Teleradiology and AI as Solution to Overcome the COVID-19 Pandemic Impact during the Lockdowns in Africa

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Abstract

The role of teleradiology during the COVID-19 pandemic is essential to maintain the continuity of the health service to patients. Using such technology based on transmission of radiological patient images, from one location to another and allows radiologists to provide services without having to be in contact with patients, is particularly important to minimize the expansion of COVID-19. In Africa, some radiology departments public and private experienced this solution of remote working, showing a positive impact during the outbreak.

Key Points

• Teleradiology and Artificial Intelligence solutions

• Role of teleradiology duringCOVID-19

Keywords: Teleradiology; AI; Africa; Remote working; COVID-19

Letter

Coronavirus Disease (COVID-19) has become a world- wide pandemic. As of September 13th, 2020 (10:25 AM), 28,778.319 cases of COVID-19 have been confirmed, with 920,544 global deaths [1]. Africa with its 54 countries is also impacted with 1,339,171 cases, the situation is more complicated despite the preventive measures and the support of the WHO to deal with the pandemic. Since transmission occurs mainly through respiratory droplets, social distancing is highly recommended to reduce the progression of the disease. This has dramatically impacted the radiology activities and all the healthcare sectors because of the direct contact of the professional with the patients.

Inestimable efforts are being made through applications and platforms of telemedicine attempting to monitor and perform surveillance tasks in both symptomatic and asymptomatic COVID-19 patients, as well as follow-up of recovered patients in their homes [2].

In Africa, as in other continents, Radiology is playing a key role in this pandemic, particularly with the use of X-ray and computed tomography to assess lung involvement by COVID-19 [3]. In this context, all the radiologic staff involved in the workflow chain need to be protected from COVID-19.Serval measures are implemented such as disinfection protocol, patient circuits

(contaminated, non-contaminated) or contact limitation. The most impactful one is teleworking by leveraging teleradiology solutions.

Radiology is one of the medical specialties with a greater degree of digitalization, and teleradiology is commonly used in many radiology departments and practices.

Teleradiology is the electronic transmission of radiological patient images, from one location to another for the purposes of interpretation and/or consultation [4]. This recent practice is becoming widely implemented by hospitals, urgent care clinics and specialist imaging companies. The reason for its increased implementation is because it addresses the lack of adequate staff to provide radiological coverage and the lack of expertise in this specialty. The process of teleradiology is based on an essential triad; an image sending station, a transmission network, and a receiving image station that must have a high-quality display screen that has been cleared for clinical purposes. In fact, there are now specialized computer programs that are dedicated to sending radiological images with the same ease associated with sending an email with image attachments [5]. Today, virtually all radiology equipment is fully DICOM compliant. Thus, images can be stored on a network or a workstation in the DICOM format. Lossy and lossless compression is possible; varying degrees of loss of information may be acceptable, depending upon the

modality and the clinical situation. Plain radiographs obtained non- digitally may need to be scanned. Currently, mammography images remain the last barrier to reliable teleradiology; this is due to the large file sizes and issues related to the image resolution required to detect micro calcifications. In the early days, transfer of images was performed over telephone lines using modems, sometimes with speeds as low as 2400 bps. Today, high-speed lines are available, allowing different centers to connect directly or over the Internet for transmission of images. Images may be directly transferred or streamed, depending upon the software being used. Image viewing requires a workstation that can display high-resolution images. Many types of software are currently available, e.g., EFilm, which allows viewing, manipulation, measurements, 3D reconstructions, etc. [6].

Continuous education during COVID-19 lockdown is also important to keep the staff working remotely up to date on new procedures and practices to make them stronger and develop their expertise. Artificial Intelligence is one of the areas that needs specific focus, since teleradiology and AI, going forward are greatly synergistic in terms of their potential to achieve impact on healthcare delivery [7]. AI for radiology triage is often described as that 'extra team member', the one that sifts through the images and highlights areas of concern, prioritizing urgent cases so that the radiologist can adjust workflows to match patient needs. It has been embedded in numerous medical institutions across the world and has proven itself a valuable partner in the radiology environment. It's not a replacement, the human touch will always be essential in both the final analysis and patient care, but AI has the ability to prioritize, allocate and alert in high-pressure situations which is very important to overcome challenges related to COVID-19.

Some countries in Africa, such as Morocco, Algeria, Tunisia, Nigeria, South Africa, etc., started last few years to developpe and implement specific regulation related to teleradiology and how to protect patient data confidentiality and privacy. Teleradiology and AI are highly demanding laws on patient data confidentiality and privacy require the highest level of security and appropriate training to all users [8].

In conclusion, the use of teleradiology, AI and teleworking in Africa is highly recommended during the COVID-19 crisis to ensure safety for professionals and patients on the one hand and increase productivity on the other. However, the optimization of IT solutions and the implementation of the right change process are an important milestone for a successful transition.

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