THE ROLE OF THE
RADIOGRAPHER
IN A PANDEMIC
Cover artist - Leslie Robinson

Leslie trained to be a radiographer in the UK in the early 1980s and then worked as a radiographer in the UK and Saudi Arabia, eventually specialising in CT and MRI. She went on to become a radiography lecturer and researcher at the University of Salford in the UK.

She has presented all over the world, has published widely and achieved a Doctorate in Education. She was recognised for her work by the UK Society of Radiographers, receiving the Radiographer of the Year prize [regional and national] twice. This year she was awarded the prestigious Fellowship of the College of Radiographers.

Leslie always enjoyed the visual element of radiography and, on retirement in 2018, she dusted off her paint brushes and started to paint again. Her love of painting the human form has been enhanced by many years of looking at and understanding radiographic anatomy. She has integrated this knowledge into her paintings to show both the abstract and objective sides of the human form.

The piece on the cover of this edition was a special commission by the ISRRT and depicts radiography in the covid pandemic. Lungs that were previously life-giving [represented by flowers] are swiftly ravaged by covid, the evidence of which is ‘beautifully’ illustrated on a daily basis by radiographers around the world: radiography is truly an art form in its own right.
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In this Special Edition, articles and reports by authors/societies do not necessarily reflect or represent the opinion and thesis of the ISRRT.
WORLD Radiography Day will be celebrated around the world by radiographers/radiological technologists on November 8, 2021. As we celebrate, let’s be sure to honor and remember Radiographers / Radiological Technologists key role in patient health care during this COVID pandemic in the delivery of medical imaging and radiation therapy. I am excited to share the third special edition of World Radiography Day, “The Role of the Radiographer in a Pandemic” with our members and health professionals around the world.

It has been well documented in the literature that chest radiography is being used as a first-line imaging tool in the pandemic and that chest CT is being used on critically ill patients. Although chest radiography is the most common procedure being used all imaging professionals have been impacted by the COVID pandemic and the procedures they perform every day. In response, they have had to adapt their daily practices to ensure the best health care for our patients.

Although this group of individuals successfully managed to provide quality patient care even during the first months of the pandemic, it came at a high price. Unfortunately, many lives have been claimed, including many of our colleagues. Our thoughts and sympathy continue to be with their relatives and friends. This year’s theme was chosen to raise awareness and help celebrate, honor, educate, and shape the perception of radiographers/radiologist technologists’ role throughout the pandemic. The resilience of radiographers/radiological technologists throughout the pandemic is to be celebrated and each of you is to be recognized for your knowledge, skills, expertise, and care you exhibit each day in your efforts to support your patients as frontline healthcare professionals.

Radiographers/radiological technologists serve as frontline healthcare workers. Although there are risks associated with COVID-19, as professionals we engage in optimal strategies to contribute to patient safety precautions and safe environments, to prevent infection transmission during our procedures, and to provide the best care for our patients while keeping ourselves healthy and safe.

ISRRT collaborated with ISRRT Member Experts, ISRRT Member Societies and Regional Stakeholders to create this special addition honoring and highlighting the radiographers/radiologist technologists role during this pandemic.

This year, throughout this issue, you will find a celebration of our member societies and the radiographer professionals in their countries. We know each of you has played a vital role in health care during this pandemic. Your work matters and we thank you for the care you give to patients across the world every day.

As ISRRT President, I am proud of the work our ISRRT member experts and ISRRT Board of Management developed and produced during the COVID-19 pandemic. These projects allowed ISRRT to collaborate, network, and represent one global voice for radiographers/radiological technologists while collaborating with the WHO and IAEA in the development of Safety Standards for Professionals and in elevating standards of care for patients during this pandemic.

Collaborative efforts with our member experts produced ISRRT educational materials, modality procedures, and best practice guidelines which are available on the ISRRT E-learning platform and ISRRT website. This included a guidance on technical specifications for the acquisition of imaging equipment to support Member States in their response to COVID-19 pandemic. This guidance document is aimed to define the minimum technical requirements of ultrasound scanners, mobile digital radiography equipment, and CT scanners with the primary purpose to be used in COVID-19 management, but also suitable for multiple other general and specific purposes after the pandemic in different resource settings.

We hope you enjoy this publication and that you will find relevant resources, educational tips, and ideas that will help radiographers/radiological technologists incorporate safety practice while performing diagnostic medical imaging procedures and treatments on patients during this pandemic. ISRRT also hopes that ISRRT members and radiography stakeholders will enjoy celebrating our member societies and radiographers’/radiological technologists’ stories as frontline healthcare workers. Know that radiographers/radiological technologists have influenced, impacted, and created change in their daily workplace within each of your countries during this pandemic.

Donna Newman
ISRRT President
COVID-19 pandemic: How the education in radiography & radiological technology program may cope with the COVID-19 pandemic

By Yudthaphon Vichianin

IN THIS article Yudthaphon Vichianin, as the ISRRT Director of Education, will discuss how our education might cope with the COVID-19. Drawn from the UNESCO website, students around the globe were affected by the pandemics. At the peak of the COVID-19 pandemic, data from UNESCO indicated that more than 1.6 billion learners in more than 190 countries were not in school. More than 100 million teachers and school staff were obstructed by the sudden closures of academic related institutions. In many parts of the world’s more than 800 million learners is affected by school closures (part or full closures). As of this writing, in Thailand, the schools and colleges mostly operated as Work-from-home (WFH) or online-only activities.

In my perspective of lecture-based, project-based, or problem-based learning activities, moving from in-class toward online learning by utilizing technology-enabled software and online meeting platform may help empowering the teaching and learning in the Radiography & Radiological Technology education.

Most of the activities now are performed as virtual classroom using various platform available in the cloud. For example, Google classroom is one of the widely use learning management system and freely available at https://classroom.google.com. Microsoft Team and Zoom are also popular choices for online meetings and online webinars. Moodle is also one of the most popular learning management platforms available for free of charge that schools may consider implementing for online learning. One can download and try Moodle for free at https://moodle.org. The Moodle is ubiquity access platform by offering both desktop and mobile [native application] versions for use with its platform. This is considered huge advantages for students who can learn anywhere, anyplace, and on any device.

Another tool that might be useful for supplemental activities is the Massive Open Online Course or MOOC that is freely available on the Internet. Educators may use these as additional assignments for students in their course in addition to the traditional class materials & activities. This is an example of a short list of MOOCs for your fun start!

Table 1. Example courses as MOOCs available on the Internet at no cost

<table>
<thead>
<tr>
<th>Course</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advance Cardiac Imaging: Cardiac computed tomography</td>
<td><a href="https://qrgo.page.link/eKsK4">https://qrgo.page.link/eKsK4</a></td>
</tr>
<tr>
<td>Basic steps in magnetic resonance</td>
<td><a href="https://qrgo.page.link/VbGxo">https://qrgo.page.link/VbGxo</a></td>
</tr>
<tr>
<td>Imaging in medicine</td>
<td><a href="https://qrgo.page.link/aNbo6">https://qrgo.page.link/aNbo6</a></td>
</tr>
<tr>
<td>Interpretation of chest radiograph</td>
<td><a href="https://qrgo.page.link/Ji41K">https://qrgo.page.link/Ji41K</a></td>
</tr>
<tr>
<td>Medical radiography explorations</td>
<td><a href="https://qrgo.page.link/ISzBC">https://qrgo.page.link/ISzBC</a></td>
</tr>
<tr>
<td>Metals in medicine</td>
<td><a href="https://qrgo.page.link/dxYSE">https://qrgo.page.link/dxYSE</a></td>
</tr>
</tbody>
</table>

Kolb [1984, p. 38] indicated that “learning is the process whereby knowledge is created through the transformation of experience”.

Figure 1. Transformation of experience diagram [Klob, 1984, p.38]
Kolb’s experiential learning theory presented a four-stage cycle of learning as depicted in figure 1.

According to Kolb, some parts of the process, such as “2) observe and reflect on the experience” and “3) analyze and conclude” processes might be able to deliver through online lecture style. However, gaining experience and testing what they learn in real world setting via clinical practicum might not be replaced by the online meeting lecture style. We might need the redesign the student learning process in this pandemic period to enable our students gain enough experience and gain confidence for their job placement.

As I learned form my students and my school, I found that, physically, most of them are struggled with eye-strain and back-pain from long hours online classes. Mentally, they are also frustrated with loss of concentration and content connections during the e-lecture these days. A short survey has been conducted in my class and found that the students suggested one-on-one online tutoring session might be needed. Small group study and access to laboratory (x-ray room) is required as permitted by laws (i.e. less than 5 people). They even suggested buying virtual reality software for x-ray positioning & therapeutic simulations that our school do not have on hand. As a result, at my program, a senior project was to develop an “RT-Way” app, a mobile game for learning the Radiation Protection as included for download in the list 1. I also compiled a short list of mobile applications is sampled and presented on the table bellow for you to try them out in the list 1 (Android apps) and list 2 (IOS apps).

More and more application software that supplements the clinical placement may be in need and could be developed to address the issue of radiology education in this COVID-19 pandemic period. I hope I can find these kinds of software freely available offering by leading firms in radiology domains for training our students and healthcare personals during this difficult time of the COVID-19. I hope you are well and stay safe!

Bibliography
2. www.simplypsychology.org/learning-kolb.html

Yudthaphon Vichianin
ISRRT Director of Education

List 1. Examples of android mobile application

RTWays: App for self-learning in Radiation Protection developed by Yudthaphon Vichianin’s students at the Radiological Technology program, Mahidol University, Thailand. https://qrgo.page.link/pg4J7
RX - Radiological Positions is an App created for students, technicians, graduates, interested in Radiology and its study, etc. https://qrgo.page.link/XNb9V
MRI - Resonance Protocols in an app that was created for all students, radiologists and graduates in Bio-Image production. https://qrgo.page.link/XUZGU
RAnatomy: CT provides a dynamic and interactive method of viewing cross-sectional human anatomy on computed tomography (CT). https://qrgo.page.link/d1rov
AMBA is the definitive MRI neuroanatomy guide. https://qrgo.page.link/dk5hq
Neuroanatomy SecondLook™: a study aid that provides a series of neuroanatomical images. https://qrgo.page.link/zkU9r

List 2. Examples of IOS Mobile application

PowerShare is a secure cloud-computing platform for medical image storage. https://qrgo.page.link/ZxAqN
RADIOLOGY ASSISTANT 2.0 Concise, peer-reviewed articles from expert radiologists https://qrgo.page.link/5w2s5
Brain MRI Atlas is a FREE app that allows you to navigate through hundreds of labeled brain structures. https://qrgo.page/link/T6HG2
Radiology Toolbox is the radiologist's ectopic brain. https://qrgo.page/link/YPqWq
Radiation Emergency Medical Management [REMM] https://qrgo.page/link/DJGhk
The COVID-19 pandemic – a personal experience

By Claire Borrelli, United Kingdom

HAVING started my radiographic training back in 1981 and qualifying in 1984 at Westminster Hospital, I now march my way onwards to 40 years in the NHS and what a journey! I worked in my early years post qualification in the same Trust, seizing the opportunity to consolidate my knowledge and clinical skills to enhance my career development so that I could strive to be the best that I could be. Having been faced with the Harrods’s bombing, nail bombings, shootings, forensics and a wild card of a one-year secondment role working at London Zoo, I started my radiographic career with a level of enthusiasm and commitment to my chosen profession.

As the years progressed, I have worked in more senior roles and latterly leading specific specialities, always within London Hospitals, finally landing in Breast Screening from 2002, she became Head of Education & clinical training in mammography at St George’s National Breast Education Centre and is currently the Radiographic Advisor to the NHSBSP/ PHE, England. Claire is an independent advisor for the private sector and an Editor of European Journal of Radiography. She has been a member of the NICE Guideline Development Group for early breast cancer and a member of the Clinical Professional Groups representing NHS Breast Screening Programme for Radiography, Equipment & Physics. Claire has been the lead for introducing the Eklund technique to all women attending for breast screening within England that present with breast augmentation. In 2015, Claire undertook a secondment role as the Radiographic Advisor and Lead Breast Screening Radiographer to the NHSBSP/NHS England & Improvement. Claire is developing the mammographic workforce to improve and sustain a high quality breast screening service and ensure safe ergonomic practice for all practitioners specialising in mammography.

Claire Borrelli
Claire qualified as a diagnostic radiographer in 1984 at Westminster Hospital, London and started her mammography career at St George’s Breast Screening Unit in 1991. As deputy superintendent radiographer and mammography clinical training lead, Claire went on to train as an Advanced Practitioner and maintained her role as a clinical instructor. In 2002, she became Head of Education & clinical training in mammography at St George’s National Breast Education Centre and is currently the Radiographic Advisor to the NHSBSP/ PHE, England. Claire is an independent advisor for the private sector and an Editor of European Journal of Radiography. She has been a member of the NICE Guideline Development Group for early breast cancer and a member of the Clinical Professional Groups representing NHS Breast Screening Programme for Radiography, Equipment & Physics. Claire has been the lead for introducing the Eklund technique to all women attending for breast screening within England that present with breast augmentation. In 2015, Claire undertook a secondment role as the Radiographic Advisor and Lead Breast Screening Radiographer to the NHSBSP/NHS England & Improvement. Claire is developing the mammographic workforce to improve and sustain a high quality breast screening service and ensure safe ergonomic practice for all practitioners specialising in mammography.

For many, we would undoubtedly never have believed that we would be pushed both physically & mentally to cope with all that would be asked of us both personally and professionally. With the Breast Screening Programme being paused in England at the end of March 2020, there was much to consider. I believed that a sensible approach was to take a moment to identify and reflect upon what the key priorities were at the time. Trying to predict what the future of work & life would look like, & what skills we would need in our various roles to meet the challenges moving forward was an enormous question, potentially with no simple answer. For myself, I could identify 3 key elements for consideration in which adapting the working practices and developing a resilient workforce would be critical to ensure the success and continuation of mammography training, restoration and recovery of service delivery and personal development.

Firstly, when exploring the future delivery of mammography related academic courses and clinical training to support the development of the mammography workforce, this was no easy remit. As a provider of education and clinical training, there was a perceived level of urgency to minimise a delay to support the development of the workforce. A workforce crisis being met with the tsunami that was the pandemic was not a good mix – but we could embrace change and become adaptable, every bone in my body believed this! The 5 national training centres recognised that to work collaboratively was a way to explore and agree best steps moving forward in the delivery of online academic teaching. Regular meetings took place during the transition and identified that timescales for moving teaching materials online may be variable across the country dependent on Trusts and University facilities to enable this change. Whilst this was true, this was...
ultimately achieved in a short duration of time due to the excellent support from colleagues within Trusts and Universities to support us in this transition. Whilst we anticipated a bumpy road to change our style of academic delivery, in reality, perhaps much of the experience has brought with it some positive outcomes. With less face to face academic teaching, we now have the advantage of colleagues attending courses from far and wide with no implications for the cost of travel and accommodation to the employer. Feedback from many delegates nationally has indicated this is now a preferred option for the reasons identified and personal experience in that time spent travelling and away from family life is reduced. This evidence will inform strategy for future delivery of courses – and is currently a discussion for many involved in education – there is much to consider, including a mix of hybrid solutions. Watch this space! Clinical training provision within the national training centres did vary from reduced days for clinical training to full access to practice. Whilst the Government supported the continuation of clinical training in healthcare, the decision was ultimately made by the employer of individual students and to their own trust policies in response to the pandemic with releasing staff to other Trusts. All clinical training was negotiated and agreed between the identified training centre and the employer to meet the current Government Guidelines and will continue to do so moving forward. At the beginning of the pandemic, this initially felt like a large mountain to climb and yet as educators, this has been achieved with a high level of success. Both the educators and the students have acquired new skills that have helped us meet the many challenges that we have faced – we continue to embrace change and be adaptable!

Secondly, in my role as the Radiographic Advisor to the NHSBSP/PHE, many breast screening units within England paused in March 2020 from service delivery until further notice. Within this element of my role, new considerations were identified and working with key stakeholder groups was critical to the success of the recovery and restoration of the breast screening programme which remains ongoing for many to reduce the backlog of appointments. The key priority was to ensure that robust national guidance was in place to support services in these challenging times with my key focus being that of the workforce and equipment. Ensuring resilience within the workforce was key knowing that we already had a depleted workforce within the service. Add into the mix that our staff may also become victim to the pandemic and have personal anxieties – as managers, we need to ensure that we must guide colleagues through such change and adversity with robust guidance documents in place. Identifying key updates to guidance was undertaken as a collaborative approach with key stakeholders to ensure timeliness of updates to support the recovery and restoration of the service. These included: Mobile specification - design features (upholstery, air flow etc) and whether a mobile unit was still appropriate for use during a pandemic (workflow through the van and number of clients on-board to meet social distancing)

Mammography x-ray equipment - many services paused for a period of time and equipment remained unused. Working with our colleagues in the National Co-ordinating Centre for the Physics in Mammography (NCCPM) and representatives from the manufacturers – specific guidance was published to ensure the safety and compliance of all equipment leading to restart of the programme.

Working conditions for the workforce was important to ensure safe working practice whilst adhering to Government Guidelines and ensuring working with our colleagues at The Society of Radiographers was an important element to support our workforce. Inviting the women back to screening – assuring the population that returning to screening was a safe environment was a critical message to share when the backlog was estimated at approximately one million women, now there’s a challenge that we are still working on but progress is being made.

Whilst the breast screening service was paused, many colleagues employed within the breast screening programme were redeployed to main radiology departments. Although I had commitments to the responsibilities that I had in education and as the Radiographic Advisor to the Breast Screening Programme – something stirred within me. At the core of everything that I do and everything that I am – I am a radiographer. I had an enormous pull to join forces with my colleagues on the front line. I wanted to help where I could and support less experienced staff in a pastoral way if not a clinical remit as I was honest to acknowledge my limitations in general radiography that was now a dark and distant memory! Nobody had experience in these specific challenges that now faced us with the pandemic – we could all learn and adapt together. An important part of managing the changes that were being forced upon us in an ever changing world was how we could manage stress, how we might respond to these challenges but something that I did know was that we were stronger together, supporting each other and comradery at such a time was, and still is, our strength. With this in mind, I offered to seek support from the main radiology team so that I could be re-introduced to the mobile x-ray machine so that should numbers of staff dwindle further in the main department or at local hospitals or the Nightingale in London, I was already prepared and could leap into action and be ready! The shifts that I did work were often demanding, tiring, emotional and at times, perhaps a little bewildering – we hadn’t been trained for this but these experiences took team work to a new level. Although working clinically in general radiography is no longer within my daily routine within my job description, on reflection, from the three separate challenges that I faced at the onset of the pandemic, I gained the most personal reward from remembering my roots, I am a radiographer first and foremost and I have the utmost respect and gratitude for all of my colleagues along the way.

Here we are 16 months on. Looking back, many of us will have either witnessed or experienced painful loss and only time will help us heal. The past months have provided an unexpected opportunity to learn more about our colleagues and ourselves than we first anticipated. We have learnt that we not only have the ability to adapt and survive, we also have the potential to reflect and potentially improve both personally & professionally, perhaps more than we ever believed possible. As we now celebrate the 73rd anniversary of the NHS, Queen Elizabeth II has awarded the George Cross to the NHS to recognise all staff ‘past and present’. The Queen continues to state that staff have acted “with courage, compassion and dedication” – I couldn’t agree more. I am a radiographer and I am proud of all radiographer’s – past, present and future. ❄️
The Impact of the prolonged pandemic on the practice and psychosocial status of radiographers and the new norms: An observation in Hong Kong and Shenzhen

By Edward Chen, Hong Kong

The beginning of the COVID-19 pandemic in Hong Kong and Shenzhen

In late December 2019, China Government informed the World Health Organization that a cluster of pneumonia cases with unknown causes was detected in Wuhan City, China. Meanwhile, a group of Hong Kong healthcare professionals working in the University of Hong Kong Shenzhen Hospital [HKU-SZH], China, heard about this information in early December. Since they have experience with the 2003-Severe Acute Respiratory Syndrome (SARS) outbreak in Hong Kong, they informed the local staff to start preparing for the pandemic arriving in Shenzhen, such as checking the PPE stock and familiar the workflow before Christmas in 2019.

After the new year holidays in 2020, HKU-SZH found the first COVID-19 case on 10 January. Then the first confirmed case in Hong Kong was detected on 23 January 20201. Before that date, Hong Kong had over 90 suspected cases.

The strategy of sustainable services

As healthcare professionals, radiographers must try their best to maintain the clinical services to the patient under the impact of the pandemic. However, different countries or regions may have various basic service needs depending on the public expectation and clinical situation to manage a pandemic. For example, in Hong Kong, the radiology departments had to reschedule the elective appointment or suspend some services to deal with the surge of pandemic patients. On the other hand, not all hospitals or departments could do the same because of the clinical necessity, such as the radiation therapy department of HKU-SZH. Nevertheless, their overall service did not drop, and some services increased during the pandemic period.

Although we have different service needs to maintain, avoiding cross-infection in the hospital setting is our shared priority. But, at the same time, people need to support each other to go through this endless fight.

1. Avoiding the transmission in the healthcare setting

The radiology departments must work with Infection Control Team (ICT) in the hospitals. ICT has the information and expertise to set up infection control policies, such as the temperature and recent travel history screening of all outpatients and visitors at the hospital entrance or department. If any high-risk person wanted to enter the hospital, they needed to show a valid real-time reverse-transcription polymerase chain reaction (RT-PCR) test. HKU-SZH can provide the rapid RT-PCR screening test for the outpatients due to the local practice.

2. Maintain the physical health of staff

ICT played an essential role in staff education of personal infection prevention, such as Personal Protecting Equipment (PPE) and handwashing training. After a year, the virus has mutated different strains. Therefore, another critical function of ICT was giving the most up-to-date information and strategies to hospital.

Social distancing is a new tactic to prevent cross-infection. Many of us, including the public, need time to learn and adapt. However, segregation of staff had been practiced during the 2003-SARS outbreak. For example, the dirty team is mainly caring the COVID-19 confirmed patients. The clean team is serving ordinary patients. Those policies can prevent large numbers of staff from being subject to quarantine.

3. Job redeployment in radiography

During the initial stage of the COVID-19 outbreak, many countries and areas did not have enough facilities and consumables to do the RT-PCR test. Fast or instant RT-PCR was impossible at that moment. Therefore,
The Psychosocial Impact on Radiographers

The infection control procedures and policies were not a severe burden to the radiographers in Hong Kong because they had the experience of SARS, Middle East Respiratory Syndrome (MERS), etc. However, the most significant difference of COVID-19 is the duration of effect. We cannot see the end of this pandemic from January 2020 to the present, August 2021. In addition, the on and off lockdown, the separation due to the quarantine or social distancing policies, etc., were causing mental distress to everyone. In my case, I could not attend two funerals to pay my last respects during this period because of the quarantine policies. One was my classmate and colleague. Another was my grandaunt. I could not visit and look after my mother even though she was sent to hospital twice within this period. According to the workforce studies in UK, Ireland and Australia\textsuperscript{5,6,9}, radiographers had to bear more stress as healthcare workers.

1. Workplace Stress
Some radiographers might feel the stress\textsuperscript{1} because the workload and the risk of exposure to COVID-19 increased after redeployment.\textsuperscript{4} However, this problem should not be an issue in Hong Kong because most of our radiographers had job rotations even though some of them were qualified specialists. A few advanced practicing radiographers might focus on a modality without job rotation.

There was another workplace stress that the researchers did not mention in the stress studies of radiographers, but it existed. It was the separation with the family because of the prohibition of long-distance or cross border travel. As far as I knew, it happened in Hong Kong,\textsuperscript{2} Singapore and China. Some HKU-SZH staff were living in Hong Kong, but their duties were in Shenzhen. They had to take 14 days of isolated quarantine for each border crossing. Then they stayed working in Shenzhen for over a month. Foreign-trained radiographers working in Singapore could not return home for over half-year due to the blockade of the border.

