



Systematic Review / Meta-analysis

# The impact of COVID-19 in the management of breast radiology units: What we have learned since 2020? A systematic review

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## ABSTRACT

During the last years, the COVID-19 pandemic determined different clinical and radiological scenarios, sometimes difficult to manage, in particular in breast units. On these bases, we tried to understand what we have learned and how to improve the management of breast cancer screening and breast cancer patients.

We included a total number of 16 studies. Most published papers about managing breast units during the spread of COVID-19 were editorial, followed by original articles and reviews. Even if the COVID spread followed a bimodal distribution, most papers were published during the first wave, without significant improvement in 2021 and 2022, and were published in journals belonging to general speciality, followed by surgical and radiological journals.

One of the most common topics reported in the final included studies is prioritizing patients in the clinical setting according to individual characteristics (first of all, age), risk factors, and time since the last imaging examination. For biopsies, prioritization has been suggested according to the risk of malignant lesions. In the screening setting, this was suspended in most reported studies, also for BRCA+ patients, and then resumed with different modalities according to different centres. Moreover, some proposed the establishment of mobile units for screening or the decentralization of more screening mammograms to smaller clinics or hospital admittance for screening patients via telemedicine.

The majority of analyzed papers underlined that all patients, before admittance into the diagnostic rooms, should be screened for suspicious symptoms directly on-site or by asking by phone. In the case of patients with a high suspicion of COVID-19 infection, some papers proposed to delay all breast imaging studies and others to use dedicated departments or areas of the cancer center. In this setting, telemedicine for radiologists has also been suggested. Moreover, other suggestions should be considered: reducing patients' time in the hospital, increasing the distance between patients in the waiting room, and creating additional waiting areas.

## Introduction

The coronavirus disease (COVID-19) outbreak began in Wuhan, China, in December 2019, and by March 11, 2020, it was declared a pandemic by the World Health Organization (WHO).

The extraordinary worldwide situation has impacted healthcare routines [1]: clinicians had to modify patient care to preserve resources and reduce exposure risk [2].

Healthcare resources, human as well as material, have been rearranged to manage the influx of a large number of patients requiring specific and often urgent assistance without compromising patients' outcomes [3].

This resulted in a sudden disruption of routine medical care,

including acute limitation of resources for non-COVID patients with critical conditions [4], in particular cancer patients, an especially vulnerable population whose outcomes are dependent on timely and high-quality multidisciplinary interventions [3].

Since a delay in the diagnosis of many types of cancer can worsen the outcomes [1], it became critically important to define which patients required more urgent care and which could wait for treatment due to the limited hospital resources during the pandemic [2].

This was also important in the diagnostic field, especially for breast cancer: benign and suspicious breast lesions have been properly triaged and prioritized for treatment under the exceptional circumstances of the COVID-19 pandemic [1].

Concurrently, containment measures were recommended and

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implemented to prevent infections in patients and healthcare professionals [3].

Even if the predominant transmission mechanism of the virus was established to be through droplet particles, it has been demonstrated that contact with infected surfaces touched by people who didn't perform efficient disinfection of the hands can be an important carrier [5]. Since people have been proven to be infectious 2–3 days before they exhibit symptoms, a certain proportion of the spread of the disease was by asymptomatic carriers [5].

Therefore, symptoms-based screening did not protect all people [5], and social distancing remained the main measure to prevent contagion [4].

However, breast imaging requires very close contact with patients, and it has been estimated that the transmission risk depends on the patient's proximity [6]. The Occupational Information Network, developed under the sponsorship of the US Department of Labor/Employment and Training Administration, determined that the occupational risk score is based on three risk factors: physical proximity, exposure to disease and infections, and daily contact with others. Among the highest at-risk professions are dental hygienists, dentists, family physicians, nurses, radiographers, and sonographers [6].

On these bases, the present study aims to analyze the impact of the pandemic on breast cancer units management in different countries during and after the pandemic, with a special focus on the standard level of care for breast cancer patients and on the safe work scenario for healthcare professionals.

