Suggested Modifications in the Management of Breast Cancer Patients in the Era of COVID-19 Pandemic: a Web-based Survey.

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Abstract

Background: Management of cancer patients in the current era of COVID-19 pandemic poses a significant challenge on health care systems.

Objective: We explored the views of oncologists for the management of breast cancer patients during COVID-19 pandemic.

Methods: A web-based questionnaire using SurveyMonkey was submitted to licensed oncologists involved in breast cancer management in Saudi Arabia, Egypt and United Arab Emirates. The survey focused on characteristics of participants, infection risk among cancer patients and possible treatment modifications related to different types of breast cancer

Results: The survey was completed by 82 participants. For early HR positive, HER2-negative breast cancer,74.4% supported using neoadjuvant hormonal therapy in selected patients, and 58.0% preferred giving 6 over 8 cycles of adjuvant chemotherapy when indicated. Only 42.7% preferred CDK4/6 inhibitor with hormonal therapy as first line in all patients with metastatic HR-positive disease. 67.1% of participants supported using adjuvant trastuzumab for 6 instead of 12 months in selected patients with HER2-positive breast cancer. For metastatic HER2-positive, HR-positive breast cancer, 80.5% of participants supported the use of hormonal therapy with dual anti-HER2 blockade in selected patients. The preferred choice of 1st line treatment in metastatic triple negative patients with BRCA mutation and PDL1<1%, was PARP inhibitor according to 42.5% of the participants, and atezolizumab with nabpaclitaxel if the PDL1>1% according to 70.4% of the participants.

Conclusions: Several modifications in breast cancer management is supported by the survey participants. These modifications need to be discussed on local basis taking into account the local infrastructure and available resources. Clinical Trial: none

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Suggested Modifications in the Management of Breast Cancer Patients in the Era of COVID-19 Pandemic: a Web-based Survey.

Introduction

Management of cancer patients in the current era of COVID-19 pandemic poses a significant challenge on health care systems [1]. However, it is mandatory to keep the required level of care of cancer patients while taking the necessary precautions to maintain safety of both patients and health care professionals [HCPs] [2-4]. Nevertheless, certain modifications of medical management of cancer patients, including surgical approach, locoregional and systemic therapies in addition to changes in treatment and follow up schedules, are required to keep the balance between patients' care and safety. In addition, setting priorities for medical care may be required when the available health services fall short of the number of patients [1]. Cancer patients can be considered a heterogeneous group of patients with different presentations, stage at diagnosis, tumour burden and therapeutic modalities with associated adverse events and related immune suppression. This may pose a variable risk for COVID-19 related complications among cancer patients [5].

Breast cancer patients, at least in part, are more vulnerable to COVID-19 infection due to variety of reasons including myelosuppression produced by chemotherapy given in [neo] adjuvant or metastatic settings [6], CDK4/6 inhibitors [7-9] and palliative radiotherapy to the spine or pelvis. In addition, myelosuppression can be secondary to bone marrow infiltration by metastatic tumour cells. Different scientific and medical societies released suggestions and recommendations that addressed possible treatment modifications and precautions in the management of cancer patients in the era of COVID-19 pandemic such as European Society of Medical Oncology [ESMO] [10], American College of Surgeons [11] and National Comprehensive Cancer Network [NCCN] [12].

The main theme behind these expert opinion-based recommendations is based on reducing the probability and/ or duration of neutropenia, reducing frequency of hospital visits/stays in addition to avoiding medications that may be risky during the current COVID-19 pandemic. ESMO recommendations for example dissects the priority of the management of breast cancer patients into low, medium and high priorities for medical care [10]. Similarly, Cancer Care Ontario reported different priorities for medical care of cancer patients using variable therapeutic modalities including surgery, radiotherapy, systemic therapy and palliative care [13]. Furthermore, American College of Surgeons provided pragmatic suggestions for triaging patients for surgical management based on the volume of COVID-19 cases, available intensive care unit [ICU] capacity, available hospital resources and degree of urgency of surgical management [11].