2. Work-related social stress
A study of Irish radiographers’ experience in COVID-19 illustrated work-related social stress. Many of them worried about transmitting the disease to their family members even though they knew the infection control procedure well. They took extra effort to minimize the risk before return home\textsuperscript{1}, such as showering and washing clothes after work immediately, cleaning the surface they touched, etc. Moreover, it didn’t seem easy to apply social distancing at home. Therefore, arranging alternative accommodation was an option. No organization in Hong Kong tried to record how the radiographers worried about passing the disease to family members. However, the Hospital Authority provided a special allowance for the high-risk frontline staff to stay in a hotel.\textsuperscript{7}

On the other hand, the family members might show social discomfort to a member who worked in the hospital\textsuperscript{1,8}. In addition, some radiographers stated that the community ignored their contribution to the patients in this pandemic\textsuperscript{1,9}. Therefore, it could increase their anxiety level unnecessarily.

3. Economic Stress
Although economic stress might not be the problem for radiographers in the public sector, the private or non-urgent radiography workload was reduced and affected the income of those radiographers.\textsuperscript{5} Another group of radiographers reported the stress of arranging children care because their kids had to stay at home.\textsuperscript{6}

4. Psychosocial Support
When talking about psychological stress, anxiety, depression, etc., we would recommend seeking professional help. There was no exception to radiographers.\textsuperscript{5} However, studies indicated that radiographers were not eager to take the service\textsuperscript{1,7}. The radiographers in Australia recommended some strategies such as allowing work from home, considering the vulnerability of the staff before
redemption, opening more channels for communication and virtual gathering on the internet8. Perhaps, those methods could help because most of the radiographers of the studies claimed that they had adequate psychosocial support. In my own experience, communicating with colleagues more and having zoom meetings with my overseas friends could ease the stress of the work and prevent depression.

The New Norms
So far, we cannot see the end of this pandemic. No matter how it should be gone. Then there must be some new norms that we should keep in the future.

1. Standardized infection control policies
Proper infection control protocols or policies for various modalities should be in place and ready to use at any time, such as wearing a mask and hand cleansing before and after touching the patients. For example, many Asia countries could do infection control at the initial stage of the pandemic because we had the experience of 2003-SARS.

2. Management of PPE
The PPE stocking and training should be one of the infection control policies. However, many countries were lack of PPE during the early stage of pandemic6,7, the regular expiry checking and practicing the donning and doffing PPE should be regularly done in the medical imaging and radiation therapy departments.

3. Online communication
Online communication should be a new model for all professionals to share their experience worldwide without the long flight. I did that with many friends in Asia. ISRRRT did a series of online education programs for all radiographers in the world during this period. The internet provided plenty of information on infection control, radiation protection, etc., by the renounce organization such as ISRRRT, WHO and IAEA.

4. Job stress of radiographers
The management should not ignore the job stress of radiographers in this pandemic. Doctors and Nurses were wearing PPE and moving around in the ward or clinic. However, radiographers pushed the mobile x-ray machine, moving around the hospital and donning & doffing the PPE for each ward or patients. They shouldered the responsibility to give the best diagnosis to the patients. The job stress should not be lesser than the other healthcare professions.

5. Recognition to radiographers
After this pandemic, those professional organizations of radiographers and radiation therapists should take this opportunity to promote the contribution of our profession. We were working together to fight this pandemic.

Conclusion
The prolonged pandemic is very different from the 2003-SARS outbreak. Then, it created a lot of impacts that we could not expect. Those impacts remodelled the practice of radiographers. Fortunately, radiographers were resilient to the problems either physically or psychosocially. After this pandemic, perhaps, we could develop some new norms that could help us face the next challenge.

Acknowledgements
I would like to thank Ms Melinda Choi, the council member of Hong Kong College of Radiographers and Radiation Therapists and Ms Chek Wee Tan, the AA Regional Director of ISRRRT and Senior Lecture of Singapore Institute of Technology. Melinda and Chek Wee gave me the most up-to-date information about the situation of HK and Singapore during the COVID-19 outbreak.

Reference

Figure 2: Online CPD programme.
The role of the sonographer in a pandemic

By Beth Weber, USA

OVERNIGHT the Pandemic created by COVID-19 changed the workflow of Healthcare, but not the purpose of caring for patients. In order to contain the exposure and transmission of the virus, scheduling of outpatient ultrasound exams as well as many elective procedures were suspended. Monitoring persons coming into the hospital included taking temperatures and answering key questions related to the symptoms and spread of the virus.

Performing the majority of the requested ultrasound exams in the patient hospital room replaced transporting patients to the department exam room for the procedure. Completing ultrasound exams on patients in hospital beds or in isolation rooms was not a new workflow, however the volume of patients in isolation increased.

COVID-19 was determined to be transmitted airborne. The side effects or physiological symptoms that patients with positive COVID-19 tests experienced precipitated the number of ultrasound exam requests. Patients experienced deep vein thrombosis, increased pulmonary emboli, and interstitial lung disease along with their existing comorbidities.

Delivery of healthcare services including ultrasound exams requires maintaining proper hygiene of staff as well as the imaging equipment. According to the World Health Organization, “Airborne transmission of infectious agents refers to the transmission of disease caused by the dissemination of droplet nuclei that remain infectious when suspended in air over long distance and time.”

Performing the ultrasound exams required additional time as well as staff to assist in donning /doffing PPE and cleaning the equipment. Creativity and innovation of the frontline essential staff performing ultrasound exams was also vital; such as scanning while the transducer and keyboard were covered with disposable plastic. Preventative measures and changes in work flow have become routine.

The acuity level of care need for the patients infected with COVID-19 increased and many struggled to breathe or were placed on ventilators. These isolation patients were not allowed to have visitors, so the staff not only cared for the patient but frequently were the only contact assisting the patient communicate with those waiting outside of the room. iPads, tablets or smart phones were utilized technology to Zoom or Face time with the patients’ family and friends.

During the Pandemic, essential frontline staff experienced working long shifts, sometimes short staffed; became weary with mask fatigue, fogged glasses and the strain of the additional workflow. However, they never lost sight of their purpose for taking care of the patients.

References
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The control and prevention of airborne transmission of infections are not simple. It requires the control of airflow with the use of specially designed ventilation systems, the practice of antiseptic techniques, wearing personal protection equipment (PPE), and performing basic infection control measures like hand washing.
How to maintain radiotherapy operation under three levels of alert

By Yen-Jung Chen, Taiwan

The novel coronavirus, also known as COVID-19, caused an unimaginable storm to our world at the end of 2019. As of today, over 165,000,000 confirmed cases have been reported worldwide, and the global death toll has topped 3,430,000. It has changed our way of living and has caused great damage to global economy and healthcare system. A prompt decision has to be made to prevent further spread of the pandemic.

COVID-19, so-called “Wuhan pneumonia,” was first detected in Wuhan, China. Taiwan, was able to respond quickly and successfully to prevent the spread of the pandemic when it first started, thanks to the experience of fighting SARS (Severe Acute Respiratory Syndrome Coronavirus). At the same time, manufacturing in personal protective equipment (PPE) such as medical masks, protective clothing, plastic gloves and etc. has accelerated to cope with the need. When the domestic supply of protective equipment was surplus, we were able to provide other countries that are in need. Hospitals also took immediate control to prevent nosocomial infections. Every day, the radiotherapy department in our hospital delivers nearly 240 treatments which includes outpatients andward patients. With such heavy workload, we perform pandemic prevention procedures with high-standard no less than other frontline department such as emergency and diagnostic radiology.

During the pandemic in Taiwan in May 2021, over 2,000 positive cases have been reported in less than two weeks. The number of infected and death increased significantly. Therefore, The COVID-19 level 3 alert was announced and guides followed. On the premise of the call for treatment, we adjusted the morning and evening shifts based on our existing human resources, which lengthen the working time of the treatment machine, the original working hours of a treatment room is 9.5 hours, which can treat about 65 patients. After adjustment, it is 13 hours to extend the use time of the treatment machine. By doing so, we allowed more time for each patient which enabled us to carry out disinfection operation in between, general large-scale disinfection in the treatment room every hour. The public area is arranged checkerboard seating for maintaining social distancing in patients’ waiting area. To avoid cross-infection among medical staff, staff who have close contact with patients were grouped into groups A and B. In case a radiotherapist needs to be quarantined due to the virus, and he or she would not infect other patients, which achieves the effect of chain scission. The patient’s radiotherapy and simulation procedures are the same as the usual clinical procedures.

Another aspect to be discussed is the protective equipment which radiologists need when they go to work. Medical masks are replaced every four hours, and they are also equipped with N95 mask. On top of their work clothes, they also wear isolation gowns, disposable hoods, protective masks, disposable shoe covers and two layers of gloves. After patient contact, they use alcohol to disinfect and clean the linear accelerator console and computer equipment. Radiologists also need to conduct self-monitoring for symptoms of COVID by take temperature and monitor their own physical condition. For adults with flu-like symptoms, they go to the emergency department for PCR (Reverse transcriptase polymerase chain reaction), which is a global standard test for diagnosing and rapid screening for COVID-19, this method which can detect whether the sample contains the genetic material of the virus. After confirming that both screening tests are negative, they would notify the supervisor immediately.
They may not go to work, but if there is no contact history with a positive case, you can return to work after self-quarantine. During the emergency period, the hospital also conducted a whole-hospital catalogue and asked all colleagues at work to receive the new coronary pneumonia vaccine as early as possible to achieve group protection, to protect themselves and others.

Outpatients who come to the hospital for treatment need to insert a health insurance card to enter and leave the hospital, implement the ‘TOCC’ (Travel history, occupation, contact history, cluster) mechanism, and truthfully provide with their travel history, occupation, contact history, and whether to cluster or other information. All hospital admissions need to undergo a PCR test and can be hospitalised only after a negative result comes back. Even after the radiotherapy course is over, it still needs to be tracked to avoid a breach during the incubation period during the treatment. As for inpatient care, if required minder, who also accompanied the nucleic acid testing needs to be done.

During the three-level alert period, the medical staff were under great pressure. They were worried about not doing a good job in pandemic prevention at work. They were also worried about the possibility of taking the virus home and infecting their families after work. Fortunately, Taiwanese people have sent back support from first-line medical personnel. Whether it is providing supplies, loving meals, or personal protective equipment (PPE), that behavior made the medical staff feels warm. The majority of people in Taiwan also fully comply with the government policies and spontaneously stay home and avoid socializing, personal living habits and environmental sanitation and disinfection, enhance self-immunity, reduce the link between the environment and humans, at the same time the mass vaccination has finally begun. The number of confirmed cases in recent days has dropped to less than 200. The hospitals handled the difficult situation very well and fortunately, this difficult period of time only lasted three months, Taiwan’s anti-pandemic fight. It took about three months to have an effect, and level 3 alert be lifted. It does not mean that the pandemic is over, but rather a beginning to live with the virus.

Overall, it is indeed another demonstration of Taiwan’s determination to fight the new coronavirus.  

Thanks for the meal boxes.
COVID-19 is a severe respiratory syndrome and infectious disease in humans, caused by Severe Acute Respiratory Syndrome coronavirus 2 (SARS-CoV-2). The first case occurred in Wuhan on December, 2019, so this serious infectious disease was also known as Wuhan pneumonia in the early stage. The disease spread in Asia first in early 2020. Nowadays, humans travel frequently to various countries, it quickly caused a global pandemic in early March and became one of the large-scale epidemics in human history. So far, nearly 200 million people have been infected, and more than 4 million people have died as a result.

The pandemic of this disease has made it rare for public to be restricted. The government has instructed the public to follow social distancing measures and stay at home to curb the spread of the virus. If you need to go out, you must wear a mask. There was a large number of employees who were instructed to work from home throughout 2020 to prevent contact. This new normal lifestyle has an unimaginable impact on a lot of industries such as catering industry, entertainment industry, and even the various walks of life. In just a few months, hundreds of companies in various countries declared bankruptcy. Although not entirely due to the pandemic, the pandemic is undoubtedly the straw that broke the camel’s back.

Before May 2021, during the world pandemic, Taiwan successfully defended it and donated supplies such as masks to the epicenter of the coronavirus actively, and had the slogan “Taiwan can help”. During that period, Taiwan still had sporadic confirmed cases that were immigration from abroad or community infections. In order to control the community spread, people are having their temperature taken before entering anywhere.

Our hospital is one of Medical centers in northern Taiwan have implemented strict entrance control, take each person’s temperature and check each person’s TOCC (travel history, occupation, contact history, cluster) at each entrance, our

As frontline healthcare worker from Taiwan, how do we respond to the invasion of the coronavirus?

By Lin-Shan Chou, Taiwan

Lin-Shan Chou
Education
2010-2012: M.S., Biomedical Imaging and Radiological Sciences, National Yang-Ming University, Taipei, Taiwan
2005-2009: B.S., Medicine Radiation Technology, National Yang-Ming University, Taipei, Taiwan
Internship: Kaohsiung Chang Gung Memorial Hospital

Work Experience
2019-now: Part-time Lecturer
Department of medical imaging and radiological technology, Yuanpei University of Medical Technology
• The Physics of Radiotherapy
• Technology of Radiation Therapy
2017-now: Medical Physicist
Department of Oncology, Division of Radiation Oncology, Taipei Veterans General Hospital, Taiwan
2012-2017: Medical Radiation Technologist, Department of Oncology, Division of Radiation Oncology, Taipei Veterans General Hospital, Taiwan
2009-2010: Research Assistant
Institute of Biological Imaging and Radiological Sciences, National Yang-Ming University, Taipei, Taiwan
• Radiopharmaceutical Chemistry

Thanks for the donated epidemic prevention products.
department should arrange ten staff to cooperate with our epidemic prevention management team scheduling assistance of entrance control. Our epidemic prevention management team also set up education training for all staff about the guidelines of infection control and in dealing with suspected and confirmed COVID-19 patients to prevent nosocomial infection.

After keeping zero confirmed cases everyday for nearly half a year, it is still unable to ride out the pandemic. The novel coronavirus outbreak eventually in Taiwan at May 2021. The government announced that it has entered the third level of alert for two weeks. It’s a pre-lockdown policy that means indoor gatherings over five people and outdoor gatherings over 10 people are banned. Because of community spread was not controlled well during the first third level of alert, it has been extended for another two weeks four times until now. During this period people who were originally unwilling to receive the AZ vaccine due to the risk of serious side effects such as thrombus have changed their attitudes to get a vaccine in an attempt to prevent infection.

During the third level of alert, our department has made some pandemic management plan to prevent nosocomial infection. The first is subdivision. Originally, 250 patients receiving radiotherapy within eight hours a day in our department. We derating the patient to around 180 patients a day and the therapist are running on shift work. It means 180 patients receiving radiotherapy within sixteen hours a day in our department. The number of patients per hour per machine is decreased in an attempt to prevent indoor gathering and the treatment room was disinfected thoroughly between two patients especially the couch of machine on which the patient lies. The therapist is divided to two groups, one is a day shift and the other is a night shift. The two groups are restricted to meet each other to prevent cross infection. When the patient is a confirmed case who had received radiotherapy in our department during incubation period and result in intra-departmental infection, we don’t need to list all staff as contact tracing to maintain half of the operating.

During this period of running on shift, the team leader’s arrangement and cooperation of the team members are required because we don’t have additional staff to help. Once a patient and his family were confirmed cases five days after the last radiotherapy. Because of the day between staff contact with the confirmed cases and the day patient and his family were confirmed cases is longer than stay-at-home order criteria so that the leader of our department assisted the staff to do a screening for COVID-19 only and didn’t receive stay-at-home order. They were asked to self-quarantine just in case until test negative three times before back to work. Fortunately they were tested negative a week later and back to work. Because of we schedule a run on shift and good awareness of pandemic prevention, the impact of this case on clinical work is minimized.

Epidemic prevention products are also in place in fist time. Each therapists and doctors who in the frontline wear disposable medical hat, surgical mask or medical N95 mask, face shield, medical surgical gloves, disposable medical isolation gown and scrubs. All the epidemic prevention products are sufficient that make staff perform any procedure safely without worrying about bringing the virus home. On the counter in front of the control room instructed temperature measurement and hand alcohol disinfection machines donated by the company for the public to use and post the QR code for public to sent a text-messenger to 1922 that is a real name registration policy cooperates with the government. All the setting is make patients and staff feeling safe of receiving radiotherapy in our department.

A large number of private enterprises donated materials such as boxed meals, coffee, energy drinks to say thank you for all the effort we’ve put in. Director of our department also provide Friday limited boxed meals for our hard work. The team leader also helps staff who is a night shift to apply the night shift allowance.

From the starting of COVID-19 pandemic people are stockpiling toilet paper until now people follow the rule to register for vaccinations, we are close to the time that government announce easing coronavirus restrictions in dribs and drabs. I believe we will get back the freedom of hanging out with friend, gathering with family and even go abroad soon. Maybe some staff also look forward to the day that never on night shift. ■

Thanks for the donated face shields. Thanks for the donated meals.
Preparing for the unknown
By Kathy Cogan, New Zealand

EARLY 2020 and the world watched stunned as the coronavirus, soon to be known as COVID-19 rapidly spread around the world. New Zealand, at the bottom of the globe was not to be immune and the first case presented 28 February 2020. Initially all cases were travellers and / or New Zealanders returning from overseas.

WHO declares an official pandemic on March 11, 2020. New Zealand closes its borders to all bar NZ citizens and permanent residents for the first time in history on 19 March 2020. A four level alert system was announced on 21 March and by 23 March NZ was on Alert Level 3.

By 25 March 2020, there were 283 COVID cases and community transmission is confirmed. New Zealand is placed in a State of Emergency and moves to Alert Level 4 and at 11.59pm goes into lockdown for a 4 week period.

How does one prepare for the unknown?
The Ministry of Health (MOH) distributed guidelines and procedures to all District Health Boards and Hospitals all of whom were required to stand up contingency planning teams. There was no shortage of information as to what was required, how and why, but much of it was conflicting. Everyone in the country was reeling, anxious and nervous, but we were frontline and we had seen the terror of Wuhan and Italy so what should we expect.

Lakes District Health Board consists of Rotorua Hospital, an average regional NZ hospital, and Taupo a small rural hospital, both located in the centre of the North Island and highly popular tourist spots. When the borders closed and NZ locked down there were still tourists within our areas. As manager of both sites keeping staff safe while maintaining services was paramount. The DHB determined at the outset that Taupo Hospital would be maintained as a COVID free Hospital which lessen the load for the small group of staff providing the service, but preparation for the unexpected still had to occur.

The declaration of the pandemic meant that all departments had completed stocktakes of PPE and an organisation wide process for access and management was initiated at that point. Community transmission had not yet been identified when the borders were closed, but being in a popular tourist city there existed a heightened sense of awareness. Training in donning and doffing occurred throughout the organisation led by a handful of key staff to ensure the same message was shared. Online key points or moments served to reiterate the importance of this learning.

When the Government announced that NZ was on Alert Level 2 on Saturday 21 March and social distancing was a requirement it was clear there was no business as usual. Monday 23 March the announcement to move to Alert Level 3 was immediate and 48 hours notice of NZ going into Level 4 lockdown for four weeks was given. Radiology had approximately 22 radiographers with four vacancies all being filled by overseas applicants and all arriving as the borders closed. These staff had to go into self-isolation and have negative COVID swabs before being able to join their new Radiology team. There were six Radiologists, four nurses and seven administration staff all of whom are part time. Staff with compromised health were to be stood down immediately. There was a scramble to enable administration staff to work from home and provide access to DHB computer systems. The decision was made to split the clinical staff into two teams of eight radiographers, two nurses and two Radiologists each. One team was rostered to cover the day time in week one and the second team covered evening and on call duties and week two was reversed. Managing CT with one radiographer on call was determined unsafe and the on-call team became a radiographer and a nurse. The nurse was to be the ‘dirty’ staff member and the nursing team were quickly taught how to centre the patient in the CT scanner.
All patients referred for an MRI scan required a negative COVID swab enabling two radiographers to be assigned to MRI for the duration of the period. As Radiology Manager I worked day shifts throughout with the key focus being to manage staff wellbeing, the never-ending changing guidelines, consumables, and anything else that might present. As a clinical CT radiographer, I was also available as a backup for our very small CT team in the event of sickness.

The manner in which staff were rostered was the key to our success as staff rostered to week two had significant downtime which enabled them to de-stress more easily. This was able to be spent at home with family members although for some this increased the stress and they lived in a separate part of the house. The DHB funded accommodation for staff on call and evening duties meaning staff weren’t returning to their home when they were tired and reducing the chances of inadvertent spread.

Communication within the organisation was consistent and matched that being shared nationally. A strong communication link was established between the Emergency Department and Radiology Department clinical leads. All planning for the identification of potential COVID patients and their ongoing management was a shared decision-making process. The Emergency Department (ED) was split into two sections and the Assessment and Planning ward became an Emergency COVID ward where patients were kept until COVID status was determined. Initially the criteria for being treated as potentially COVID positive included overseas travel & or contact with, along with sore throat, fever and runny nose symptoms so most patients required a mobile chest x-ray.

Typically, Rotorua would perform approximately 80 – 100 mobile x-rays per month. April 2020 saw the team perform 283 mobile exams requiring two staff in full PPE. The stars of the team were two relatively new graduates who were on duty together the night community transmission in NZ was announced, resulting in a very low threshold for PPE and mobile imaging and about 11 mobile x-rays being required. They demonstrated a true commitment to their profession when they ‘just got on with the job’ and lead the way in teaching and sharing their rapidly learned knowledge. As the criteria changed and abdominal pain became an equivocal symptom it became clear a ‘dirty’ x-ray room was required and new pathways and workflows were created to enable the safe transfer and imaging of potential COVID positive patients that needed more than a chest x-ray. The only certain thing with managing in a pandemic was uncertainty!

The radiology department itself was divided in two and only Radiology staff could access the staff corridors. A Liaison Radiologist role was established and all communication was by phone. As time wore on multi-disciplinary meetings resumed via Zoom. Staff meetings were held socially distanced along the corridor and staff rooms had limits as to numbers permitted at anyone time. Radiology practice mirrored the organisation actions and there existed only two entrances to the Hospital and all entering required temperature checks.

On 28 April 2020 New Zealand dropped to Level 3 which allowed for some urgent outpatient imaging to resume. Social distancing, wearing of masks and careful selection of patients was required. Notably many patients including oncology patients chose to defer their imaging sometimes for up to six months such was their anxiety about leaving their homes or their ‘bubbles’. By 14 May the country was at Alert Level 2 and with many of the restrictions having ended and there existing no community transmission staff rosters returned to normal, scheduling ramped up and those working from home returned.

New Zealand was fortunate – for once being at the bottom of the world and a long way distant was a bonus. At Rotorua we only ever had two positive patients admitted, one was known prior to arrival and was an inpatient briefly, for a condition unrelated to COVID. We did have those scary moments in the early days when after the event the medical team would determine a patient was potentially COVID and staff would be stood down until tests were confirmed and the slowness of test results increased anxiety.

The closing of New Zealand’s borders so rapidly was our saving grace and combined with lockdown for four weeks resulted in COVID-19 running a self-limiting course. Our teams coped well and morale stayed high, but would we have managed had the situation continued for a lengthened period? The most important thing throughout was communication and looking after each other, making sure extended families were okay, that there was always someone to talk to. Being frontline was scary, challenging, we didn’t know what to expect so you plan for the worst, but it is our job, its what we do, we look after people when they are at their most vulnerable. And in going to work each day there was purpose, and a consistency to our lives. Lockdown for most meant uncertainty, fear and boredom. My own son, home from university where he was studying medicine said: “Mum you’re the lucky one, you get to go to work each day”.

