

COVID-19: a blessing to teleradiology

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Abstract

Teleradiology is a developing practice in the field of medicine. It has been developing since the 1950s due largely to its advantages over traditional radiology practice. The COVID-19 pandemic affected clinics and institutions as well as commercial teleradiology businesses. Clinics had to adapt rapidly to the bigger shift in teleradiology as well as the reduction in case volumes while teleradiology businesses had to adapt to the reduction in revenue due to cancellation of elective cases. Overall, the COVID-19 pandemic forced clinics and institutions to adapt further to teleradiology and due to social distancing restrictions, teleradiology proved how useful it can be in maintaining a high quality of case reporting.

Background

Radiology is a mature field of medicine which has existed for well over a century, since the discovery of the properties of X-rays by Wilhelm Roentgen in 1895. Teleradiology's roots on the other hand can be traced back around a half a century later when radiographic images were successfully transmitted through telephone lines.¹ Teleradiology is simply the transmission of medical diagnostic images electronically from one geographical location to another with the goal of diagnosis and/or consultation.² Teleradiology today has great benefits as it allows underserved hospitals to get timely access to off-site radiologists who can report and/or be consulted on outstanding cases, and in turn can act just like on-site radiologists. This is known as external reporting. External teleradiology has also become a business as there are companies that offer hospitals timely radiologist support with emergency cases as well as subspecialty and day coverage. Teleradiology can also be performed by radiologists who are part of a clinic or institution. This is known as internal reporting. Internal radiology is when radiologists report for their institution/clinic without being physically on site. Therefore, teleradiology is practiced in two ways, either by the radiologists from the clinic/institution or through the commercialised route by a business supplying on-demand radiologists to a clinic/institution.²

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Teleradiology growth

The teleradiology market has been on a path of growth for a long time and there are several key drivers for this phenomenon. These factors can be summarised in 4 key points,

- Radiologist shortages
- Increased demand for specialised modalities
- Demand for out-of-hours reporting
- Technology advancement

The first important drivers of growth are radiologist shortages in healthcare systems around the world. In the US it is estimated that there are 11 radiologists per 100,000 people. In some parts of the world, this number can be as low as 1 person per 100,000 people.³ The second driver is the increased demand for specialised modalities – not all radiologists are well versed in all imaging modalities, therefore having access to specialists in each modality is extremely beneficial for maintaining a high quality. The third driver is demand for out-of-hours reporting, which is usually due to time-sensitive situations as well as suspicion of serious injuries such as trauma. Finally, the biggest driver which has facilitated the advancement of teleradiology are innovations in information technology.³ Teleradiology poses multiple technological challenges primarily due to the security and confidentiality of the information being transmitted as well as the timeliness of information transmission. Innovation with internet speed and the movement from web 1.0 to web 3.0, innovations with virtual private network (VPN) systems, security systems and communication systems have enabled major advancements in the field of teleradiology. More recently the use of the cloud has facilitated a faster and easier transmission of diagnostic imaging.³ It is evident that teleradiology has many benefits, as it helped with the problems mentioned above (radiologist shortage in remote areas, demand for specialised modalities and out of hours reporting). However, teleradiology has disadvantages too. Although there are major advancements in technology there is still a higher risk of security breach and the loss or exposure of confidential patient information. Moreover, if a tele-radiologist suffers an internet outage, this could have consequences on the physician's institution which is relying on their reports to be completed in a timely fashion.

COVID-19 impacts

COVID-19 impacts on healthcare and institutions

COVID-19 has had adverse on all healthcare system around the world. The sudden increase in hospital admissions and patients in the intensive care unit has put tremendous pressure on healthcare systems. Moreover, healthcare workers are forced to observe social distancing measures to reduce close contact. COVID-19 has also forced healthcare systems to cancel routine and elective procedures to free up hospital beds and reduce the interactions between people.

