



WBCT-T, pediatric protocol

The main principle is restraint with WBCT-T in children, as there is no support in the literature for this examination diminishing mortality when compared to targeted CT [25]. Children are more sensitive to radiation exposure and has a long life-expectancy and are therefore more prone to radiation-induced malignancies [26].

Position: Supine, head or feet first depending on body size. Arms along the body when head and neck is examined, arms over head (if possible) when thorax/abdomen/pelvis is examined.

Protocol: based on body weight 0 – 16 years; this governs $CTDI_{vol}$ (radiation dose) as well as volume of intravenous contrast media.

- Native phase, separate series
    - brain
    - cervical spine
- Venous contrast media phase
    - thorax/abdomen to symphysis (lower extremities as adjunct)
- Arterial contrast media phase only when vessel injury is suspected

Contrast media:

- Circa 500 mg iodine/kg body weight
- Volume contrast media dependent on concentration of iodine
    - 2 ml/kg if iodine concentration circa 250 mg iodine/ml
    - 1,5 ml/kg if iodine concentration circa 350 mg iodine/ml

Injection of contrast media:

Intravenous peripheral venous catheter in <u>right</u> arm:

- 24 G: up to 1,5 ml/s
- 22 G: 1,5 – 3 ml/s
- 20 G: 3 – 5 ml/s

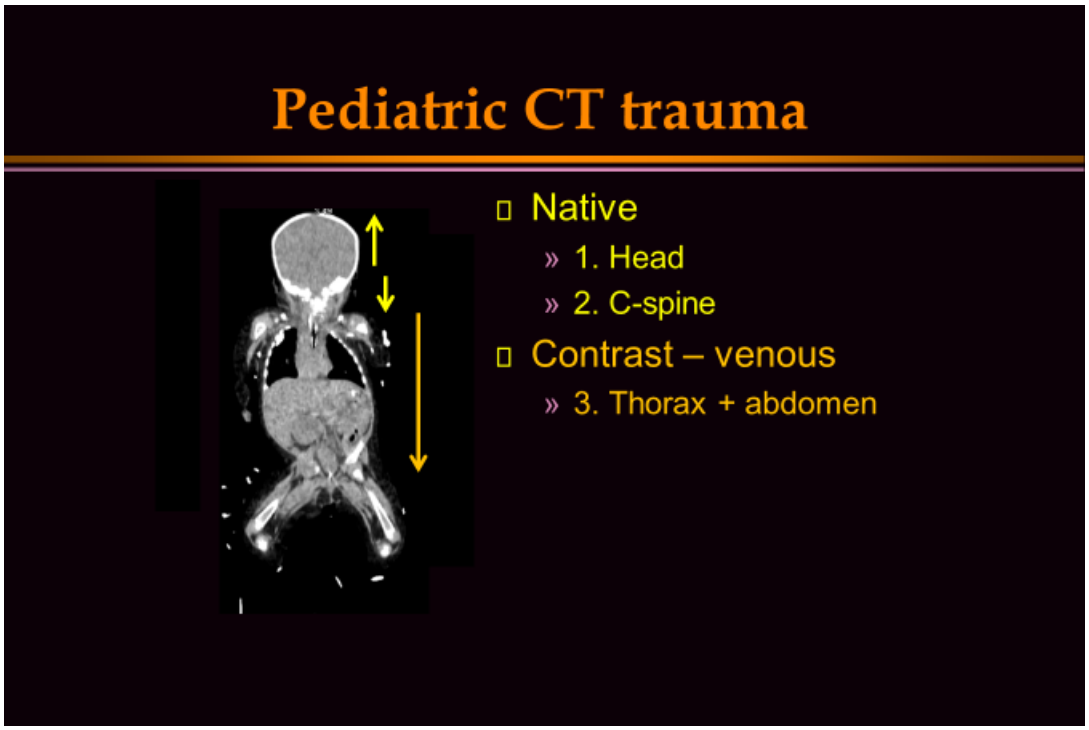
Injection rate with CT power contrast injector (pressure limit PSI <300):

Body weight, kg	Injection rate, ml/s	Flush, ml NaCl
< 5	0,5	10
6 – 10	1	20
11 – 15	1,5	30
16 – 30	2	40
31 – 40	3	40
41 – 60	4	40

Contrast media could as an alternative be injected manually in peripheral or central venous catheter. It is however difficult to give general rules for injection rate, as the size and position of the child affects potential rate. If contrast media is injected in an intraosseous needle, maximum injection rate is 5 ml/s.