Alert Level One and Rotorua Radiology Department celebrated by having a “Graduation Ceremony” for our new Graduates and Master’s recipients all of whom had had their graduation ceremonies cancelled. We had a borrowed ceremonial gown, a beautifully handcrafted mortar board, and scrolls to present. We were finally together as one department and were able to meet all of our new staff. Morning tea was cupcakes decorated with mortar boards. We were thankful for our situation and ready to meet our new challenge – the unmet health needs of our community whom had been isolated for three months. ▪

 Remarkable achievement in a year of uncertainty.
Building volunteering capacity – The academic role in supporting the role of radiographers and medical imaging specialists during pandemics

By Samar El-Farra, United Arab Emirates

1. Background - Necessity is the mother of invention
As COVID-19 was making headline news, educational institutions’ closures have impacted almost 70% of the world’s student population (UNESCO, 2020). Halfway through the spring 2020 academic semester, the government of the United Arab Emirates (UAE) announced full distance learning and closure of physical learning activities in classes, affecting the 191,794 students in the tertiary education sector (UNESCO, 2020).

The Higher Colleges of technology (HCT) is the UAE’s largest federal Higher Education Institution (HEI). Approximately, 22,000 students attend 16 campuses across the country. When COVID-19 was declared a global pandemic, the medical imaging program had 118/313 enrolled students, who have successfully completed courses, and a corresponding clinical preceptorship course, to perform Chest X-Rays (among other plain x-ray examinations).

As the early weeks of the pandemic unfolded, the demands and expectations placed upon the front-line radiographers were becoming overwhelming and the need for a reservoir for volunteers was ever more pressing. The Radiographer Society of Emirates was approached through the mother society, the Emirates Medical Association to recruit participants for a volunteer bank. It was a challenge to verify and classify the competency levels of student volunteers, a necessity that required the need for an innovative response. In the last decade, the number of Higher Education Institutions early-adopting Alternative Digital Credentials (ADCs), including Micro-Credentials (MC) and Digital Badges (DB), continues to rise. Certainly, building short/long-term qualified/verified volunteering capacity can only be achieved through shorter periods of formal education, rather than the lengthy educational cycles of diplomas and Bachelor degrees, usually offered by HEI. Re-skilling of existing MRI, CT and mammography professionals, with more than 5-10 years’ experience, to perform CXRs was again of potential value. On the other hand, clinical sites may rightfully be skeptical about any qualification other than a Bachelor’s degree, let alone ADCs. Recognition and quality assurance of the level of competency remain a major challenge for gaining both learners’ and recruiters’/employers’ trust.

So what are ADCs? The working paper published in 2020 by the Organization for Economic Co-operation and Development (OECD) defines the term “alternative credentials” as “credentials that are not recognized as standalone formal educational qualifications by relevant national education authorities” (Kato et al., 2020). ADCs are short credentials that digitally capture job related competencies, which are gaining popularity because of how they respond to young adults’ preferences for shorter, and more job outcome-based, learning(Kato et al., 2020; ICDE, 2019). ADC is a broad term that encompasses MCs, DBs and professional certifications/qualifications (Kato et al., 2020). Evidently, ADCs of uncertain quality are vulnerable to exploitation by unscrupulous providers (Department of Education, 2019). Moreover, HEI transcripts fail in describing learners’ capacities with job requirements. However, HEIs are widely accepted as the academic heartland, and the increased interest in ADCs is challenging their existing provision and business model (ICDE, 2019; Gallagher, 2018). When HEIs successfully respond to the opportunities...
and challenges brought about by skills’ gaps and unemployment, they are expected to attract learners with relevant skills for employment and entrepreneurship (Chakroun & Keevy, 2018). At the global level, governments are embracing ADCs and expecting HEIs to play a role in the provision and management of ADCs.

Finally, while medicine students have been enjoying the competency-based medical education (CBME) is an approach to the design of educational systems or curricula that focuses on graduate abilities or competencies (Englander et al., 2017). A similar approach is achievable by the adoption of ADCs. Given that CBME curricula are planned to use a combination of professional tasks, competencies and milestones with Entrusted Professional Activity (EPA) which is a professional task that requires adequate knowledge, skills, and attitudes and leads to a work outcome (ten Cate et al., 2016). The ADC proposes an equivalent EPA of “Successfully, safely, and accurately executing human thorax medical imaging tasks within a clinical setting”.

2. Higher education institutions and society collaborations

As the developer of the existing accredited Medical Imaging (MI) curriculum, serving the highest number of post-secondary students in the UAE, the author has a long experience in MI curricular development and accreditation; and serves as the scientific chairperson of the Radiographers Society of Emirates (RASE) board. Tremendous pressure was experienced witnessing colleagues at clinical sites, trying to cope with the stress imposed. As a result, urgent meetings were held for the long-term risk mitigation of pandemics, such as COVID-19, which was becoming the new-normal.

Thus far, the expectations are:
1. A verified and qualified volunteering capacity was needed;
2. Brief training/verification was required;
3. Academia and clinical expertise needed to join forces.

The main challenge of buy-in and trust can only be possible through collaborative input in developing a quality control framework, which governs the award standards i.e. syllabus proposed to enhance the employers’ trust in the ADCs offered. In addition to clinical input from the RASE board members, the writer, in collaboration with the HCT Executive Dean of Health Sciences, proposed an ADC designed under a quality assurance model to ensure rigorous certification of volunteers, who are capable of medically imaging human thorax and extremities in a non-trauma setting [Medical Imaging Assistant – plain radiographs of human thorax and extremities ADC]. These can be categorized under the unit-group 5329 - Personal Care workers in Health services Not Elsewhere Classified of the International Standard Classification of Occupations (ISCO-08). The endorsed ADC provides training and reliable evidence of competency in imaging human thorax and extremities in non-trauma setting, to be issued through Blockchain ledger. The ADC has performance expectations that are more challenging than the existing curriculum, in terms of the expected quota of patients completed and the threshold scores. That is, only if a learner achieves an 85% score in all assessments will the award be granted, as opposed to the 60% satisfactory achievement in any undergraduate course. With emphasis on the educational aspect, we applied a model that was benchmarked against the United Nations Educational, Scientific and Cultural Organization (UNESCO) report by Chakroun & Keevy (2018), where four areas of success forecast and identified stakeholders’ trust and acceptance of ADC content at the academic level, as the main two quality challenges to the HCT-ADC ecosystem. The proposed Value, Resources, Standards, Validation, Accessibility & Support (VRSVAS) model mitigates the content challenges by means of building trust and acceptance via:
1. Outlining a distinct ADC value in relation to employability/vulnerability/evidence of competency, in addition to the stack-ability that guarantees a possible accumulation of a number of ADCs, contributing to a full credential (a

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**Figure 1** ISCO-08 pages pertinent to the ADC proposed classification and job title. Blue represents the ISCO-08 Job title Medical Imaging Assistant (Level 1), which was added to indicate stack-ability and limited anatomy and modality. Green represents the corresponding ISCO-08 Code 3211. Red is for the performance/functions in-scope.
higher diploma or a Bachelor's degree). The stackability value will certainly be possible through developing ADCs in other domain/modalities (eg. ADC in mammography or ADC in management of MI departments).

2. Outlining evidence of resources’ availability though proposing the use of the existing resources which support the undergraduate program at HCT campuses, including labs, eBooks, faculty, staff and clinical preceptorship/work placement.

3. Declaring transparent standards for ADCs accomplished, by developing and issuing an Award Standards Document (ASD) with each awarded ADC.

4. Sound and life-long documented validation processes, by ensuring that the HCT issued ADCs will be considered as part of learner’s transcript.

5. Incorporating individualized accessibility characteristics, especially through adjusted pre-requests, enrollment and completion requirements for adult learners, who are already working and have family responsibilities and who are interested in re-skilling or up-skilling opportunities. Prior learning recognition is also used as a means of support and accessibility enhancement.

6. Offering learner support avenues, which is a new concept where faculty change roles from instructors to mentors, to guide learners through the journey of stacking the suitable collection of ADCs.

3. Curricular standards

The coalition between the academics, represented by HCT and RASE, and the clinical experts, represented by RASE, finally endorsed a schema to use the capacity of undergraduate students to perform the basic CXR services in addition to extremities, to enhance the value of the ADC, as described under ISCO-08 (Job title Level 1 Medical Imaging Assistant–plain radiographs of human thorax and extremities micro-credential- Unit group 5329 Personal Care workers in Health services Not Elsewhere Classified) where competency tasks in-scope are:

1. Lifting, turning and moving patients and transporting them in wheelchairs or on movable beds;
2. Preparing patients for examination or treatment;

4. In scope and curricular components

For the in-scope competencies of:

1. Setting up imaging and patient transfer instruments, preparing materials, and assisting radiographers during procedures; and
2. Limited exposing diagnostic x-rays of human thorax and extremities.

The teaching and training requirements are:

- 90 hours of knowledge (cognitive complexity didactic pedagogy)
- 30 hours of skills (cognitive complexity of laboratory pedagogy) and
- 180 hours of clinical preceptorship at clinical sites at the Application cognitive complexity level.

These total to 300 hours and are equivalent

Table 1

<table>
<thead>
<tr>
<th>2. Teaching and Training Content</th>
<th>Credits (total=9)</th>
<th>Contact hours (total=300)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1. Knowledge: Didactic theory learning</td>
<td>Exposition parameters for digital thorax and extremities radiography.</td>
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<td></td>
<td>Positioning techniques for thorax and extremities digital radiography.</td>
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<td></td>
<td>Image critique and evaluation for thorax and extremities plain radiographs.</td>
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<td></td>
<td>Patient care including empathy, safe transfer, and handling techniques in the imaging of thorax and extremities.</td>
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<td></td>
<td>Professional communication.</td>
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<td></td>
<td>Radiation safety measures.</td>
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<tr>
<td>2.2. Skills: Laboratory. Performing medical imaging procedures of plain x-rays on phantom/simulator thorax and extremities in a lab setting</td>
<td>Exposure parameters for digital thorax and extremities radiography.</td>
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<td>Positioning techniques for thorax and extremities plain x-rays.</td>
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<td>Patient care, safe transfer, and handling techniques in the imaging of thorax and extremities.</td>
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<td>Radiation safety measures.</td>
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<tr>
<td>2.3. Application: Clinical Preceptorship. Performing medical imaging procedures of plain x-rays on human thorax and extremities in the authentic and authorised clinical setting</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

Total 9 Credits 300 contact hours

Digital Badge: details, assessment and evidence requirements

7.1. Title | Competencies and character qualities within Medical Imaging of Human Thorax context badge

7.2. Performance Criteria 1

- Successfully, safely, and accurately executing human thorax medical imaging tasks within a clinical setting for:
  1. 100 different patients under clinical supervision, and
  2. Five different patients under assessment conditions conducted by clinical site assessor while exhibiting evidence of proficiency in:
     a) critical thinking/problem solving,
     b) communication,
     c) collaboration,
     d) adaptability,
     e) social and cultural awareness, and
     f) empathy.

7.3. Evidence linked to learner’s record- Performance Criteria 1

- Lab log book: graded and verified by HCT and clinical site trainers.
- Clinical log book of number of hours (90 hours) and patient quota (100 patients) graded and verified by clinical site trainers.
- Clinical log book of assessment (5 patients) conducted, graded, and verified by clinical site trainers.

7.4. Performance Criteria 2

- Evaluate medical images and determine diagnostic value and additional / corrective action.

7.5. Evidence linked to learner’s record- Performance Criteria 2

- Image critique portfolio: graded and verified by HCT and Viva Voce graded and verified by HCT with contribution from clinical site trainers as jury members.
- Reflection journal graded and verified by HCT.

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1. The International Standard Classification of Occupations (ISCO) is an International Labor Organization classification structure and is a part of the economic and social classifications of the United Nations.
2. Full ASD is available upon request.
3. The section about plain radiography extremities curricular components is available upon request.
4. The proposal is limited to human thorax and extremities in non-trauma settings.
to nine Credit Hours. The 180 hours of clinical preceptorship is achieved and issues in the form of a DB that has an accessible web link, where all the Competencies and character qualities within Medical Imaging of Human Thorax context badge, including Performance Criteria and discretion of Evidence linked to learner’s record (Table 1), are explicitly articulated as part of the ASD.

Teaching and training requirements, the Competencies and character qualities within Medical Imaging of Human Thorax context badge, including Performance Criteria and discretion of Evidence, are linked to a learner’s record (Table 1)

5. Incidental, low-hanging fruits
As we were assuming a responsive mode, opportunities of preemptive plans surfaced. Looking for low hanging fruit, how do we recruit radiographers and MI specialists? My experience spreads across four countries; Kuwait, Canada, the UAE and, to a lesser extent, the UK. From this, I can confidently say that in the clinical world we do “headhunt” MI students as they are completing their clinical practicum/preceptorship courses. How many of you have - thought that a particular student would be great in MRI, CT or Mammography? I can also go further. How many of us have thought that a particular student has outstanding communication and empathy capacities? How about formalizing and verifying those covert processes instead of chatting about it during the lunch hour? This was certainly a great motivator, especially valuable for countries with smaller populations that do not support MI micro-specialization. This is the case in the UAE and almost all the Arab world. MI undergraduate programs tend to be offered to incorporate plain radiography, fluoroscopy, angiography, mammography, CT and MRI. Some even have nuclear medicine, radiotherapy and ultrasound as part of the 4-year Bachelor’s degree programs.

6. Summary and conclusion
The ADC adoption is correlated with CBME curricula where the degree to which the evidence of performing CXR competency supports the validity on the basis of the assessment in authentic environment and is not just a grade.

The collaboration between academic institutions and society is of paramount importance, a stamen hat came into realization more prominently when the MI world was rocked by the pandemic. Using the power of disruption with a preemptive mindset, RASE and HCT have developed and endorsed an ADC that verifies the level of competency in human thorax and extremities plain radiography, which can be used as a confident indicator for volunteers to be able to set up imaging and patient transfer instruments, prepare materials, and assist radiographers during procedures involving limited exposure diagnostic x-rays of human thorax and extremities. The suggested ADC was developed based on a quality assurance framework, with the value proposition of:

2. Offering a vertical stackable design that does not affect the students’ journey, or progression, for a full B.Sc. of MI Sciences.
3. ADCs are intended to alleviate the workload on medical staff during pandemics or catastrophes.  
4. Certified attainment provides incentive and self-regulation for the learners with high academic/clinical performance.
5. Providing greater exposure of students, so employers have a better chance making informed judgments on who to invest with targeted training and/or recruit in the future.
6. Enhanced prospects for upskilling and re-skilling of existing working forces within MI.

References
THE impact of the ongoing COVID-19 pandemic on national health systems across the globe has been unprecedented. While the roll-out of vaccinations programmes worldwide brings optimism, with early signs that the virus’s stronghold is beginning to wane, COVID-19 continues to disrupt vital healthcare services and as is the case with many other catastrophic events, the devastating effects are likely to be felt for many years to come.

The necessary mobilisation of resources and the diversion of funding by leaders and government officials in order to respond to the ongoing threat has impacted negatively on other key healthcare areas. A recent report by Deloitte highlighted that as a result of these measures, healthcare systems will likely face two major “collateral” issues, the physical and mental exhaustion of healthcare workers and the mounting backlog of healthcare procedures. Despite the enormous challenges faced, healthcare professionals have stepped up by adapting and innovating in order to safeguard critical frontline services for our patients and to restore other affected services as quickly as possible.

The first case of COVID-19 in the Republic of Ireland was reported on the 29th February 2020 and less than 2 weeks later the government had begun to impose significant restrictions on society. Hospitals and departments across the country took preparatory steps in order to put in place the various measures recommended by the National Public Health Emergency Team and the Health Service Executive (HSE). Additionally, the National Cancer Control Programme (NCCP) published a number of guidelines on the management of patients undergoing radiotherapy treatment during the COVID-19 crisis.

In the early stages of the Irish experience, while circulating numbers were low, public health guidance was focused on limiting contagion through social distancing measures and testing of those with symptoms or those deemed close contacts. There was a need to reduce the time spent and the overall footfall within healthcare facilities to curb the spread of infection while simultaneously maintaining frontline services. Our department moved very quickly to implement measures to ensure compliance with social distancing guidelines and to manage those patients presenting with symptoms. The key focus within our organisation was to protect the health, safety and welfare of our patients and staff and to minimise disruption to radiotherapy services. Thankfully, radiotherapy had been designated as a frontline service and therefore the redeployment of radiation therapists [radiographers] to other areas did not occur.

A triage area was setup in the main reception foyer where patients are triaged for symptoms of COVID-19 using dedicated questionnaires every day. If a patient is deemed to be symptomatic, they are sent for clinical assessment and for testing as required. If a patient is asymptomatic, they are then checked-in to the relevant treatment area. Routine test screening was also implemented for patients being admitted to the hospital. Radiation therapist staff also triaged each other before their shifts every day and those with symptoms were tested and required to isolate. In order to minimise the time spent and the number of patients within the department at any one time, radiation therapist staff worked with physics colleagues to develop a bespoke crowd control computer programme. This programme allows staff at triage to monitor the number of patients within each waiting area to ensure that capacity limits for the area are adhered to. If there is no available space in the required waiting area the patient is either asked to wait in their car until a space was available.

**Dean Harper**

Dean Harper is the current President of the Irish Institute of Radiography and Radiation Therapy (IIRRT) which is the professional body representing both professions in the Republic of Ireland. He has presented at various national and international study days including the inaugural ‘International Radiographer Advanced Practice Conference’ in Sheffield Hallam University.

Dean qualified in 2004 with a B.Sc. Radiation Therapy (Hons) from Trinity College Dublin. He currently works as the Radiotherapy Services Manager in St. Luke’s Hospital Rathgar. Prior to this he worked as a Clinical Specialist in the St. Luke’s centre on the St. James’ campus, specialising in IGRT and SABR.

Dean has recently completed a M.Sc. in Radiotherapy and Oncology through Sheffield Hallam University in the UK. His Masters dissertation investigated the dosimetric impact of soft-tissue based corrections in patients undergoing SABR to peripheral lung lesions delivered via RapidArc.
The use of PPE was updating constantly and necessitated the upskilling of all staff in a very short timeframe. Additionally, the evidence base and advice around the procedure for donning and doffing in relation to COVID-19 presented challenges. In developing many of the COVID-19 specific policies, procedures and guidelines, radiation therapists have shown true leadership by innovating, adapting and incorporating change into their daily practice.

As the number of cases of COVID-19 in the community began to rise and contact tracing efforts ramped up, we began to witness a surge in the so-called R-value of the disease in the country and many of our patients were deemed ‘close contacts’ of confirmed cases or became infected themselves. As these patients required longer appointment slots owing to PPE and room cleaning requirements, this reduced the clinical time available on the treatment units and threatened to delay new patients commencing treatment. In order to overcome this problem and ensure timely access to radiotherapy services for our patients, radiation therapists took the lead by proposing a split shift pattern which extended the clinical availability by two hours each day. This move ensured that there was adequate time to treat our patients safely and to accommodate new patients into the service.

Throughout the course of this pandemic, we have often been forced to rethink the way we work with a greater emphasis on infection control and containment. Within our own organisation, radiation therapists have led the way in developing many of the COVID-19 specific policies, procedures and guidelines to reflect the necessary changes in local work practices as a result of the pandemic. This has ensured that risks are effectively managed and safety is prioritised.

The global COVID-19 pandemic has changed the way we live, the way we work and the way healthcare is delivered in an extraordinary way. Multi-disciplinary teams have come together to propose and develop innovative solutions in response to the challenges faced in order to ensure that critical services are maintained and this level of teamwork and comradery for the benefit of our patients is truly inspirational and will hopefully continue into any post COVID era. Across the world, radiographers and radiation therapists have shown true leadership by innovating, adapting and changing their work practices whilst risking their own health and the health of loved ones, all in the pursuit of maintaining critical services for patients. As radiographers and radiation therapists we are well versed to the concept of change but our collective response to this unprecedented challenge should give us all a sense of enormous professional pride.
The impact of the pandemic on the CT radiographer in the UK
By Ann Heathcote, United Kingdom

Introduction
As the global Coronavirus Disease 2019 (COVID-19) pandemic took hold in the UK in March 2020 all areas of healthcare provision were thrown into unprecedented situations and a dramatic rise in diagnostic imaging particularly for Computed Tomography (CT) and general chest x-ray was seen. This resulted in many challenges within radiographic teams and associated support services. It is well documented in that there is a shortage of radiographers within UK healthcare. This was evident during the pandemic response across radiography. Radiographers are resilient, adaptable professionals that strive to meet any challenge that occurs. On the 8th November 2021, World Radiography day, as CT radiographers reflect on the previous 12 months many will be hoping for light at the end of the tunnel.

CT services within the UK are provided both within the National Health Service (NHS) and the Independent Sector (IS). The distribution of radiographic workload was without a doubt impacted during the initial response to the pandemic. In many locations to prevent the NHS becoming overwhelmed in the UK existing pathways were dramatically altered to accommodate CT radiographers reflect on the previous 12 months many will be hoping for light at the end of the tunnel.

CT services within the UK are provided both within the National Health Service (NHS) and the Independent Sector (IS). The distribution of radiographic workload was without a doubt impacted during the initial response to the pandemic. In many locations to prevent the NHS becoming overwhelmed in the UK existing pathways were dramatically altered to accommodate COVID-19 requirements.

A number of elements impacted upon CT service delivery across the UK throughout the COVID-19 pandemic. This article will briefly discuss a small number of these.

Resources
Workforce
Within radiology some areas saw a reduction in requirements, referrals decreased from General Practice as the public stayed home, out-patient clinic capacity reduced to facilitate social distancing or in some instances ceased. There was a reduction in some examinations within radiology as a result.

However, the increase in critically ill patients saw a spike in the requirement for CT imaging. As previously discussed there is a recognised shortage of radiographers within UK healthcare. This combined with the additional challenges as a result of staff isolating due a positive COVID-19 diagnosis, contact with a known COVID-19 case or radiographers being instructed to shield due to an underlying health condition resulted in unprecedented pressures on radiographer resources. The shortage of CT radiographers was addressed by use of temporary workforce i.e. agency radiographers competent in CT or redeploying radiographers from other departments that could be released from their primary role to support the CT services. This latter group required modality training so this had to be planned and implemented whilst maintaining service provision and not ‘overcrowding’ clinical areas.

CT Capacity
It has to be remembered that radiographers are only one part of the resource equation, the physical asset i.e. the CT scanner has to be available for the radiographer to operate. The introduction of additional CT units to support the national response to the pandemic was seen both within traditional hospital sites and within the Nightingale hospitals, temporary hospitals established to support the pandemic response. These were in the form of traditional static CT rooms, modular or mobile CT solutions. This increase in physical capacity exacerbated the requirement for suitably trained radiographers across many departments.

Service Delivery
To minimise the risk of cross-infection between patients with a known or suspected COVID-19 infection and those that are clinically vulnerable, new pathways were introduced.
Table 1: Description of Coloured COVID-19 pathways.

<table>
<thead>
<tr>
<th>PATHWAY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>RED</td>
<td>Known Covid-19 Positive</td>
</tr>
<tr>
<td>AMBER</td>
<td>Suspected Covid-19 infection</td>
</tr>
<tr>
<td>GREEN</td>
<td>Confirmed no Covid-19 infection</td>
</tr>
</tbody>
</table>

Table 2: Description of Hot and Cold COVID-19 pathways.

<table>
<thead>
<tr>
<th>PATHWAY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOT</td>
<td>Known / suspected Covid-19 Positive</td>
</tr>
<tr>
<td>COLD</td>
<td>Confirmed no Covid-19 infection</td>
</tr>
</tbody>
</table>

Cohort Pathways
In some areas Red, Amber and Green pathways were introduced for patients as shown in Table 1.