Therefore, during the COVID-19 pandemic, the risk/ benefit ratio of different treatment modalities may need to be reconsidered to select the best therapeutic strategy for each patient. Given so, discussion in multidisciplinary tumour boards and assessment of available hospital facilities are critically important. Moreover, it is crucial to check the response of practicing oncologists to these recommendations of therapeutic modifications and whether adopted in real practice. In the current survey, we will explore the views of oncologists treating breast cancer patients on possible modifications in breast cancer management in the current period of COVID-19 pandemic. This survey will cover suggested modifications by key medical societies in different subtypes of breast cancer, focusing mainly on systemic therapy. In addition, the survey may help to fill the gap between guidelines recommended by scientific societies in COVID-19 era and what is actually ongoing in every day clinical practice in three Middle east countries. These countries have relatively different health care systems, economic resources and patient volume. This will shed light on how these potential modifications can really guide oncology practice in the current era.

Methods

Development of the instrument

We generated our survey instrument using rigorous survey development and testing methods [14]. Items were selected based on literature review, emails and telephone correspondence. Three experts in the field of breast cancer from King Abdullah Medical City, Saudi Arabia extensively discussed the topic and reviewed items until no further questions were raised. Items were nominated then, ranked by expert breast oncologists to reach a consensus on the selected items. Further review was performed to eliminate redundant items using binary responses [exclude and include]. Fuzzy logic was applied to check the consensus among the experts in a more robust way than the traditional method [14].

During construction of the survey, we grouped the items into the domains we wanted to explore and then we refined the questions [15]. The self-administered survey consisted of 25 items that focused on 5 domains: characteristics of participants, COVID-19 infection risk among cancer patients/ need for treatment modifications, possible modifications related to hormonal receptors [HR]-positive, Human Epidermal Receptor 2 [HER2]-negative breast cancer patients, HER2-positive and triple negative breast cancer patients. Structured responses formats used in this survey included binary [yes/no], nominal and ordinal responses. Other options were also allowed such as: I don’t know.

Testing of the instrument

During pre-testing and pilot testing, questions were reviewed by three breast cancer experts to check for the consistency and appropriateness of the survey questions [16]. Then they are reviewed by a non-expert colleague to assess the dynamics, flow and accessibility. Three medical oncologists carried out pilot testing of the instrument.

We also conducted clinical sensibility assessment to evaluate the

comprehensiveness, clarity, and face validity of our instrument on a scale of 1-5. We invited 4 colleagues with methodologic and oncology expertise. Results of the clinical sensibility testing using mean scores on the 5-point scale suggested that the instrument had face validity [4.3], content validity [4.2], clarity [4.3], and discriminability [4.5]. This survey was approved by IRB of King Abdullah Medical City, Makkah, Saudi Arabia [IRB number 20-634].

Study procedures

We used nonprobability snowball sampling ¹¹ design[17]. This web-based questionnaire was submitted to licensed medical oncologists involved in breast cancer management in Saudi Arabia, Egypt and United Arab Emirates. We identified breast oncologists, who are members of national oncology societies in the above mentioned countries, through the data base of theses societies. They were contacted by email to participate in the survey and were asked to send the survey link by email to other experienced breast oncologists. A reminder was sent twice, one week apart, by email to the invited participants.

Participants received electronic links accompanied with concise instructions, the background, objectives of the survey, target population, expected time to finish the survey and a request to participate voluntarily. They need to register in first page of the survey and provide their professional/academic degree. Fellows or trainees were excluded, while only those who has at least three-year experience in the management of breast cancer after completion of their specialist training, were included. Participants were consented to join the survey and to keep records of their professional details, institutes and countries of clinical practice.

Each page of the survey contained 4-5 items, giving a total of 6 pages. Checking the completeness of the survey was performed using JAVAScript. To avoid duplicate entries, the survey would not display again to the same user, once response is submitted. The answers were kept anonymously using SurveyMonkey. These data were protected from unauthorized access. Only authors and data analyst

had access to these data.

Outcome Assessment

The survey was conducted between 10/7/2020 to 30/7/2020. We assessed the percentage of response of breast oncologists. Descriptive statistics were used to summarize data and report views of participants. We followed the CHERRIES guidelines for conducting and reporting results of the survey [18].