Imaging:

- **Arterial phase**: imaging begins 5 s after completed injection of contrast media
- **Venous phase:** imaging begins 70 s after start of injection of contrast media and at least 30 s after completed injection



References

1. Wiklund E, Koskinen SK, Linder F, et al. Whole body computed tomography for trauma patients in the Nordic countries 2014: survey shows significant differences and a need for common guidelines. Acta Radiol. 2016;57(6):750-7. Epub 2015/08/15.
2. Treskes K, Saltzherr TP, Luitse JS, et al. Indications for total-body computed tomography in blunt trauma patients: a systematic review. European journal of trauma and emergency surgery: official publication of the European Trauma Society. 2017;43(1):35-42. Epub 2016/07/21.
3. Loewenhardt B, Huttinger R, Reinert M, et al. Dose effects and image quality: is there any influence by bearing devices in whole-body computed tomography in trauma patients? Injury. 2014;45(1):170-5. Epub 2013/01/22.
4. PM Intraossösa infarter och injektion av jodkontrastmedel Utfärdat 2018-12-18 / Maria Lindblom, Linköping för Svensk uroradiologisk förenings kontrastmedelsgrupp http://www.sfmr.se/sidor/jodkontrastmedel-lathundar-checklistor-och-originaldokument/
5. Sierink JC, Treskes K, Edwards MJ, et al. Immediate total-body CT scanning versus conventional imaging and selective CT scanning in patients with severe trauma (REACT-2): a randomised controlled trial. Lancet. 2016;388(10045):673-83. Epub 2016/07/03.
6. Caputo ND, Stahmer C, Lim G, et al. Whole-body computed tomographic scanning leads to better survival as opposed to selective scanning in trauma patients: a systematic review and meta-analysis. The journal of trauma and acute care surgery. 2014;77(4):534-9. Epub 2014/09/25.
7. Mistral T, Brenckmann V, Sanders L, et al. Clinical Judgment Is Not Reliable for Reducing Whole-body Computed Tomography Scanning after Isolated High-energy Blunt Trauma. Anesthesiology. 2017;126(6):1116-24. Epub 2017/03/28.
8. Kimura A, Tanaka N. Whole-body computed tomography is associated with decreased mortality in blunt trauma patients with moderate-to-severe consciousness disturbance: a multicenter, retrospective study. The journal of trauma and acute care surgery. 2013;75(2):202-6. Epub 2013/05/25.
9. Davies RM, Scrimshire AB, Sweetman L, et al. A decision tool for whole-body CT in major trauma that safely reduces unnecessary scanning and associated radiation risks: An initial exploratory analysis. Injury. 2016;47(1):43-9. Epub 2015/09/18.
10. Surendran A, Mori A, Varma DK, et al. Systematic review of the benefits and harms of whole-body computed tomography in the early management of multitrauma patients: are we getting the whole picture? The journal of trauma and acute care surgery. 2014;76(4):1122-30. Epub 2014/03/26.
11. Huber-Wagner S, Biberthaler P, Haberle S, et al. Whole-body CT in haemodynamically unstable severely injured patients--a retrospective, multicentre study. PloS one. 2013;8(7):e68880. Epub 2013/07/31.
12. Wada D, Nakamori Y, Yamakawa K, et al. Impact on survival of whole-body computed tomography before emergency bleeding control in patients with severe blunt trauma. Crit Care. 2013;17(4):R178. Epub 2013/09/13.
13. Esposito AA, Zilocchi M, Fasani P, et al. The value of precontrast thoraco-abdominopelvic CT in polytrauma patients. Eur J Radiol. 2015;84(6):1212-8. Epub 2015/03/22.
14. Aran S, Daftari Besheli L, Karcaaltincaba M, et al. Applications of dual-energy CT in emergency radiology. AJR Am J Roentgenol. 2014;202(4):W314-24. Epub 2014/03/26.

15. Kahn J, Grupp U, Maurer M. How does arm positioning of polytraumatized patients in the initial computed tomography (CT) affect image quality and diagnostic accuracy? Eur J Radiol. 2014;83(1):e67-71. Epub 2013/11/06.

16. Hackenbroch C, Riesner HJ, Lang P, et al. Dual Energy CT - a Novel Technique for Diagnostic Testing of Fragility Fractures of the Pelvis. Zeitschrift fur Orthopadie und Unfallchirurgie. 2017;155(1):27-34. Epub 2017/03/02. Die Dual-Energy-CT als neue Technik zur Diagnostik von Insuffizienzfrakturen des Beckens.

