Virtual Management of Cancer Patients in the Era of COVID-19 Pandemic

Emad Tashkandi, A Zeeneldin, A AlAbdulwahab, O Elemam, Shereef Elsamany, W Jastaniah, S Abdullah, M Alfayez, A Jazieh, Ho Al-Shamsi

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Abstract

Background: During COVID-19 pandemic, patients from distant geographical areas will be affected the most. Virtual management "telemedicine" has been shown to reduce health costs and improve access to care.

Objective: The aim of this survey is to report the views of oncologists on virtual management (VM) "awareness, challenges, preferences" and priority of prescribing anti-cancer treatments during the COVID-19 pandemic.

Methods: We created self-administrated electronic survey about VM of cancer patients during COVID-19 pandemic. We evaluated the clinical sensibility and pilot tested the instrument. We surveyed practicing oncologists using snowball sampling in the Gulf and Arab countries via emails, social media networks and sent reminders one and two weeks later using SurveyMonkey.

Results: We received 222 responses from validated respondents from April 2-April 22, 2020. Awareness of the virtual clinics, virtual multidisciplinary teams (MDT) and virtual prescriptions encountered in 82%, 79% and 75%, respectively. VM challenges were lack of physical exam in 60%, patient's awareness & access in 59%, lack of physical attendance of patients in 42%, IT support in 37% and safety of VM in 35%.

50% and 48% of oncologists did not prefer virtual prescription of chemotherapy and novel immunotherapy respectively, however, 85%, 74% and 57% preferred virtual prescription of hormonal, bone modifying agents and targeted therapy respectively

Oncologists preferred to continue neoadjuvant, adjuvant & perioperative treatments in 83%, 83%, 80% respectively. 53% preferred to continue 1st line palliative treatment, in contrast to 20% and 30% preferred to interrupt 2nd and 3rd line palliative treatment respectively. All responders preferred oral route and 53% preferred subcutaneous (SC) route. In contrast, 87% did not prefer intravenous (IV) route. Forty six percent of oncologists responded "definitely" prefer to manage cancer patients virtually,

Conclusions: Oncologists have high level of awareness about VM. While 2nd and 3rd line palliative treatments should be interrupted, treatments in neoadjuvant, adjuvant, peri-operative and 1st line palliative should continue. Our results confirm that oncologists' views on priority of anti-cancer treatments are consistent with evolving literature during COVID-19 pandemic. Challenges to VM should be addressed to improve the care of cancer patients.

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Abstract

Background

During COVID-19 pandemic, patients from distant geographical areas will be affected the most. Virtual management "telemedicine" has been shown to reduce health costs and improve access to care.

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50% and 48% of oncologists did not prefer virtual prescription of chemotherapy and novel immunotherapy respectively, however, 85%, 74% and 57% preferred virtual prescription of hormonal, bone modifying agents and targeted therapy respectively

Oncologists preferred to continue neoadjuvant, adjuvant & perioperative treatments in 83%, 83%, 80% respectively. 53% preferred to continue 1st line palliative treatment, in contrast to 20% and 30% preferred to interrupt 2nd and 3rd line palliative treatment respectively. All responders preferred oral route and 53% preferred subcutaneous (SC) route. In contrast, 87% did not prefer intravenous (IV) route. Forty six percent of oncologists responded "definitely" prefer to manage cancer patients virtually.

Conclusions

Oncologists have high level of awareness about VM. While 2nd and 3rd line palliative treatments should be interrupted, treatments in neoadjuvant, adjuvant, peri-operative and 1st line palliative should continue. Our results confirm that oncologists' views on priority of anti-cancer treatments are consistent with evolving literature during COVID-19 pandemic. Challenges to VM should be addressed to improve the care of cancer patients.

Keywords:
Tele-oncology, telemedicine, e-health, cancer, COVID-19.

