Review Article

What breast radiologists have learned from the COVID-19 pandemic

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Abstract: The impact of COVID-19 on the world of breast cancer care has been unprecedented, with worrisome short- and long-term consequences, and there remains a long road ahead to recover and unbury the breast imaging departments from their current backlog. Radiologists have to consider what the new normal will be going forward. At present time, because of widescale COVID-19 vaccination, benign vaccine-related reactive lymphadenopathy is likely to be encountered in oncologic patients and we need data-driven guidelines to manage unilateral lymphadenopathy and avoid unnecessary biopsies. In the next years, some procedures like wearing masks and maintaining social distancing will probably remain in use, as radiologists show patients that they are concerned about patient safety. Accordingly, odds are it will incorporate novel protocols for patient safety, innovative technologies (such as telemedicine and Artificial Intelligence algorithms), and changes in radiology workflow to create an environment that feels safe to both patients and radiologists, preventing backlogs (preventive service must not to be declined anymore) and burnouts (we need to take medical staff's mental health seriously). However, there is hope on the horizon with new lessons learned from this pandemic that can help clear the backlog and improve the working in breast imaging departments to achieve what is most important: saving lives in the fight against breast cancer.

Keywords: Radiology; coronavirus disease (COVID-19); breast imaging; policy

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Introduction

As at July 2021, the coronavirus disease (COVID-19) pandemic has claimed more than 4 million lives worldwide, infecting around 190 million people (1). While the high number of patients in critical conditions has saturated intensive care units in the major outbreak areas for months, the COVID-19 pandemic has had an unprecedented impact on physicians from all specialties, including the staff in breast imaging departments (2,3). The worldwide scientific community has united in an unprecedented manner, volunteering time, skill, and effort, and we can learn lessons from such challenging times. In this editorial commentary, we discuss 5 lessons that breast radiologists working in a referral Institute for breast cancer care located in Lombardy (the area in Italy most affected by COVID-19) have learnt in the past two years.

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First: patients' safety (primum non nocere)

As patients are looking to feel comfortable and safe when they return for imaging, we must implement practices and policies that ensure patient safety. *Primum non nocere* is a Latin phrase, part of the Hippocratic Oath, and means "first, do no harm" and that is one of the principal precepts of bioethics that all students in healthcare are taught and is a fundamental principle throughout the world. After more than 2000 years from its formulation, this principle is even more relevant today, when avoiding the transmission of an infectious disease such as COVID-19 in patients is an absolute priority.

From the beginning of COVID-19 crisis, the goal of our hospital, one of the most important referral centre in Europe for breast cancer (BC) care (4) has been to continue to provide optimal care to patients while reducing infective risk to both patients and staff (3). Our radiologists, radiographers and nurses washed their hands frequently, regularly used the personal protective equipment (5), and cleaned the ultrasound probes and the mammography machine with 1,000mg/L chlorine-containing disinfectant after each use (6).

Although there has always been an emphasis on hygiene in radiology departments, the pandemic may be the boost needed to widely implement safety procedures and increase the focus on hygiene and sanitation, including waiting-room sanitation and use of air purification systems.

Despite, during summer 2021, policies of some nations relaxed the masking guidance for those who have been fully vaccinated (7), all the staff in our Institute (similarly to other Italian hospitals) must still be masked all the time inside the hospital, although it is currently mandatory by a Italian law for health personnel to have completed the vaccination course. Even if vaccinated, both staff and outpatients are still screened for COVID-19 through questionnaires and temperature checks before entering our Institute. All non-urgent outpatients are informed that, in the presence of fever, cough and/or flu-like symptoms, our medical staff will evaluate the case to post-pone/schedule another appointment. All in-patients undergo the reverse transcription polymerase chain reaction test performed on respiratory samples obtained by a nasopharyngeal swab the day before their hospitalization. Finally, we have introduced visiting restrictions to protect our patients, who may be vulnerable due to their oncological condition. On the other hand, we recognized that families and friends have an important role in meeting the care needs of many patients, both before admission to hospital and following discharge, so there were exceptions for patients who require the support of a carer. Such exceptions were at the discretion of our medical doctors: if the risk of passing on COVID-19 is too high, carers may not always be allowed to enter in our Institute. In the latter case, we have put in place a range of ways for patient's family to speak with clinical staff.

Some procedures like wearing masks and maintaining social distancing will probably remain in use long-term (like mask-wearing became more common across East Asia after the 2003 SARS outbreak) (8), as radiologists show patients that they are concerned about patient safety.