## Materials and methods

Considering its nature, this study did not require approval by our hospital's institutional review board.

### Search strategy

We systematically searched MEDLINE (PubMed interface) and EMBASE (Elsevier interface) in August 2022 by using the following search keywords and relative equations: "(COVID) AND (breast unit), (COVID) AND (breast) AND (management), (COVID) AND (breast cancer), (pandemic) AND (breast) AND (management)"

All the obtained records were imported into Rayyan (<https://www.rayyan.ai>) to screen them. After the first automatic screening, duplicates were excluded.

One reviewer (G.R.), with ten years of experience in breast cancer management, examined titles, keywords, and abstracts. The reviewer excluded abstracts, posters, and conference papers. Published studies not in English were excluded as well.

After the manual screening process, the reviewer analyzed the full text of each paper.

The reviewer recorded the following characteristics: type of paper, online publication date, country location determined according to the first author, university-affiliated center, journal speciality, and journal impact factor (according to Web Of Science).

### Statistical analysis

Continuous variables were expressed as mean  $\pm$  standard deviation (SD). Categorical variables were expressed as numbers and percentages.

All statistical analyses were performed using IBM SPSS 26.0 (SPSS Incorporated, Chicago, Illinois, USA).

## Results

The literature search identified 1652 publications. Using the Rayyan website, 542 studies were excluded due to duplication, while 325 were marked as ineligible by automatic tools. The reviewer first excluded all studies not in English ( $n = 24$ ) and reports not retrieved ( $n = 10$ ).

Finally, starting with a total of 751 studies, the reviewer, by reading all titles, excluded 650 papers not in line with the aim of this systematic review, 50 papers due to the lack of the whole text, and 33 due to the format ( $n = 25$  poster and  $n = 8$  conference paper). Finally, the total number of included studies was 15 (Table 1). The PRISMA flowchart of the study is reported in Fig. 1.

Most of the published papers about the management of breast units during the spread of COVID-19 were editorial ( $n = 9$ , 60%), followed by original articles ( $n = 3$ , 20%), and reviews ( $n = 3$ , 20%). Most papers were published in 2020 ( $n = 10$ , 66.7%), while 5 in 2021 (33.3%). Even if the search was made in August 2022, we didn't find any useful papers published this year.

Most papers were published in journals belonging to general speciality ( $n = 8$ , 53.3%), followed by surgical ( $n = 5$ , 33.3%), while only two studies (13.3%) were in radiological journals. The overall mean impact factor was 2.73 ( $\pm 1.18$ ).

Most of the included studies from North America ( $n = 5$ , 33.3%) and Europe ( $n = 5$ , 33.3%), followed by Asia-Pacific ( $n = 2$ , 13.3%), South America ( $n = 2$ , 13.3%), and only 1 (6.7%) from Africa. Most papers were published by Authors not belonging to university affiliations ( $n = 11$ , 73.3%). All original articles included were retrospective and single-center based (Table 1).

Based upon different breast societies' recommendations, eleven papers (73.3%) discuss the importance of prioritization of patients [1-3,4,7-12] based on their condition and/or patient age, aspects of pandemic phases and institutional resources; most of them explicit that mammographic screening was postponed after the acute COVID phase [3-8]. Many papers emphasize the importance of adopting practical measures to reduce infection spread [4,5,9-13], minimizing number of hospital visits for each patient [including positioning of marker the same day of biopsy [11] or of surgery [12,14]], measuring body temperature at the hospital entrance, using personal equipment, reducing number of people and time of permanence in radiological Units, incrementing spaces between chairs in the waiting rooms, and also modifying technical aspects of acquiring mammographic images and of cleaning equipments [13]. Some articles report the importance of telemedicine for pre-hospital triage [1,8] and for the evaluation of images by Radiologists [6,12,15]. One paper reported the utility of daily briefings about the availability of supplies and reinforcing the importance of disinfection [11].

Finally, a work discussed the utility of mobile units [15].

