Letter to the Editor Re: the iPad Tablet Computer for Mobile On-Call Radiology Diagnosis? Auditing Discrepancy in CT and MRI Reporting

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Dear Dr. Honeyman-Buck,

I am interested in teleradiologic consultation because I am an emergency physician and there are many hospitals in my country where 24 h on-call radiologic consultation is not available. I also thought the iPad could be an excellent medical imaging device and so was glad to read the article by John et al. entitled “The iPad Tablet Computer for Mobile On-Call Radiology Diagnosis? Auditing Discrepancy in CT and MRI Reporting” in the May 2012 issue of the *Journal of Digital Imaging*. However, I had concerns about several methodological issues raised by that article which aimed to prove the value of the iPad as a teleradiologic device.

There were authors’ comment about the network limitations of that study in which they used a portable hard disk and a MacBook laptop for transmitting medical imaging data. I understood that there was a problem of network security between the iPad application, OsiriX, and the PACS system. This meant that OsiriX had limitation in the practical application of real-time teleradiologic consultation. In a recent study, I used another application, RemoteView Agent 5.0 (Rsupport Co, Seoul), which allowed remote control of a desktop computer by tablet PCs to overcome that limitation [1, 2]. This application connected a Wi-Fi link (802.11 g) via an Rsupport’s relay server, allowing the screen of the

emergency department (ED) image server to be visualized on the iPad. The radiological images were transmitted from the ED image server to the iPad using lossless compression and true color depth [3]. The speed of data downloading by the wireless network was satisfactory, and all functions of the DICOM viewer were supported by the remote viewing application on the iPad. Therefore, I believe that Remote view is a good candidate for teleradiologic application of the iPad.

Other studies have evaluated the potential of the iPad as a teleradiologic tool. These focused on one organ or one kind of radiologic examination such as brain CT or spine MRI [4, 5]. However, in their study, John et al. chose common acute cases of CT and MRI of various organs, including the brain, neck, chest, abdomen, and spinal cord, and concluded that diagnoses of emergency conditions made by CT and MRI using the iPad agreed well with those made by review on PACS workstations. I have doubts about the quality of the data. Because our ultimate interest is to confirm the potential of the iPad as a practical teleradiologic consulting tool, prominent radiological abnormalities are not appropriate as tests. Therefore, in our recent analysis, we chose brain CT cases in which the abnormal findings were missed by our ED junior residents (1- or 2-year experienced) to guarantee the subtlety of the imaged defects. The examination of subtle abnormalities also increases the power of discrimination between the iPad and LCD monitor since the more prominent the abnormality is, the more difficult a reviewer finds it to perceive a difference between the two displaying devices. The number of comparisons made by John et al. was another issue. The authors’ interpretation of their results implied that if one applied the results of their study to the clinical situation, one could use the iPad as a teleradiologic consulting device for all kinds of CT and MRI. However, their study was clearly inadequate in, for

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example, the case of teleradiologic consultation of spine MRI to examine the possibility of spinal fracture, as they included only one case of spinal fracture diagnosed by MRI. Thus, their use of mixed cases of CTs and MRIs was not appropriate for demonstrating the value of the iPad as a teleradiologic tool.

I had concerns about another methodological point: “lighting conditions.” The authors explained that for “best simulation of a real-world application,” location and lighting conditions were not standardized. In the study of Martin et al., two levels of ambient lighting, 450 and 50 lx, yielded discrepant results for several pathologies in digital chest radiography [6]. The teleradiologic focus on ambient lighting conditions should be on whether suboptimal lighting influences the interpretation of a certain pathologic finding. The authors commented that they did not standardize the environmental and lighting conditions in their study in order to simulate real-world conditions, but absence of standardization did not always create the real-world situation. Because ambient light is reflected on the surface of the displaying device, it alters the contrast ratio of the device. Thus, differences of ambient lighting conditions can affect many characteristics of displaying devices. I believed that ambient lighting was an important factor in teleradiologic consultation, and that, because of the absence of standardization, this study has not dealt adequately with this matter.

In spite of these methodological questions, the study of John et al. has increased my belief in the iPad as a promising teleradiologic tool.

Any comments and clarifications from the authors would be most welcome.

Sincerely,

Bo Seung Kang

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