Introduction:
In Dec 2019, a cluster of patients with severe pneumonia were identified in Wuhan, China and discovered to have a novel coronavirus 2019 (COVID-19)[1]. This disease can range from asymptomatic infection to severe respiratory distress syndrome and death. The World Health Organization (WHO) has declared the novel coronavirus outbreak as a pandemic, and as of 25 April 2020, a total of 2,719,897 cases and 187,705 confirmed deaths have been reported across more than 200 countries[2]

This virus is characterized by rapid human to human transmission[3], highly contagious and risk factors for mortality include older age and comorbidities[4]. Patients with cancer are susceptible to COVID-19 infections because of the immunosuppressive effect of cancer and anti-cancer treatments like chemotherapy or surgery[5] and hence carry poorer prognosis.

Tele-oncology is the application of telemedicine to oncology, it has the potential to enhance access to and quality of clinical cancer care[6]. During curfew, patients from distant geographical areas will be affected the most. Virtual management (tele-medicine) has been shown to reduce health costs & improve access to care and examples of successful technology applications include survivorship care, palliative care, symptoms management and supervising satellite anti-cancer infusion suites[7][8][9]. An updated conceptual framework of telemedicine for COVID-19 pandemic has been defined and could be applied at larger scale to improve national public health response[10]. Further reduction of patient's exposure to infection could be achieved, when certain clinic visits are replaced by virtual clinics to minimize hospital visits via video-conference or telephone. This allows oncologists to defer routine follow ups, assess patients who can continue certain anti-cancer treatments such as (chemotherapy, immunotherapy, targeted therapy or hormonal therapy) and continue cancer care virtually.

Multidisciplinary tumor (MDT) boards ensure selection of high priority curative cases and improve outcomes without delays or interruptions of cancer care. This could be continued virtually and depends on the capacity of the health care system and if available.

Virtual prescription & delivery of drugs is an alternative way to manage cancer patients specially when delivering drugs home via courier services or near home health facilities to avoid interruption of treatments provided that this service is logistically feasible and available.

Oncologists need to weigh the risks and benefits of anti-cancer treatments during the pandemic. Caring for cancer patients during this period is challenging. Jeopardizing safety by exposing patients to infection by leaving home, visiting oncology clinics and receiving anti-cancer treatments may lead to greater risks of potential adverse events.

There is limited number of studies and researches to guide oncologists on how to manage cancer patients during a pandemic. In this survey, we aim to report the views of oncologists on virtual management (awareness, challenges and preferences) and priority of prescribing anti-cancer treatments during the COVID-19 pandemic. This could help oncologists to conduct future controlled studies or trials, and guide health systems on areas of improvement in supportive infrastructure.

Methods
Study design:
This is a web-based questionnaire submitted to licensed oncologists in the Gulf and Arab region.

Study Population:

We included study subjects who met the following criteria; licensed practicing oncologists in the Gulf or Arabic region, treating adult or pediatric patients and involved in the care of patients with cancer using anti-cancer treatments such as (chemotherapy, novel immunotherapy, targeted therapy, hormonal therapy and bone modifying agents). Exclusion criteria were non-oncologists and trainees.

Study procedures:
We used nonprobability snowball sampling[11] design. To identify target population, we contacted oncologists who are members of established national oncology associations and societies in the region to participate and distribute the survey. If this was not applicable, we contacted 1-2 regional oncologists per area to distribute and participate in the survey. We have used emails and WhatsApp as it is the most popular social media network in the region to reach oncologists.

Development of the instrument:
We generated our survey instrument using rigorous survey development and testing methods[12]. Items were selected based on literature review, emails and telephone correspondence. Five experts in the field of oncology and hematology from 3 countries extensively discussed the topic and reviewed items until no further questions were missed. Items were nominated then ranked by expert oncologists to reach a consensus on selected items. Further review by methodology and content experts to eliminate redundant items using binary responses (exclude and include)

We aimed to have a survey that is simple, succinct and easy to understand. During the construction of the survey, we grouped the items into domains we wanted to explore and then refined the questions[13]. The self-administered survey consisted of 20 items that focused on 4 domains: characteristics of oncologists, COVID19 pandemic measures, virtual management and oncologists' views on virtual management & priority of prescribing anti-cancer treatments (Appendix, survey available as supplementary material).

