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Cold CT scanner rooms: A simple solution for the patient comfort and for hypothermia cases

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Abstract

The normal patient temperature is 98.6°F or 37.2°C where the CT scanner room temperature is 72°F or 22.2°C. The temperature difference between degrees is 26.6°F or 15°C degree which is large. Therefore; a new method of warming the patient is required to give more comfort for the patient and in cases where the patient suffers hypothermia.

Keywords: Computed Tomography; Patient Table; Warmer; Hypothermia; Patient Care

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Introduction

Many patients complain of the low temperature of the CT scanner rooms and it can be serious issue in cases of hypothermia. Air condition (AC) systems are used in CT rooms not to cool the patient “per se”, but to cool the CT machine itself. The CT scanner’s computer components generates a lot of heat which can result in making the machine shut down if the AC system is not used to cool the machine. The hospitals will have it is own AC system, but CT scanner rooms will have their own AC system to avoid shutting down with the rest of the hospital AC system since the hospital AC system can be overpowered especially in heat waves. The patient is lying inactive and wear very thin clothes or hospital gowns which can’t

protect the patient from the cold AC. The staff in the hospital might not feel the same because they wear very covering clothes and keep moving and working, so they might not notice any temperature issue. Hospitals as well, want to keep patients from sweating on the CT scan table, stop airborne pathogen transmission, and the scan time is relatively short in CT rooms so the patient will not stay there forever. The normal CT room temperature should be at 72°F and do not exceed 75°F or fall below 64°F. Humidity control is basically controlling how moisture is the air? Similar to temperature, humidity can cause electronic damage; therefore; humidity is kept in the CT room between 30% and 70% according to the original equipment manufacturer (OEM) Standards.

Discussion

The AC system in CT room will cause noise which is another issue for the patient comfort and it makes the communicating with the patient very hard if the patient can't hear well due to the fan noise. The point of cooling the CT scanner is to protect the machine and maximize its lifespan. If there is no cooling system, the CT scanner will be overheated (i.e. high temperature spikes) after every single patient and it will make a delay to scan the coming patients and it can cause irreversible damage to the electronics of the scanner. Radiographers usually try to fix the issue of a patient feeling cold in the CT room by giving the patient a blanket, make the scan faster, or shutdown the AC system for a short time, but they risk to destroy the hardware. There are a similar issue with contrast media injection where the patients feel very cold when the contrast media is being administered to them and it was solved by contrast media warmer which is usually attached to the contrast media injectors. If a patient suffers a hypothermia, the patient should not undergo CT scan until the temperature of the patient became at normal level.

There are two types of CT scanner: Air-cooled CT scanners and water-cooled CT scanners. The air-cooled systems provide the same quality of cooling, but water-cooled system needs monitoring of the water purity. If the water become impure than it will affect the performance of the cooling system then damage the electronic parts with over-heating. Water-cooled system needs more maintenance to keep a good image quality and without maintenance the lifespan of the machine will decrease. Any room with inconsistent temperature and humidity will have more effect on the air-cooled system, while it will not affect water cooled systems. The water-cooled system will have less fan noise which means more quieter

and more warmer room compared to rooms where the air-cooled systems is used. The air-cooled system will make the inside of the gantry dirty by pulling dust and hair inside the gantry, while the water-cooled system is cleaner. Dust build-up has been known to bind mechanical moving parts in the scanner, clog fans, and burn out boards. The dust builds inside CT scanners and the dust will clog fans and cause overheating. This can also lead to slow system performance and even component damage. Biomedical engineers need to make sure that filters are being cleaned or replaced and clean the machine internally and externally to maintain the machine lifespan. The cost of the water-cooled system is lower than air-cooled system. The air-cooled considered better than the water-cooled systems. The Heating, Ventilation, and Air Conditioning (HVAC) system will need a regular check on daily bases to avoid overheating and damage to the internal components.

The solution can be made by keeping the AC working and making a CT couch/table that has a warmer that can be switched on in the control panel by the radiographer when the patient request it see (Figure 1). This warmer switch off automatically at the end of the scan. The warmer makes the CT couch warm not hot and a blanket can help maintain the patients' temperature especially in hypothermia cases. The new technologies can make the warmer change the couch warm instantly. Even in the market there are products available that consist of a blanket with a warmer that can control the temperature of the patient, but it can't be used until the product have been tested to make sure that it will not cause any artifact or it has any radiopaque materials. It remains the best solution if the manufacturing company made a table warmer see (Figure 1). All CT scan manufactures must follow this suggestion to standardize the care of the patient [1].

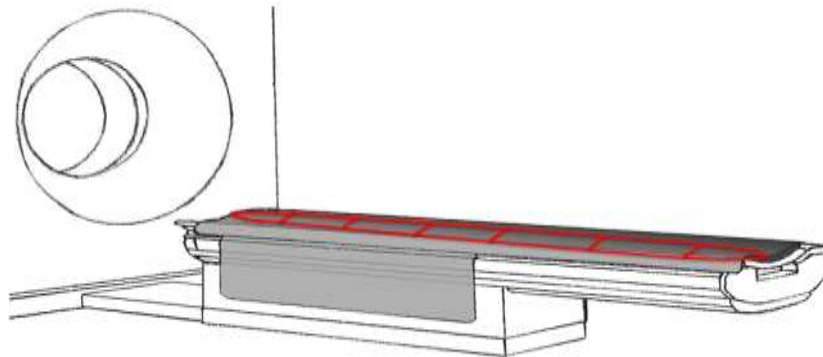


Figure 1: A CT scanner table/couch with a warmer impeded in the table to make the patient warm. It is spread to cover the whole table.

Conclusion

A couch warmer will help in making the patient feel less cold and with a blanket the cold AC temperature will not make the patient feel discomfort or affect the patient health in case of low body temperature.

Reference

1. Alahmari AF. 2020. Lack of Standards in Radiology: A Letter to the Editor. International Journal of Radiology. 7: 240-241.