## Discussion

During the last months, the COVID-19 pandemic determined different clinical and radiological scenarios, sometimes difficult to manage, in particular in breast units. Even if the international literature widely focused attention on the diagnosis and prognosis of COVID-19 patients, our review demonstrated that a slight percentage of published papers discussed the importance of breast cancer patients. We found out that most were editorials, while reviews and original articles did not reach half of the total. Even if the COVID spread followed a bimodal distribution, most papers were published during the first wave, without significant improvement in 2021 and 2022. Moreover, even if breast cancer patients and their management belong to radiological and surgical departments, most analyzed papers were published in general speciality journals and only about 5% in radiological ones. North America was the most productive by evaluating geographical regions, followed by Europe.

On these bases, we tried to understand what we have learned and how to improve the management of breast cancer screening and breast cancer patients. Considering that the included papers reported different aspects of breast unit management, we decided to focus on the most important ones for everyday practice.

One of the most common topics reported in the final included studies is the prioritization of patients, in particular, the American Society of Breast Cancer suggested dividing them into three categories, according

Table 1

Study title	Year of publication	Journal	Country	University affiliation	Findings
Management of benign and suspicious breast lesions during the coronavirus disease pandemic: recommendations for triage and treatment [1]	2020	Clinics (Sao Paulo, Brazil)	Brazil	No	Recommendations from different breast societies on patient prioritization (considering patients' condition, age, aspects of pandemic phases, and institutional resources); enhance telemedicine to contact and evaluate patients.
Recommendations for prioritization, treatment, and triage of breast cancer patients during the COVID-19 pandemic. The COVID-19 pandemic breast cancer consortium [2]	2020	Breast cancer research and treatment	USA	Yes	It suggests priority classification for breast cancer patients based on the severity of their condition (including comorbidities) and potential efficacy of treatments.
Recommendations for triage, prioritization and treatment of breast cancer patients during the COVID-19 pandemic [3]	2020	Breast (Edinburgh, Scotland)	Italy	Yes	It provides guidelines for the management of patients: mammographic screening is suspended until the pandemic has subsided; diagnostic procedures in symptomatic patients are scheduled according to local availability and resources. However, it is important to avoid delayed diagnosis in those with suspicious symptoms or clinical or imaging findings [BIRADS 5 or BIRADS 4].
COVID-19 pandemic: The new normal in breast cancer management - prioritization of care from a breast surgical unit's experience in Singapore [4]	2021	Asian journal of surgery	Singapore	No	It describes the management of breast cancer patients : minimize hospital visits; defer screening imaging for 6–12 months; give priority to conditions that, when delayed, would increase the chances of relapse or deterioration.
Breast Cancer Screening during COVID-19 Emergency: Patients and Department Management in a Local Experience [5]	2021	J Pers Med	Italy	No	It proposes a protocol for managing daily screening after the acute COVID phase: depicts four possible clinical scenarios (Non-COVID-19 patient; Confirmed COVID-19 in an asymptomatic screening patient; Suspected COVID-19 in a symptomatic or confirmed breast cancer patient; Confirmed COVID-19 in a symptomatic or confirmed breast cancer patient), with a different schedule of screening patients; give suggestions for infection prevention.
COVID-19: Safe Guidelines for Breast Imaging During the Pandemic [6]	2020	Canadian Association of Radiologists journal	Canada	No	It provides general recommendations: personal protective equipment, physical distancing measures, home review by radiologists, and four priority patient classes.
Management of Breast Cancer Patients during the COVID-19 Pandemic in Northern Italy [7]	2020	Breast care (Basel, Switzerland)	Italy	No	It describes the management of breast cancer patients: screening for asymptomatic subjects (including BRCA carriers) was suspended; regular investigations were conducted for subjects with suspected lesions.
Learning from organizational changes in the management of breast cancer patients during the COVID-19 pandemic: Preparing for a second wave at a breast unit in northern Italy [8]	2021	The International journal of health planning and management	Italy	No	It describes their management of breast cancer patients: pre-hospital phone triage, suspended screening for asymptomatic subjects (including BRCA carriers), and regular investigations for subjects with suspected lesions.
How has COVID-19 impacted cancer screening? Adaptation of services and the future outlook in Australia [9]	2020	Public health research & practice	Australia	No	It proposes adaptation of screening services: risk assessment, personal protective equipment, increased social distancing and modified mammogram positioning techniques, with preference for women in the target age range (50–74 years).
Prioritizing breast imaging services during the COVID pandemic: A survey of breast imaging facilities within the Breast Cancer Surveillance Consortium [10]	2021	Preventive medicine	USA	No	Data collected from The Breast Cancer Surveillance Consortium (BCSC): reported numbers of centres closed or working at reduced capacity; general recommendations for reducing the spread of Covid infection; prioritization for rescheduling canceled appointments.
Tailored breast imaging during the first wave and preparedness for the second wave of the COVID-19 pandemic [11]	2020	European Journal of Radiology open	Canada	Yes	It suggests prioritization of pts; positioning of metallic breast marker at the end of the biopsy; in-hospital triage for symptoms; personal protective equipment; daily briefing on availability of supplies/reinforcing the importance of disinfection; modifications to waiting rooms.
COVID-19: Impact and challenges at breast imaging unit [12]	2020	The breast journal	Saudi Arabia	No	It recommends patient triage (positive cases redirected to designated isolated clinics); suggests cancelling all screening and rescheduling B3 and B4; preoperative localization the day of surgery; social distancing strategies; remote consultation of images.
The COVID-19 BreastScreen Department - beyond the pandemic [13]	2020	Journal of Medical Radiation Sciences	Australia	Yes	It gives suggestions to modify technical aspects of positioning the patient; reschedule mammography for patients who recently travelled overseas if