The introduction of these pathways lead to its own logistical challenges, these included; how do you split a hospital into potentially two halves? How do you manage a ‘Cold’ scanner when it is next to the ‘Hot’ scanner? In, some instance this required the installation of additional imaging capacity as previously discussed.

Availability of CT appointments was impacted by the changes to the patient pathway such as the introduction of temperature checks for patients on arrival, the requirement for social distancing in waiting rooms and the introduction of enhanced cleaning regimes in between each appointment.

Case Mix
Initially it was anticipated that COVID-19 patients would require a CT scan of the Thorax to support the diagnosis and patient management. In reality this was not the case and the requirement was more for CT examinations of the Thorax, Abdomen & Pelvis and angiographic procedures to support management of the deteriorating patient. By its nature this required the CT radiographer to have a higher level of modality competency to be able to meet this demand which had to be taken into account when planning staff training and rota’s/staff teams.

Working Practices
In some instances radiographers were requested to temporarily adopt different working patterns such as working nights or within team bubbles. As seen with other healthcare specialities some radiographers and managers made the choice to remain away from their families to protect vulnerable relatives. On occasion radiographers had to adapt to whole new teams when they moved to different areas to support the COVID-19 response. It is routine for radiographers to assess the image quality at the end of an examination, part of this is an assessment for significant pathology for example evidence of pneumothorax prior to the pandemic. An addition to this was processes implemented for radiographers to flag instances where findings could be consistent with COVID-19 infection.

Personal Protective Equipment
As a healthcare professional, radiographers are well versed in the importance of personal protective equipment (PPE). For the majority of CT radiographers this involves gloves, aprons and on occasion lead rubber aprons / thyroid shields. This was until COVID-19 arrived, suddenly radiographers were thrown into a world that had multiple ‘alien’ PPE requirements. Radiographers were familiar with the use of fluid resistant surgical masks and gloves, but the use of filtering Facepiece (FFP) masks was largely unknown in general CT departments and imaging. Managers found that they had to facilitate ‘fit test training’ to ensure the safety of staff working with patients with known or suspected COVID-19 infection.

Welfare
Staff welfare has been a primary concern throughout the pandemic response. Radiographers could potentially affected by the events associated with the pandemic, these may be directly related to work activities such as increased shifts, new work patterns or not. Radiographers may be worried about taking the virus home or staying away from family. They may also be adversely affected by the wider restrictions minimising social contacts and activities. To support staff at this time many organisations have extended existing staff welfare programmes to provide additional support to staff.

Conclusion
This article has provided an insight into the impact of the COVID-19 pandemic on CT services and radiographers within the UK. There has without a doubt unprecedented collaboration between the NHS and the Independent sector imaging providers to meet the demand for CT examinations. CT Radiographers in the UK continue to feel the pressures directly related to the COVID-19 pandemic and it will be some time before these diminish, particularly as the out-patient services begin to return to greater capacity whilst the impact of the pandemic is still being seen. CT service managers have without a doubt had to deal with circumstance that two-years ago they would not have even considered a possibility. CT departments across the UK have continued to provide high quality, safe and effective pathways for all patients requiring CT examination under the most extraordinary circumstances.

Going forwards it will be interesting to see what impact Post-COVID Syndrome more commonly known as Long COVID will have upon CT referrals, if any.

References
Radiographers are part of the frontline heroes during the COVID-19 in Finland and globally

By Hanna Kalliomäki, Finland

DURING the last 1.5 years there is no country nor person in the world that the COVID-19 pandemic would not have affected. In February 2020, the first infections were found in Finland and the public and private healthcare received new instructions how to act and protect the personnel and patients against the virus. At the beginning of the pandemic, it was very confusing for the staff to receive new instructions almost daily and adapt to it carrying out the normal operations at the imaging departments. At the same time, it was required to set up the imaging operations for the suspected infected patients as well as how to image the infected patients. The “normal” had ended and new ways to work were adapted quickly.

Unfortunately, especially in the beginning of the pandemic, radiographers were often forgotten to be the frontline healthcare workers when sharing the protective equipment, even though we were meeting the patients in the first line at the infection clinics and at the ICU, isolation rooms at the departments and when imaging the more severe cases with CT at the imaging department. Very often the administration was thinking more of the short time the radiographers spent with the patients rather than how close the radiographers are next to the patients when carrying out the imaging tasks.

The Society of Radiographers in Finland (SORF) received many messages from the members to help regarding the issues of noticing radiographers as frontline staff and protecting them accordingly. The support we gave varied, but it was clear that especially during the spring 2020 majority of the Society resources were used to support the members. It was obvious for us that the organizing and guiding the radiographers varied greatly, depending on where the members worked, and some needed lot of support from the Society to be heard in the healthcare organizations. We expressed our opinion as a Society as a statement on national newspapers, regarding the situation of the Radiographers as a frontline healthcare personnel in Finland during the COVID-19.

In March 2020 the Finnish government, in cooperation with the President of the Republic declared a state of emergency in Finland over the coronavirus outbreak. The aim of the measures was to slow down the spreading of coronavirus and to protect risk groups. This had direct effects to the healthcare; on the private sector personnel was laid off due to lack of patients, and the public hospitals took care of the covid patients which often meant that the personnel were directed to do overtime, and vacations were cancelled, or the workers had to take them in smaller parts for example max 1-2 weeks in time, all this was possible because of the state of emergency laws were in force. Even though state emergency finally ended in June 2020, the personnel were tired of the abnormal situation, the unfair treatment they often received by overtime and short vacation periods and working with protective equipment day to day. The state of emergency has taken its toll from the Radiographers as well as other healthcare professions.

When it was time to start the vaccinations against COVID-19 in Finland, the National Advisory Committee on Vaccines (KRAR) appointed by the Finnish Institute for Health and Welfare (THL) made a risk assessment for the objectives of Finland’s COVID-19 vaccination strategy. The aim was
to lower the disease burden of COVID-19, i.e. severe cases, premature deaths and years of potential life lost; and to maintain the functioning of the health care system. We, as a Society expected that the radiographers would be in the mentioned first group of vaccinated healthcare personnel, but to our disappointment it was not so. We contacted the KRAR and their response was clear: Yes they do recognise the radiographers as the first group. Unfortunately, the regional vaccination groups had the power to decide the vaccination order, and dependant of the region the radiographers were forgotten. It was clear that the Society was to help the members by giving support and trying to influence to the regional vaccination groups with support and statement letters, with some success. To our disappointment to this date, there have been areas in Finland where the healthcare personnel including radiographers have had to wait for the age-group vaccinations to start, and all of the members have not yet had the second vaccinations.

Due to the pandemic the situation in Finnish healthcare is not ideal. Over the past 1.5 years healthcare workers have started to shift from jobs in public sector to private sector, some have changed their careers from the healthcare to other professions and this is seen in the field of radiography as in other healthcare professions. There is rising debt in national and global healthcare to prevent and care of other illnesses, health issues, and deceases. the Society of Radiographers in Finland, as other healthcare societies and unions have stated that the crisis in the healthcare deepens in coming years if the decision makers and politicians do not wake up and change the course of the healthcare by directing better funding to the healthcare sector to enable better pay, better resources, more professional manpower, and enabling better management to the healthcare.

This pandemic has shown how important part Radiographers are fighting as frontline healthcare professionals. We must be proud of the profession and ensure that radiographers are recognized on national and international levels by other healthcare professions, the healthcare management, politicians, and decision makers. To last, the Society of Radiographers in Finland would like to pay tribute to all the radiographer colleagues who have lost their lives fighting against the COVID-19 pandemic, the true heroes, and heroines who gave the ultimate sacrifice. You and your close ones are in our thoughts and prayers.
Pandemic COVID-19 and RTs in the cath lab

By Angeliki Kolyda, Greece

On March 11, 2020, the World Health Organization made the assessment that COVID-19 be characterized as a pandemic due to both, the alarming levels of spread and severity and by delays of action. The announcement of national lockdowns impacted everything worldwide.

Radiological technologists (RTs)/radiographers, as frontline healthcare workers, play an important role to national health system worldwide. They are not the persons who simply press the button to "release" x-rays. Their work and their provisions are greater. The role of RT’s has been developed remarkably by the rapid technological and innovative advances in medical imaging and radiation therapy. They are essential for the smooth operation of radiology, interventional radiology and cardiology, nuclear medicine, and radiotherapy. Responsibilities in radiology are manifold, needing a multi-tasking approach. An RT also requires concentration and precision to perform the increasing complex examinations and interventional procedures. The role of a RT is distinct and autonomous within the team while effective teamwork is a vital prerequisite especially in interventional cardiology departments.

Community and officials should not overlook that during this period, RTs contributed so much to fight the pandemic. Several lost their lives during this strenuous situation, worldwide, by working and being fully aware of the important work they offer to patients and generally to the healthcare system. There were RTs who lost their lives because they did not have access to appropriate personal protective equipment (PPE) or they were unaware of their use to protect themselves.

RTs who work in the interventional cardiology departments (catheterization laboratory-cath lab) are more protective than others who work in different modalities. In the cath lab, RTs operate imaging equipment, and other medical devices, such as the intravascular ultrasound (IVUS) and the optical coherence tomography (OCT), adhere to the rules of radiation protection and protect the other medical staff from radiation, support the cardiologist during the procedures, and more. All procedures are conducted in a sterile environment in the cath lab, so RTs are more familiar with sterilization and donning and doffing is a routine process. However, their procedures have a high exposure risk, which can be defined as having face-to-face contact within 2 meters.

Angeliki Kolyda

Angeliki Kolyda is a radiological technologist in interventional cardiology department in General Hospital “Asklepieio” Voula, Greece and council member of the Panhellenic Society of Radiological Technologists.

Her major areas of interest are cardiac angiographies, radiation protection and patient safety.

She received her secondary education in Athens, Greece. In 2010, she graduated from Technological Educational Institute of Athens (TEI), as radiological technologist. Five years later, she obtained her Master of Science (MSc) “Neoplasms in Human Body” in National and Kapodistrian University of Athens School of Medicine.

Her working experience started, in 2011, as radiological technologist in the x-ray department in a large public teaching hospital for eight months. When she graduated from TEI, she had been specialized on Positron Emission Tomography and Computed Tomography (PET-CT). She had worked on PET-CT department in a private hospital for four years, before she commenced working in her current job.

Figure 1: RT in cath lab during the pandemic.
in a closed environment for more than 15 minutes. For this reason, stringent infection prevention control measures and PPE use must be observed. RTs, doctors and nurses as a team must aim to minimize the time of contact without compromising diagnostic quality and patient care. [Figure 1]

The first wave of the pandemic in Greece began on March 12, 2020. The majority of the Greek community felt anxious with the new situation and feared the announcement. The Hellenic National Health System attempted to find solutions quickly to prepare for the wave of the pandemic COVID-19. However, it was inevitable because of the rapid spread of COVID-19. No one could imagine that the entire planet would be affected, with images resembling scenes from horror and science fiction movies. Evidently, knowledge on managing the pandemic was somewhat limited. Similarly, there was lack of confidence from RTs on how to handle the situation while official updates on COVID-19 were general and not dedicated for our profession.

From the first time, interventional cardiology procedures have contributed to the care of COVID-19 patients worldwide. In Greece, during the first wave of the pandemic, specific hospitals were managing patients positive to SARS-CoV-2 and other hospitals were placed on standby. The reduction in cath lab activity has been considerable, particularly for elective procedures. During the first wave of the pandemic, substantial changes to minimize risk of contagion among staff ensured that the cath labs will continue to function throughout the course of the outbreak for urgent cases. Furthermore, there was a noticeable reduction in patient flow with heart attacks as they avoided visits despite their symptoms because they were afraid. Many patients lost their lives, unjustly, either by staying at home or due to their late arrival in the catheterization laboratory. However, patients who came to the hospital were assessed and screened prior to coming to the cath lab.

Only, for COVID-19 positive or suspected patients, appropriate PPE was readily available for only three persons, for the doctor, the radiographer and the nurse, including N95 respirator, gown, cap, face shield and/or goggles, and gloves. Moreover, in the cath lab, there was an extra protection, an ultraviolet (UV) lamp that was used to sterilize the examination room. UVC radiation has been shown to destroy the outer protein coating of the SARS-Coronavirus, and to inactivate the virus. UVC radiation may also be effective in inactivating the SARS-CoV-2 virus. The duration of the entire procedure was less than 20 minutes, because the dose of UVC lamp was higher and the exposure was shorter compared to those used at home. [Figure 2]

The second and the third wave of the pandemic, compared to the first one, were so close to each other and much worse in Greece. There were a lot of new positive cases to SARS-CoV-2, many deaths and many people were in intensive care. Many of healthcare workers became ill from COVID-19, so the needs were growing and there were no more staff to overcome all this situation. As a result, the Greek national health system was almost ready to collapse. Private clinics are ordered to meet the treatment needs of patients with COVID-19 and medical staff were transported to hospitals exclusively for COVID-19 to meet needs for a couple of months. Many RTs were also transported to those hospitals.

It is undisputable that RTs were facing difficult circumstances during the pandemic and their contribution was still significant, as always.

The Panhellenic Society of Radiological Technologists (RTs) responded immediately by producing and delivering safe practice guidelines for RTs during the era of the pandemic. The effort of the team included a three-hour online meeting on a daily basis in order to collect, and share information available from WHO and our National Organization of Public Health (EODY) and of course update each other. In almost a week, our team developed by adapting and communicating focused instructions and rules to support radiographers in the frontline, in each and every modality in medical imaging and therapy.

After preparing relevant material for COVID-19, the Panhellenic Society of Radiological Technologists, on March 22 2020, uploaded the guidelines for good practices during the pandemic for Radiological Technologists on its website (www.pasyta.gr). These guidelines demonstrated how a radiological technologist can be protective against an asymptomatic patient, as well as for an established COVID-19 patient.

With this in mind, the team of editors decided to communicate these instructions by utilizing a more dynamic approach, by organizing live seminars, hiring and using WebEx platform. All this effort was delivered via four webinars per week for a whole month, and completed successfully as participating RTs were beyond our expectations. Special importance was given with videos which were presented on how to protect themselves by donning and doffing and by disinfecting medical imaging and therapy systems.

Furthermore, what interested the Panhellenic Society of Radiological Technologists was two issues, the first, concerning the increased protection measures and the guidance on COVID-19 for RTs while the second investigated their psychological health during the pandemic. Hence, the Society distributed two surveys for each issue. The results showed that the guidelines of our Society were highly effective in supporting RTs because there was no official practical instruction on how to apply PPE for COVID-19 and how to
The impact on nuclear medicine radiographers in a pandemic

By Fozy Peer, South Africa

IN KEEPING with 2021 ISRRT World Radiography Day theme, “The Role of the Radiographer in a Pandemic”, the impact of the COVID-19 pandemic on nuclear medicine radiographers at a tertiary level centre is discussed below. The main focus is adherence of prevention of spread of the virus, provision of services, use of available time during decreased workloads, staff monitoring, standard operating procedures, and challenges in service provision. During the pandemic it is essential to provide platforms to share knowledge and to gain knowledge despite not being able to host face-to-face meetings. The role of the Society of Radiographers of South Africa in providing such a platform is also discussed.

Radiographers across the different radiographic categories have faced significant challenges during this extraordinary time. However, they have shown much resilience and professionalism in providing excellent patient care incorporating both personal and patient safety throughout.

The standard operation procedures (SoP) in nuclear medicine departments around the globe, including at a tertiary centre in South Africa, had to be adjusted in order to continue providing essential services while also considering the safety of other patients, staff and the public to curb the spread of the virus.

The main mechanism of transmission of COVID-19 from human to human is mainly via droplets and fomites from an infected person; in a nuclear medicine department infection exposure may occur anywhere from patient registration areas to waiting rooms, injection areas and/or scanning rooms. This can be quite challenging for healthcare professionals as infected individuals need to be identified and appropriate precautions taken.

In accordance with the World Health Organisation (WHO) publication COVID-19: operational guidance for maintaining essential health services during an outbreak certain operational procedures that directly affected the service had to be adapted. In terms of providing a nuclear medicine service during the pandemic some of these guidelines were considered and implemented in our department.

i) The identification of context-relevant essential services. Thus initially only the services that were considered essential were provided, e.g., PET-CT for oncology patients, lung hybrid CT-perfusion scans for pulmonary emboli.

ii) The rapid redistribution of health workforce capacity, including reassignment of tasks. This meant staff were requested to stay home and/or be tested if they were not well, staff were segregated into staff teams, staff were mobilised to work in other areas within the department if required, the necessary personal protective equipment (PPE) was made available to all staff. Staff were made aware of psychological counselling services, available in the hospital, and there were regular short staff updates/meetings.

iii) Identify mechanisms to maintain the availability of essential equipment and supplies. This required that all supplies were listed and possible suppliers with distribution channels identified.

To provide an efficient service meant that the radiographer manager, together with the nuclear medicine physicians, had to reschedule non-urgent studies where patient requests were evaluated on a patient-by-patient basis. The workload initially decreased for several reasons. For example, patients could not keep appointments due to limited public transport; the number of passengers in taxis was limited; the government imposed curfews hence patients could not leave from and/or get back home in time to meet curfews. Many patients were simply afraid to enter a hospital.
The decreased workload due to the non-show of patients initially was responsible for some wastage of radiopharmaceuticals that were ordered for booked patients and could not be used. Lesson learnt led to us contacting every patient prior to their appointment to check whether they were going to be able to attend before the radiopharmaceuticals were ordered. There were some spin-offs from the decreased workload. For example, this allowed for staff rotation and helped when staff had to self-isolate due to symptoms or possible exposure to Covid-patients. The reduced workload meant advantage was taken of the additional time to effectively practice infection control procedures including sanitising of equipment and the donning and doffing of PPE, where necessary.

As frontline workers, it is essential that radiographers have access to appropriate PPE. We were fortunate as we did have an adequate supply of PPE, but it had to be carefully monitored to avoid wastage and theft. All staff were allocated PPE as needed to ensure their safety. The radiographer manager also arranged for in-service training of all staff categories in terms of infection control with special attention to the correct way of donning and doffing the appropriate PPE. Training for hand-hygiene specifically was also arranged particularly as it is underscored as the key in preventing the spread of COVID-19.

An infection management team was set-up to implement infection control procedures. To comply with appropriate social distancing meant re-arranging patient waiting areas, and the way staff could work, as well as leisure areas. Hand-hygiene and social distancing were closely monitored. It was evident during this experience that all staff in the nuclear medicine department (i.e., clerical personnel, cleaners, radiographers, nurses, medical physicists and doctors) had to work together as a team to curb the spread of this virus.

• Staff monitoring

Hospital policy demanded that every member of staff recorded their temperature and any signs/symptoms of Covid-19 on a daily basis. To minimise exposure of staff it was necessary to allocate staff to teams. At any one time only members of one team were present on duty. This was a proactive decision to ensure that if a member from a team was exposed to the virus, the other team could replace them and continue with the service. All staff who had been in contact with a Covid-19 positive person were counselled and helped emotionally to deal with their well-being.

• Standard operating procedures (SOPs)

SOPs relevant to nuclear medicine were compiled and incorporated information from hospital policies and protocols, relevant literature from the International Atomic Energy Agency (IAEA), and the ISRRT April 2020 document produced shortly after the start of the pandemic, namely, COVID-19 ISRRT Response Document - Appropriate and safe use of Medical Imaging and Radiation Therapy with infection control measures considered in addition to standard radiation protection procedures.

• Challenges in the PET-CT department

The primary radiopharmaceutical used for imaging of the patients requiring PET-CT imaging is Fluorine-18-fluorodeoxyglucose (F-18-FDG). The closest South African cyclotron that supplies this radiopharmaceutical is approximately six-hundred kilometres, in another province, from the hospital. Air-freight is the usual delivery mode. This entails a one-hour flight followed by a 20-minute drive to the hospital. Due to stringent lockdown regulations air or road travel between provinces was prohibited. This meant there were no air-freight services for the delivery of the F-18-FDG radiopharmaceutical. This impacted on oncology services as it was not possible to offer our PET-CT service. The radiographer manager then set-up meetings with the suppliers so that an alternate mode of transport could be used. It was decided to drive-down the radiopharmaceutical albeit that it would arrive later (2-3 hours) than normal. Consideration had to be given to both the decay, that is, the short half-life of 110 minutes of the radiopharmaceutical and the fact that the doses expired within a certain time after manufacture. Hence, instead of the usual 8-9 patients that were routinely imaged in normal circumstances, only doses of the F-18-FDG for 5-6 patients were received.

This resulted in a limited service being offered for the duration of the lockdown.

It is interesting to note that in recent literature, it is stated that although F-18-FDG PET-CT imaging is ‘usually not a first-line imaging modality, it can be a useful adjunct to traditional imaging techniques to help reduce COVID-19 disease burden and provide vital information at the molecular level’. In some patients, where symptoms were non-specific, F-18-FDG PET-CT studies detected undiagnosed cases of COVID-19 in the early stages of infection. The features of SARS-CoV-2 infection on F-18-FDG scans could lead to the detection of non-oncologic pathologies.

The other services in the department slowly returned to normal as lockdown rules became less stringent. Radiographers persevered and provided a limited but excellent service throughout.

Our facing challenges and coming up with solutions do highlight that radiographers are resilient and can easily adapt to change where necessary. I salute the radiographers in this particular setting and all radiographers at large for their vital role and unwavering support of patients during these trying times.

• Society of Radiographers of South Africa SORSA is the only professional body in South Africa that represents all radiographers, that is, diagnostic (includes MRI and CT), radiotherapy, nuclear medicine and ultrasound. As an executive member and public liaison officer of SORSA, my tasks include arranging of continuing professional development (CPD) events such as congresses, workshops and symposia.

Due to the stringent lockdown regulations, events of more than 50 persons in a closed venue were not permitted. Also no inter-provincial travel was allowed. The planned congress, seminars and other meetings had to be postponed and in some cases cancelled. This resulted in disgruntled members and the rearranging of meetings to avoid financial losses as deposits were paid well in advance. SORSA then faced the challenge of not being able to host face-to-face meetings. The result was hosting virtual symposia. Since the start of the pandemic SORSA has hosted three...
virtual symposia. These were attended on average by 500 national and international delegates via on-line platforms. The symposia boasted speakers of exceptional calibre where the presentations covered all radiographic categories including ethics. Registration to the symposia were free for all delegates. A 4th virtual symposium has been planned for September 2021. It will be interesting to see whether, things go back to ‘normal’ post pandemic or whether we will adapt to a ‘new-normal’

This experience, globally enforced by the COVID-19 pandemic in all walks of life, demands that continued professionalism and leadership in healthcare is essential to beat this pandemic.

References

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protect themselves, while most radiographers were distressed during the pandemic.

Finally, new strategies from the Greek government and guidelines for good practices from the Panhellenic Society of RTs were followed by RTs to cope with COVID-19. Radiological technologists adapted to changes, during the pandemic, to be protected, but sadly two of them lost their lives as frontline healthcare workers. In general, radiographers have an integral role but not limited to medical imaging, therapy and radiation protection. The pandemic highlighted the necessity of practicing using hygiene safety techniques to limit infections in all aspects of our work and especially in the catheterization laboratory in order to provide timely interventions to patients and a safe working environment for personnel.

The COVID-19 pandemic has demonstrated how fast a contagion can spread in the modern world.

Let us hope the vaccines will stop the spread of the COVID-19 disease and make people’s life better.