Results

The survey was distributed to 100 participants in Saudi Arabia, Egypt and United Arab Emirates. Eighty two responded and agreed to participate in the survey. The completeness rate [filling all items of the survey] among respondents was 100%.

Characteristics of survey participants

Out of the respondents, 75.6% were medical oncologists, while clinical oncologists and hemato-oncologists constituted 15.9% and 8.5% of the participants, respectively. The majority of respondents [87.8%] work in governmental hospitals, and 62.2 % of the participants have more than 10- year work experience [Table 1].

COVID-19 prevalence and requirement for treatment modifications:

The majority of the participants [92.0%] reported that they have COVID-19 diagnosed patients in their hospitals. Meanwhile, 67.0% reported that they have HCPs diagnosed with COVID-19 in their institutes [Figure 1]. The great majority [87.8%] agreed/strongly agreed that cancer patients are at increased risk of COVID-19 related complications [Figure 2] and that the risk of these complications is different among cancer patients [80.5%] [Table 2]. Noteworthy, the majority [85.4%] supported modifications in breast cancer management during COVID -19 pandemic [Figure 3]. Similarly, the majority [92.7%] endorsed doing virtual multidisciplinary tumour boards for breast cancer patients during COVID-

19 pandemic [Table 2].

Hormonal receptors [HR]-positive breast cancer patients:

Neoadjuvant therapy

When neoadjuvant therapy is indicated, the majority of participants [74.4%] supported using neoadjuvant hormonal therapy in selected patients [strong ER-positive, low Ki67], while 11% endorsed using neoadjuvant hormonal therapy in all patients. In T1/T2 tumours, when no downsizing is required, participants were divided over the use of neoadjuvant hormonal therapy as a bridge till the pandemic is over [Table 3].

Adjuvant chemotherapy

When chemotherapy is indicated in early HR-positive, HER2-negative breast cancer, 58% and 21% of participants preferred giving 6 and 8 cycles, respectively, while 21% reported that the number of chemotherapy cycles does not matter. Noteworthy, 54.9% of participants disagreed/strongly disagreed for delaying adjuvant chemotherapy after finishing adjuvant radiotherapy, while only 25.6% agreed for this approach [Table 3].

Therapy for metastatic patients

For metastatic patients, 42.7% preferred using a CDK4/6 inhibitor with hormonal therapy in all patients, while 35.4% preferred deferring CDK4/6 inhibitors to second line in selected patients [Table 3]. The treatments of choice of survey participants for metastatic patients with non-visceral metastasis were aromatase inhibitor [54.9%], CDK4/6 inhibitor with aromatase inhibitor [34.1%] and fulvestrant [11.0%]. For patients who have already started therapy with a CDK4/6 inhibitor, 43.9% disagreed/strongly disagreed for holding the CDK4/6 inhibitor till the pandemic is over, while only 31.7% agreed/strongly agreed with that approach. Meanwhile, the participants were divided over the use of everolimus or alpelisib in second line therapy. Meanwhile, for patients who have already started therapy with everolimus, only 26.9% agreed/strongly agreed for holding everolimus till the

pandemic is over [Table 3].

HER2-positive breast cancer patients

Two thirds [67.1%] of the participants supported using adjuvant trastuzumab for 6 instead of 12 months in selected patients with HER2-positive breast cancer such as low risk, elderly patients or when there are logistic barriers of receiving the medication during COVID-19 pandemic.

For first line treatment of metastatic HER2-positive, HR-positive breast cancer, 80.5% of the participants supported the use of hormonal therapy with dual anti-HER2 blockade in selected patients [elderly, those with low tumour burden] [Table 4].

Triple negative breast cancer patients

Regarding the choice of first line treatment in metastatic patients with BRCA mutation and PDL1<1%, the preferred treatment choices were PARP inhibitors [41.5%], platinum-based chemotherapy [36.6%], taxanes [13.4%]. Meanwhile, in metastatic triple negative breast cancer with BRCA mutation and PDL1>1%, atezolizumab with nab-paclitaxel was the preferred choice for 70.7% of the participants. When chemotherapy is indicated for patients with metastatic breast cancer, participants were divided between oral [47.6%] and IV chemotherapy [52.4%]. If IV chemotherapy is chosen, the preferred choices of survey participants were 3-weekly taxane [59.8%] and weekly taxane [20.7%] [Table 4]. During COVID-19 pandemic, 52.4% of participants supported lowering the threshold of prescription of G-CSF following chemotherapy.