17. Banaste N, Caurier B, Bratan F, et al. Whole-Body CT in Patients with Multiple Traumas: Factors Leading to Missed Injury. Radiology. 2018, https://pubs.rsna.org/doi/10.1148/radiol.2018180492

18. Geijer H, Geijer M. Added value of double reading in diagnostic radiology, a systematic review. Insights into Imaging. 2018; 9: 287–301 https://doi.org/10.1007/s13244-018-0599-0

19. Kahn J, Grupp U, Kaul D, et al. Computed tomography in trauma patients using iterative reconstruction: reducing radiation exposure without loss of image quality. Acta Radiol. 2016;57(3):362-9. Epub 2015/04/09.

20. Eichler K, Marzi I, Wyen H, et al. Multidetector computed tomography (MDCT): simple CT protocol for trauma patient. Clinical imaging. 2015;39(1):110-5. Epub 2014/12/03.

21. Hakim W, Kamanahalli R, Dick E, et al. Trauma whole-body MDCT: an assessment of image quality in conventional dual-phase and modified biphasic injection. Br J Radiol. 2016;89(1063):20160160. Epub 2016/05/18.

22. Alagic Z, Eriksson A, Drageryd E, et al. A new low-dose multi-phase trauma CT protocol and its impact on diagnostic assessment and radiation dose in multi-trauma patients. Emerg Radiol. 2017;24(5):509-18. Epub 2017/04/06.

23. Atluri S, Richard HM, 3rd, Shanmuganathan K. Optimizing multidetector CT for visualization of splenic vascular injury. Validation by splenic arteriography in blunt abdominal trauma patients. Emerg Radiol. 2011;18(4):307-12. Epub 2011/05/27.

24. Bruns BR, Tesoriero R, Kufera J, et al. Blunt cerebrovascular injury screening guidelines: what are we willing to miss? The journal of trauma and acute care surgery. 2014;76(3):691-5. Epub 2014/02/21.

25. Meltzer JA, Stone ME, Jr., Reddy SH, et al. Association of Whole-Body Computed Tomography With Mortality Risk in Children With Blunt Trauma. JAMA pediatrics. 2018;172(6):542-9. Epub 2018/04/10.

26. Risk of ionizing radiation exposure to children: a subject review. American Academy of Pediatrics. Committee on Environmental Health. Pediatrics. 1998;101(4 Pt 1):717-9. Epub 1998/04/29.

Examples of templates for standardized reports

Template for report of initial reading WBCT-T, Akademiska sjukhuset, Uppsala, Sweden.

Huvud		☐ Blödning
Thorax	Höger	☐ Pneumothorax ☐ Hemothorax
	Vänster	☐ Pneumothorax ☐ Hemothorax
Buk		☐ Fri gas ☐ Fri vätska
Bäcken		☐ Stor skelettskada
Kommentarer		Sign

Template for report of initial radiologic assessment of WBCT-T, Sahlgrenska Universitetssjukhuset, Göteborg, Sweden.

Used in paper-form with a copy that is scanned to the computerized medical record, the original follows the patient.

Initial rapport multitrauma

Namnetikett

Komplement till muntligt svar, utesluter ej skada

Kryss för positivt fynd, streck för inget uppenbart fynd. Skriv kompletterande information under övrigt.

	x/-	Uppenbara fynd	Höger	Vänster	Övrigt
CT hjärna		Blödning			
		Impressionsfraktur			
		Medellinjesöverskjutning			
CT Halskärl		Uppenbar skada			
CT halsrygg		Uppenbar halsryggskada	Nivå:		
CT rygg		Uppenbar ryggskada	Nivå:		
CT Thorax			Höger	Vänster	
		Pneumothorax			
		Hemothorax			
		Uppenbara revbensfrakturer			
		Kärlskada/extravasering			
		Avvikande endotrachealtub/dränläge			
		Pericardvätska			
CT Buk					
		Fri gas/vätska			
		Organskada			
		Kärlskada/ extravasering			
		Sammanfallen IVC			
CT Bäcken Ben ai			Höger	Vänster	
		Kärlskada/ extravasering			
		Uppenbar fraktur			
Övriga skador, främmande kroppar					

OBS! fyll i nedanstående uppgifter

Radiolog: **Dect:** **Tid:**

Emergency report form for screening whole body computed tomography in multitrauma, Nordter

FIG 1 Emergency report form for screening whole body computed tomography (SWB-CT) in multitrauma