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Table 1 (continued)

Study title	Year of publication	Journal	Country	University affiliation	Findings
Breast Cancer Diagnosis, Treatment and Follow-Up During COVID-19 Pandemic [14]	2020	European Journal of Breast Health	USA	Yes	symptomatic; it suggests patients arrive no more than 5 min before the appointment; it suggests changes for equipment cleaning. Giving the option to be rescheduled to screening and routine patients; seed placement on the day of surgery.
The Utilization and Benefits of Telehealth Services by Health Care Professionals Managing Breast Cancer Patients during the COVID-19 Pandemic [15]	2021	Healthcare (Basel, Switzerland)	Jamaica	No	It evaluate benefits of telehealth by literature review: reduction in numbers of imaging studies and increase in advanced stage cancers detected. It proposes mobile units and telemedicine for radiological interpretation.

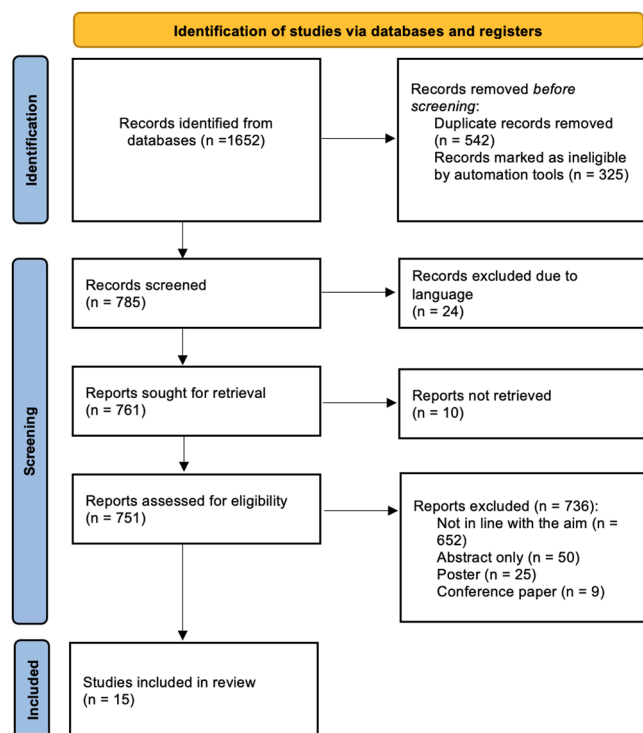


Fig. 1. – Flowchart of the study.