Table 1: Characteristics of survey participants

Country of Practice		
Saudi Arabia	**Egypt**	**United Arab Emirates**
31 (37.8%)	39 (47.6%)	12 (14.6%)
Subspecialty		
Medical Oncologist	**Clinical Oncologist**	**Haemato-oncologist**
62 (75.6%)	13 (15.9%)	7 (8.5%)
Duration of experience		
Less than 5 years	**5-10 years**	**More than 10 years**
15 (18.3%)	16 (19.5%)	51 (62.2%)
Type of institute of main practice		
Governmental hospitals	**Academic institute**	**Private hospital**

72 (87.8%)	7(8.5 %)	3 (3.7%)

Table 2: risk of infection during COVID-19 pandemic/required treatment modifications

Are cancer patients at increased COVID-19 infection- related complications such as respiratory failure?				
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
36 (43.9%)	36 (43.9%)	9 (11.0%)	1 (1.2%)	0 (0.00%)
Is the risk of serious complications of COVID-19 infection such as respiratory failure is different among cancer patients?				
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
17 (20.7%)	49 (59.8%)	13 (15.8%)	3 (3.7%)	0 (0.0%)
Are treatment modifications required for breast cancer patients during COVID-19 pandemic?				
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
34 (41.5%)	36 (43.9%)	6 (7.3%)	5 (6.1%)	1 (1.2%)
Is virtual Multidisciplinary approach for the management of breast cancer patients mandatory in the current situation?				
Strongly agree	Agree	Neither agree nor	Disagree	Strongly

		disagree		disagree
45 (54.9%)	31 (37.8%)	2 (2.4%)	3 (3.7%)	1 (1.2%)

Table 3: Suggested modifications for hormonal receptors (HR)-positive, HER2-negative breast cancer inpatient physicians practice.

When neoadjuvant therapy is indicated (down-sizing is required), What is the treatment of choice?				
Neoadjuvant chemotherapy	Neoadjuvant hormonal therapy		Neoadjuvant hormonal therapy in selected cases (strong ER+, low Ki67)	
12 (14.6%)	9 (11.00%)		61 (74.4%)	
Will neoadjuvant hormonal therapy be considered in T1, T2 tumours (no down-sizing is required) as a bridge till the pandemic is over?				
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
13 (15.8%)	34 (41.5%)	15 (18.3%)	19 (23.2%)	1(1.2%)
Can adjuvant radiotherapy be given before adjuvant chemotherapy to avoid chemotherapy induced neutropenia till COVID-19 pandemic is over?				
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree

0(00.0%)	21 (25.6%)	16 (19.5%)	37 (45.1%)	8 (9.8%)
Using CDK 4/6 inhibitors for new patients with metastatic HR-positive, HER2-negative breast cancer:				
CDK4/6 inhibitor+ aromatase inhibitor is the treatment of choice	Defer CDK 4/6 inhibitor to 2nd line till the pandemic is over in all cases	Defer CDK 4/6 inhibitor to 2nd line till the pandemic is over in selected cases		
35 (42.7%)	18 (21.9%)	29 (35.4%)		
For new patients with non-visceral metastasis, what is the treatment of choice in 1st line during COVID-19 pandemic ?				
Fulvestrant	Aromatase inhibitor	CDK 4/6 inhibitor+ aromatase inhibitor		
9 (11.0%)	45 (54.9%)	28 (34.1%)		
For patients who have already started a CDK4/6 inhibitor+aromatase inhibitor, would CDK4/6 inhibitor be hold till the pandemic is over?				
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
3 (3.7%)	23 (28.0%)	20 (24.4%)	30(36.6%)	6 (7.3%)
For patients with metastatic HR-positive, HER2-negative breast cancer, will you give everolimus or alpelisib in second line?				
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
3 (3.7%)	23 (28.1%)	27 (32.9%)	27 (32.9%)	2 (2.4%)
For patients who have already started everolimus or alpelisib, will these medications be hold till the pandemic is over?				
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
4 (4.9%)	18 (22.0%)	26 (31.7%)	33 (40.2%)	1(1.2%)

