



WhatsApp and Its Role in Teleradiology

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We are today at the end of an era and the beginning of another, as we look back on a global pandemic which racked the entire world. There are many lessons which we in the health care sector learned from this pandemic. Above all else, what we learned is that the pandemic fostered new and innovative ways of connection. Where these did not exist, they were created. And where they did exist, their use skyrocketed (read Zoom, TikTok). In health care specifically, the use of virtual medicine was deployed and became decentralized to a point where smartphones and social media became an integral part of health care delivery, consultation, and education.^{1–3} Separated from physical connection by the isolation of lockdown, physicians and patients reached out to each other using the tools that were available at their fingertips. And equally important, physicians reached out to other physicians for help and support.

Why Did Coronavirus Disease Effect Such Change?

The coronavirus disease (COVID) scenario was unique for several reasons. First, at the outset there was zero knowledge or experience about the disease. Next, it presented clinical challenges that were unique and unprecedented, namely, (1) rapid onset surges which filled to capacity hospital emergency departments and intensive care units, (2) sudden and ultra-rapid patient deterioration (in the prevaccination era) which exposed the vulnerability of our medical systems, and (3) overworked, exhausted physicians and nurses caring for desperately sick patients leading to a huge staffing mismatch.⁴

On the flip side, the positive outcome in the midst of all the negatives was the creation of an overall environment of innovation, as the human instinct for survival and collaboration took over. Health care made significant advances by adapting and employing technologies that had been available for decades, but never fully utilized.⁵ The research

establishment went into turbo mode to come up with solutions to deal with the crisis. All medical specialties were forced to innovate during the pandemic to navigate the challenges of lockdown. Radiology in particular morphed in several ways—one, it embraced the offsite reading concept which had been in existence for two decades already. As a noted public health expert observed with respect to our 20-year-old organization, Teleradiology Solutions, “It is as though you have been preparing for a pandemic for the last twenty years.”^{6–8} The established success of teleradiology offered in parallel to all of medical specialties a new way of practicing medicine, safely and remotely.^{9,10} The barriers that had constrained the growth of this model came crashing down. And a new way of practicing medicine evolved, in a very short time. The age old practice of medicine handed down to us by Hippocrates has effortlessly melded itself with the modern era technologies of the Internet, in particular, social media.

The Post-COVID World

Now that the COVID dust has settled, it is interesting to reassess the status of social media (in particular, WhatsApp) which has dominated the world of remote radiology consultations.

It is necessary to reflect on and to understand the clinical need which has made the use of WhatsApp ubiquitous during COVID.

Primarily, it is used for the triage of radiographs to determine clinical need for referral, that is, in acute disease. COVID was the perfect application as it involved the use of radiographs. Additionally, the expertise on COVID was limited in the early stages and therefore opinions from experts facilitated clinical decision support and rapid diagnosis for triage. In some cases, the use of artificial intelligence (AI) was incorporated into the paradigm.

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The WhatsApp consultation may also be used in classification or grading of pathology to assist in treatment planning—for example, pediatric or even certain types of adult fractures, where the orthopaedic surgeon can assess the need for surgery on the WhatsApp image.^{11–13} Similarly, in COVID, the need for patient admission was often established.

Viewing of image by clinician prior to accepting referral: WhatsApp can also be used to send an image to the clinician who needs to take a treatment decision.

Where the Need Lies

Rural hospitals: A major beneficiary of WhatsApp teleradiology is the rural hospital with access to imaging (typically X-ray and basic computed tomography [CT]) but no radiologist on site. My daughter worked for a year as a rural doctor in a tribal hospital. Faced with the lack of onsite radiologist support, she would regularly WhatsApp me X-ray and CT scan images of her patients to help her make emergency clinical decisions.