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The COVID-19 pandemic – A personal perspective in my role as Director of Professional Practice

By Stewart Whitley, United Kingdom

I AM PRIVILEGED for having a long and varied career in radiography having qualified in London in 1967 as serving soldier in the Royal Army Medical Corps. As I reflect on my career and the world of radiography, I must say that the ongoing COVID-19 pandemic has been the most challenging period in my history and that of many others when considered from a worldwide perspective. It has been such a period of uncertainty but a time in which we have learnt so much together and adapted our working practices magnificently to maintain radiography and radiation therapy services while keeping our patients and colleagues safe.

I am amazed as to the consequences that this infection as brought to humanity and in particularly the Radiography world. This has affected us all in so many different ways curtailing our freedoms to travel and to join with family and colleagues. Being of a certain age, at the start of the first wave, this brought a lot of uncertainty and brought change on freedoms with imposed isolation to prevent the spread of the virus.

Thankfully, supported by a wonderful wife, I was able to use all my energies in front of my PC as the ISRRT swung into action to provide resources and advice to radiographer colleagues across the world. What a productive time it has been! From the moment that we heard that the World Health Organisation [WHO] had declared a pandemic it was not long before I was involved in sketching out some basic principles to protect radiography staff from acquiring COVID-19 infection. This involved collaborating with colleagues from around the world in a hectic race to get enough meaningful information based on the knowledge that we knew at the time. Whist all this was happening WHO engaged the ISRRT, along with other notable Non-State Actors, in formulating immediate advice to those involved in diagnostic services. This took us on a memorable journey which involved me and others in many meetings as we formulated different WHO Technical strategies and advice documents.

I will shortly highlight some of the guidelines and resources that ISRRT produced to support colleagues across the world in many varying and different environmental conditions. These took the form of standard readable PDF documents accessible from the ISRRT website and a number of E-Learning course modules with the focus on mobile radiography, Computer Tomography, Ultrasound, External Beam Radiation Therapy, and Nuclear Medicine incorporating PET-CT which are free to all and available from the ISRRT website ISRRT e-Learning. We are grateful to those the expert contributors who gave of their time to develop these excellent modules. These resources, outlined below, will be followed by those generated by the WHO and the International Atomic Energy Authority (IAEA) which published a range of Technical related COVID-19 guidance documents which ISRRT played a significant part in developing and ensuring that the radiographers’ expertise and voice was heard.

However, in addition to the resources, it became evident that ISRRT had to produce a Position Statement based on the importance of radiographers and radiological technologist working as ‘Frontline Health Workers’.

It came to our attention that in some countries that radiographers and radiological technologist were not being treated as frontline workers and as such were not being provide with adequate personal protective equipment [PPE] and resources.

Stewart Whitley
Stewart Whitley qualified as a radiographer in the UK in 1967. He is a Fellow of the College of Radiographers and has held several roles in the radiography profession. This year as part of the Society of Radiographers Centenary celebrations he has been awarded a gold medal for his services to radiography. Having retired from the NHS he is a freelance Radiography Management Advisor and the ISRRT’s Director of Professional Practice, having been Treasurer for eight years prior to this. While working in the NHS Stewart held several import managerial roles serving on national and regional committees as well as holding different roles with the Society and College of Radiographers including being a regional and national Council member. As senior editor and series editor of the Clark’s family of Radiography textbooks he has published several radiography textbooks including ‘Clark’s Positioning in Radiography – 13th edition’ and most recently ‘Clark’s Procedures in Diagnostic Imaging – A system-based approach’ and now is working on 30 pocketbooks spanning all aspects of Medical Imaging and Radiotherapy. He has represented ISRRT on several IAEA technical meetings and projects, serving also on several WHO Non-State Actor user groups and contributing to a number of WHO technical documents, including COVID-19 related documents.
The statement says ‘The ISRRT states that healthcare employers have a responsibility to recognise radiographers and radiological technologists as ‘Key Frontline Healthcare Workers’. Furthermore, healthcare employers have an overarching responsibility in maintaining working conditions to advance for the safety, care, general health and mental wellbeing of radiographers and radiological technologists.’

It is important for employers to understand that radiographers and radiological technologists are responsible for undertaking a wide range of diagnostic imaging, molecular imaging, intervention, radionuclide therapy and radiation therapy procedures that are not possible without direct patient contact. As such they play an essential role in supporting the care of patients across the pathway from referral into the service and their knowledge and skills are required throughout the patient’s entire continuum of care process. Without imaging support to provide optimal images a diagnosis of the patient’s condition their treatment plan and medical intervention will be greatly hindered. Additionally, the delivery of safe and effective radiotherapy is dependent on therapeutic radiographers and technologists working closely with patients.

It is important that employers understand that there is an overarching responsibility for the safety, general health, and mental wellbeing of all employees. Those regarded as engaged in essential clinical contact with patients may require specific attention to ensure that services to patients can be delivered efficiently and safely.

The position statement can be found at ISRRT e-Learning

Notable ISRRRT Responses – documents and E-Learning Course modules

ISRRT COVID-19 Response Document – all modalities

ISRRT developed the COVID-19 - ISRRT Response Document - Appropriate and safe use of Medical Imaging and Radiation Therapy with infection control measures considered in addition to standard radiation protection procedures in response to the requirement for a technical guidance document which addresses the personal protective equipment (PPE) necessary for radiography personnel working in Medical Imaging and Radiation Therapy centres.

The document addresses the control of infection measures necessary to manage imaging and radiation therapy procedures for patients who may carry the COVID-19 virus. Additionally, it outlines measures necessary for imaging the more complex and higher risk patients undergoing aerosol generation procedures (AGPs). All of these infection control considerations are levelled against the necessary published radiation protection and medical imaging safety procedures and protocols.

At short notice radiographer experts from around the world contributed to the content of this publication gathering and reflecting best practices in their countries as well as the current guidance and publications issued by several professional societies. The document was designed to assist in the development of local action plans for a safe way of working, outlining all the relevant steps to be considered for a range of medical imaging and radiation therapy procedures and situations. This included appropriate PPE required to protect against COVID-19 transmission and daily best practice for social distancing of radiographers, patients and personnel including health care workers. It contains also valuable information relating to best practice for general cleaning after performing medical imaging and radiation therapy procedures on patients with the COVID-19 virus.

The document was shared with the World Health Authority (WHO) and the International Atomic Energy Authority (IAEA) as technical input for the development of joint WHO/IAEA guidance documents on COVID-19 safety procedures.

The document can be found at Full Guideline for Protective Measures | ISRRT and a shortened version which is a ‘Quick Guide for Protective Measures’ can be found at Quick Guide for Protective Measures | ISRRT.

E-Learning Course modules

International COVID-19 support for Radiographers and Radiological Technologists – mobile radiography

The International COVID-19 Support for Radiographers/RTs is an e-learning module, developed collaboratively by the ISRRT and the EFRS through international experts from both organizations.

The ISRRT and EFRS thanks Emeritus Professor Peter Hogg, School of Health and Society, University of Salford (UK) for his enthusiasm and commitment to making this project a reality. Peter, together with Mr Ken Holmes (University of Cumbria, UK) have led this work and the rapid content development process. A special thanks to a large number of content authors from across the world for creating the teaching and support materials. We also want to thank each of the experts that took the time to develop and share best practice information for our professionals worldwide.

The material within this e-learning module, and the scientific evidence that supports it, will provide the Radiographers/RTs throughout the World with additional resources to help in their fight against this global pandemic by keeping themselves healthy and supporting the healthcare services in their countries to support patients.

Access to the course can be found at Covid-19: About this course [isrrt.org]

Practical guidelines for radiographers/ radiological technologists during the pandemic. - 19

The following courses are available at ISRRT e-Learning

- CT Examination during the pandemic COVID-19 By Efthimios Tim Agadakos
- Ultrasound Examination during the pandemic COVID-19 By Gill Harrison
- Delivery of External Beam Radiation Therapy during the pandemic COVID19 By Anastasia Sarchosoglou and Rodanthi Karavelaki
- NM and PET - CT examination during the pandemic COVID19 By Angela Meadows

Notable WHO and IAEA technical COVID-19 related documents with ISRRT Contributions

WHO document ‘COVID-19 Use of chest imaging in COVID-19 – A RAPID ADVICE GUIDE’ [who.int]

This rapid advice guide examines the
evidence and makes recommendations for the use of chest imaging in acute care of adult patients with suspected, probable, or confirmed COVID-19. Imaging modalities considered are radiography, computed tomography, and ultrasound. This guide addresses the care pathway from presentation of the patient to a health facility to patient discharge. It considers different levels of disease severity, from asymptomatic individuals to critically ill patients. Accounting for variations in the benefits and harms of chest imaging in different situations, remarks are provided to describe the circumstances under which each recommendation would benefit patients. The guide also includes implementation considerations for different settings, provides suggestions for impact monitoring and evaluation and identifies knowledge gaps meriting further research.

ISRRT made significant input to the development of Annex 1 ‘Infection prevention and control for chest imaging in patients with suspected or confirmed COVID-19’.

This annex is part of a rapid advice guide on the use of chest imaging in COVID-19. It focuses on the imaging modalities referred in the guide recommendations. Building upon WHO guidance on COVID-19 infection prevention and control in health care settings (A1–A4), this annex addresses good practices for infection prevention and control for front-line staff performing imaging procedures during the COVID-19 pandemic. Additionally, it describes specific infection prevention and control measures necessary while undertaking chest radiography both in the general imaging department and with portable radiography equipment, as well as when undertaking chest computed tomography (CT) and lung ultrasound scans.

OpenWHO on-line training on imaging in COVID-19
Working with Dr Maria Perez, WHO, we contributed to the on-line training in COVID-19 Courses OpenWHO

WHO-IAEA COVID-19 Pandemic: Technical Guidance for Nuclear Medicine Departments
ISRRT made significant input into the development of the document fund at

**WHO-IAEA Priority medical devices list for the COVID-19 response and associated technical specifications – CT, Ultrasound, and portable X-ray**

This important document found at Priority medical devices list for the COVID-19 response and associated technical specifications: interim guidance, 19 November 2020 (who.int) provides detailed information including technical specification on a range of equipment used in treating COVID-19 patients. ISRRT contributed to the section dealing with imaging equipment, detailed in the ‘COVID-19: a rapid advice guide’ which highlighted optimum specifications for ultrasound, X-ray, and CT scanners.

**WHO-IAEA technical specifications for ultraportable radiographic system review**
The WHO published in 2020 its ‘Rapid communication on systematic screening for tuberculosis’ document found at 9789240016552-eng.pdf (who.int). This document highlights the plight of this disease across the world and focuses on the use of systematic screening programme highlighting the role of chest radiography.

ISRRT was involved in developing a specification for an ultraportable radiographic system which could be used in low to medium income countries. This report will soon be published.

Involvement in these projects has been a privilege, however one must reflect on the number of hours and input provide by colleagues that has made this possible whilst we have been engaging directly with WHO and the IAEA. I am proud to belong to a profession which has been selfless and displayed great resilience during this very uncertain time and which was quick and continues to work collaboratively in communicating and sharing best practices. With the patient always central in all our actions and thoughts we will continue the role of delivering safe and effective imaging and radiation therapy services.

However, while this pandemic shows no sign of diminishing we must continue to practice safely and learn new skills and techniques bearing in mind how we adapt
A wave of change

By Shellie Pike, USA

THE COVID-19 Pandemic brought on a multitude of changes for healthcare workers across the United State. Medical imaging was no exception. As a Radiologist Assistant (RA), I have the honor of working with radiologic technologists across many modalities in medical imaging as well as students. When the pandemic first struck, recommendations to stop all elective procedures were announced. This declaration brought on fear for many staff members. Along with the concern of potential exposure to the virus, there were concerns of lost wages and the overall unknown. There was much last-minute planning. However, no one was prepared for what was coming.

Initial Planning.
At first, discussions within our radiology practice of 35 radiologists, centered on how to keep staff safe; radiologists, Ras, and radiologic technologists alike. With shortages in personal protective equipment (PPE), we discussed ways to maximize our practice efficiency while minimizing use of PPE. Because of direct patient care, it was decided that N95 masks would be provided to our four interventional radiologists as well as our two RAs. Our radiology practice, along with many others across the United States, planned to have more radiologists working remotely during the pandemic. Once the pandemic hit, the practice decided to limit potential exposure to our physicians by installing home workstations for many of the radiologists. Prior to the pandemic, our practice had seven to eight radiologists on-site at each of our main hospital campuses. This resulted in only 3-4 radiologists on-site during the day. Having less direct access to radiologists, meant that the RAs would need to provide more direct patient care than before.

Next Steps
With the guidelines to cancel routine procedures, our attention turned to developing procedure appropriateness guidelines for all procedures. Initially, I began by reaching out to referring providers, to decide which of our routine scheduled procedures were necessary and which of those could be delayed to a time when there were no longer shortages of PPE; as well as when proper staff were available to complete the procedures. I also worked with our radiology practice Medical Director to figure out which procedures would be performed in our department. Since our fluoroscopy suite was not equipped for negative pressure ventilation, some procedures had to be re-routed to our interventional radiology suite where the procedure room already had negative flow ventilation. Additionally, we set up protocols for COVID positive patients and a process to allow referring clinicians to reach out to have procedures completed which they considered necessary during the implemented restrictions. I coordinated with our radiologic technologists working in fluoroscopy and the hospitals’ speech therapists to ensure a smooth implementation of our guidelines for our most frequently performed procedures.

Functioning Safely and Effectively
Since we continued to provide patient services to patients who were not diagnosed as COVID positive, we worked with staff to develop best practices about performance of these procedures. It was decided that our staff would wear N95 masks in addition to their surgical masks for all procedures where the patient was either suspected of having COVID-19 or if the patient had to remove their masks during the procedure (e.g., upper GI exams, swallow study in conjunction with speech therapy).

We supplied services to COVID-19 patients who were unable to effectively eat. Procedures to assess swallow function were completed and if patients needed

Shellie Pike

Her radiology practice employs 31 diagnostic radiologists, four interventional radiologists and two radiologist assistants (Registered Radiologist Assistant (R.R.A.) or radiology practitioner assistant (RPA)).

Shellie graduated from Mercy/ St. Luke’s School of Radiologic Technology in 2000 and completed a short internship in interventional radiology and cardiac catheterization. She was employed as a radiologic technologist using a variety of modalities including computed tomography, surgery, general radiography and fluoroscopy. As a Radiologist Assistant, she provides direct patient care in the diagnostic radiology department. Shellie performs a variety of GI, GU and MSK procedures.

Shellie has served on several committees for the American Society of Radiologic Technologists and the American Registry of Radiologic Technologists.
short-term supplemental feedings, we were able to place gastrointestinal feeding tubes to allow for adequate nutrition during the recovery phases.

**Developing a Support System**

Due to lack of routine patient procedures, during the first few weeks of the pandemic, I found myself interacting more directly with the radiologic technologists in our department. I found that the radiologic technologists in the departments needed more support as many were struggling with the increase stress and fear as well as reduced staffing that resulted from the pandemic. As a result of the pandemic, our student technologists were not allowed to be in clinic for several months which added to the strain placed on our radiologic technologists. I tried to become a sounding board to listen to the technologists. I think that just having someone to listen to your concerns, worries and frustrations helped ease their minds as well as help them through the challenging times. It was obvious that being out of clinic for an extended period of time, brought on new challenges for our students; not only did they have to learn new processes, they needed additional time to “re-learn” the procedures they previously performed.

**Additional Duties Completed**

During the first few months of the pandemic, the overall number of procedures slowed down dramatically compared with previous years. Therefore, the RAs in our practice found that they had more time to complete quality improvement projects. I worked on projects involving radiologist peer review and process improvement. One peer review project involved analyzing radiologist accuracy. The radiology practice used a committee of radiologists, from a variety of specialties, to review previous dictations for accuracy. Another project I completed involved comparing radiologist reports with intra-operative findings. Both of these projects allowed for improved practice when practice returned to normal.

Another project we implemented was a quality improvement process for dual energy X-ray absorptiometry (DEXA) scans performed across the practice. The RAs completed education regarding the performance of DEXA scans. With guidance from one of the radiologists regarding the interpretation of DEXA scans, the RAs worked to develop reporting templates that would increase consistency among the dictations completed by the radiologists. In conjunction with the information technology department, the templates were created and vetted via the Powerscribe® dictation system. When procedures returned to normal, the RAs continued to provide quality assessment of DEXA scans and provided radiologic technologists with additional guidance in order to provide the most accurate scans for our patients.

**Where Are We Now?**

Following approximately, 2 months of reduced patient schedules, our radiology departments procedure totals were off the charts while working through the backlog of exams that were delayed from the initial onset of the pandemic. Even a year after the pandemic, some of our facilities continue to have an increase in number of procedures being performed on a daily basis.

One specific area of increase utility is in video pharyngograms performed in conjunction with speech therapy. These exams evaluate a patient’s swallow for function and to any necessary strategies. There are several patients who are recovering from COVID-19 but have experienced residual swallowing dysfunction following diagnosis. These patients are evaluated regularly to determine the best diet to ensure the quickest recovery.
IT IS almost two years since the announcement of the pandemic COVID-19, from the World Health Organization (WHO). This pandemic has changed people’s lives, and especially students’ education. As known, the SARS-CoV-2 was first detected in the city of Wuhan, China in late 2019. Its diagnosis is most often confirmed through a combination of symptoms. The most common symptoms include fever, fatigue, diarrhea, dry cough, sore throat and loss of taste or smell - and findings on a chest X-ray, chest CT scan, which typically shows atypical pneumonia and this affirms that the radiography profession is inarguably such an important asset for the detection and follow up of the disease. From the beginning of March 2020, the Greek Government decided to close all public and private educational institutions, of all levels, gradually in the whole country, to control the spread of the pandemic.

In Greece, the first wave of the pandemic was milder than the subsequent two. There were not many deaths recorded due to the virus and the national health system seemed to control this strenuous situation. However, during the third wave the daily count of new confirmed COVID-19 cases increased indicating the seriousness of the pandemic. [Figure 1].

The COVID-19 vaccination campaign in Greece began on 27 December 2020. As of the 5th of July 2021, 5,034,790 people have received their first dose (47.0% of total population), and 4,017,820 people have been fully vaccinated (37.5% of total population). On July 27, 2021, the day this article was written, the national chart of the vaccination campaign progress is illustrated [Figure 2].

The Section of Radiology & Radiotherapy of the Department of Biomedical Sciences - School of Health and Welfare Professions, University of West Attica, Athens Greece covers the fields of medical imaging, nuclear medicine and radiotherapy oncology and according to the official legislation upon completion of their studies.

**COVID-19: The changes of Greek radiologic technology students’ education**

By Perdikake Danae, Markou Michael Raphael, Katsarini Persefoni (Graduates of West Attica University, Section of Radiology & Radiotherapy) and Karanisa Ioanna Sofia (3rd year student of West Attica University, Section of Radiology & Radiotherapy)

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**Danae Perdikake**
Danae Perdikake is a graduand student. She was born in Rethymno, Crete and moved to Athens in 2017 to begin her studies in radiology and radiotherapy at the West Attica University. She chose this profession consciously, as she wanted to be a radiological technologist from her young age. She anticipates graduating in September 2021.

**Karanisa Ioanna Sofia**
Karanisa Ioanna Sofia is a 3rd year student of West Attica University, in radiology and radiotherapy. She has a big interest in new technologies applied in the fields of radiology and radiotherapy and dreams of working as a researcher. Karanisa has also been involved with the pharmaceutical science. She is a nature lover who likes hiking, trailing and cycling and travelling as much as possible.

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**Figure 1**: Daily new confirmed COVID-19 cases

**Figure 2**: National chart of the vaccination campaign progress.
the graduates of the department acquire the necessary scientific and technological knowledge and skills to act as radiological technologists/radiographers, radiotherapy technologists and nuclear medicine technologists. The duration of studies at the Department of Radiology & Radiotherapy is eight semesters and includes theoretical, clinical and combined schemes, hospital placements and a degree dissertation. At the same time, additional practicals are undertaken, as well as basic health-related subjects (anatomy, physiology, etc.).

Higher education has undergone a dramatic transformation during the pandemic COVID-19. The COVID-19 outbreak in Greece occurred during the spring semester 2020 and Greek universities had to rapidly shift to virtual and digital strategies such as online distance learning and also postponed all the clinical, practical and hospital placements.

E-learning is the best option available to ensure that epidemics do not spread, as it guarantees social distancing. The majority of students use mass transit in order to attend university classes but according to epidemiological data, SARS-COV-2 spreads rapidly with public transportation. Despite the associated with e-learning, it can save time, effort and travel expenses compared to traditional in person learning. The teaching materials such as notes are easier to access at any time and the lectures can be recorded so students can take up classes, depending on their daily routine. This is often advantageous for working students who have a challenging pace of life and struggle balancing studies and work. The student becomes a self-directed learner and learns simultaneously and asynchronously at any time.

However, there are many disadvantages of distance learning, with the most important being that students acquire knowledge only on a theoretical basis without applied practical skills. The profession of radiography requires practical training and clinical experience and as a consequence e-learning has made students feel undereducated, uncertain and hesitant to integrate the healthcare workforce. Before the COVID-19 outbreak the clinical exercises were allocated throughout the entire semester where students attended hospitals 2 or 3 times a week in groups of 4 or 5. During the pandemic only one or two students were allowed inside the hospital and a negative PCR or rapid test for COVID-19 was necessary for their entrance. Eventually, final year students had their whole year’s clinical placements “squeezed” in a single semester during spring in order to avoid course completion delays. The attendances were compressed to two weeks for each practical/clinical subject (PET/CT, MRI & radiotherapy). The use of e-learning technology has also

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**Michael-Raphael Markou**

Michael-Raphael Markou was born on the island of Rhodes. He came from Kos, and moved to Athens in 2011 to begin his studies in music at a Conservatory until July 2017. In September 2017, he started his studies at the University of West Attica in radiology and radiotherapy. He volunteered in the General Hospital “Ippokrateion” Kos radiology department during the summer of 2018 & 2019.

**Persephone Katsarini**

Persephone Katsarini was born on the island of Samos. 2017-2021 she studied at the University of West Attica in radiology and radiotherapy. She volunteered at the General Hospital “Agios Panteleimon” of Samos from June to Sept 2019 in the radiology department and also volunteered at the Diagnostic Center “Papaioannou” of Samos Nov 2020 to May 2021. And, has completed the 4-month internship at the “Papaioannou” Diagnostic Center of Samos.
proved to be somewhat challenging for both, lecturers and students. Students find it hard to stay concentrated in front of the computer screen in combination with the comfort of their home. Unfortunately, a number of students were occupied with other distracting activities such as playing video games, eating, drinking coffee or even sleeping while professors were teaching.

Also, during the pandemic COVID-19, exams are conducted through a university online platform, thus the physical presence of the student during the examination is not required. To participate in the examination a computer with internet access and also a web-camera and a microphone were necessary and had to remain open the entire time of the examination. This means that the academic performance of the students depended on the internet speed and financial situation rather than their studying effort. Several students live in areas where the internet connection is slow and unreliable leading to poor assessment results or even to no attendance incidents. Furthermore, cheating can occur as there are no teachers or supervisors to watch over students during exams and also, they can share answers or check their notes. It is important to mention that during the lockdown the book stores were closed so the students’ books were delivered to their houses by couriers which is convenient but the delivery delays were serious and students received their books few days before and even days after the examination. Last but not least, the pandemic and the use of distance learning widened the “gap” between professors and students. There was an impersonal, formal communication that took place only through a computer screen. All these changes created uncertainty regarding the implications for higher education.

Profoundly, the impact of covid 19 pandemic on social aspects was greater than that on their educational aspects of students’ lives. Online learning has impacted immensely on student life and hence their overall university experience. Even though distance learning is comfortable, it is difficult for students to socialize and connect to each other through virtual courses and that leads to monotony, solitude and anxiety. In addition, the fear of financial distress was a major concern of young adults because most of them work on services providing food and drink for example cafes, restaurants and clubs which were closed during the lockdown.

