NCPS
Nebraska Coalition for Patient Safety

Patient Injured in a CT Scanner

Nebraska Coalition for Patient Safety

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Event

- A CT scan was ordered for a patient with a history of a stroke with left affected side.
- The patient was unable to raise her arm out of the way for the exam, so she held it at her side.
- Upon entering the CT tube the second time, her arm fell off the table however she did not notify the CT tech until she noticed that the arm was hurting.
- The CT tech entered the room to check on the patient and found the patient's arm hanging down the side of the CT table between the table and the gantry.
- X-ray of the left shoulder showed a non-displaced humeral head fracture.

Event Review

Degree of Harm: Moderate harm

Duration of Harm: Temporary

Contributing factors:

- Human factors
- Other, specify – Patient unable to hold up arm. Tech thought arm would stay at patient's side.

Actions taken to avoid future errors:

- Staff trained on the use of positioning devices that hold extremities in place when patient control is possibly or clearly compromised.
- Environmental scan of CT suite to remove any possible visual obstructions from CT control room to patient in CT.

Possible Causal Statements:

- The lack of policies/procedures outlining required positioning aids for patients with limited physical capabilities resulted in the CT tech not utilizing appropriate equipment to secure the patient's arm which increased the likelihood that the patient's arms would fall off the table, get caught between the CT table and the gantry resulting in a non-displaced humoral head fracture.
- The lack of the CT tech's understanding of the physical limitations of the patient resulted in the CT tech not utilizing appropriate equipment to secure the patient's arm which increased the likelihood that the patient's arm would fall off the table, get caught between the CT table and the gantry resulting in a non-displaced humoral head fracture.
- The incomplete documentation in the patient's chart explaining her left sided weakness led to the CT tech not utilizing the appropriate equipment to secure the patient's arm which increased the likelihood that the patient's arm would fall off the table, get caught between the CT table and the gantry resulting in a non-displaced humoral head fracture.

Possible Causal Statements:

- The lack of a clear line of site from the CT control room to the CT table resulted in the CT tech not recognizing the patient's arm had fallen off the table which increased the likelihood that the patient's arm would become stuck between the CT table and the gantry resulting in a non-displaced humoral head fracture.

- The lack of a method to visually monitor a patient on the CT table from the CT control room or imbedded warning devices within the CT equipment resulted in the CT tech not recognizing the patient's arm had fallen off the table which increased the likelihood that patient's arm would become stuck between the CT table and the gantry resulting in non-displaced humoral head fracture.

Patient Harm When Undergoing a Computed Tomography (CT)

- An estimated 74 million CT procedures are performed annually in the United States (~18% of the world's estimated total)[1]
- A 2015 study of reported incidents of harm in CT found a rate of 0.22% (1,918 incident reports for 843,902 CT exams). The most common harm events were[2]:
  - ❑ adverse drug reaction.
  - ❑ medication/IV safety.
  - ❑ diagnostic test orders.
- Few direct risks are associated with CT scanning. (e.g., contrast-induced allergic reactions, contrast-inducted nephropathy, long-term risk of cancer development due to radiation exposure)[3]

Patient Harm When Undergoing a Computed Tomography (CT)

- Historically, CT harm studies have focused on extravasation and adverse drug reactions and less on safety incidents in CT (e.g., skin injuries during transport or exam, intravenous line incidents, staffs' occupational injuries, physical or verbal violence, incidental extubation, environment or equipment failures, intra- and inter-hospital service coordination errors, and diagnostic mistakes).[3,4,5,6,7]
- CT is the destination of almost 50% of the patients transported for diagnosis or treatment.[8]
- Intra-hospital transportation requires coordination between services which has been shown to increase the risk of complications, morbidity and mortality.[9]
- Incomplete clinical documentation, in both ambulatory care and inpatient settings, can lead to complications in patient management, and subsequent administrative operations.[10,11,12,13]