Clinics and diagnostic centers with digital imaging: As diagnostic centers in small towns in India often face issues with obtaining radiologist's time, being able to transmit certain images instantly to a radiologist for an interpretation can be extremely helpful in the acute setting such as injury (bone X-ray) or suspected infection (chest X-ray).¹⁴

General practitioners (GPs) with lack of on-site radiologist support: GPs who seek radiologist support frequently use WhatsApp for this purpose.^{15,16}

Components of the Workflow

Acquisition: In the case of X-rays these may be acquired digitally or using the older film technology.

Digitization: If the X-ray is of the analog type (X-ray film), smartphone cameras today have sufficient resolution to enable high-quality digital image capture.¹⁷

Transmission: WhatsApp upload and transmission of the image from the sending clinic/physician to the account of the radiologist.¹⁸

Interpretation – on smartphone screen or tablet/personal computer: This is not recommended for diagnostic reporting on scale as the image size and workflow are suboptimal especially for CT or magnetic resonance imaging images; however, for analysis of individual X-ray images, sufficient quality can be achieved. This may be supported by AI algorithms.¹⁹

Reporting workflow: This is the Achilles heel of WhatsApp, which is primarily a communication tool and not a workflow organizer. For this reason, WhatsApp cannot currently be efficiently used for reporting of large numbers of images.

Transmission of report to referrer: This may also be done by WhatsApp.

Long-Term Implications

Any long-term opportunity needs to take into consideration these concerns:

Image quality: The primary rule here is garbage in, garbage out. If the images are themselves of poor quality, the digital camera capture is likely to be poor. For images captured from view boxes or workstations, the positioning of the camera and inclusion of all parts of the film are important. Showing multiple thumbnails of CT panels is suboptimal.²⁰

Legal/malpractice: If a clinical decision made based on a WhatsApp consult goes awry, who is legally responsible? This is a serious issue which needs to be further discussed and regulated.²¹ Ultimately, legal liability always rests with the physician/radiologist and cannot be delegated to technology, which is ultimately only the enabler.

Patient privacy/security: Ensuring that patient privacy is not compromised is challenging/cannot be strictly maintained in an open environment such as WhatsApp. Therefore, this interaction has to be conducted in an environment of mutual trust. The patient should ideally be informed, prior to a WhatsApp consult being sought. Images should be cropped to preserve patient confidentiality prior to transmission.²²

Workflow as scale increases: While manageable for single consults, when there are multiple such consultations happening in parallel, the process is likely to break down and here a formal teleradiology workflow platform is needed.

Conclusion

In summary, the COVID pandemic opened a Pandora's box and revealed to us the following.

Social media tools provide a valuable bridge/connection and may be effectively used for health care consultation. While during the pandemic, these were used extensively in the cities, such technologies potentially benefit rural hospitals and clinics the most in the longer term.

This process is especially useful for one-off (known as kerbside) consults, typically for X-rays. However, for any digital solution to be implemented at scale, a workflow platform that incorporates a worklist, communications tracker, quality analytics, and performance metrics is necessary.

Image quality needs to be kept optimal and background clinical data must be provided to ensure relevance of interpretation. Patient confidentiality and legal issues need to be considered for solutions to be deployed safely on scale.

Although the focus of this article has been on WhatsApp, given its popularity and large user base in India (over 535 million users), it must be noted that other providers offer other advantages from the perspective of image sharing. Telegram is another messaging application (albeit less prevalent in India, with an Indian user base of 104 million) that allows for the transmission of larger files (up to 1.5 GB), including Digital Imaging and Communications in Medicine (DICOM) files for reporting purposes. While WhatsApp restricts the file size limit for sending images, Telegram offers a higher limit, making it more suitable for medical image sharing. Further, it is possible to share DICOM files as ZIP files in Telegram, which is not possible in WhatsApp. This makes Telegram a potentially better alternative for medical image sharing, as it preserves the original quality of the

images and allows for more detailed and potentially accurate analysis.

As long as the focus remains on quality reporting, the use of social media tools especially WhatsApp will continue to play a supportive role in radiology.

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Conflict of Interest

None declared.

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