In contrast, staying connected with family members and pets, appreciating life and death, reorganizing priorities in life, trying to follow a healthy lifestyle and feeling societal destiny unity were the prominent positive impacts that emerged.

The pandemic has changed the way of education and there is no doubt that this situation has left a negative imprint on the mental health of the majority of young people in our country, with the most common negative emotions reported by students being stress, monotony, pessimism, lack of motivation, loneliness and depression.

On the other hand, our generation is strong and will survive this setback through teamwork and social unity.

Finally, as students and graduate radiographers, we wish the vaccination campaign continues so that we are all protected and can return to our university for courses and to the hospitals for our clinical exercises, because radiography cannot be and should not be delivered online.

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The NZIMRT and a Worldwide Pandemic

THE New Zealand Institute of Medical Radiation Technology (NZIMRT) has a membership of 1570 and has a governance board consisting of six regional representatives, the ISRRT council member and an Education Director. The day-to-day management of the organisation is performed by the Executive Officer, a radiographer also, whom works part time for NZIMRT, so in reality a small organisation that relies on significant voluntary support; a Board that consists of 100 percent frontline workers!

When the World Health Organisation (WHO) announced a worldwide pandemic on March 11, 2020 the NZIMRT Facebook page had already posted articles of interest from around the world. New Zealand closed its borders to all bar NZ citizens and permanent residents on March 19 and by March 25, 2020 NZ went into Alert Level 4 and lockdown. The previous day, March 24, the NZ registration body Medical Radiation Technologists Board sent emails to radiographers with lapsed Annual Practising Certificates asking for anyone interested in re-registering, most thought it was a prank!

The NZIMRT was quick to respond that this was no prank, there was a high probability that an increased workforce would be required should New Zealand exposure follow that of the rest of the world.

Communication was key in the early stages and the Facebook page became an easy conduit to place information and share Ministry of Health COVID-19 updates, along with the likes of ISRRT information and WHO releases. The NZIMRT President Carolyn Orum’s message to members on the eve of lockdown noted that radiographers stepped “unblinking, forwards, to ensure our patients are treated, imaged and cared for when all logic says to step back.” It reminded the profession that the NZIMRT is the membership and that “we will get through this together; NZIMRT here with you, here for you, Kia Kaha Be Strong, Arohanui”.

The Facebook page became a forum to share stories and photos of how members were working together and while there isn’t huge participation it was an important tool for those who used it.

The ability to offer free continuing professional development was seen as a positive response even though for many at least initially being away from work needed to be “away from work, physically, mentally and emotionally.” Due to the very fortunate position that New Zealand achieved with elimination, members did then have time to look at ongoing learning and most managed the new environment well, coming to terms with technology, cameras, computers ZOOM!

As the spread of COVID-19 has been rapid and understanding of the virus changing daily, keeping up to date has been challenging internationally. The NZIMRT was fortunate to have Ben Harris, Medical Microbiology Scientist as a guest speaker at the NZIMRTs first virtual Annual General Meeting held in September 2020.

World Radiography Day celebrations provided an opportunity to celebrate colleagues around the world who were facing covid patents day in day out and this provided an opportunity for NZ members to have a closer understanding and empathy for their colleagues. The campaign was aimed at encouraging NZIMRT members to become ISRRT Associate members.

Throughout this whole ‘new world’ the NZIMRT Office has been open and managed numerous phone calls and for many this human contact has been huge. This was especially so for members who were unable to work during the lockdown period due to their own compromised health. Often people just needed to know they were still relevant in the workforce and that beyond the immediacy of the initial crisis thinking there would be a need to support those who needed a break.

Nationally there was huge support for frontline workers with opportunities for separate queues at supermarkets, road signage supporting and advertising reminding the community who their frontline workers were. The Sky Tower in Auckland was lit up in blue specifically to honour frontline healthcare workers and with the Prime Minister’s support, the Easter Bunny joined the ranks of New Zealand’s frontline workers! As a small Board, all of whom work clinically mostly in the country’s hospitals a long period of lockdown may well have challenged the organisation. Contingency planning, and the changing of practice and especially the sharing of roles was a positive outcome. Utilising the skills of each individual whatever their role is vital to succeed as a group when under sustained pressure and there was a huge feeling of support within the Board member group.

Here in New Zealand the COVID expertise of our profession has not been repeatedly tried and tested like many places internationally, and for this we are so thankful but never complacent. We are always mindful of the necessary precautions we must take to play our part in keeping COVID-19 at bay. We have nothing but respect and admiration for our professional colleagues continuing to provide patient care in the midst of this pandemic.

Kathy Colgan
NZIMRT ISRRT Director

Linda Whitehead
NZIMRT Executive Officer
The role of radiographer in a pandemic

Radiographers have a big role in handling the COVID-19 during pandemic. Radiographers not only play an important role in making good diagnosis image but also in afford to prevent infection transmission especially in the X-ray and CT scan room. COVID-19 is the pandemic disease declared by the World Health Organization (WHO). In Bangladesh the first COVID-19 patients were identified on March 8, 2020. Bangladesh declared the COVID-19 infection report from Director General of Health Service on daily basis with 48 confirmed case and five death having community transmission dated 28 March 2020. Situation is evolving rapidly with global case counts and deaths increasing each day. Self-isolation at home is not possible because of the lack of care giver over clouding at home or any other cause, patient should be brought to the hospital for institutional isolation in a designated area and isolation. Medical resources may be required during the pandemic if healthcare infrastructures are overwhelmed. Medical imaging plays an important auxiliary role in the diagnostic of COVID-19 patient, mainly those most seriously affected. Practice differ widely among different countries, mainly due to the variability of access to resources (viral testing and imaging equipment, specialized staff, protective equipment). It has been well documented that chest radiograph should be the first line imaging tool and chest CT should only be reserved for critically ill patient or when chest radiograph and clinical presentation is conclusive. The additional time and effort required for management, and clinical presentation may be in conclusive so Radiographers in Bangladesh are also playing a great role in handling COVID-19. Bangladesh is a developing country, so our economic condition and health facilities are not highly established. Among X-ray’s advantages are low cost and versatility, especially in an environment dominated by concerns about infection control. The important issue when using X-ray for COVID-19 is to know the limitations of the modality when making a diagnosis. Radiography can complement other tools, like CT to help clinicians make a diagnosis of COVID-19. And X-ray’s value is for more than just diagnosis – it is also invaluable as a prognostic tool that can help predict the likely course of COVID-19.

Radiographers are frontline of COVID-19 pandemic

During the COVID-19 Pandemic Radiographers continue to provide high quality diagnostic imaging services and deliver cancer treatment, while ensuring the safety of the patients.

- Radiographers working in medical imaging, nuclear medicine, and radiotherapy have continued to provide essential services during the pandemic.
- COVID-19 has presented many challenges for radiographers who have responded well to overcome these.
- Education providers and student radiographers have also responded well and have also responded rapidly to this crisis.
- Continued leadership is required within the profession for the months and years ahead.

The current global COVID-19 pandemic has impacted all of us and will continue to do so for some time. Radiographers have continued to provide high quality diagnostic imaging services and to deliver cancer treatments throughout the pandemic. In doing this, they continue to ensure the safety of their patients with additional COVID related considerations and precautions. Radiographers work across three recognized branches of the profession, namely, Medical Imaging, Nuclear Medicine, and Radiotherapy, usually having completed a Diploma degree which is often followed by further bachelor’s education and training. The Bangladesh Association of Radiology and Imaging Technologists represent over 5,000 Medical Technologists (radiography) and over 2,000 Medical Technologists (radiography) students within pandemic period. This representation covers radiographers working in medical imaging, nuclear medicine and radiotherapy.

The reduction in examinations across many areas, together with the dramatic increases in mobile chest examinations, has resulted in many radiographers being redeployed. For example, in some regions radiographers working in breast screening services which have been working temporarily suspended, have been deployed to support colleagues in primary care units, in radiography, in emergency departments, in intensive care units, in radiology departments and in primary care settings. Such additional manpower has been essential to allow services to continue and many departments were hit by the impact of radiographers, and other personnel, having to keep self-isolate due to symptoms or confirmed COVID-19. The additional time and effort required for effective infections prevention and control measures including the donning and doffing PPE and effective cleaning regimes following all examinations has also increased the workload.

Radiographers /medical technologists (radiography) are...
always standing besides the COVID-19 affected people. As medical technologists (radiography) work on the frontline they should be aware of the potential risks, setting the area and staff, preparing for examination and conducting the examination. The level of PPE use, cleaning and disinfection method and treating medical waste can reduce strategies. Radiographers/medical technologists (radiography) as front line staff should be familiar with the main challenges and controversies related to imaging patients with COVID-19. So they can fulfill their role in safeguarding patients safety, patient care, they should be aware of ways to keep themselves safe and well during this unprecedented situation by correctly using the right PPE and ensuring all their work spaces are adequately decontaminated to minimize the risk of further infection. There are not over 800 Radiographers / Medical Technologists (Radiography) who are government employers and only 1200 private sector and above 3000 Medical Technologists (Radiography) are unemployed now. Even though there are not any huge number of Medical Technologists (Radiography) in Bangladesh but still they are giving their heart and soul into this COVID-19. Radiographers / medical technologists (radiography) are doing both CT scan and X-ray in both pandemic Covid-19 and Non Covid-19 departments. Even though they know that they could get infected by COVID-19 but they always fought shy of it and kept doing their best for the country and served people in a right way. This time we have lost three beloved colleagues:

• Binoy Krishna Paul, medical technologist (radiography) at Sir Salimullah Medical College & Mitford Hospital in Dhaka.
• Md.Babar Ali, medical technologist (radiography) at Khulna Medical College Hospital in Khulna
• Dilip Kumar Mondal, medical technologist (radiography) at Sir Salimullah Medical College & Mitford Hospital in Dhaka.

All of them were affected by COVID-19. They have given the best for the nation. But we couldn’t save them. A large amount of technologists have been affected by COVID-19 at DMCH, 25 out of 30 technologists were affected. Technologist proactive has to significantly adjust to these new requirements to support optimal and safe imaging practices for the diagnosis of COVID-19. The adoption of low dose CT rigorous infection control protocols and optimal use of personal protective, equipments may reduce the potential risks of radiation exposure and infection respectively within radiology department. Radiographers even keep up late while they are on right duties to help the helpless people by doing there CT scan, X-ray. They left no stories unturned to finish their duties in time.

For those of we in leadership positions, now is our time to lead our professions through these unprecedented challenges which for many of us, will no doubt get worse before things get better. The BARIT thanks all medical technologist (radiography), medical imaging, nuclear medicine and radiotherapy for their efforts and service, and the pride we are showing in our profession at this time, BARIT believe that if we work together as a professionalism everything is possible, be involved and make the difference. We are all COVID-19 super heroes.

Md. Shah Alam Khan
President
Bangladesh Association of Radiology and Imaging Technologists (BARIT)
Belgium

The COVID-19 and the radiographers (TIM) in Belgium

LIKE many countries, Belgium was hit hard by the coronavirus pandemic during this year 2020. The life of Belgians is turned upside down in many areas and in everyday life. Many measures are taken by the government to eradicate this virus. Medical imaging services must adapt to this new way of life.

The various important dates of the measures taken in Belgium are:

- The first case of coronavirus was confirmed in Brussels on February 4, 2020, man repatriated from China. He was accompanied by 9 other people and are all placed in quarantine. The first COVID-19-related death occurs on March 11.
- March 13, 2020, the Wallonia-Brussels Federation announces that classes are suspended, as of Monday March 16 for all schools. Consultations are canceled as of March 14. The hospital emergency plan is triggered on this date. Non-urgent consultations resume on May 11.
- April 24, the Belgian government announces the gradual lifting of containment measures.
- Belgium reopens its borders on June 15.
- Second wave affects Belgium from October, the difference is a lighter lockdown but consultations and imaging examinations continue in parallel with those dedicated to COVID-19 patients. This will be longer and higher in terms of hospitalizations.
- A long flat curve followed before the start of a third wave in March 2021 which was controlled in particular thanks to the vaccinations underway since January 2021 and the measures which are constantly adapting according to the figures.

For medical imaging:

In view of the importance of detecting sick patients early in order to ensure optimal management and to isolate the infected patient as quickly as possible, performing a chest scan is essential. Medical imaging therefore occupies a central place in the fight against the virus. Medical imaging technologists are exposed and in contact with patients potentially infected with this virus, as are other frontline professionals. Medical imaging technologists had to adapt to the many protocols put in place by hygienists; which was not easy because the hygiene rules were reviewed regularly.

The protocols established for the management of a patient suspected of or carrying COVID-19 depend on the hospital in which the patient is being cared for. PPE is often the same for everyone, but some technologists had to fight in order to have the correct equipment at the onset of the pandemic. Frontline workers have been recognized by the government, caregivers and radiographers have benefited from a bonus, although anecdotal, but which has the merit of existing following the fight against COVID-19 in 2020-2021.

In addition to the impact on technologists who have performed a lot of chest x-rays in COVID units and the ICU, chest scans in complex conditions and emergency management. The technologists were of great help during the first wave when exams and consultations were canceled. In fact, for example, in nuclear medicine, oncological examinations [PET-CT and scintigraphy] as well as pulmonary examinations continued, but for supernumerary staff as well as nuclear medicine nurses, they were helped in the COVID units, the USI, laundry and many more. Radiotherapy and treatment continued despite everything. Medical imaging professionals have been on all fronts and during the second wave where the exams were maintained in addition to the COVID-19 load much higher than in March-April 2020. We highlight the courage and mutual aid shown by Belgian radiographers.

At the time of writing, nearly 10% of Belgians have been infected with COVID-19, of which 0.25% have died. 60% of the Belgian population received a first dose of vaccine and 30% received the second dose. Radiographers were among the first in Belgium to receive their vaccine following their involvement in healthcare establishments from the end of January 2021. Despite the hardships endured, a surge of solidarity has strengthened the ties of the profession as well as its visibility. Thoughts of the radiographers who have left us and particularly of Guy Bonjomba, who left us at 31 years of age with COVID-19 during the first wave.

For AIM (Association of medical imaging professionals)

AIM has been an information relay from the start of the health crisis for medical imaging professionals. Through his social networks and his website, AIM relayed the information inherent to COVID-19 from January 2020, in particular for the detection of the virus on scanner images, best practices and precautions to be adopted for technologists and supported the sector throughout the crisis. AIM has also played a role in the media in highlighting far too little prominent medical imagery. There were articles in the written press as well as on Belgian television. The annual convention being canceled, the association still offered webinars on the site in order to keep training continued. In addition, an article was produced on the technologist in the face of covid-19 in Belgium for the special edition of the AFPPE magazine “Le Manipulateur”.

Following feelings of non-recognition of our activity, AIM also spoke with one of our federal deputies who questioned the Belgian Minister of Health on various issues encountered by radiographers and the place they occupy in the first lines facing COVID-19. It should be remembered that the action of the AIM continues in order to have our profession recognized at its fair value in Belgium by wanting in particular to become the regulatory body for the approvals of radiographers and by positioning the technologist as the reference professional in the imaging field.
Perspectives from Guyana

OUR first recorded COVID-19 case - and subsequent death - was recorded on March 11, 2020. We were in the midst of our national elections, and we now were thrown into a global pandemic. The elections would take several months to resolve with unstable healthcare leadership which inevitably derailed any possible progress to be made with the Covid-19 pandemic. Thankfully, in 2020 we had access to guidance documents from the International Society of Radiographers and Radiologic Technologists as well as other position statement documents to use as guidance.

The COVID-19 pandemic is the first pandemic most Guyanese have encountered in their lifetime. Due to our current oil and gas boom, we are now seeing a larger influx of people from all parts of the globe. This means that COVID-19 and any other future pandemics will reach us sooner than we would have anticipated in the past.

With the guidance document from the ISRRT, we were able to include medical imaging professionals as staff requiring the use of Personal Protective Equipment and to be included as frontline healthcare workers. We were also able to set up a more controlled patient flow with limited contact where possible.

But how has the role of the Radiographer changed during the pandemic in Guyana?

For one - more and more persons are becoming aware that we exist, and they know what we do. Unlike other health crisis that we’ve faced in the recent past - e.g. malaria, dengue, etc. COVID-19 required at minimum a chest x-ray and either bedside echocardiography/ a full echocardiogram post Covid. With deep vein thrombosis occurring with COVID-19 vascular ultrasound also became a necessity. Unfortunately, CT services were restricted for positive COVID-19 patients due to the possibility of cross-contamination with our lone CT unit in our national referral hospital.

Medical imaging professionals also make up the Healthcare frontline in Guyana - both at the initial COVID-19 triage, and now as a part of the imaging department at our Infectious Disease Hospital. Cardiac imaging services are currently tracking post COVID-19 patients in Guyana for long COVID-19 and how it may affect the heart.

While medical imaging professionals have always exercised caution with using ionizing radiation, we also had to learn to work around personal protective equipment as well as our lead aprons and ALARA principle. Disinfecting and cleaning has become the norm and has taken a toll on the workload resulting in a compounded backlog from patients that were cancelled in the height of the pandemic and the limitation of the number of patients that can be seen currently and safely in 24 hours.

Thankfully, with Guyana being understaffed in the field of medical imaging, we have had no layoffs. We unfortunately had several medical imaging professionals test positive for COVID-19 but thankfully all have recovered to date.

Our vaccination campaign began in February 2021 with the kind compliments of the Barbados Prime Minister Mia Motley through one of the first donations of the AstraZeneca vaccines in the Caribbean region by the Indian government. Up until July 4, 2021 Guyana has recorded 20,378 positive COVID-19 cases with 478 COVID-19 deaths.

As of July 2, Guyana has vaccinated 234,255 citizens with a first dose of a COVID-19 vaccine and 112,371 Guyanese are fully vaccinated (estimated total population of Guyana is around 880,000 people). Guyana currently has the AstraZeneca vaccine, the Sputnik V vaccine, and the Sinopharm vaccine.
Canada

The Profound and Wide-Reaching Effects of COVID-19 on Canadian MRTs

IN CANADA, the coronavirus pandemic has had profound effects on medical radiation technologists, and most believe it will affect the future of most fields, both in imaging and radiation therapy. To try and understand how COVID-19 has been affecting medical radiation technologists (MRTs) in Canada, the Canadian Association of Medical Radiation Technologists (CAMRT) asked the members of its Professional Practice Advisory Council (PPAC) how they thought the pandemic is changing their area of MRT practice.

Across dozens of respondents from the eight specialist subgroups of this committee (radiological technology, nuclear medicine, MRI, breast imaging, CT, interventional radiology, radiation therapy and artificial intelligence), the sense of immense challenge, rapid adaptation and lasting change from the experience were common. In their responses, we were able to see shifts in practice, MRTs playing important roles in the pandemic response and emerging roles for MRTs that will carry through the recovery phases and in the long-term.

Keeping essential medical imaging and radiation therapy services running throughout the pandemic and beyond

It was clear from most of the respondents to our survey that MRTs in Canada have worked, and continue to work, tirelessly and selflessly to maintain essential medical imaging and radiation therapy services for Canadians throughout all the months of this pandemic. In fact, the pandemic itself, the absence of certain services during government-mandated closures, and the current recovery phase have shone stark light on just how important the contributions of MRTs are to maintaining the modern healthcare system that Canadians have come to expect.

Enhanced infection control in imaging and radiation therapy

The most common theme to emerge from the survey related to the direct consequences of an infectious disease pandemic and the resulting intensity of focus on infection control. In medical imaging and radiation therapy, the continued importance of personal protective equipment and of sanitization and cleaning protocols was mentioned again and again by respondents. This was the case for those MRTs across Canada working directly in the diagnosis and follow up of confirmed COVID-19 patients, and those who maintained the other essential aspects of healthcare during this pandemic.

Most MRTs surveyed believed that the increased emphasis on infection control through sanitization and personal protective equipment would continue well beyond this pandemic and would become a much more prominent part of MRT practice in the future.

Addressing wait lists

Wait times were another common thread in the responses. Certain services like breast cancer screening, surgeries and lower priority imaging exams were scaled back or halted entirely during the first wave of the pandemic. The effects of the backlogs created from these closures, added to existing backlogs, will result in long wait times becoming a marked legacy of this pandemic.

In the past, wait times in Canada have frequently been an issue of public concern, to the point that they have affected elections across the country. From recent political pronouncements, it is clear that politicians see surgical and medical imaging wait times as an area for investment. Many strategies are currently being considered by governments across the country to address backlogs from COVID-19. As this occurs, CAMRT is working hard to ensure that MRTs will be involved in these deliberations and that their concerns will be addressed.

Based on information gathered from CAMRT members in the clinical arena, we understand that any solutions considered will not be straightforward. Enhanced infection control protocols have substantially slowed patient throughput in departments. We also know, from our survey and our broader National Mental Health Survey, that levels of emotional exhaustion and burnout are at all-time high levels for MRTs. CAMRT is advocating strongly that the demands on the MRT workforce be considered through this recovery and that well-being of professionals is not overlooked.

Recognizing that wait times have wide ranging effects, some survey respondents also articulated other ways they felt these wait times might affect their own areas of practice. In breast imaging, it is anticipated that there will be a need for more staff, as institutions consider measures like longer working hours to address the backlogs. In general x-ray, there was hope expressed by some that ‘triage by appropriateness’, seen to some extent during the pandemic, will continue. In radiation therapy and cancer care, cancer referrals at the beginning of the pandemic were down as much as 30%. There is a fear that these delays in screening, diagnosis, and treatment in 2020 will lead to higher numbers of cancer patients now, and that these patients will be at more advanced stages of cancer when their treatments finally begin.

Impact on technologists as individuals

The demands on MRTs throughout these past 18 months have been immense. In the first months of the pandemic, technologists were asked to adapt. Being asked to wade into the fray of COVID during the
uncertainty of those early days took immense courage, and from coast to coast to coast, Canadian MRTs demonstrated their professionalism and dedication to patient care, no matter the risk. As time passed and lockdowns lifted, the added demands of backlogs began to emerge, creating new challenges for imaging and therapy departments. With the virus still in circulation, this was doubly demanding for MRTs. It is not surprising, therefore, that emotional exhaustion and burnout is an issue being discussed and recognized amongst MRTs.

Respondents to our PPAC survey said that burnout in professionals had become an emerging issue early in the pandemic. Our National Mental Health Survey, run from March to May 2021, confirmed this with a broad sampling of MRTs across the country. In that survey, the percentage of MRTs feeling stressed ‘often’ or ‘always’ jumped to 67% during the pandemic from 48% in 2018. Emotional exhaustion grew from 36% of the MRT population surveyed in 2018 to 64% of those surveyed in 2021.

Electronic records and virtual care
The march to virtual care had begun long before a pandemic. Prior to 2020, the transition seemed slow. The pandemic, and more specifically the isolation and lockdowns prescribed to deal with it, have expedited the migration along with increased adoption of virtual tools for care. Whether it be the adoption of electronic records, virtual bookings, or even virtual appointments for follow up or education, virtual care was seen by many as a possible long-term legacy of COVID-19 in healthcare and in medical radiation technology.

While visits for imaging and treatment themselves will not be virtual aspects of care as they see and interact with more electronic patient records, work to schedules coordinated by virtual means and more

Fostering greater awareness of the roles and importance of medical radiation technologists
From the first weeks of the pandemic, it was clear that a clear understanding of the issues facing the medical radiation technologist community, and intense advocacy to address these, would be a top priority for us.

Immediately following the declaration of a pandemic, CAMRT worked with MRTs across Canada to gather information and advocate for critical issues like access to appropriate personal protective equipment (PPE). As a national association with a large and highly engaged membership, CAMRT was able to quickly assess and convey PPE supply concerns to those in positions to make a difference. The same direct advocacy was required again for MRT access to vaccines, and again for the most part, the MRT voice was heard and heeded. As the pandemic continues to evolve, and we begin to discuss recovery, CAMRT is well poised and ready to address other issues like mental health and burnout on behalf of MRTs.