We need guidelines for unilateral lymphadenopathy in (vaccinated) cancer patients

Since the first COVID-19 vaccines were delivered in December 2020, 3.42 billion doses have been administered globally as at 11 July 2021, and 30.35 million are now administered each day (9).

In the meantime, reports of subclinical axillary lymphadenopathy identified on the side where COVID-19 vaccination was administered are rising rapidly, although axillary adenopathy has rarely been reported following the administration of other, non-COVID-19 vaccines and, in trials, it was reported only in 1.1% of Moderna cohort participants and in 3% of Pfizer-BioNTech cohort participants (10). In these cases, lymphadenopathy was reported based on physical examination rather than by using imaging and it was only reported as an unsolicited adverse event. Accordingly, the true incidence rate is likely higher.

At present, no data are available regarding the duration of radiologically evident lymphadenopathy or clinically validated follow-up intervals, and the management approach to unilateral axillary adenopathy in patients who recently received a COVID-19 vaccine is based at this point on expert consensus opinion (11). Therefore, management recommendations are varied, including biopsy, immediate additional imaging with ultrasound, short-interval imaging, and clinical follow up (12). The Society of Breast Imaging (SBI) recognized that there are a variety of valid approaches to this clinical situation and encourage a conservative approach, which stresses an abundance of caution (11). According with SBI considerations, anticipated high rates of false positive recalls for additional imaging and/or biopsy of transient reactive nodes can be reduced by following the ACR BI-RADS management recommendations for

unilateral lymphadenopathy in the setting of a known inflammatory cause that supports a benign assessment (13).

In our department, similarly to the approach proposed by Lehman *et al.* (12,14), we use six weeks to define recent vaccination and for patients with suspicious findings in the breast (BI-RADS 4 or 5), management of the ipsilateral adenopathy is at the discretion of the dedicated breast radiologist based on suspicion of the breast lesion and lymphadenopathy appearance. For patients with a recent BC diagnosis, presenting in the pre-/peri-treatment setting, we encourage injection in the contralateral arm. However, because of widescale vaccination, lymphadenopathy due to COVID-19 vaccination is likely to be encountered in oncologic patients and we need data-driven guidelines to manage unilateral lymphadenopathy and avoid patient emotional stress as well as unnecessary biopsies of benign vaccine-related reactive lymphadenopathy (12). In this clinical scenario, management should be decided by consultation between the oncology treatment team and radiologists.

The aim of the recent recommendations (11,14) is to reduce patient anxiety, provider burden, and costs of unnecessary evaluation of lymphadenopathy in the setting of recent vaccination and to avoid further delays in vaccinations and recommended imaging for best patient care during COVID-19 pandemic (14).

Preventive service must not be declined anymore

During the first months of both 2020 and 2021, many imaging operations have experienced a sharp decline in volume and almost 4 million women in the US and 1 million in the UK have missed their routine screening mammograms due to the pandemic (15).

In 2019, our department provided 65,000 breast-imaging examinations and procedures (4): during the first months of 2020, as the Italian government imposed a lockdown, we stopped non-deferrable exams, reporting a decrease of 68% of both mammography and ultrasound and of 52% of breast MRI, while the interventional diagnostic procedures (such as imaging-guided biopsies) reported a decrease of only 15% (3).

From May 2020 to October 2020, we examined all the patients we previously postponed and the volume of all patients in our departments were reported to be around 35% more than the same period of the previous year (namely, from May 2019 to October 2019). This was the case not only in our hospital: during the spring and the summer of both 2020 and 2021, as the pandemic subsides, radiology departments gained back volumes to pre-COVID-19 levels, ramping up procedures and deferrable examinations including the follow-up imaging exams which are crucial for BC patients (16).

However, the elective procedure postponements, also due to many patients' fear to come in for imaging, lead to repercussions such as the increase in cases of advanced disease (17). Avoiding delays to preventive services is crucial as it is estimated that the pandemic-related diagnosis delays may lead to an estimated 7.9–9.6% increase in the number of deaths due to BC up to 5-years after diagnosis (18).

Although in our Institute the number of breast imaging examinations provided to patient in 2021 are back in line with those of the pre-pandemic era, many breast-imaging departments have reopened with reduced capacity due to increased COVID-19 safety protocol. For instance, all machines (mammography and MR scans) and their parts (US probes) should be cleaned by radiologist technician with 1,000 mg/L chlorine-containing disinfectant (13) after each examination, and facilities have added social distancing measures, such as limiting the number of chairs in waiting rooms and scheduling appointments 30 minutes apart or on alternate days (3). Accordingly, many hospitals had to defer routine diagnostic work that normally would allow breast cancer to be diagnosed and treated earlier (3,19,20): these delays may collectively contribute to later-stage diagnosis, during which women have a lower probability of surviving breast cancer (18).