to priority (where A stands for life-threatening conditions or even a short delay would significantly alter the prognosis, including evacuation of hematomas or drainage of breast abscesses, B stands for patients need treatment or services not be delayed until the end of the pandemic, including (BI-RADS) category 4–5 screening mammograms, biopsies for abnormal mammograms, or breast symptoms and discordant biopsies likely to be malignant, and C is directed to patients for whom certain treatment or services can be indefinitely deferred until the pandemic is over, including routine screening with mammogram, MRI, or breast ultrasound; excision of benign nodules; duct excision; follow-up of discordant biopsies likely to be benign; treatment of high-risk lesions/atypia/papilloma; or prophylactic surgery) [5]. The recommendations of the American College of Surgeons are similar to those discussed above but also consider important aspects of pandemic phases (Phase I, II and III) and institutional resources that affect decision-making [1].

Similarly, the Canadian Society of Breast Imaging suggests a prioritization divided into four classes (where P1 stands for emergent, P2 for urgent, P3 for semi-urgent, and 4 for non-urgent) [6]

However, during the pandemic peaks, different breast units were forced to close, and when the reopening was possible, the majority adopted a strategy first focused on diagnostic imaging and secondary on

screening [2–5].

In the clinical setting, some units prioritized patients who contacted the facility to schedule an appointment according to individual characteristics, risk factors, and time since the last imaging examination [10]. For biopsies, prioritization has been suggested according to the risk of malignant lesions (category 5 vs. 4c vs. 4b vs. 4a) [10]. Moreover, patients' age was considered one of the most important factors in determining the screening prioritization, with a special focus on women with a year range of 50–74 due or overdue for a screening exam [9].

In the screening setting, this was suspended in the majority of reported studies, also for BRCA+ patients, and then resumed: some rescheduled screening mammography within three months from the previous appointment [5], whereas some gave priority to patients who contacted the facility to schedule an appointment [10].

In a certain number of units, also during the pandemic, it was guaranteed regular investigation for specific clinical conditions, with a proposed approach directly linked to the lesion suspicion [BIRADS 5 (high priority) or BIRADS 4 (medium priority)] [2,7,12], or linked to those conditions that when delayed would increase risk of relapse or deterioration [4]. One facility specifically performed the biopsy during the visit [12] or the same day [10], thus avoiding losing time for patient care and reducing the risk of contagion linked to the pandemic. As a consequence of the above-reported data, it has been proposed that BI-RADS3 and 4a categories should be rescheduled [12] to increase the medical effort for more suspicious lesions.

Considering the large number of patients affected by COVID-19 and the high risk of contagion, the establishment of mobile units for screening [15] and the decentralization of more screening mammograms to smaller clinics [6] have also been proposed. Another suggested item useful to reduce hospital admittance for screening patients was telemedicine: a dedicated staff was used to give appointments by phone [4,13] or to contact patients before scheduling appointments to investigate the reason for the visit [4].

The majority of analyzed papers underlined that all patients, before admittance into the diagnostic rooms, should be screened for suspicious symptoms [3,6,7,9,10,12] directly on-site or by asking it by phone, including body temperature measurement at the entrance of the hospital [5,6]. In the case of patients with a high suspicion of COVID-19 infection, it has been proposed by some papers to delay all breast imaging studies [15] and other papers to use dedicated departments or areas of the cancer center [3]. In this setting, the use of telemedicine by radiologists has also been suggested to reduce the risk of contagion [6,7,15], specifically one of these proposed a home review [6]. Moreover, other suggestions should be taken into account: reducing patients' time in the hospital by shortening the time from hospital admittance to the diagnostic test [15], increasing the distance between patients in the waiting room [5,6,10-13], and creating additional waiting areas [7,10] were considered useful methods to reduce the pandemic spread and continue an acceptable radiological approach to breast cancer patients.