In addition to areas of acute need, the pandemic has awoken a desire among MRTs to have their important roles understood and valued by Canadians. CAMRT’s planned awareness campaign has been expanded and was launched in 2020 to include a broad national online advertising campaign to complement in-facility campaigns and MRT-led awareness.

One survey does not tell the whole story of MRTs in Canada during the trying times of 2020 and 2021, but we do believe it captured some of the most important changes and trends. While MRTs themselves know they are indispensable to the Canadian healthcare system, it was encouraging to find in our survey that recognition from the public of the essential MRT role was on the rise. This is an encouraging sign for our long-term awareness project, and an important motivator for MRTs to keep doing the things that MRTs have been doing to garner this recognition: spending more time with patients, taking time to answer questions with patients, being more outspoken in their own settings, and being active advocates.
Denmark

COVID-19 challenges in education – a report from University College Lillebaelt, Denmark

COVID-19 hit the world and even though the situation in Denmark right now is close to normal and the restrictions have been lifted, it has presented itself as a great challenge to ensure the quality of teaching and thereby secure an output of the coveted radiographers. Denmark has 3 educational facilities for radiographers of which the largest is University College Lillebaelt (UCL).

UCL University College is a regional institution of higher education with campus locations primarily in the city of Odense. Current enrollment is more than 10,000 students and 1,000 employees. The School of Radiography has about 175 students covering seven semesters, with a duration of 3.5 years. The School of Radiography has some unique educational facilities, including a CT-scanner, an ultrasound scanner, X-ray department including wireless DR Imaging, PACS and a laboratory for handling nuclear medicine.

The lecturers’ POV
Thomas Søndergaard Larsen, Associated Lecturer

The learning philosophy is based on a hands-on approach, so the students early in the educational process become familiar with the technology. The facilities play an extremely important role in education and with the restrictions that forced a shut-down, caused by the pandemic, learning opportunities became challenging.

The restrictions put in place following the closure of campus have made it a difficult challenge for educators and students alike. The physical classroom and laboratories with hands-on activities were placed on hold and replaced by online instruction; using platforms like Zoom, Google Meet and Teams became a necessity. The abrupt shutdown and its consequences upon the constraints of, and the activities involved in teaching have been a tremendous challenge for educators who overnight had to perform in a new educational forum (the virtual classroom).

Online teaching was a new and untested territory for many educators, hence the level of experience as minimal and the quality of education has no doubt been challenged. It left little or no room for reflections or any other considerations, it was learning-by-doing from day one.

The challenge was equally great for students who also had to conform to the new normal with online instruction without the usual forum of learning activities taking place in a classroom and without the use of a laboratory setting as well. Ones private home became the new classroom and challenges arose, with the largest among them being the quality and speed of internet connectivity, the ergonomic environment, and the lack of social interactions in the physical space. The students’ social network and study environment which are so important for the motivation of the students were also brought to an abrupt halt by the pandemic. Fortunately, the conventional social networks (Facebook, Instagram and Twitter) found a plethora of uses and allowed the study environment and the students’ social networking to stay intact.

By and large it has been possible to maintain the quality of education and, as a positive by-product of the pandemic, the competencies of the educators have not only been improved but also strengthened. Looking forward, the experiences gained from online education should certainly be taken into account for future instruction plans but it is also important to point our that the online education alone cannot replace the traditional classroom instruction nor the unique laboratory facilities of the radiography education.

An important prerequisite for learning in the field of radiography is the interplay between theory and practice where those unique educational facilities of the radiography school, are not only important, but fundamental to instruction and education of the highest quality - it is not replaceable by online instruction only.

The student’s POV
Jasmin Sandell, student, bachelor of radiography

When the Danish Prime Minister, Mette Frederiksen, announced on TV the evening of March 11, 2020 that Denmark was going to close down schools, universities, workplaces etc due to the pandemic, my student group chat exploded with questions and comments like: ‘What is going on’, ‘are we allowed to go to class tomorrow’, ‘what will happened with our education’. Everyone was confused and looked for answers. Already the same evening, our school announced that we should stay home and await further instructions. The school and especially the teachers were subsequently quite fast to adapt to the new reality after the lock-down with online education and new ways of meeting and training us online.

Some of the positive take-aways for me from the lockdown and from being trained/taught online were the mental breaks I could easily take between the classes. It gave me time to rest my head and thus be more mentally ready for the next class. Another good experience for me was that one of my exams was converted into an online oral exam. This was a better way for me to be examined because I suffer from exam anxiety and doing the exam online in my own home.
gave me the calmness that I needed to be successful. And I thereby avoided being nervous to the same extend as I would have been in a normal exam situation.

The more negative side of the lock down was especially the lack of social interaction both in school and outside school. Since the situation was new to all of us, we did not dare to meet in our spare time either. Another negative side effect is that I feel that my education is being compromised a bit, e.g. by missing out on LAB time. In my third semester I was deprived from spending time in the LAB and thus did not touch a CT scanner before I actually had to use one in my internship. The same happened in my fourth semester where I did not touch an MRI scanner due to lack of LAB time before having to use one in my next internship. Another missed opportunity is the lack of needle-practice. I still did not get my 'needle-certificate'.

One of the lessons from the online training, that was quickly discovered, was the need for using the cameras during class. This gave the teachers a better feeling of reaching the students, however, it has proven to be difficult for the teachers to see if we actually understand what we are taught. And both I and many of my class-mates have been reluctant to voice if we were lost and did not understand what our teachers were explaining.

All in all, I still think that I am very fortunate that the education that I have chosen comprises of both theory in class and internships. Even though we have had lock down for several months over the past 14 months, I have still had the luxury of trying out the knowledge that I have gained through my online studies in real life during my internships. And I am really happy that the internships have not been cancelled due to COVID-19.

*Clas Brix, Director of Professional Policy, Danish Council of Radiographers*
Germany

Introduction
On January 27, 2020, the first case of the new coronavirus was detected in Germany. After that, the virus spread rapidly. First 16 more people, then 241 and on 12/31/2020 there were 32,500 people infected with SARS-CoV-2 within 24h. Hospital beds and intensive care units became increasingly scarce and the burden on staff increased. The pandemic has brought professional groups such as medical technologists into increasing focus. The general public has become aware of these important professions - as key players in patient care.

Training in Germany
In a global comparison of the training of medical technologists, Germany is very special. This is because the prerequisites for training as a medical technologist in Germany are ten years of schooling and not twelve years, as it is the case in other European countries, for example. The academization is being pursued, but has not yet been established. In radiographer training, not only subjects such as natural sciences, anatomy and physiology are taught, but also radiological diagnostics (X-ray, CT, MRI, DSA) nuclear medicine, radiation therapy and dosimetry. With their qualified degree, radiographers can work in hospitals, industry or government agencies.

What is the role of the radiographer in radiological diagnostics against the fight of the notorious virus?
As an radiographer in radiological diagnostics, especially at a university hospital, you are used to a lot. Severely injured patients come into the emergency room every day, concurrently strokes, aortic dissection will also soon arrive in the clinic, and the doctors at the intensive care units have also called again and again, because they are waiting for their chest x-ray to be able to treat further. It never gets boring. The examinations are becoming more challenging, the number of patients is increasing and the job of a radiographer is more like a manager with additional qualifications in medicine and physics.

And then, all of a sudden, there were reports in the media about a virus that was supposed to destroy the lungs. No one suspected what was coming.The current situation has completely changed radiology. Personal protective equipment, keeping your distance, and PCR testing [testing for COVID-19 disease] are all part of the daily routine. In most clinics, a so-called ’Covid CT’ has also been set up in order to separate patients with a weak immune system from COVID-19 patients. The biggest challenge in radiology, especially for radiographers, is the additional workload resulting from compliance with hygiene measures and the increased number of examinations in intensive care units, but also the complexity of CT examinations. In contrast to other countries, Germany was not hit quite as hard due to the early measures taken. Despite all the efforts of intensive care physicians and nurses, many relatives have had to let their loved ones go.

Over the years, more and more intensive care patients with severe diseases are being examined in the CT. Modern technology makes it possible to obtain an adequate and fast examination even in an unstable patient. Due to the COVID-19 pandemic, some patients were so severely ill that machine ventilation was no longer sufficient and a so-called ’ECMO’ had to be applied. Through an ECMO (extracorporeal membrane oxygenation) system, venous, oxygen-depleted blood is transported out of the body and enriched with oxygen in the ECMO machine. The oxygenated blood is then delivered into the bloodstream via the jugular/ femoral vein (IV/venous) or via the carotid/subclavian artery (VA/veno arterial). This allows oxygen/ carbon dioxide exchange outside the body to provide oxygen to the body’s cells. VV - ECMO is mainly used in ARDS (lung failure) patients to artificially maintain lung function. VA-ECMOs are used for cardiac diseases such acute heart failure.

The difficulty for radiographers is that due to the unstable situation and external circuits no standardized CT protocols can be used. Through close cooperation with the intensive care physicians and various information from specialist, it was possible to further educate ourselves in order to be able to guarantee an adequate examination. This also required a lot of initiative and commitment on the part of the individual radiographers. The psyche have to also not be forgotten in a pandemic, that should be considered. Due to the stress of the increased patients, the non-breathable protective equipment and the restrictions in the private environment, it is difficult to find a work-life balance. Coping strategies to deal with the experience also fail. Some institutions therefore provide special support services for people in the health care system. These offers of help to manage to process the experiences and to be strengthened in the everyday working life. Only strengthened ones can fight pandemics.

An umbrella association in crisis
The routine of the umbrella association of radiographers, called in Germany DVTA, has also changed. All meetings and conferences had to be held online, the association work had to be done in home office and planning for events for the coming year was completely cancelled. There was only one question: What can we do as a Non-Profit-Organisation (NPO)? What special help do medical technologists need?
In the professional magazine of the DVTA, the ’MTA - Dialog’, regular updates about COVID-19 were given. Experts wrote about new examination methods and about their experiences in the pandemic. A petition for a Corona bonus was also launched. Everyone should be rewarded for the extra effort they put in. Unfortunately,
very few have received up this Corona bonus. For the most part, this is because the radiographer profession is not in focus. One of the targets of the DVTA is to make the job as a radiographer more attractive and better known. A crucial and important measure was the law change for medical technologists. The DVTA worked hard on the draft law, which will come into force in 2023.

**Conclusion**

Over 3.5 million (as of May 2021) have died from SARS-CoV-2 disease worldwide. And probably there will be more, because the pandemic is not yet over. In Germany, the numbers of newly infected people are decreasing. Through specific raise awareness and implementation of the measures (social distancing, wear mask, observe hygiene like wash or disinfect hands) and increasing vaccination offers, but also through early detection, Germany can keep the numbers stable and, if necessary, reduce them. In the hospitals and/or in the intensive care units one notices the relief to be moderate.

On April 18, 2021 there was a commemoration in Germany for those who died from the pandemic. On that day, hospitals also thought of the people who died from COVID-19 and reflect one year of the COVID-19 disease.

We are tired of the pandemic, terrified of what a virus can do and yet we remember the beautiful things that led to never giving up. In my personally view, as a radiographer in radiology, I will always remember the team spirit and the motivating vibes from the whole hospital in this tough time. And of course the daily challenges with critical and terminally ill patients. And not to forget the young people who unfortunately died. Despite the many fates I saw on a daily basis, I can find something positive: I have never been able to learn so much and the team spirit from the whole hospital has never been so great! Due to the expansion of the disease, I had to acquire a lot of new knowledge, but because of the great support of every specialty, I was always able to provide the best examination for patients.

With this final word I would like to say many thanks to all doctors, nurses and all those who fight against the virus every day. Thank you for continuing despite the many strokes of fate. We can fight the virus together!

Katharina Banzhaf
COVID-19: What’s the role of radiological technologists in pandemic situation?

As the Corona Virus, which started in 2019, became a global pandemic, all medical systems, including hospitals, were put in an emergency situation. Currently, in Korea, an average of 1800 people are being infected with COVID-19 every day, which is a growing trend. Currently, the South Korean government is struggling with the application of Level-4 Social distancing measures. The time has come for all the people to work together to overcome this.

Among them, the medical/health professions working in hospitals are at the forefront of the fight against the COVID-19. From SARS and MERS to the COVID-19, they have been fighting fiercely to overcome their respective responsibilities. Also, in the war against this virus, various efforts have been made to minimize the damage until a dramatic game changer appears. So, what has changed compared to the past? Today we would like to explore the role of ‘Radiological Technologists’ among those struggling to eradicate the COVID-19.

The Department of Radiology, the first line of defense against COVID-19

The duty of radiological technologists is the core of COVID-19 treatment. This is because, due to the nature of COVID-19, which mainly accompanies pneumonia, it is necessary to diagnose the patient’s condition by Radiology imaging. When a patient visits the hospital for the first time, unlike in the past, he or she can enter the hospital after undergoing several tests through a screening station.

It is no exaggeration to say that quarantine is the most important part for radiological technologists because it is a job that requires almost first contact with patients in their hospital. Radiological technologists working in hospitals dedicated to COVID-19 all across the country present in imaging rooms in the screening station and perform chest X-rays for patients. At this time, the radiological technologist should wear a set of 5 protective suits and conduct an examination of the patient. These five pieces of protective clothing consist of goggles, N95 mask, gloves, a quarantine gown, and a hair cap.

In the case of taking a portable X-ray, these 5 types of protective clothing must be changed to a new one every time moving to the other isolation room to prevent the spread of COVID-19. In addition, radiological technologists working in CT and Angiography room must also perform examinations and procedures with wearing all level D protective equipment. Also, to examine a confirmed COVID-19 patient, a level D protective suit and a PAPR (Powered Air Purifying Respirator) must be worn.

Wearing such a protective suit is essential not only for the examiner to prevent infection but also for the prevention of group infection between patients and patients, so all radiological technologists should wear them without exception. Basically, it can be a doubly difficult factor for radiological technologists who work in lead apron over their uniforms.

In the case of CT, MRI, and angiography & intervention, COVID-19 patients should be tested at last, because the laboratory with HEPA filter must be closed for a certain period to minimize patient-to-patient infection and it can also difficulties to adjust the schedule of the examination. This is to prevent nosocomial infections that can occur between patients, and for this
reason, close cooperation with each ward and other departments is needed more than before.

After examining a COVID-19 patient, all items in the laboratory, including equipment and tools used for the examination must be disinfected with hospital-grade environmental disinfection tissue, and items used for patient examinations and procedures should be collected and disposed with a quarantined medical waste box.

So, What should radiological technologists do to combat the COVID-19?
Radiological technologists are one of the most important people in the diagnostic field. Without radiology diagnosis, the role of the hospital is inevitably fatal. Therefore, we must do accurate imaging examination while avoiding contact with COVID-19 as much as possible. It is also the duty of the radiological technologists to relieve the patient’s anxiety during the radiology imaging. Due to COVID-19, patients’ anxiety has increased, and sufficient advance explanation is needed so that the patient can understand this and receive the test with peace of mind.

First, it is necessary to check why the patient currently needs a chest X-ray examination, whether there is any particular discomfort, and whether there is a fever. And, since the voice may be difficult to hear due to the mask worn by the examiner, it is necessary to speak loudly so that the patient can hear it easily.

In addition, the route of movement in the hospital that has been complicatedly changed due to COVID-19 should be explained in detail. Normal patients and visitors usually do not fully understand the process of examination and treatment, so explain kindly the place to go after the examination.

We need particular attention not only when working in a hospital, but also in our personal lives. Hand hygiene must be meticulous at all times, and a KF94 grade mask must be worn everywhere, even when exercising and at restaurants. Dinner party between your team members should also be prohibited because many people inevitably must gather for a dinner party. Although everyone is going through an uncomfortable time, it seems that the current dark situation can only be overcome by the efforts of everyone.

Radiological technologists are running and sweating for the examination and treatment of COVID-19 patients. Since radiology exam is essential in the diagnosis of COVID-19, the role of radiologists is expected to become increasingly important in the future. The struggle of radiology workers will not end until the day when COVID-19 in South Korea and around the world comes to an end.

Yeonjun Park
International Director of KRTA
The role of the radiographer in a pandemic with views from our experience at home

GROWING up, one would have always heard the phrase "Change is Inevitable", and for those who haven’t believed it as yet, I am sure that this pandemic, COVID-19, has brought you to that realization. Everything that we once knew is evolving, mainly with the aide of technology e.g. staff meetings and church services are being held on a video call and contactless pick-up point of sale business transactions e.g. supermarkets, hardware’s and all food establishments.

The World Health Organization (WHO) has tried to put all countries on the same level in terms of how the COVID-19 Virus should be treated as an attempt to eradicate its existence. This has allowed third world countries to implement some first world standards. In the Radiology Department, we have also experienced change, some of which has been in regards to patient care, infection control and prevention, quality, quality assurance and personal well-being.

Patient care has always been a very critical role in the functioning duties of a radiographer. Being skilled and trained to recognize when a patient is uncomfortable or afraid and how to adapt your approach to ensure maximum cooperation from the patient is essential to our practice. To do otherwise, obtaining quality images to diagnose the patient’s condition would be extremely difficult. During this COVID-19 Pandemic, we have had to boost and adapt our patient care skills to make our interactions efficient, no longer can patients identify a friendly face when they enter the Radiology Department as we are all masked and unrecognizable. It is even easier for children to be afraid of us. A lot more emphasis has been put on receiving patient requests with adequate history and taking the extra time to enquire about flu like symptoms based on the COVID-19 symptoms list from (WHO). In the early stages of the pandemic, the screening and sanitizing process of patients was a somewhat tedious and challenging task, as this change was usually met with resistance by some patients to comply with the new rules given, however, now they have grown accustomed to what the new norm entails and it has become a smooth process. As the virus is airborne as indicated by WHO, keeping minimal conversations and interactions with patients is completely necessary in an attempt to reduce the risk of infection. This can be seen by the average patient as harsh behaviour due to quick movements, however once explained the cooperation would be given. Being COVID-19 positive can be described by many citizens as a death sentence, due to the nature and the information forthcoming about the virus and its many variants, therefore, interacting with COVID-19 positive patients require a great deal of empathy, in order to show care and compassion in an attempt to keep them coherent.

As we know, in the hospital environment, we take infection control and prevention very seriously. However, this Pandemic has caused us all to even take it up several notches to ensure that there are absolutely no remnants of COVID-19, after each patient, within the department. It is mandatory for masks, gowns, hair covers, shoe covers and face shields to be worn at all times during patient employee interactions along with constant sanitization of all interactive surfaces. By using critical thinking, we have found new and innovative ways of taking images of COVID-19 positive patients in an attempt to reduce risk exposure and contamination of the portable unit. One of our existing methods of infection control in radiology is to have a “clean and dirty” radiographer for infectious patients. In this case, both radiographers wear all necessary personal protective equipment, the dirty radiographer enters the patient room to place the image receptor (IR), collects and cleans the IR after exposure, duff and returns to the department. The clean radiographer stands outside the glass door of the patient room and sets up the portable unit, to take the image, after which they clean the portable, duff and return to the department. We have also implemented the batching of positive patients, no longer do we execute xrays one at a time unless the patient is in distress, due to the cost of Personal Protective Equipment (PPE) per patient, the amount of PPE stocks supplied and the time consumed to don, duff and expose each patient. Some hospitals have implemented a specific

Radiographer clothed in full personal protective equipment.
COVID-19 x-ray room or area and have assigned a specific radiographer which minimizes intermingling. In the event that a positive patient has to enter the department, e.g., patient needs a Computed Tomography Procedure, the Health Attendant Unit and the Occupational Safety Health Department (OSHA) are notified for thorough sanitization of the department. Not only do we sanitize when there is a positive patient, we have continued our regular sanitization after each patient that comes into the department and scheduled department sanitizations are completed each week. Employee health questionnaires are required to be submitted to the supervisor [online] before arriving for duty, and upon arrival temperatures are checked and recorded in the Employee Register Log. Regardless of the new implementations, it is pertinent to note that the basis of patient care in radiology has not been compromised.

As we know, radiology today involves artificial intelligence. It is one of the departments, in a hospital, that is very technologically advanced and Information Technology (IT) based. With innovation comes adjustments, therefore to maintain quality assurance of the images being produced for positive patients, taken through the glass door, the exposure technique has to be adjusted. Continuous education is also a key factor for being able to accurately identify between a normal, pneumonia, tuberculosis and COVID-19 positive chest images are also key. This can be done via reputable and scholarly articles and by online meetings with radiologists to prevent contact. This knowledge will prevent further intermingling of the positive patient with negative patients or even the population by informing the doctors in charge immediately (as their images may not be reviewed right away), who will then have them isolated and further tested for confirmation.

With all the new information being released it can be very easy for individuals to become overwhelmed and panic thus causing a dysfunctional department. Protocols with clear and concise guidance were implemented to prevent this occurrence. This gives in detail to the employee, a list of steps to follow for any possible situation that may arise and details to the patient of what they should and should not do when in the department.

Just by being in a pandemic, and furthermore in an extended lockdown without jobs, is stressful and takes a toll on the average person’s mental health and physical being. However, by being a radiographer, we haven’t lost our jobs but, on the other hand, the job has become more stressful. Stress which is left untreated can result in mental health issues requiring a form of therapy. From endlessly sanitizing to wearing layers of PPE at all times, to scrutinizing every patient and endlessly worrying and hoping to not carry this virus home to our families can be challenging and leads to a form of paranoia. Emotionally we are affected by seeing, hearing and being in the midst of so many COVID-19 deaths, yet still we have to take that plunge and mentally prepare our minds and bodies to go to work to face this ordeal everyday. Being an Isolated Radiographer in this time has been truly difficult for us, as we have always worked as a team. There was always that person to render assistance for an extremely difficult patient, someone to always say “Hey, can I borrow your L?” or simply to discuss a topic and share a few snacks. Now the presence of workers is limited and everyone has to remain in their section, to maintain distance and reduce the risk of transmission between workers. The downside of this is that the emotional health of some radiographers can be affected, due to the lack of communication or interaction experienced at the workplace. In recent news, radiographers have been newly appointed to volunteer their service by providing the public with vaccinations in an attempt for mass vaccination to be effective. For years, vaccination has been the gold standard for individuals to develop immunity to different viruses. With herd immunity being achieved, it will prevent serious or life-threatening effects of COVID-19 if an individual were to be infected.

All in all COVID-19 has impacted us as radiographers both in a positive and negative way, as we have been fluid and adapted to a new normal. While the positive outweighs the negative, it is evident that the new technological advances implemented, in relation to zoom meetings and new techniques, have increased the efficiency and effectiveness of the radiological department. As the field of radiology is always updating with new innovations, we should continue this new norm and even find more innovative ways to improve what we have already adapted to. As we move forward in hopes of a brighter tomorrow, let us continue to follow the COVID-19 protocols as outlined by WHO and stay safe. Until then stay safe, sanitize and social distance.  

Rayer Forde,  
Registered Radiographer,  
Trinidad and Tobago
COVID-19 and the radiology technologist’s tasks: A mandatory change!

As we write this article, Tunisia is still fighting COVID-19. In July 2021, the number of new patients with the disease exceeded 10,000 people per day. It is a great pressure on the care teams including the radiology technologists. The situation is forcing radiology professionals to adapt while changing their practices. A new management is therefore to be prioritized. This is a new task added to a long list.

Organize according to the change

The first wave of the pandemic due to SARS COV2 in March 2020 forced hospitals and health centers to reorganize and apply new practices. The special Covid circuit is then adopted. Triage boxes have been created near emergency departments to limit the spread of the disease to other departments such as radiology.

