Covid-19: free resources to support radiographers

Peter Hogg (University of Salford, UK), Ken Holmes (University of Cumbria, UK), Jonathan McNulty (President, EFRS, European Federation of Radiographer Societies, Catharijnesingel 73, 3511 GM, Utrecht), Donna Newman (President, ISRRT; Sanford Health System in Fargo, North Dakota, USA), Dorothy Keene (The Society and College of Radiographers, UK), Charlotte Beardmore (The Society and College of Radiographers, UK).

Introduction

The first report of a new Coronavirus disease (Covid-19) was in December 2019 and the disease was declared a pandemic by the World Health Organisation (WHO) in March 2020[1]. At this point WHO called on governments to change the course of the outbreak by taking urgent and aggressive action. By the end of April, the number of cases was in excess of 3 million with 211,350 deaths worldwide. Covid-19 is related to previous pandemics - SARS-CoV-1 (SARS) and Middle East respiratory syndrome (MERS)[2] and it can be asymptomatic or result in mild to severe symptoms. Unlike influenza it can be contagious before symptoms are apparent[3]. Due to the highly contagious nature of the disease, rapid and reliable diagnosis is critical. Medical imaging has valuable roles in the diagnosis and management of the Covid-19 patient and radiographers have already started to share their experiences with imaging it[4 5 6 7 8]. Chest computed tomography (CT) has diagnostic value[9], though presents challenges including CT availability, the complexity of imaging patients who may be on ventilators and the time taken to decontaminate the CT scanner and room after a Covid-19 patient has used it. For these reasons mobile chest radiography (CXR) has become the most commonly utilised imaging modality for the radiological follow up of lung abnormalities[10].

For the purpose of raising the profile of web-based resources to help radiographers understand more about Covid-19, this Guest Editorial outlines why and how the resources were created as well as explaining what they are and how to access them.

The need for an information source about mobile chest radiography

On April 4th, 2020, an urgent need was identified to create an international source of information to help radiographers across the world to manage the imaging of Covid-19 patients using mobile CXR and to take the necessary steps to minimise the chance of them contracting the disease. Three factors informed the rationale for creating this information source. First, not all countries were able to provide detailed information to their radiography workforce about protection against contracting Covid-19. Second, with an emphasis on mobile CXR, there was limited information available within the public domain to reskill and/or upskill the workforce which was being redeployed to undertake these examinations. Third, there was potential for a massive amount of replication to occur at hospital, regional and national levels to address this information deficiency; it was estimated that tens of thousands of radiographer hours would be directed away from caring for patients and instead invested in creating training opportunities for staff about Covid-19 and CXR.

Creation of the web-based learning and support materials

Creation involved close collaboration between International Society of Radiographers and Radiologic Technologists (ISRRT) and European Federation of Radiographer Societies (EFRS), with substantial input from e-Learning for Healthcare (e-LfH, UK) / Society and College of Radiographers (SCoR, UK). National input also came from colleagues across the world, this included the Italian Federazione della Associazioni Scientifiche Radiologia (FASTeR), who had a good deal of relevant experience to share. Several content teams were established around topics and they read widely and drew on personal experiences to create website materials. Teams tended to be multinational and given the restricted development timeframe, time zones created a few communications problems; also, team members often didn't know one another and that too created a few challenges. Content teams contained a broad range of subject experts, including a virologist, academic / clinical radiographers with varying areas of expertise, medical practitioner, eLearning design specialists and microbiologists. We only wanted people to work on this project who were authorities on their subjects, this was because time was severely limited and the luxury of allowing contributors a chance to start learning new fields from scratch was lacking. Web programmers uploaded and organised web content, then added functionality; a graphics artist drew or redrew images as needed; and new videos were created with a professional camera man taking and then editing video shoots.