HOSPITAL NAME		EMERGENCY REPORT CT-Multitrauma Date..... Time..... Dr..... Pager.....		Patient name Trauma surgeon..... Pager.....		
NEG	**INJURY**	**ORGAN**	**FINDINGS**	**DETAIL**	**ALERT!**	**COMMENTS**
☐ X= NEG NOT= not included	☐	Head	**Bleed** ☐EHD ☐SDH ☐Subarach ☐Intracerebral ☐DAI ☐FX	 ☐RT ☐LT ☐RT ☐LT ☐RT ☐LT ☐RT ☐LT ☐Skull ☐Facial	☐Herniation ☐Shift.....mm ☐Oedema ☐Impression ☐Infection-risk	
☐	☐	Thorax	☐Heart ☐Mediast hematoma ☐Pneumothx ☐Haemothx ☐Contusion ☐Ribfx	 ☐RT ☐LT ☐RT ☐LT ☐RT ☐LT ☐RT ☐LT	☐TAI ☐Tension-pneumothx ☐Flail chest	
☐	☐	Abdomen	☐Free abd fluid ☐Retroperitoneal fluid ☐Diaphragm ☐Pancreas ☐Other organ	☐Amount	☐Ongoing bleed ☐Hypovolemia	
☐		Bowel	☐Oral contrast leak ☐Free air ☐Wall thickening ☐Mesenteric blood	☐Perforation ☐Location		
☐	☐	Liver	☐Subcaps hematoma ☐Parenchymal ☐Contrast leak		*Grade:*	
☐	☐	Spleen	☐Subcaps hematoma ☐Parenchymal ☐Contrast leak		*Grade:*	
☐	☐	Kidneys/ Urinary tract	☐No enhancement ☐Parenchymal ☐Urine leakage ☐Bladder rupture	☐RT ☐LT ☐RT ☐LT ☐RT ☐LT ☐Extraperit	*Grade:* ☐Intraperit	
☐	☐	Spine	☐Cervikal ☐Thoracic ☐Lumbar	Level:	☐Dislocation	
☐	☐	Major skeleton	☐Pelvic ☐Hip ☐Femur (2/3) ☐Additional	☐RT ☐LT ☐RT ☐LT ☐RT ☐LT		
Summary/recommended follow-up:						

Example of template for reading of WBCT-T

Organ	Initial report (directly)	Preliminary report (within 1h)	Definitive report (within 16h)
Brain	• Bleeding • Midline shift • Projectile	• Bleeding – type and size • Edema • Midline shift • Contusion • Impression fracture • Projectile	• Contusion • Fracture – type • Reass. of earlier findings • 3D-reconstructions of combined facial- and skull fractures
Facial skeleton	• Obvious fracture • Projectile	• Impression fracture • Retrobulbar hematoma • Herniation of eye bulb muscles • Projectile	• Fracture – type and grade (LeFort) • Reass. of earlier findings • 3D-reconstructions of complex facial fractures
Cervical spine	• Obvious airway injury • Obvious cervical spine injury • Projectile	• Larynx fracture • Cervikal spine fracture – type • Projectile	• Reass. of earlier findings
Cervical vessel angiography	• Vessel injury with extravasation • Projectile	• Vessel injury with extravasation/ dissection • Projectile	• Reass. of earlier findings
Thorax	• Pneumothorax • Hemothorax • Pericardial effusion • Large vessel injury/ extravasation • Abnormal position of endotracheal tube and/or chest tube • Projectile	• Mediastinum and vessels: pericardial effusion, heart, aorta • Lungs: pneumothorax, hemo-thorax, contusion, laceration • Chest wall: fractures • Diaphragm • Abnormal position of endotracheal tube and/or chest tube • Projectile	• Fracture(s) in sternum, costae, scapulae and clavicula – number, type • Reass. of earlier findings • 3D-reconstructions of extensive thoracic injuries
Abdomen-pelvis	• Free gas/fluid • Organ injury • Large vessel injury/ extravasation • Pelvic fracture • Projectile	• Free gas/fluid • Organ injury – grading of spleen injury (AAST-OIS) • Intestines / bowel • Urinary bladder • Large vessel injury/ extravasation • Retroperitoneal bleeding • Pelvic fracture • Projectile	• Organ injury – grading of liver, kidney and pancreas injuries (AAST-OIS) • Reass. of earlier findings • 3D-reconstructions of pelvic a/o acetabular fractures
Spine	• Obvious spinal fracture • Projectile	• Fracture • Projectile	• Fracture – type • Reass. of earlier findings
Pelvic-lower extremity angiography	• Vessel injury with extravasation • Obvious fracture • Projectile	• Vessel injury with extravasation • Vessel injury with dissection • Fracture – type • Projectile	• Reass. of earlier findings