Table 4: Suggested treatment modifications in HER2-positive and triple Negative breast cancer

Can adjuvant trastuzumab for 6 instead of 12 months can be considered in selected patients with HER2-positive breast cancer (low risk, elderly patients or logistic barriers)				
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
17 (20.7%)	38 (46.4%)	7 (8.5%)	17 (20.7%)	3 (3.7%)

For first line treatment of metastatic HER2-positive, HR-positive breast cancer, will hormonal therapy with dual anti-HER2 blockade be considered in selected patients (elderly, low tumour burden)?				
Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
13 (15.9%)	53 (64.6%)	7 (8.5%)	8 (9.8%)	1 (1.2%)

In metastatic triple negative breast cancer with BRCA mutation and PDL1<1%, what is the 1st line treatment of choice?			
PARP inhibitor	Platinum-based chemotherapy	Taxan	Others
34(41.5%)	30 (36.6%)	11 (13.4%)	7 (8.5%)

In metastatic triple negative breast cancer with BRCA mutation and PDL1>1%, what is the 1st line treatment of choice?			
PARP inhibitor	Atezolizumab+ nabpaclitaxel	Taxan	Others
14 (17.1%)	58 (70.7%)	5 (6.1%)	5 (6.1%)

When chemotherapy is indicated for patients with metastatic breast cancer, If IV chemotherapy is chosen, what is the preferred regimen?				
Taxane: 3-weekly regimen	Taxane: weekly regimen	Anthracycline	Gemcitabine	Vinorelbine
49 (59.8%)	17 (20.7%)	9 (10.9%)	4 (4.9%)	3 (3.7%)

Discussion

In this survey, we explored the views of breast cancer oncologists practicing in three Middle East countries, regarding modifications in breast cancer management during COVID-19 pandemic. The great majority of participants has COVID-19 cases in their institutes and believes that treatment modifications are required. We focused on modifications related to systemic therapy of breast cancer patients and they were categorized according to different breast cancer subtypes. The majority of participants supported using treatment strategies that decreased the risk of COVID-19 infection/related complications such as using neoadjuvant hormonal therapy in HR-positive/HER2 negative patients, using 6 months of adjuvant trastuzumab in selected patients with HER2-positive disease and using hormonal therapy with dual anti-HER2 blockade in metastatic HR-positive/HER2-positive patients. Meanwhile, participants were divided over some suggested modifications such as using IV vs. oral chemotherapy in metastatic patients when indicated.

Patients with cancer are at increased risk for severe disease and increased mortality due to COVID-19 infection [19]. In hospitalized COVID-19 patients, case fatality rates reported among patients with cancer are higher compared to other patients, 29.4% versus 10.2%, respectively [$P < .0001$] [20]. Large cohort studies have consistently demonstrated that all-cause mortality and the likelihood of ICU admission are higher in cancer patients, even after adjustment for age, sex, diabetes, smoking, cardiovascular and pulmonary disease, and other common risk factors for COVID-19 severity [20-22]. These data highlight the critical need to decrease the risk of COVID-19 infection among cancer patients.

Therefore, management of breast cancer patients is challenging during COVID-19 pandemic given the limitations of access to care, maintaining the level of patients' care, travel restrictions and immune-suppression secondary to therapeutic modalities or the disease itself. This highlights the importance of the above-

mentioned modifications in breast cancer management to decrease the risk of myelosuppression/immune-suppression, decrease the frequency of hospital visits and need of laboratory monitoring in addition to adopting alternative strategies when standard treatment approaches can't be provided. Hereby, we will explore the scientific evidence of different survey items supported by participating oncologists.

