



Commentary

Validating Use of Technology for Cognitive Test Assessment



Dorene M. Rentz

Harvard Medical School, Departments of Neurology, Brigham and Women's Hospital, Massachusetts General Hospital, 221 Longwood Avenue M97, Boston, MA 02115, United States

ARTICLE INFO

Article history:

Received 1 August 2016

Accepted 1 August 2016

Available online 3 August 2016

The use of technology in healthcare is transforming, not only our access to medical information, but improving patient care. For example, the electronic medical record (EMR) permits the instant availability of medical information to specialists who are providing care across hospitals (Ovretveit et al., 2007). On the patient level, adaptive devices assist with monitoring blood pressure (Belghazi et al., 2007), glucose levels (Vashist, 2013), physical activity (Block et al., 2016) and even sleep (Marino et al., 2013). Physicians are now encouraging patients to transmit pictures via their cell phone to inspect rashes or dangerous-looking moles before they become melanoma. Telemedicine is also allowing university and tertiary care hospitals to deliver expert advice or to assist with a diagnosis in remote areas around the world. As we work through security and privacy issues, the use of technology, in this innovative way, has the potential of transforming medicine for both the professional staff and patients seeking care.

As portable electronic devices become more accessible around the globe, the use of these devices to capture behavior and cognitive test performance is also appealing. It is possible that evaluating individuals with suspected dementia in the privacy of their own home may provide more reliable information than an in-clinic visit (Kaye et al., 2014). As with all of these technologies, practical and scientific questions need to be addressed in order to determine if they provide reliable and valid information in contrast to in-clinic or face-to-face assessments.

In this issue of *EBioMedicine*, Castanho and colleagues (Castanho et al., 2016) address whether cognitive tests performed using videoconferencing could provide comparable diagnostic information as an in-clinic evaluation. They studied 69 individuals, aged 57 to 95 years, across the diagnostic spectrum from normal to dementia and in various locales, i.e., community health centers, assisted living facilities and nursing homes. To validate the videoconferencing procedure, each participant received The Telephone Interview for Cognitive Status-Modified,

Portuguese version (TICSM-PT) over the telephone in addition to receiving the TICSM-PT via a videoconference and finally a face-to face, in-clinic assessment, using the Mini Mental State Exam (MMSE). They sought to determine if the use of the videoconference approach in different locales provided comparable information to an in-clinic assessment. Validating these innovative technologies with currently known and endorsed procedures is critical in order to determine whether the data derived from these assessments are reliable and provide accurate diagnostic information.

Castanho et al. (2016) report a high correlation between the telephone and video versions of the TICSM-PT assessments and with the in-clinic MMSE. They also found that the videoconferencing approach had a high level of accuracy for detecting cognitive impairment and that the test findings acquired from the videoconferencing approach demonstrated good sensitivity and specificity. Castanho et al. (2016) also examined the applicability of videoconferencing in various settings and locales and found that individuals, across settings, were “at ease” throughout the videoconference test administration and that there was no significant difference in approaches between locales. The important findings of this pilot study confirm that cognitive test assessment via videoconferencing will allow clinicians to reliably follow-up on their dementia patients who live in assisted living facilities and nursing homes.

Studies, such as that presented by Castanho et al. (2016), are critical if 21st century technology is to be accepted in the clinical and research setting. This study adds to a growing body of literature validating technologies that are unobtrusive, continuous and performed at-home for measuring cognition and behavior (Kaye et al., 2014; Castanho et al., 2016; Rentz et al., 2016; Sano et al., 2010). From a clinical and research perspective, implementation of home-based technologies for cognitive test administration would greatly reduce the burden of in-clinic visits and enable close patient follow-up of individuals residing anywhere, not just within easy driving distance of a clinic or research center. The ease of at-home cognitive test assessment could also benefit clinical trials by allowing for more frequent assessments of cognitive change in the individual's natural environment. This approach has the potential of increasing the reliability of cognitive endpoints, thus yielding more sensitive measurements of change over time (Kaye, 2008). The results of Castanho and colleagues' study (Castanho et al., 2016) underscore the importance of validating newer technologies for clinical use. As technology becomes integrated into healthcare, further validation studies will be required to ensure that the technologies used to perform routine in-clinic evaluations provides the same valid and reliable data as the in-clinic, face-to-face assessment.

DOI of original article: <http://dx.doi.org/10.1016/j.ebiom.2016.08.001>.E-mail address: DRENTZ@BICS.BWH.HARVARD.EDU.<http://dx.doi.org/10.1016/j.ebiom.2016.08.002>2352-3964/© 2016 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Disclosure

Dorene M. Rentz has served as a paid consultant for Eli Lilly Pharmaceuticals, Jansen Immunotherapy, Biogen Idec and Neurotrack.

References

- Belghazi, J., El Feghali, R.N., Moussalem, T., Rejdych, M., Asmar, R.G., 2007. Validation of four automatic devices for self-measurement of blood pressure according to the International Protocol of the European Society of Hypertension. *Vasc. Health Risk Manag.* 3 (4), 389–400.
- Block, V.A., Pitsch, E., Tahir, P., Cree, B.A., Allen, D.D., Gelfand, J.M., 2016. Remote physical activity monitoring in neurological disease: a systematic review. *PLoS One* 11 (4), e0154335.
- Castanho, T.C., Amorim, L., Moreira, P.S., et al., 2016. Assessing cognitive function in older adults using a videoconference approach. *EBioMedicine* 11, 278–284.
- Kaye, J., 2008. Home-based technologies: a new paradigm for conducting dementia prevention trials. *Alzheimers Dement.* 4 (1 Suppl 1), S60–S66.
- Kaye, J., Mattek, N., Dodge, H.H., et al., 2014. Unobtrusive measurement of daily computer use to detect mild cognitive impairment. *Alzheimers Dement.* 10 (1), 10–17.
- Marino, M., Li, Y., Rueschman, M.N., et al., 2013. Measuring sleep: accuracy, sensitivity, and specificity of wrist actigraphy compared to polysomnography. *Sleep* 36 (11), 1747–1755.
- Ovretveit, J., Scott, T., Rundall, T.G., Shortell, S.M., Brommels, M., 2007. Improving quality through effective implementation of information technology in healthcare. *Int. J. Qual. Health Care* 19 (5), 259–266.
- Rentz, D.M., Dekhtyar, M., Sherman, J., et al., 2016. The feasibility of at-home iPad cognitive testing for use in clinical trials. *J. Prev. Alzheimers Dis.* 3 (1), 8–12.
- Sano, M., Egelko, S., Ferris, S., et al., 2010. Pilot study to show the feasibility of a multicenter trial of home-based assessment of people over 75 years old. *Alzheimer Dis. Assoc. Disord.* 24 (3), 256–263.
- Vashist, S.K., 2013. Continuous glucose monitoring systems: a review. *Diagnostics (Basel)* 3 (4), 385–412.