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Dear NPC Customer:

By now I'm sure you've heard about the fiasco at Cedars-Sinai Medical Center regarding high patient radiation doses from CT brain perfusion scans. If you haven't heard, or if you want to refresh your memory, here are a few links you find informative:

<http://www.fda.gov/MedicalDevices/Safety/AlertsandNotices/ucm185898.htm>

<http://www.diagnosticimaging.com/display/article/113619/1475485?verify=0>

<http://www.latimes.com/news/local/la-me-cedars-sinai14-2009oct14,0,5065886.story>

Specific information is sketchy, and there is much speculation going back and forth over the Internet, but here's what we do know: Techs at Cedars-Sinai Medical Center in Los Angeles modified their brain perfusion protocol in order to improve image quality. In doing so, the resulting skin dose increased from a typical 0.5 Gy to between 3 and 4 Gy. (The threshold for skin injury is assumed to be 2 Gy.) Over an 18 month period, 206 patients received high doses. Erythema and epilation were reported by many of the patients.

NPC consultants have been receiving questions and some possible overreactions as a result of this incident. NPC would like to stress that this is an isolated incident, and the likelihood of it happening in your facility is small. However, NPC will work with all its clients to be sure that safeguards are in place to be sure that radiation doses are kept to a minimum. Ohio customers should be aware that the ODH recently passed regulations that require you to establish an ALARA program for CT patient doses, so this fits right in.

The ACR, the Ohio Department of Health, and the New York Department of Health have set dose limits for adult and pediatric abdomen scans, as well as routine head scans. Your NPC consultant tests your scanners annually to be sure they comply with these limits. We do this for all clients including non-accredited facilities in states other than Ohio and New York. Aside from these three studies, no other dose limits have been determined, to the best of my knowledge. In 2005 the CRCPD surveyed CT facilities as part of its Nationwide Evaluation of Xray Trends program. Unfortunately at this time the data have not yet been published.

At this time, the best action you can take in response to the incident is to monitor patient doses. All modern scanners display dose both before and after scans. In many cases, the data are even sent to PACS along with the images. For the three studies mentioned above, be sure the dose values labeled CTDIvol are below the following limits:

Adult abdomen: 30 mGy

Pediatric abdomen (5 y.o.): 25 mGy
Head (cranium): 80 mGy

ACR-accredited facilities should deduct 5 mGy from each limit. Bear in mind that the dose limit for adult abdomen refers to an average size patient. It is understandable that large patients may require slightly higher doses. If your scanner displays CTDI_w instead of CTDI_{vol}, you can calculate CTDI_{vol} by dividing CTDI_w by pitch for helical scans. For axial scans the two quantities are equal provided there are no gaps between the scans. If there are gaps between the scans (e.g. hires chest) multiply the CTDI_w by the slice thickness then divide by the table increment.

For brain perfusion scans, the FDA is recommending a typical dose of 500 mGy for the entire study. Remember that, unlike a helical scan, in which the radiation exposure is spread out over a large volume, the brain perfusion scan concentrates the radiation from multiple gantry rotations into small volume, so the local radiation dose is accumulated.

When you find it necessary to modify existing protocols, pay attention to the effect on the displayed CTDI_{vol}. If by changing the protocol you notice that the CTDI_{vol} increases significantly, contact your NPC consultant. And obviously if changing an abdomen or head protocol results in a CTDI_{vol} greater than the limits above, you may not use the modified protocol.

In summary, the best defense against overexposure is education and being aware of the patient dose display. Work with your physicist to set up a program of monitoring the doses and taking action if the doses are too high.

I attempted to include as many appropriate recipients as I could think of. If I missed an important person in your facility, please be so kind as to forward this information to him or her. I have also posted a copy of this notice on our web site (<http://www.nationalphysics.com>) and our ftp server (<ftp://ftp.nationalphysics.com>).



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