CDK 4/6 inhibitors in HR-positive, HER2-negative breast cancer

CDK 4/6 inhibitors with an aromatase inhibitor is currently the standard first line therapy in HR-positive, HER2-negative patients without visceral crisis. Several clinical trials established the survival benefit of these medications [7-9]. Neutropenia is the most frequent side effect encountered with this class of medications [7-9]. This may pose a particular risk in the era of COVID-19 pandemic, particularly in elderly patients and those with low baseline neutrophil count. Moreover, in September 2019, the American FDA released a warning of rare but serious drug-induced interstitial pneumonitis with CDK 4/6 inhibitors [23]. Therefore, delaying CDK 4/6 inhibitors to second line therapy [till the pandemic is over] may be an appropriate strategy, given that they demonstrated survival benefit in second line when added to fulvestrant [24-25]. Noteworthy, ESMO recommendations reported that postponing the incorporation of a CDK4/6 inhibitor in the first line, for patients presenting with special patterns of disease [e.g. bone only, low-burden, *de novo* metastatic disease] could be an option, especially in the elderly population [10].

Interestingly, in the FALCON study, Progression free survival [PFS] was significantly improved with fulvestrant monotherapy compared to anastrozole as a first line therapy in patients with non-visceral metastasis [22.3 vs. 13.8 months, respectively], which makes fulvestrant an attractive first line option that is recommended in this category of patients [26].

mTOR and PIK3 inhibitors

Everolimus and alpelisib improved PFS when added to hormonal therapy in BOLERO2 and SOLAR1 studies, respectively [10, 11]. However, these medications are associated with adverse events that make their use problematic in the current era such as hyperglycemia and non-infectious pneumonitis [NIP] [27-28]. Patients with NIP may have similar manifestation to that of COVID-19 infection such as dyspnea, cough, hypoxia and fever, thereby complicating the diagnosis and may exacerbate potential respiratory drawbacks of COVID-19 infection. Noteworthy, treatment with steroids is required in patients with ≥ grade 2 NIP which may put patients at increased risk of COVID-19 infection [29]. ESMO recommendations advised that the addition of mTOR or PI3KCA inhibitors is not of immediate priority and should be avoided [10].

Neoadjuvant hormonal therapy in HR-positive, HER2-negative breast cancer

Several trials have investigated the use of neoadjuvant hormonal therapy in postmenopausal patients with bulky HR-positive, HER2-negative disease to achieve better surgical outcome. Several studies and meta-analysis demonstrated improved rate of breast conservative surgery with aromatase inhibitors compared to tamoxifen [30-33]. Data from randomized trials in postmenopausal patients displayed that higher ER and lower Ki-67 levels were significantly correlated with a higher probability of response [31, 34]. Therefore, neoadjuvant hormonal therapy can be a good strategy to postpone breast surgery without compromising patients' outcome, with the current limitations in health services with limited surgical slots. Noteworthy, neoadjuvant endocrine therapy is recommended by ESMO as an option for patients with ER-positive/HER2-negative breast cancer to enable deferral of surgery by 6 to 12 months in clinical stage I or II breast cancers [10].

Choice of systemic chemotherapy in metastatic breast cancer in COVID-19 era

Oral chemotherapeutic agents including capecitabine and vinorelbine displayed

activity in heavily pretreated patients, with overall response rates of up to 35-40%, which may be comparable to that of anthracyclines and taxanes [35-39]. Oral chemotherapy may be more convenient in COVID-19 era. Generally, they are well tolerated and can be dispensed for several cycles and delivered to patients via medication delivery services. This approach can limit hospital visits and exposure to infection.

HR-positive, HER2-positive breast cancer: chemotherapy-free regimens

Treatment with hormonal therapy combined with dual anti-HER2 therapy in HER2–positive/ HR–positive MBC was assessed in several trials with encouraging results [40-42]. This strategy can be considered in selected patients such as elderly patients, those with borderline performance status and patients with limited tumour burden. This chemotherapy-free approach can avoid neutropenia and other chemotherapy-related adverse events to minimize possible COVID-19 associated sequelae.

Duration of adjuvant trastuzumab in HER2-positive breast cancer

Several studies assessed adjuvant trastuzumab for 6 vs. 12 months including HORG, PHARE and PERSEPHONE studies [43-45]. All studies except for the PERSEPHONE study, failed to demonstrate non-inferiority of shorter vs. longer duration of adjuvant trastuzumab. Meanwhile, the absolute difference in survival was 2% on average [46]. This data may be reassuring that in certain groups of patients, particularly those with low risk of relapse and logistic limitations, the survival outcome will not be greatly compromised with limiting adjuvant trastuzumab duration to 6 months. Noteworthy, for selected HER2-positive breast cancer, low-risk or elderly patients with cardiovascular or other comorbidities, adjuvant anti-HER2 therapy may reasonably be discontinued after 6 months instead of 12 months of treatment according ESMO recommendation during COVID-19 pandemic [10].