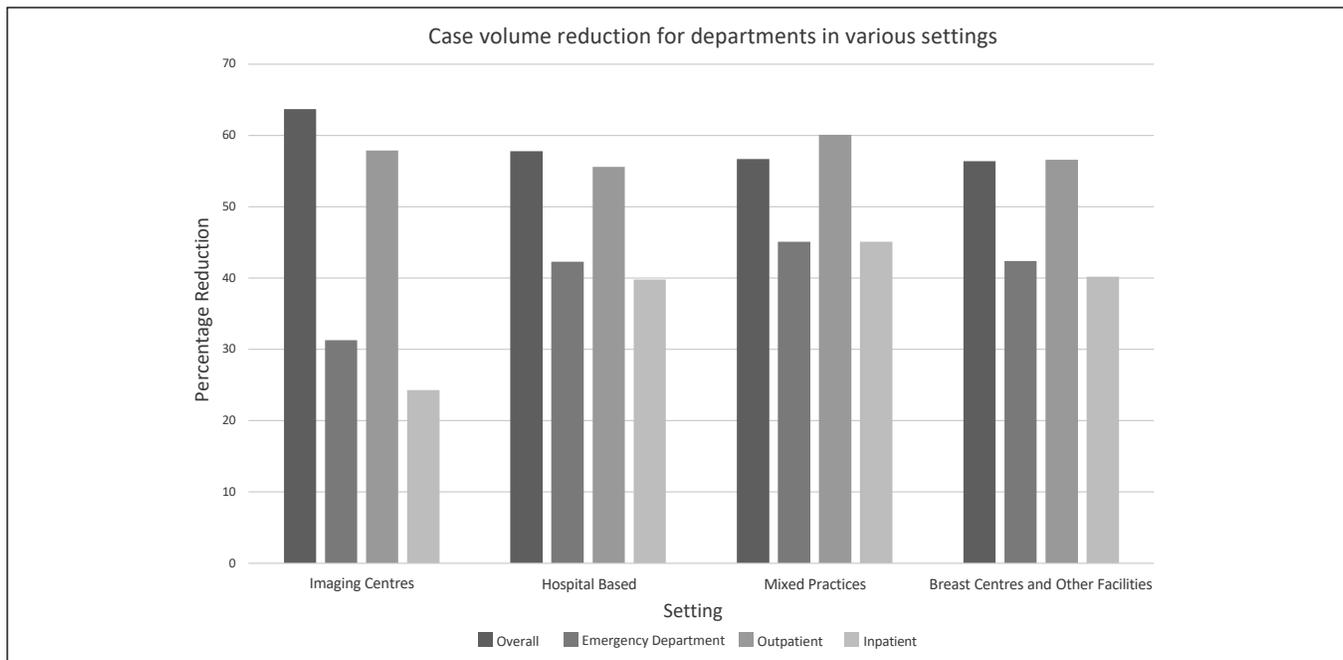


Figure 1. Percentage declines reported from baseline in overall imaging volumes⁵

Furthermore patients cancelled appointments themselves to avoid visiting hospitals and potentially getting exposed to the virus.⁴ This, in turn, had effects on teleradiology as well. In the United States, a study included 28.9% of the American College of Radiologists members as well as members from the Radiology Business Management Association in May 2020 and showed that all members in the survey reported considerable reduction in imaging volumes (approximately a 56.4%-63.7% decrease). Figure 1 shows the detailed reduction in various settings illustrated in the study. It is clear the biggest reduction was in the outpatient setting.

The same study also reported that 67% of practices reported that radiologists were staffed to remote locations. Moreover, 62.3% reported they already existing remote teleradiology capabilities prior to COVID-19. However, 22.3% had to develop their teleradiology capabilities to allow their radiologists to work remotely.⁵ The reduction in case volumes from Figure 1 agrees well with the fact that healthcare stopped all elective procedures as mentioned earlier as one of the effects of COVID-19. Moreover, as mentioned earlier, some patients cancelled their hospitals appointments themselves to avoid going to the hospital and potentially getting exposed. This might explain the relatively bigger drop in outpatient case volumes relative to the other settings. Another study on 174 institutions around the United States found an overall jump of 65.2% in the installation of home teleradiology workstations as well as 73.6% switching normal daytime shifts to internal teleradiology. Interestingly, there was no visible correlation between home workstation adoption and hospital admissions.⁶

COVID-19 impact on teleradiology businesses

As mentioned, teleradiology businesses provide support to hospitals during high demand times such as afterhours emergency reporting as well high demand daytime shifts. From Figure 1 it is

evident there was a drastic drop in case volumes in the emergency department and outpatient setting too. This meant that the extra cases the clinic needed external support in reporting were considerably lower. Moreover, the cancellation of electives meant that even fewer cases were available for teleradiology business to report. Consequently, this meant that teleradiology business received fewer cases to report, resulting in reduced revenue. Unfortunately, the vast majority of teleradiology business are private and hence do not report their earnings. However an example of a public teleradiology company is Medica Group PLC which is based in the United Kingdom and reports primarily to the United Kingdom's National Health Service (NHS). Medica Group PLC reported a revenue decline of 22.7% between the first half of 2019 compared to the first half of 2020. The revenue loss was primarily due to the suspension of elective procedures where Medica lost 42.4% of their annual revenue from electives.⁷ The results from Medica Group correlate well with previously mentioned data around the cancellation of electives reducing the number of case volumes.

Future of teleradiology post-COVID-19

Prior to COVID-19, teleradiology was a thriving market, it is expected to be worth \$22.8 billion by 2025.⁸ The industry is growing at a much faster rate than most other markets. The value of the teleradiology market in 2020 is \$7.9 Billion.⁸ This means the market is expected to grow by nearly 290% in 3 years. Although COVID-19 has added an economic hindrance to almost all global markets, it has helped pave the way for wider acceptance and integration of teleradiology in more practices. In the study done on the 174 institutions in the US, 64.3% (36 of 56) of the private institutions in the study desired to continue a similar internal teleradiology workflow after the pandemic, 47.5% (29 of 61) of the hospital-owned practices in the study share a similar approach to

the private practices and finally 63.6% (35 of 59) of the community institutions would like to continue a similar internal teleradiology workflow after the pandemic. A majority of 64.8% of respondent reported a decreased stress level.⁶ For teleradiology businesses, it is looking promising too. Medica reported that although there was a considerable revenue loss in 2020, there was a 95% recovery in their emergency procedure reporting by the end of the of the first half of 2020, and electives reporting started recovering to 10% by the end of the first half of 2020.⁷ Moreover, with the continued development of information technology and better security and communication systems, teleradiology will continue to advance. Therefore, although teleradiology was negatively affected by the COVID-19 pandemic it has helped its wider acceptance in the long-term.

Conclusion

Although the COVID-19 pandemic has caused a drastic reduction in case volumes, it is also evident that there are positives to come out of the pandemic. It has forced a huge shift to teleradiology in a very short period of time which would have taken much longer to happen without COVID-19. Whether COVID-19 is a blessing to teleradiology or not is subjective. one can argue that in the short term it is not a blessing due to case volume reduction. However, in the long term, it can be argued that it has greatly helped the wider spread of teleradiology and accomplished milestones which may have taken months or even years to be done.

Acknowledgements

This report would not have been possible without the help & guidance of Dr Mohamad Saied, an NHS radiologist with vast experience in the teleradiology field. Moreover, the knowledge from Dr Sajeesh Kumar and Dr Elizabeth Krupinski's book: Teleradiology has really set the foundation for the breadth of knowledge that encouraged me to write this report.

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