All radiological examination requests for patients suspected of or suffering from COVID-19 are signed by a senior physician and are subsequently validated by a senior radiologist. All patients with suspected or confirmed COVID-19 infection should be clearly identified on imaging requests. With the paramedical team and the disinfection of premises and equipment, we always discuss the benefit and risk of the examination, its relevance and compliance with health priorities.

Technologists received training from disease prevention teams. The cleaning and disinfection of the radiological equipment in the examination rooms are carried out by the technologists. The involvement of technologists in cleaning and disinfection increases the feeling of safety among professionals and patients as well. These spots make the whole group aware of the importance of disinfection and the fight against contamination. The distribution of tasks is carried out by the team leader according to a well-defined schedule (Figure 2).

Hospitals have provided mobile devices to perform X-ray examinations directly in intensive care rooms to limit the spread of the virus. “Any patient who shows symptoms of the flu is a high-risk patient.” This is an assumption that allowed technologists to work with patients while protecting themselves. (Figure 1)

Protecting our workers is a priority!

In the medical imaging departments, we have limited the contact of certain categories of workers with patients suspected of having the disease. Trainees, students, immunocompromised technologists, and pregnant women are excluded.

During the pandemic, the psychological and mental state of workers must remain strong. Assistance and support committees were made available to health professionals to support them and meet their needs. Working hours are also changed to accommodate this change. New scheduling management allows compulsory rest for teams and reduces the risk of contamination of nursing staff. Teams work every other day and others every other night.

Special radiological examinations and pandemic management!

Lung X-rays and chest CT scans are in high demand during the pandemic. The screening for COVID-19 is carried out by a PCR test but the monitoring and control of pneumonia are carried out using radiology. Dedicated periods for the diagnosis of COVID-19 by CT scanner are established only at the end of the day to avoid contamination. Three technologists perform the CT scan: one who stays on the device’s acquisition console all day and processes the images, and two others take care of positioning patients in the exam room. Those near patients will never meet the console technologist. (Figure 3)

A technologist, trained in disease prevention, supervises the workflow of the entire department. He warns, advises, and corrects deficiencies related to prevention. He ensures the disinfection of equipment between all patients. He is in direct contact with patient transport and hospital hygiene teams. He presents a detailed report to the manager at the end of the day. The collaboration of multidisciplinary teams is important during a pandemic. The team leader works with intensive care professionals to schedule and book schedules for chest CT scans. We avoid a prolonged time of an intubated patient in the radiology department.

Roles of learned societies during the pandemic

Support activities between colleagues have been created on social networks to exchange and discuss the gaps in the various hospitals. The Tunisian Association of Radiological Technologists (ATTR) has periodically published advice to support and assist technologists in their daily activities. ATTR informed the technologists of various guides published by the Tunisian Society of Radiologists and the College of

Figure 1: Taking X-rays of the lungs in patient rooms.
Medical Imaging, Biophysics and Nuclear Medicine on “the epidemic of COVID-19: recommendations for imaging” and “the stages essential to respect to protect yourself and comply with the rules of hospital hygiene”. These recommendations constitute an aid for the implementation of good practices within an Imaging department aimed at preventing the spread of the disease by identifying the relevant indications for Imaging examinations, their safe performance while referring to companies, learned and considering our local context.

Lessons to learn
After each pandemic, there are lessons to be learned and new approaches to be adopted. COVID-19 has changed management in radiology departments. It is a management based on the participation of all the workers of the department. Each has an important role to play. The pandemic has heightened the need for good mental health among radiology workers. A psychologically stable employee is a worker capable of providing good service to the patient.

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Kaiés Letaief and Mohamed Khelifi
Tunisia
COVID-19: The Zimbabwe frontline

The frontline
As the president of the Radiography Association of Zimbabwe, I take honour to speak on behalf of the cadres, who found themselves fighting in the frontline zones of the COVID-19 battle. It was not out of choice, but by virtue of being Imaging professionals, that they found themselves in compromising positions. Ethically they were faced with a dilemma which none but themselves could resolve. Legally they were obliged to offer a service to the vulnerable patients who were in need. This article heightens awareness of the courage exhibited inconspicuously by a group of radiography professionals in our country. I will share and reflect on experiences we went through as a country, association and as individual members.

Unsung Heroes
There is a song we normally play in Zimbabwe for our departed, when they are declared as national heroes. The song by Matias Xavier and is called “Tormented soul”. It is sad that it is played in recognition of hero status posthumously. Today we have heroes and heroines amongst us, who should be celebrated and recognized for having encountered death face to face because of COVID-19.

The transition
When Covid came no one had the slightest idea on how to fight against this virus. Going to work was like taking a nose dive into uncharted waters, not knowing whether you would come back alive. One by one we saw radiographers and sonographers taking difficult decisions and making a commitment to serve. Slowly protocols were put in place and we learnt to live with the virus. The Radiography Association of Zimbabwe advocated for safety and provision of adequate personal protective equipment (PPE) by employers. Committees for developing and coming up with guidelines for handling patients in this era were setup. The association raised member awareness via Continuous Professional Development (CPDs). It also minimised contact events by going online for most processes. We also applaud the ISRRRT for providing useful international guidelines for member societies. But most importantly we commend those who fought first. We applaud the cadres who led the troops in fighting from the front. Words cannot be enough to express our gratitude towards their selfless dedication to save lives.

Experiences
To have a slight glimpse of their experiences here are few excerpts from interviews conducted. A few names to remember are Ashton Nyamasime, Charleen Mudondo, Tsitsi Muchinu and felistas Fungura.

“I tested positive in January 2021 … I had done a thorough cleaning of my room … I just thought it was the dust from the cleaning. Like I never thought I would ever get Covid. I developed fever the next day.

… The flu now was progressing … Monday I was worse, that is when I had a PCR test … I was told I was positive in the evening on Tuesday. That is when I began my two weeks quarantine.

During quarantine I would stay in my room, isolating from the other tenants. I would exercise, drink ginger hot water and steam. I would watch TV so that I didn’t get bored but to be honest isolating is the worst, I felt neglected.

So, my thinking is isolation kind of worsens the situation … the other tenant would start cleaning walls etc. You will be scared to even go to the bathroom you start feeling like you are a parasite.

“Let me start with what could have been the cause. We went to a memorial service for my grandfather … I kind of trusted my family or can I say felt uncomfortable wearing a mask around my family. Also, I had a baby … babies are the biggest spreaders of this virus because they are handled by anyone.

… At first, I suspected I could have caught the virus, but was in denial and also the thought of me knowing that I went to a function I felt guilty knowing I had exposed myself. Also, the fear of stigma … because I had to go to work, I had to get tested.

… five people in our family were positive. The journey was terrible with a terrible cough, fever, difficulty in breathing and I got treatment. I couldn’t isolate from my baby because she was breastfeeding.

Being a Covid survivor, I thank God because fighting this disease is hard. Family support is important … I feel there are some systems in our bodies which don’t get back to normal. Ever since that time I’m constantly tired. The first days I was too weak to even sit basking in the sun but with the help of my husband we used to go for walks, he had to force me.

I was afraid of spreading the virus, especially to my house help. cause when I told her not to come back since I had tested positive, she said she had to help me with the kids. When she came back, she would get the baby in the morning and then give me back in the evening … It took me time to visit others even when I went back to work, I tried to spend time alone for almost a month."

"We have a Covid Centre and we are doing Chest X Rays for admitted patients. Infection prevention and Control (ICP) is difficult for one radiographer (Rad). For bedridden patients the nurse becomes the dirty Rad. Part care is very challenging. For walking patients
you set up at the entrance to the ward and Rad will be outside and there is no need for full combat. Most CXRs have movement unsharpness due to condition of patients. All health staff were vaccinated.

I was isolated away from normal family contact. Isolation is like prison. I had a lot of fears and these fears definitely affected the family, like a soldier going to war.

"I was fully vaccinated and the last shot was 24 March 2021. Before the vaccination I had a Covid antigen test which came out negative. Felt ill and I visited doctor today on 4th day of my symptoms and my swab test came out positive. Concerning the vaccine, I don’t know what to think. Part of me actually thinks that it weakened my immunity and made me susceptible to the attack.

My job remains my chief suspect. Initially I had no fears, but after contracting the disease I’m a bit scared now. ... scared like any normal human being when approaching something dangerous.

...I felt like a villain attacking my own family. I felt bad for bringing the monster home and endangering my family. After two weeks I went for a retest and it came out negative."

**Recommendations to the sick and carers**

"Have a positive mindset, take the period as a phase which will just pass and end soon. Take the time of quarantine as a self-care period with no work worries. ...exercise if you can, meditate, make use of social media to talk to your loved ones or even watching funny skits, watch TV, I recommend watching comedies. Just have hope that you will be fine soon and you will be able to resume to your normal duties. Don’t forget to pray".

"Advise to those who get sick, get tested in time and seek medical attention early. Also eating healthy food. To carers, they need to give moral support and not stigmatize. Eat healthy, sanitize washing of hands constantly. Also wearing of the protective clothing if available. Those who are sick they need help in a lot of things, because in isolation one cannot do their day to day activities, so try to ask them what they need so that they can leave a better life during the period of isolation. Friends and family who are not at the house do the grocery shopping they need. Or if it’s a couple who are sick and can’t cook for themselves try to provide food for them because they might not be able to even cook for themselves. Help them by all means possible"

"... Avoid unnecessary crowds and follow all the recommendations religiously."

**Recommendations to front line staff**

Attend numerous ICP workshops. It helped calm the nerves. There is need for Continuous training on donning and doffing. Stick to WHO guidelines. Keep up to date with changes in Covid-19 management especially from CDC and WHO. Proper PPE should be worn. Take turns to avoid continuous expo. Develop your own local protocols (ICP) and test them by doing mock drills. Invite outsiders to observe so that you identify gaps.

**Charge**

Going forward I urge us all as Radiography professionals - in Zimbabwe, Africa and world over - to be vanguards of healthcare and continue fighting on the side of life, survival and hope. I repeat the words outlined in the Handbook of Covid 2019 prevention and treatment, "The hospital is the battleground where we eliminate the virus, not where the virus defeats”.

We cannot accept defeat because of fear, loss and trauma. The benefit far outweighs the risk. The joy of saving lives outweighs the grief of losing some.

Let us be advocates in our communities, to our friends and families on positive living.
Since January 2020, the world has changed. Certainties once assumed (freedom to congregate or travel, safety in social situations, continuation of social life and practices) have been shown to be fragile and far from assured. Normal working life for vast tranches of people has ceased, or altered. We hope that most of these changes are temporary, but some will persist.

One aspect of life taken for granted by many (in the developed world) has remained certain: the provision of high-quality healthcare, by dedicated professional staff, regardless of the circumstances. It’s reasonable, given the events of the COVID-19 pandemic, that those staff might expect a little more recognition for their efforts when this disruption has passed.

When much of what we take to be normal had to stop (schools and shops closed, travel restricted, much work done by remote means rather than face-to-face), the continuation of healthcare delivery was never in doubt. Caring for the seriously-ill, whether their illness was related to COVID-19 or other conditions, had to continue and did so. Some limited aspects of healthcare shifted to remote provision, but no such option existed for those needing hospital-based care. Patients continued to present with acute medical and surgical problems, and added to this was a new disease, which accounted for large numbers of acutely unwell patients, many needing intensive care. Remote work was not an option in caring for these people; they needed the physical presence and hands-on intervention of dedicated hospital staff. Among the professional groups most-exposed to risk from the need to provide this care was radiographers. When a new patient presented to an emergency department with dyspnoea and cough, someone had to obtain the necessary chest x-ray or CT. When a ventilated COVID patient in ICU needed follow-up imaging, someone had to position the patient and take the image. When vasculitic or thrombotic complications of COVID required investigation, someone had to perform the needed radiologic investigations. In every such instance, radiographers accepted the risk, and did their job. They understood they were on the front line of ensuring as few lives as possible were lost to this disease, and they rose fully to the challenge.

Ways of working had to change during this pandemic. The use of personal protective equipment had to be learned and rigorously observed. Equipment and room cleaning between patients had to be fitted into already-busy working days. Patient handling protocols had to adapt. Non-COVID work had to continue, amidst the delays and inconveniences of protocols adapted to minimise cross-infection. Radiographers, and other healthcare professions, accepted these changes, and implemented them. And still the patients came, sometimes threatening to overwhelm facilities. If any such overwhelming occurred, it was a result of an unbridgeable mis-match between resource provision and demand. It was not because staff failed to care for their patients, or to do what was right.

Furthermore, increased staff flexibility was needed during the pandemic, particularly before vaccination became available for healthcare workers. Staffing...
rosters were subject to change without notice, as colleagues became infected with COVID-19 or were obliged to self-isolate as a result of being in contact with others who were infected. New teams needed to work together in new ways. For example, those staff who cleaned rooms quickly and efficiently between COVID-19-positive patients became key members of radiology department staff, without whom our work would have slowed greatly. Again, radiographers and others stepped up; new methods of team-working were forged, gaps were covered, services were maintained, patients were looked after.

The effects of this crisis will be long-felt in hospitals and radiology departments. As COVID-19-related care came to dominate hospital activity during the most intense phases of high incidence, other patient groups had their care postponed, or delivered in different settings. Again, this required adaptation by staff. Restoring normal levels of service, catching up on those radiological and other investigations which were, of necessity, deferred, will take months or years. COVID-19 was not a moment in time; it remains an active major influence on how we do our jobs, and radiographers will continue to be part of solving the knock-on effects of pandemic service disruptions.

There were great personal and familial costs for many staff during the pandemic. In the early days, staff rosters were often abandoned, with available staff members working as long as they were needed, with no concern for arbitrary working hours. In many cases, staff were obliged to isolate from their families, sleep away from home, and return to the fray again and again, after inadequate rest. The dangers of bringing infection home meant many healthcare staff didn’t see their families for long periods. And worse: in country after country, the highest incidence of COVID-19 infection was among healthcare staff, attempting to care for those already ill. While members of the general public who became infected [but did not require hospitalisation] were instructed to isolate until they recovered, in many instances infected healthcare staff had to continue to work, despite the dangers; there was nobody else to do their work, and their work had to be done. Many healthcare workers died, their skills and their lives lost to their patients and their families, because they had put their patients first.

Now, as vaccines are available and vaccination of populations is progressing, the pandemic is coming under control in many countries. There are still places where vaccine delivery is falling behind, especially in the developing world, and where the prevalence and incidence of COVID-19 infection and death remain stubbornly high, but there is now hope that this disease can be tamed. Once that has been achieved, much of the world will go back to normal life. There is a saying that describes the tendency to forget lessons learnt in times of crisis: “Eaten bread is soon forgotten”. This should not be allowed happen with respect to this pandemic. We must remember those among us who behaved with great professionalism in the face of grave danger, who cared for those who needed our care, regardless of personal risk to themselves, and who, in some instances, paid an extreme price for their dedication. When the public thinks and speaks about health care, attention is often directed mostly towards nurses and doctors. Radiographers are a group who often receive scant public attention when health services are being praised or criticised. Nonetheless, for the many reasons given above, radiographers are among the heroes of the COVID-19 pandemic, and should be recognised and thanked as such.

The ESR is proud to have close relations with our radiographer colleagues, to acknowledge your sacrifices, dedication and devotion to patients, and to be associated with this IIRRT World Radiography Day book marking radiographers’ experiences and contributions to managing the COVID-19 pandemic.
The European Federation of Radiographer Societies is pleased to be invited by the ISRRT to contribute to this World Radiography Day publication on the important theme of the 'The role of the radiographer in a pandemic' and hopes through this short summary to provide an overview of the work of the European Federation of Radiographer Societies (EFRS) during the pandemic in supporting our radiography colleagues on the frontline of the pandemic.

Introduction
The EFRS has just celebrated its 10th anniversary, it represents over 105,000 Radiographers and over 8000 Radiography students from across Europe via the membership of over 45 National Societies and over 65 Educational Institutions. Through our national societies, our networks, and the media we were able to witness the huge impact of the pandemic on the profession and upon services, both within medical imaging services and within cancer and radiotherapy services across Europe.

The Pandemic in Europe
The pandemic hit Europe hard, and the WHO confirmed that the first cases in Europe were found in France on 24 January 2020 and in March 2020 the number of reported new cases of COVID-19 in Europe exceeded case in China, the World Health Organization (WHO) started to consider that Europe maybe the active centre of the COVID-19 pandemic, with all countries within Europe having confirmed cases of COVID-19. In late March it was stated that more than 250 million people were in lockdown in Europe.

Radiographers’ roles
This was such a challenging time for all Radiographers across Europe, particularly as there were already radiography workforce shortages across many of the European countries. The pressures upon services grew as services struggled to cope with the numbers of patients requiring ‘chest’ imaging examinations. The focus of work changed and in many countries screening services were halted and radiographers redeployed to emergency and intensive care, as the focus moved from these services to focus upon chest imaging. At all stages of the pandemic radiographers were and remain central to diagnosis and surveillance of patients, working in tough conditions on the clinical front line. Many radiographers were required to rapidly develop new skills, working within challenging conditions, changing their working practices, fighting for appropriate personal protective equipment (PPE) to minimise the risk of spread of the virus, and retraining due to redeployment from traditional work areas. Radiographers were working longer shifts to cover for colleagues and to ensure imaging services were available 24/7. Within the university and education setting our academic radiography staff across Europe worked hard to support the ongoing education and training of the student workforce, moving rapidly to on-line teaching with simulation playing an increasing role in education due to severe limitations with clinical placements and students being withdrawn for safety reasons. In my own country of the UK, students nearing completion of their programme were invited to work within service to help support the growing workload.

Charlotte Beardmore
Charlotte Beardmore is the President for the European Federation of Radiographer Societies (EFRS) Board, past chair of the EFRS Radiotherapy Committee and Executive Director of Professional Policy at the Society and College of Radiographers (SCoR) and is an honorary member of the Royal College of Radiologists.

She is a past president of the Society and College of Radiographers, and has over 35 years of experience as a Radiographer working across clinical practice and education within clinical imaging and radiotherapy.
The role the EFRS played

The role of the EFRS is to represent, promote and develop the profession of radiography in Europe, within the whole range of medical imaging, nuclear medicine, and radiotherapy and moreover everything that is directly or indirectly related or beneficial to this role, everything in the broadest meaning, so what did we achieve during the pandemic? Naturally there was disruption to our planned activity plan, and the Executive Board and Educational Wing Management team refocused their energy on the immediate requirements of the profession.

Our priorities were to identify how we could best support radiographers through the challenging times, and developing resources became one of the core focuses for the Federation.

One important area of focus was the development of written on-line resources to support members. We were pleased to be invited to collaborate with the ISRRT to develop online resources for radiographers and a comprehensive course was developed called, ‘The International COVID-19 Support for Radiographers/RTs. This is an e-learning module, developed collaboratively by the ISRRT and the EFRS through international experts from both organisations’. The early focus for this work was upon provision of a comprehensive guide to support mobile chest radiography as clinical demand dramatically increased for this imaging technique, and included nine section to support practice from defining what is a virus, to radiation protection, technique, personal protection, protection, image review and reporting and audit. The EFRS wishes to thank the ISRRT and particularly Emeritus Professor Peter Hogg, School of Health and Society, University of Salford (UK) for his leadership in facilitating the co-ordination of the publication including scientific evidence supporting the programme and so rapidly delivering such a high quality resource, to support healthcare services in providing expert patient care. This was promoted and welcomed to our members across Europe.

The EFRS had also started to run webinars before the pandemic and so we quickly saw an opportunity to develop a number of series’ of short one hour webinars through the pandemic to provide learning and collaboration opportunities for radiographers, these provided important opportunities to come together and collaborate as radiographers. The webinars were offered and promoted to our member societies and educational institutions but available for professionals world wide to join free of charge, and available as recorded learning material free of charge via www.efrs.eu. There were webinar series’ supporting CT, radiotherapy practice with the IAEA and Eurosafe; an education and research webinar series; nuclear medicine and currently a new series of Radiotherapy webinars with the SAFE Consortium in Europe (www.SAFEeurope.eu). Each webinar is proving popular with well over 1000 registrants on average for each, with more accessing post the events.

The official Journal of the EFRS, the International Journal of Diagnostic Imaging and Radiation Therapy ‘Radiography’ soon published many Covid-19 related research papers from European authors with papers appearing from April 2020 onwards helping to disseminate early learning and research findings from the pandemic; this included ‘The Management of patients with suspected or confirmed Covid-19 in the radiology department’, from colleagues in Italy, ‘A case series to support radiographer preliminary clinical evaluation’, from the UK, ‘COVID-19 in the Radiology department: What Radiographers need to know’, from Greece, ‘Modifications to mobile chest radiography technique during the Covid-19 pandemic: implications of x-raying through side room windows’, (UK). To date the journal has published over 70 COVID-19 related articles. The EFRS continue to promote this work.

The activity of the EFRS Executive Board continued during the pandemic and although there have been delays we are pleased to have been able to continue our collaborations with stakeholder organisations across Europe, we have contributed as partners in a document about to be published European consensus on Patient Contact Shielding, and we have established a new relationship with the European Society of Medical Imaging Informatics (EuSoMII) to support our members working within informatics. In addition we continue our work to take account of the fundamental change in the roles of radiographers which lie ahead. Radiographic practice underpinned by education and informed by research is already vital to the delivery of effective and timely Medical Imaging, Nuclear Medicine and Radiotherapy services to patients and this importance can only grow as the shift from population to personal health care services takes effect.

Acknowledging the significant and rapid changes ahead, the EFRS took the decision to develop and publish a White Paper that defines radiographer education, research, and practice for the next decade. It commissioned a research project to ensure the White Paper drew on the expertise of the profession in Europe, and internationally, and was evidenced based. Our Delphi commissioned research is being finalised following strong input from European and International collaborators, we are pleased that ISRRT were able to contribute to this work. As a result of the pandemic, it has been easier to meet with partner organisations and a successful outcome was the summit to engage and hear views from European and International Imaging and radiotherapy organisations who presented their views on the future of Imaging and Radiotherapy services. Fundamental change in the roles of radiographers lie ahead, with the rate of change accelerating as the decade unfolds and personalised medical and health care becomes the norm. As the European Federation it is essential that we lead and consider the future alongside supporting the immediate needs of our members. This work will be presented to our AGM in November 2021 and published.

The EFRS has continued to support the research goals of its members during the pandemic, supporting the EFRS/ECR Research hub moving on line due to the pandemic, with a rapidly increasing number of requests for research studies to be shared through the hub. The EFRS has also established a new Research committee to support the EFRS Executive Boards activity plans and the widening research agenda across our member societies and educational wing members. We have recently launched and awarded our first round of the Patient Centred Care Awards to celebrate the work of the profession, and despite the pandemic the requests to support European research studies has
started growing again as the capacity within the workforce becomes available again.

The EFRS held its 2020 AGM online in February 2021, this offered an opportunity to bring representatives from the European countries together to celebrate the fantastic work of the radiography profession from across Europe, both clinical and academic, acknowledging the role the profession has played and will continue to play by demonstrating how radiographers professionalism, skills, care and compassion, and resilience, have continued throughout this pandemic, with radiographer going above and beyond in striving to meet the growing imaging demands. Europe has faced some of the most challenging situations, and our members have provided insight and learning about the pandemic for other countries beyond Europe. The EFRS recognises that continued leadership is required within the profession for the months and years ahead and we hope as a Federation to continue our strong support for the profession through our strategic plan.

The EFRS wishes to thank its members in Europe and Radiographers worldwide for their continued hard work and commitment on the front line in delivering care to patients, and to wish all Radiographers World Wide a Happy World Radiography Day.

I will end with the motto of the EFRS which shines through all the work of the profession within the pandemic ‘Together everything is possible’ ‘Be Involved, make the difference’.