The primary communication medium of the website is text with hyperlinks to relevant external and internal content, this facilitated random access within and between topics. To assure quality, peer review was used; reviews were turned around within a 24-hour period this included feedback to content authors for changes to be made. Web platforms that were used to house the contents included ISRRT eLearning platform (https://www.elearning.isrrt.org/) and e-LfH platform. Four e-LfH sessions have been developed using the web content from the collaboration's work, this includes ensuring safe practice for radiographers, their families, colleagues and the wider community and secondly to provide detail of how to produce and evaluate diagnostic quality chest radiographs. The sessions are: 'Minimising Risk during Mobile Radiography'[11]; 'Mobile Chest Radiography'[12]; 'Image Evaluation for the Diagnostic Quality of Chest Radiographs including Covid-19 cases'[13]; 'Radiographic Practice'[14]. Links, using URLs, exist between the platforms. ISRRT / EFRS platforms will be used for webinars in due course. ISRRT eLearning platform and e-LfH eLearning resources went live on 22nd April 2020, 18 days after the concept was proposed.

Main Covid-19 resource content

The following explains, in brief, the content of each section of the website.

Section 1: What is a virus? What is Corona virus and why is it different?[15]

This section helps the reader establish an understanding of why Covid-19 is so harmful to humans and why it is different to other viruses. It explains why it is easy to catch. It covers the nature of viruses, describes how they multiply within their host and explains some basic principles of minimising the spread to yourself and the community.

Section 2: Measures Radiographers can take to minimise risk to themselves during professional working and their families[16]

Within this section, Personal Protective Equipment (PPE) usage is explained and professional practices are outlined that should minimise risk to you and your loved ones. Physical and mental well-being of radiographers during self-isolation due to Covid-19 is explored. Finally, coping with wearing PPE in your professional work is considered.

Section 3. Effective communication[17]

Effective communication is an essential factor in healthcare to improve patient safety and staff safety and this is even more so when Covid-19 is confirmed or suspected. This section provides some background on effective communication and discusses aspects of communication between staff and with patients in the context of Covid-19. This component is under development and should be available by 9th May

Section 4: Mobile X-ray equipment[18]

As the pandemic progresses, the medical community will frequently rely on mobile CXR due to its widespread availability that currently limits CT utilization. This section explains how to use a mobile X-ray machine and perform mobile CXR on Covid-19 patients. It also considers the parameters which will optimise radiation dose / image quality for mobile CXR.

Section 5: Radiographic procedure[19]

Undertaking radiographic procedures when there is a possibility that the patient suspected or confirmed Covid-19 positive brings challenges. This section explains how to undertake a mobile CXR examination on a Covid-19 patient. Importantly it outlines how to produce a diagnostic image at the first opportunity.

Section 6: Radiation protection[20]

Radiation dose is important, and this should always be kept As Low As Reasonably Achievable / Practicable. This section explains radiation protection measures that can be taken for a mobile CXR on a Covid-19 patient.

Section 7. Image review and reporting[21]

This section explains how to use the 10-point plan to ensure the image is diagnostic. It also provides details on how to identify common radiological appearances on the CXR of Covid-19 patients; it also outlines the importance of communicating findings to the referrer.

Section 8: Patient informatics[22]

This section focuses on the main challenges to be considered by PACS teams or other individuals who support the I.T. functionality of Radiology services, which will also be affected by the provision of imaging during this outbreak.

Section 9: Audit and Learning[23]

This section introduces audit and in situ review and the possible topics to review. It has four components - ‘Imaging activity data’, Technical aspects’, ‘Accuracy of CXR versus CT’ and 'Effectiveness’.

How to use the materials

There is no set way in which the web-materials should be used or accessed. It could be that radiographers work through them on their own volition at home or at work. The materials may be accessed sequentially, thus experiencing everything; or they may be accessed on an individual needs basis. Continuing Professional Development (CPD) Officers or Radiology Service Managers might direct their staff into specific topics, for upskilling and/or reskilling purposes. Similarly, university lecturers / teachers might direct their students to work through all or some sections; equally university lecturers / teachers may download information to use within their own classroom teaching. A key point to note is the web resources do not replace practical training alongside an experienced radiographer; this activity should run alongside the theoretical training provided on the web.

Advertising, use and updating of the web resources

ISRRT and EFRS along with many national radiography societies have been promoting, actively, the web resources. In the first 7 days, over 4000 people from 107 countries (from all the continents) used the site. Updating of web resources will be considered as any new information emerges in this rapidly changing pandemic.