Table 1 Variables, definitions and examples

	Definition	Examples
• Diagnostic test orders	• Any kind of medical test ordered to help in the diagnosis or detection of disease [20]	• Wrong patient ordered • Laterality errors • Wrong test ordered
• ID	• The process of identifying someone [20]	• No ID bracelet on patient
• Documentation	• Providing information or evidence that serves as a record [20]	• Wrong date of birth • Wrong spelling of name
• Service coordination	• The deliberate organization of patient care activities between two or more participants (including the patient) involved in a patient's care to facilitate the appropriate delivery of healthcare services [21]	• Patient was waiting a lot to be picked up for CT • Patient was sent for CT on stretcher, was left alone • Transport was unfamiliar with the location
• Surgery	• The treatment of injuries or disorders by incision or manipulation [20]	• One needle missing
• Procedure	• An action intended to achieve a result in the care of patient [20]	• During the biopsy, the tip of needle broke off • Patient coded during CT
• Line	• An IV line that is inserted into vein for therapeutic or diagnostic purposes [20]	• Chest drain line came out
• Tube	• A hollow cylindrical instrument used for insertion into bodily passages or hollow organs for removal or injection of materials [20]	• Patient pulled out the IV line • Chest tube was pulled out
• Medication	• A drug used in healthcare [20]	• The syringe was not labeled
• IV safety	• Any situation that makes intravenous injections safe and harmless [20]	• Extravasation occurred • Drug was expired
• Employee general incident	• Discrete occurrence in the course of work that may lead to physical or mental occupational injury [20]	• Patient's blood splashed to eye • Slipped on wet area • CT equipment dropped on ankle
• Safety	• Any situation that protects from or makes unlikely to cause danger, risk or injury [20]	• Patient verbally abused the nurse
• Security	• Being free from danger or threat [20]	• Patient became agitated in CT
• Conduct	• The manner in which someone behaves [20]	• Physician became hostile and threw the papers
• Environment	• Surroundings or conditions in which a person spends or operates at our institution [20]	• Unable to connect airline
• Equipment	• The necessary items for a special purpose [20]	• One of the instruments fell from CT • PACS computer delays
• Adverse drug reaction	• An appreciably harmful or unpleasant reaction, resulting from an intervention related to the use of a medicinal product, which predicts hazard from future administration and warrants prevention or specific treatment, or alteration of the dosage regimen, or withdrawal of the product [22]	• Patient experienced hives after injection • Patient was seen itching post injection • Patient started sneezing after injection
• Skin/tissue	• The surface tissue forming the natural outer covering of the body of a person [20]	• Tourniquet was fixed too tight on arm • Patient cut his finger on the door • Large skin tear was noted
• Diagnosis	• Identifying the nature of an illness by examination of the symptoms [20]	• Patient took diabetic medication but not eaten food
• Treatment	• The attempted remediation of a health problem, usually following a diagnosis [20]	• Collar was not fixed • The amount of contrast injection was not enough
• Fall	• Inadvertent change in a person's position from standing, sitting or lying down to lying on the ground or other surface lower than their starting point [23]	• Patient was assisted to sit on the floor • Patient fell onto the floor • Patient slipped on wet area and fell on the ground
• Infection control	• A discipline that applies to the prevention or reduction in rates of nosocomial infections [20]	• TB was suspected but the patient did not have a mask • MRSA patient with no sticker on chart • During removal of IV line blood splashed possibly to the mouth and eye

From How often are Patients Harmed When They Visit the Computed Tomography Suite? 2015

Table 2 Descriptive statistics of safety incidents related to CT scan modality

Categories	Number of incident reports	Total CT exams	Incident rate	
			# of incident reports × 100/total of CT exams	# of incident reports × 100/total of incident reports
Diagnostic test orders	206	843,902	0.024	10.7
• Wrong patient	• 16	• 843,902	• 0.002	• 0.8
• Requisition errors	• 32	• 843,902	• 0.004	• 1.6
• Others	• 158	• 843,902	• 0.018	• 8.3
ID/documentation	95	843,902	0.011	5.0
Service coordination	127	843,902	0.015	6.6
Surgery/procedure	10	843,902	0.001	0.5
Line/tube	39	843,902	0.005	2.0
Medication/IV safety	573	843,902	0.068	29.9
• Extravasation	• 545	• 843,902	• 0.065	• 28.4
• Others	• 28	• 843,902	• 0.003	• 1.5
Employee general incident	61	843,902	0.007	3.2
Safety/security/conduct	33	843,902	0.004	1.7
Environment/equipment	29	843,902	0.003	1.5
Adverse drug reaction	652	843,902	0.077	34.0
Skin/tissue	21	843,902	0.002	1.1
Diagnosis/treatment	23	843,902	0.003	1.2
Fall	25	843,902	0.003	1.3
Infection control	24	843,902	0.003	1.3
Total	1918	843,902	0.227	100

From: How Often Are Patients Harmed When They Visit the Computed Tomography Suite? 2015

Could this happen in your organization?

	Yes	No	NA	Action
Do you have policies and procedures to provide instruction to CT techs for determining when to utilize positioning devices? ***Contact Your CT Manufacturer for Their Available Resources***				
Have you verified CT staff's competency in determining when and how to use positioning devices? Do you have a sufficient number of the devices?				
Do you have policies and procedures that outline required steps for the transport of patients from one department in the hospital to another? Does it include pertinent patient management information? Does it enhance communication between the patient sending department and the patient receiving department so that undue delays do not occur, or patients are left unattended on gurneys in the hallway? ***See IPASS***[14] *and* ***NCPS Deidentified Event Oct 2023: Intradepartmental Transport of Patients Requiring Oxygen***[15]				
Is the physical environment of the CT suite uncluttered so that the CT tech is more easily able to visually observe the patient when they are in the CT control room and the patient is in on the CT table? Does your CT have the capability to employ audible warnings or visual methods for the tech in the CT control room to adequately monitor a patient undergoing a CT? ***Contact Your CT Manufacturer for Their Available Resources***				
Is the patient history provided to direct patient givers for outpatients receiving services sufficient?				
Does your organization have effective disclosure policies so that patients are informed of unanticipated events and outcomes? *See* ***AHRQ's CANDOR toolkit***[16]				

Could this happen in your organization?

	Yes	No	NA	Action
Are staff trained in emergency management procedures for a patient undergoing a CT (e.g., contrast reaction, Code Blue, chest tube displacement, IV-line displacement, air injected when using contrast injector, etc.)?				
Does your patient identification policy require the use of a minimum of two patient identifiers which include the patient's full name and date of birth? When possible do you ask the patient to state their full name and date of birth? ***See National Patient Safety Goals***[17]				
Does the patient identification practice observed in your organization conform to what is stated in the policy? Are there barriers to performing the identification process as outlined in the policy				
Does your organization have a process to assess the fall risk for patients receiving outpatient services? ***See NCPS Patient Safety Alert December 2021: Falls in Ambulatory Care Settings***[18]				
Does your organization have inpatient and outpatient infection control policies/procedures to protect staff from possible transmission of an infectious disease from a patient? (e.g., masks on patient suspected of having an airborne or droplet transmitted infectious disease such as measles, pertussis, COVID-19, etc.)				

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Additional Resources

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