We need to find new strategies to avoid disruption of preventive services caused by a pandemic: during a pandemic, the breast-imaging department, with appropriate safety protocol, can still systematically offer preventive service, also considering the use of teleradiology and innovations.

Teleradiology and Artificial Intelligence in breast-imaging may become the normal

Although teleradiology cannot substitute all the breast-imaging practices which include performing radiological exams and biopsies, the pandemic introduced a new urgency to what has been a gradual switchover to web platforms for remote patient visits. In March 2020, NHS England recommended physicians to change face-to-face appointments to telephone or video (21) and in the same year some telemedicine platforms made their services

available for free (22).

Accepting the suggestions of radiologists, our Institute implemented home PACS, moving from 100% of radiologists onsite to 80% reading CT and chest X-ray from home within a few weeks. However, for breast radiologists happened at much lower levels as this process is more complicated for breast imaging due to the need to be on site for diagnostic (like the ultrasound "second look" of MRI findings) and interventions.

Overall, telehealth increased in our Institute, for patient surgery, oncology, and genetics appointments, as well as for multidisciplinary tumor boards moved to virtual platforms, similarly to what happened with educational conferences and lectures (23).

Most of the radiologists of our department (22/40) believed that teleradiology would continue and lead to increased efficiency, similarly to what has been reported by a survey of the American College of Radiology (24). If telemedicine can be a great support during the pandemic waves, AI-enabled algorithms can help to face the overloads of patients which followed the peaks of COVID-19 waves in prioritizing the list of unscreened patients, inviting women with an identified elevated BC-risk first, and then working through the remaining patients as efficiently as possible. This approach aims to reduce any further delays which could mean lower rates of survival and higher treatment costs.

The journey through the COVID-19 pandemic has been longer than expected, and there remains a long road ahead to recover and unbury the breast screening community from its current backlog. However, there is hope on the horizon with new approaches and technology applications powered by AI that will help clear the backlog.

We need to take mental health seriously

Even prior to the COVID-19 pandemic, burnout and fatigue among radiologists presented significant hurdles for breast-imaging departments, exacerbated by an overall shortage of qualified radiology professionals (25).

From prevention to diagnosis, COVID-19 has created the above-mentioned issues for radiologists throughout the BC screening pathway hindering their ability to detect and manage BC expeditiously. This probably contributed to the rise in reported mental health problems that have been described as "a second pandemic," highlighting mental health as an issue that needs to be addressed (26).

However, while everyone's situation is different (and some people have experienced tremendous difficulties), many have seen that it is possible to be resilient in a crisis. In our hospital, staff members were forced to adjust to new shifts, change their work routines and cut back on socializing, but they started seeking out new strategies to counter the stress and, when the number of examinations decreased, radiologists and residents used their work time to make progress on research, to participate in webinars or to learn about trending topics, and some breast-imaging employees also have volunteered to be deployed to other areas where their skills and experience were most needed.

As mentioned before, teleradiology may increase radiologist morale, flexibility, and even potentially productivity but its real effects still remain unclear: alternatively it may decrease collaborations, interfacing with multidisciplinary colleagues, educational value, or productivity indeed, with a long-term negative impact on radiologists' mood (23).

Nevertheless, the issue of burnout and fatigue among the staff has also persisted and likely worsened under the strain of the pandemic, negatively impacting quality of work and workforce morale. An internal survey showed that 60% of breast radiologists experimented more fatigue and stress during the last two years. If these issues are not managed, each of these factors can lead to a vicious cycle in which breast screening backlogs are extended rather than reduced (27).

Accordingly, it is crucial for radiology leadership to incorporate wellness activities into the department's operations, to develop peer support programs and groups, to emphasize work-life balance and to increase enthusiasm and pride in a such important job.

Conclusions

Since the beginning of 2020, our medical staff demonstrated the remarkable resilience in adapting quickly to the new demands forced by the COVID-19 pandemic. Although our radiology departments have already been functioning at pre-pandemic capacity since the first surge of the pandemic subsided, there are some lessons we have learn to be ready for future waves of COVID-19 pandemic and for future pandemics. Moreover, the above mentioned 5 lessons learned from this pandemic can help clear the backlog and improve the working in breast imaging departments to achieve what is most important: saving lives in the fight

against breast cancer.

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Footnote

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