## Future directions

To be prepared to face another possible pandemic, we should evaluate the most important suggestions from all the studied papers. The main topic is the prioritization of patients based on their personal condition and/or age, aspects of pandemic phases and institutional resources. Mammographic screening could be postponed after the end of the acute pandemic phase (no longer than six months), with prioritization of patients also for screening restart. Moreover, we should never again be unprepared with insufficient personal equipment, and we should remember standardized measures for reducing infection spread (minimizing number of hospital visits for each patient, measuring body temperature at the hospital entrance, using personal equipment, reducing number of people and time of permanence in radiological Units, incrementing spaces between chairs in the waiting rooms, and also modifying technical aspects of acquiring mammographic images). We should discuss which of these latter measures we could adopt even during daily clinical practice out of a pandemic risk period. Moreover, telemedicine should be considered as a resource during another possible future pandemic emergency, either for pre-hospital patient triage or for evaluation of images by Radiologists. It could also be taken into consideration that the utility of mobile units was available.

All these re-organization models of radiological activities tend to regularly investigate patients with suspected breast cancer, but further studies are needed to investigate and understand if this re-arrangement of radiological unit activity could not affect the outcome of asymptomatic patients that undergo screening for breast cancer.

## Ethic statement

Not applicable due to the nature of the study (review and meta-analysis)

## CRedit authorship contribution statement

**Gilda Rechichi:** Conceptualization, Software, Investigation, Data curation, Software, Writing – original draft, Validation, Writing – review & editing, Investigation. **Cesare Maino:** Investigation, Data curation, Software, Writing – original draft, Validation, Writing – review & editing, Investigation. **Daide Ippolito:** Writing – original draft, Validation, Writing – review & editing, Investigation, Supervision. **Rocco Corso:** Validation, Visualization.

## Declaration of competing interest

The authors of this manuscript declare no relationships with any companies, whose products or services may be related to the subject matter of the article.

