

Audit Title:

Evaluation of the variation in sounds levels in the positron emission tomography (PET) radiotracer uptake facilities.

Authors:

Hector Aguilar, Kristy Romaniuk, Ryan Hung, Jonathan Abele, University of Alberta

Rationale and clinical problem:

PET molecular imaging has a growing role for diagnosis and monitoring of patients with various neurodegenerative diseases, relying on the ability of this modality to discern subtle regional changes in brain activity.¹ Unexpected physiologic activity in areas to be scrutinized for diagnosis may complicate imaging interpretation. Specifically, activity in the temporal lobes might be related to physiologic auditory processing rather than the neurodegenerative disease in question. Minimizing ambient noise levels should help to reduce unwanted physiologic temporal lobe activity. The following is the method we used to evaluate the sound level and variation thereof in our facilities to assess whether a noisy ambient environment might compromise local brain PET studies.

Protocol:

Assessment of local practice was as follows:

- Implement the aid of a technical staff person that can discretely place the sound level measuring device in the uptake room without alarm
- Measure the sound level variation using a validated smartphone application² and the internal microphone of a smartphone as a recording device.
- Sample the ambient sound level at a high enough frequency to avoid missing large changes (we used 1 Hz sampling)
- Evaluate routine PET examinations in the uptake facility in question (we opted for 30 consecutive exams), not necessarily limited to brain studies if other types of PET studies occur in the same facility.
- Evaluate the resultant data for the maximum sound level during the uptake period, as well as the percentage of data points exceeding a predetermined threshold (we selected 50 dB³ as reasonable, though perhaps as low as 40 dB is desirable).

Audit Target:

- Fewer than 10% of readings exceed a sound level of 50 dB (quiet office environment)

Implementation/Intervention:

In the event that the above target is not met:

- Ask that patients wear industrial grade disposable sound reduction ear plugs with a high “noise reduction rating” (please see https://www.ccohs.ca/oshanswers/prevention/ppe/ear_prot.html)
- summarize and disseminate data via presentations to the technical support staff regarding the importance of minimizing noise in the uptake room
- Ask that the uptake rooms be closed as much as possible
- A second audit could be performed 6 – 12 months later to determine the effectiveness of these intervention(s); however, the implementation of sound reduction ear plugs (10-30 dB reduction) in itself should overcome mild excessive elevations in sound levels. A second round audit may therefore be less helpful, except perhaps to address compliance with distributing/wearing ear plugs.

References:

1. Nasrallah, I. M. & Wolk, D. A. Multimodality Imaging of Alzheimer Disease and Other Neurodegenerative Dementias. *J. Nucl. Med.* **55**, 2003–2011 (2014).
2. Kardous, C. A. & Shaw, P. B. Evaluation of smartphone sound measurement applicationsa). *J. Acoust. Soc. Am.* **135**, EL186–EL192 (2014).
3. Canada Safety Council. *Office Noise and Acoustics* Available at: <https://canadasafetycouncil.org/workplace-safety/office-noise-and-acoustics>. (Accessed: 22nd November 2015)