



e-Health vs COVID-19: home patient telemonitoring to maintain TIA continuum of care

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Dear Editor,

The majority of the world's population have experienced lockdown or restricted movement due to self- or enforced quarantine in response to the COVID-19 pandemic.

The global emergency led healthcare systems to focus primarily on COVID-19 management and the citizens on COVID-19 symptoms. Further, the fear for infection discourages patients from going to the hospital even though they suffer from severe illnesses or experience considerable complications.

Nevertheless, keeping focused on the other highly invalidating diseases, including stroke, is paramount. In this context, TIA/minor stroke management should remain crucial in healthcare in the sub-acute phase, too. If untreated, TIA carries a high risk of early stroke and it is associated with poorer long-term survival, while, if urgently managed, recurrent stroke risk may be as low as 1–3% at 90 days [1].

Hence, a dedicated service to urgently manage TIA in the sub-acute phase is needed. Our University Hub Hospital in the cross-border Italy-Slovenia area (which serves 373,803 people) has implemented a TIA/minor stroke pathway since 2016. Patients presenting at the emergency department with acute focal and transient neurological symptoms compatible with TIA/minor stroke undergo immediate neurological assessment, non-enhanced CT, and ECG, as well as administration of an antiplatelet agent/anticoagulant therapy, if appropriate.

Extracranial CT angiography has been performed for patients with recurrent focal neurological symptoms or presenting a number of cardiovascular risk factors. After ABCD2 risk stratification, if the score is high (score 6–7), patients are admitted to our stroke unit, and if low or moderate (score ≤ 5), patients are rapidly (<48 h) referred to our TIA service. In the latter case, at TIA service admission, the following standard investigations were performed: neurological visit with focus on vascular risk factors according to patients' age, hematologic laboratory tests, ECG, EEG, and extracranial and intracranial arteries color-Doppler. Echocardiography, 48 h Holter ECG and MRI are performed at a later point (<10 days) when necessary.

Since 2016, our TIA service has managed more than 100 patients yearly (with an average of 10 patients per month). During COVID-19 emergency, we have observed a decrease of TIA/minor stroke admissions of about 50%, probably related to the widespread fear of going to the hospital during the pandemics when showing mild or transient stroke symptoms [2]. Patients admitted at our TIA service stated that they worried about coming back to the hospital to undergo the remaining examinations. They also showed anxiety for their health, stroke recurrence, and COVID-19 infection.

Telemedicine and telemonitoring (e-Health) solutions may grant health workers a better TIA/minor stroke management in sub-acute phase while at home and be implemented in the patients' routine care in the post-pandemic health system, too [3]. e-Health may contribute to maintain social distancing and reduce the need to access hospital facilities, thus avoiding direct contacts with health workers. Video teleconferencing has proved to be a suitable method for physicians and a positive experience for stroke patients, similar to that for in-person encounter [4].

In the light of this, we suggest to rapidly implement e-Health in TIA management pathways. e-Health activation should start within 24–48 h from transitory ischemic event

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and continue for at least 2–4 weeks, when patients are dismissed and at home. Patients should be instructed on e-Health devices and procedures during their single access (viz., that following TIA) to TIA service. At the end of the telemonitoring and teleassistance period, all devices must be adequately sanitized. Telemonitoring of vital signs and parameters linked to main cardio-vascular risk factors should be carried out using wearable smart technologies combined with teleassistance. Alteration such vital signs may be highly informative to assess patient conditions, titrate therapy, and prevent stroke recurrence.

High blood pressure is the main stroke recurrence risk factor and its telemonitoring may enable physicians to rapidly treat patients and prevent complications, stroke, and cardiovascular deaths [5]. Telemonitoring blood pressure is all the more important, since about one-third of stroke patients report poor adherence to antihypertensive therapy.

Heart rate and R-R intervals remote monitoring are fundamental for cryptogenic stroke, while glucose monitoring may help to set treatment for IGT, diabetes mellitus, and lacunar syndromes. In the COVID-19 era, temperature and SpO₂ may alert in case patients develop infection symptoms.

Devices for telemonitoring of vital signs and parameters should support wireless transmission protocols and send throughout the gateway the data to the healthcare provider's server. The caregivers should be able to review the patients' data in real-time through dedicated interactive web-portal which also should provide smart-alarms. The patients should also be empowered with a device with video teleconferencing features to enable medical face-to-face communication, if needed. The remote patient monitoring system should be GDPR compliant.

Telemonitoring and teleassistance may benefit from a dedicated team to carry out the entire process. The nursing personnel may be involved in the teleassistance phase, by assigning them with preliminary screenings of vital signs and patients' needs. A thorough implementation would require a strategic planning in terms of training efforts both for the medical personnel and for the patients (or patients' relatives in case of patients' cognitive/physical impairments), time allocated to alert monitoring (although automatized), and not least, costs.

During COVID-19 pandemics, in our clinic of neurology, a TIA-dedicated e-Health program was developed and implemented. The possibility to home monitor blood pressure (BP), heart rate, SpO₂, and temperature, as well as the implementation with video teleconferencing and phone teleconsulting, is shown to be important for patient management in COVID-19 emergency period. Not only our proposed e-Health solution is applicable in the non-emergency period in TIA patients' care,

but it may also be crucial in the second phase of COVID-19 pandemic, in the potential autumn second COVID-19 wave or in future emergencies. Next autumn, e-Health might be pivotal to maintain social distancing and lower the need for access to hospital facilities, thus reducing the risk of infection for vulnerable patients.

Although the COVID-19 emergency may lead health systems to put the management of other diseases on hold, TIA telemonitoring cerebrovascular risk factors at home may lend a hand by decreasing stroke recurrence, patients' anxiety toward their conditions, and the risk of infection. In this complex scenario, e-Health may be a great asset to maintain the continuum of care and enable health systems not to neglect TIA/minor stroke management.

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Compliance with ethical standards

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