However, our study has some limitations. This survey was conducted in 3 Middle East countries, which may not reflect current practice in other parts of the world. Furthermore, the sample size is relatively small, which is mostly related to the fact that many oncologists in the region are general oncologist without specific practice in breast cancer. In addition, differences in economic status, availability of medications/ medication delivery service and health system infrastructure may affect application of the above mentioned modification strategies.

Finally, these modifications need to be discussed on local basis taking into account the local infrastructure and available resources. In addition virtual tumour board discussion is critically important in this context to choose the most convenient therapeutic strategy without compromising treatment efficacy or patients' safety.

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Supplementary Files

Figures

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Figure 1

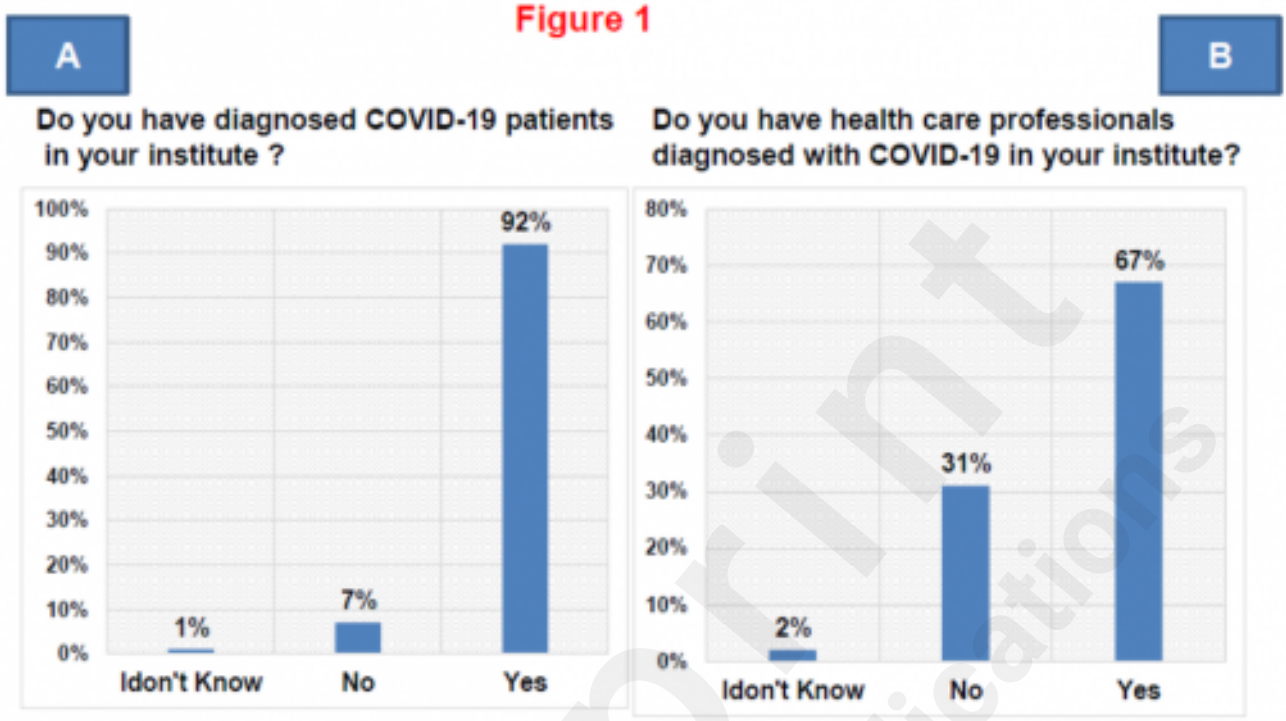

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Figure 2

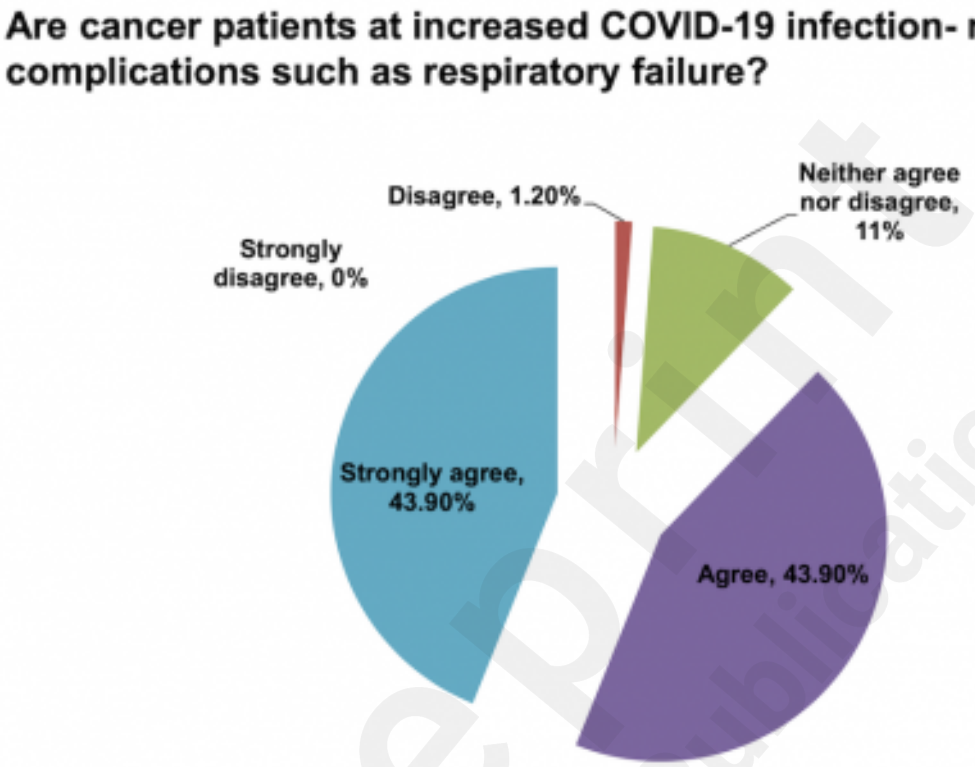

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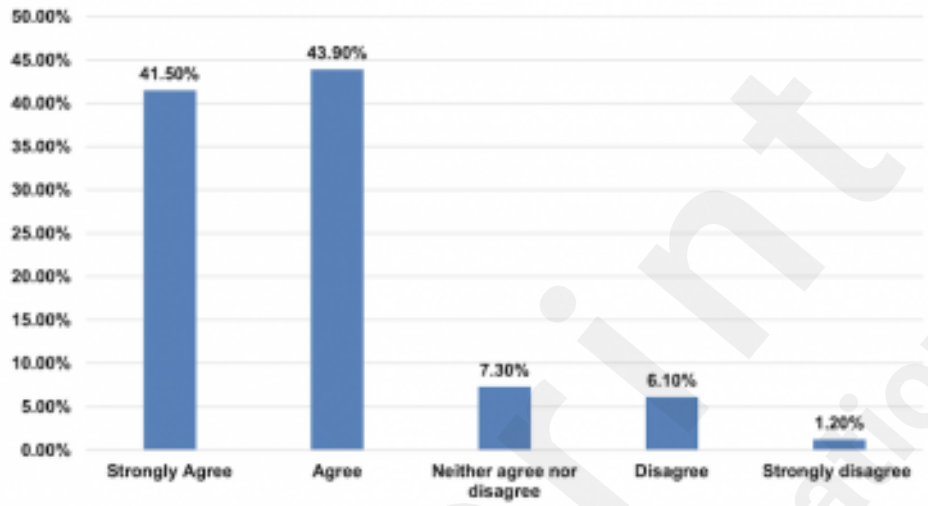
Figure 3

"Do you think that treatment modifications are required for breast cancer patients during COVID-19 pandemic?"



Multimedia Appendixes

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