Acknowledgments

The ISRRT and the EFRS are grateful to have had the opportunity to collaborate and help provide this resource for the radiographers around the world. This project demonstrates how the use of resources from key experts facilitates collaboration across several organisations with similar missions. Using the knowledge, skills, facilities, and resources from ISRRT and EFRS member societies, together with the expertise of groups such as e-Learning for Healthcare and College of Radiographers (UK), allowed this rapid content development process. In particular we should like to thank the following people, without which the web-resources would not have been possible.

Moreno Zanardo, Alex South, Anant Patel, Alex Peck, Andrew England, Angie Devetti, Ben Mollo, Jo Webb, Deborah Harrison, Charlotte Thompson, Chloe James, Christopher Boothman, Cláudia Sá dos Reis, Demetra Kapnia, Dimitris Katsifarakis, Nikolaos Delikanakis, Denise Choong, Desmond Hoon, Diego Catania, Ian Goodhead, Jonathan Loui Portelli, Judith kelly, Natalya Fox, Julie Nightingale, Julie Woodley, Liang Chongri, Luis Lança, Neil Withnell, Nick Woznitza, Nikos Delikanakis, Rachel Newcombe, Roberta Gerasia, Seth Kwadjo Angmorterh, Shane Foley, Stefano Durante, Stewart Whitley, Tay Yi Xiang, Victor Shane Clampitt, kholoud Zuood, Jackie Chong Ri Liang, Riccardo Biffi, Matteo Migliorini, Marco Nicolò, Stefano Pacifici, Cristina Poggi, Camilla Risoli, Marco Santucci, Stefano Santucci, Richard Birtles.

[1] WHO website https://www.who.int/emergencies/diseases/novel-coronavirus-2019
[2] Birtles R, Goodhead I and James C Accessed 28th April 2020 https://www.elearning.isrrt.org/mod/book/view.php?id=236
[3] Rubin GD, Ryerson CJ, Haramati LB, Sverzellati N, Kanne JP, Raoof S, Schluger NW, Volpi A, Yim JJ, Martin IBK, Anderson DJ, Kong C, Altes T, Bush A, Desai SR, Goldin J, Goo JM, Humbert M, Inoue Y, Kauczor HU, Luo F, Mazzone PJ, Prokop M, Remy-Jardin M, Richeldi L, Schaefer-Prokop CM, Tomiyama N, Wells AU, Leung AN, The Role of Chest Imaging in Patient Management during the COVID-19 Pandemic: A Multinational Consensus Statement from the Fleischner Society, CHEST (2020), doi: https://doi.org/10.1016/j.chest.2020.04.003.
[4] https://doi.org/10.1016/j.radi.2020.04.016
[5] https://doi.org/10.1016/j.radi.2020.04.010
[6] https://doi.org/10.1016/j.radi.2020.04.008
[7] https://doi.org/10.1016/j.radi.2020.04.005
[8] https://doi.org/10.1016/j.radi.2020.04.002
[9] Zhou S., Wang Y., Zhu T., Xia L. CT features of coronavirus disease 2019 (COVID-19) pneumonia in 62 patients in Wuhan, China. Am J Roentgenol. 2020:1–8. March.
[10] ACR recommendations for the use of chest radiography and computed tomography (CT) for suspected COVID-19 infection American College of Radiology
[11] https://portal.e-lfh.org.uk/Component/Details/628359
[12] (https://portal.e-lfh.org.uk/Component/Details/628364)
[13] https://portal.e-lfh.org.uk/Component/Details/623355
[14] Insert final URL when it is published
[15] https://www.elearning.isrrt.org/course/view.php?id=12#section-3
[16] https://www.elearning.isrrt.org/course/view.php?id=12#section-4
[17] https://www.elearning.isrrt.org/course/view.php?id=12#section-5

[18] https://www.elearning.isrrt.org/course/view.php?id=12#section-6
[19] https://www.elearning.isrrt.org/course/view.php?id=12#section-7
[20] https://www.elearning.isrrt.org/course/view.php?id=12#section-8
[21] https://www.elearning.isrrt.org/course/view.php?id=12#section-9
[22] https://www.elearning.isrrt.org/course/view.php?id=12#section-10
[23] https://www.elearning.isrrt.org/course/view.php?id=12#section-11