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## References

- [1] F.A.C. Purcino, C.A. Ruiz, I.C.E. Sorpreso, A.M.M. Costa, J.M. Soares-Júnior, E. C. Baracat, J.R. Filassi, Management of benign and suspicious breast lesions during the coronavirus disease pandemic: recommendations for triage and treatment, *Clinics*. 75 (2020) e2097.
- [2] J.R. Dietz, M.S. Moran, S.J. Isakoff, S.H. Kurtzman, S.C. Willey, H.J. Burstein, R. J. Bleicher, J.A. Lyons, T. Sarantou, P.L. Baron, R.E. Stevens, S.K. Boolbol, B. O. Anderson, L.N. Shulman, W.J. Gradishar, D.L. Monticciolo, D.M. Plecha, H. Nelson, K.A. Yao, Recommendations for prioritization, treatment, and triage of breast cancer patients during the COVID-19 pandemic. The COVID-19 pandemic breast cancer consortium, *Breast. Cancer Res. Treat.* 181 (2020) 487–497.
- [3] G. Curigliano, M.J. Cardoso, P. Poortmans, O. Gentilini, G. Pravettoni, K. Mazzocco, N. Houssami, O. Pagani, E. Senkus, F. Cardoso, the editorial board of The Breast, Recommendations for triage, prioritization and treatment of breast cancer patients during the COVID-19 pandemic, *Breast*. 52 (2020) 8–16, <https://doi.org/10.1016/j.breast.2020.04.006>.
- [4] S.M. Tan, Y.L. Melissa Seet, C.W. Mok, COVID-19 pandemic: The new normal in breast cancer management - prioritization of care from a breast surgical unit's experience in Singapore, *Asian J. Surg.* 44 (2021) 389–391, <https://doi.org/10.1016/j.asjsur.2020.08.020>.
- [5] F. Maio, D.U. Tari, V. Granata, R. Fusco, R. Grassi, A. Petrillo, F. Pinto, Breast Cancer Screening during COVID-19 Emergency: Patients and Department Management in a Local Experience, *JPM* 11 (2021) 380, <https://doi.org/10.3390/jpm11050380>.
- [6] J.M. Seely, A.M. Scaranelo, C. Yong-Hing, S. Appavoo, C. Flegg, S. Kulkarni, A. Kornecki, N. Wadden, Y. Loisel, S. Schofield, S. Leslie, P. Gordon, COVID-19: Safe Guidelines for Breast Imaging During the Pandemic, *Can. Assoc. Radiol. J.* 71 (2020) 459–469, <https://doi.org/10.1177/0846537120928864>.
- [7] A. Ferro, P. Cristofolini, C.A. Garcia-Etienne, O. Caffo, M. Pellegrini, C. Fantò, S. Mussari, M. Campregher, G.M. Guarrera, Management of Breast Cancer Patients during the COVID-19 Pandemic in Northern Italy, *Breast. Care (Basel)* 21 (2020) 1–3, <https://doi.org/10.1159/000511943>.
- [8] A. Ferro, P. Cristofolini, C.A. Garcia-Etienne, O. Caffo, M. Pellegrini, C. Fantò, S. Mussari, M. Campregher, S. Lazzeri, S. Cantarelli, G.M. Guarrera, Learning from organizational changes in the management of breast cancer patients during the COVID-19 pandemic: Preparing for a second wave at a breast unit in northern Italy, *Int Health Plann Manage* 36 (4) (2021) 1030–1037. Jul.
- [9] E. Feletto, P. Grogan, C. Nickson, M. Smith, K. Canfell, How has COVID-19 impacted cancer screening? Adaptation of services and the future outlook in Australia, *Public Health Res. Pract.* 30 (2020) 3042026, <https://doi.org/10.17061/phrp3042026>.
- [10] B.L. Sprague, E.S. O'Meara, C.I. Lee, J.M. Lee, L.M. Henderson, D.S.M. Buist, N. Alsheik, T. Macarol, H. Perry, A.N.A. Tosteson, T. Onega, K. Kerlikowske, D. L. Miglioretti, Prioritizing breast imaging services during the COVID pandemic: A survey of breast imaging facilities within the Breast Cancer Surveillance Consortium, *Prev. Med.* 151 (2021) 106540, <https://doi.org/10.1016/j.ypmed.2021.106540>.
- [11] T. Shimpi, S. Kulkarni, K. Bukhanov, R. Fleming, A. Scaranelo, S. Ghai, F. Au, M. Beresford, H. Dua, A. Grant, V. Freitas, Tailored breast imaging during the first wave and preparedness for the second wave of the COVID-19 pandemic, *Eur. J. Radiol. Open*. 7 (2020) 100265, <https://doi.org/10.1016/j.ejro.2020.100265>.
- [12] A.F. Al-Muhanna, COVID-19: Impact and challenges at breast imaging unit, *Breast. J.* 26 (8) (2020) 1620–1621. Aug.
- [13] K.M. Spuur, The COVID-19 BreastScreen Department – beyond the pandemic, *J. Med. Radiat. Sci.* 67 (4) (2020) 352–355. Dec.
- [14] A. Soran, M. Gimbel, E. Diego, Breast Cancer Diagnosis, Treatment and Follow-up During COVID-19 Pandemic, *Eur. J. Breast. Health* 16 (2) (2020) 86–88. Mar 25.
- [15] D.A. McGrowder, F.G. Miller, K. Vaz, M. Anderson Cross, L. Anderson-Jackson, S. Bryan, L. Latore, R. Thompson, D. Lowe, S.R. McFarlane, L. Dilworth, The Utilization and Benefits of Telehealth Services by Health Care Professionals Managing Breast Cancer Patients during the COVID-19 Pandemic, *Healthcare (Basel)*. 9 (2021) 1401, <https://doi.org/10.3390/healthcare9101401>.