Structured responses format used in this survey included binary response (yes/no), nominal and ordinal. Other options were also allowed such as undetermined, other and any other comments with free text to capture unanticipated responses. Respondents received electronic links accompanied with concise instructions, a cover letter is stating the background, objectives of the survey, target population, and request to participate voluntarily and their answers will be kept anonymously using SurveyMonkey.

Testing of the instrument
During pre-testing and pilot testing, questions were reviewed by three colleagues specialized in oncology to check for the consistency and appropriateness of the questions designed by investigators[14], [15] and then reviewed by non-expert colleagues to assess the dynamics, flow and accessibility. Five oncology members carried out pilot testing of the instrument with minor modifications. 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 5 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 (4.4), content validity (4.2), clarity (4.6), and discriminability (4.3).

Administration of the instrument:
After the approval of King Abdullah Medical City (KAMC) Institutional Research Board, we sent the questionnaires electronically to licensed oncologists treating adults or pediatrics patients (medical oncologists, malignant hematologists, pediatric oncologists, clinical oncologists and haemato-oncologists) in the region.

Study Duration/ Study Timeline:
On April 2, 2020, we sent embedded link to the web-based survey on SurveyMonkey along with electronic cover letter/instructions to complete the survey via emails, text messages and social media accounts such as Facebook, Twitter and WhatsApp groups. Primary investigators contacted the oncology members of national associations and societies in the region to participate and create broad distribution network. Regional oncologists provided the links to distribute to their regional members & network and there were no incentives provided. We sent reminders one and two weeks later then we closed the survey on April 22.

Statistical Analysis

Descriptive statistics used to summarize data, synthesize and report views of oncologists. Description of the data also included proportions, frequencies, means and standard deviation for the continuous variables when appropriate.

Results:

We received 222 completed surveys from 10 different countries in the region (Table 1). Seventy one percent of responders were males. Respondents were in practice for a median of 10 years. Responders' specialties were Medical Oncology in 44%, Hematology in 14%, Hematology/Oncology in 13%, Clinical Oncology in 13% and Pediatric Oncology in 12%. Others were 10 in total; five internal medicine practicing oncology, one gynecologist and the remaining without further information provided.

Saudi Arabia was the country of current practice in 49%. The remaining 51% involved Arab countries; UAE 17%, Egypt 8%, Tunisia 5%, Kuwait 4.5%, Lebanon 3.6%, Oman 2.2%, Jordan 1.8% and 5% were from other countries. Seventy-four percent practiced in public health sector and urban locations in 97%.

Table 1 Characteristics of respondents, n (%)

Gender	
Male	157 (71)
Female	65 (29)
Years in oncology practice, median	10 years
Specialty	
Medical oncologist	97 (44)
Hematologist	31 (14)
Oncologist and hematologist	29 (13)
Clinical oncologist	28 (13)
Pediatric oncologist	27 (12)
Other	10 (5)
Practicing Country	
Saudi Arabia	105 (47)
UAE	38 (17)
Egypt	18 (8)
Tunisia	13 (6)
Kuwait	10 (5)
Lebanon	8 (4)
Bahrain	7 (3)
Oman	5 (2)
Jordan	4 (2)
Other	12 (5)
Practice setting	

Public health care	163 (73)
Private health care	33 (15)
Both public and private	26 (12)
Practice Location	
Urban	215 (97)
Rural	7 (3)

This table shows the practice profile of 222 surveyed respondents

COVID-19 cases were diagnosed in responder's country, city, hospital and department in 97%, 97%, 77% and 24% respectively (Table 2). Eighteen percent of respondents reported COVID-19 cases among their own patients.

Table 2. Respondents' response to confirmed COVID-19 cases, n (%)

| Do You Have COVID-19 Cases	Yes	No	Unknown
In the country you are practicing?	215 (**97**)	6 (2.5)	1 (0.5)
In the city you are practicing?	215 (**97**)	6 (2.5)	1 (0.5)
In the hospital you are practicing?	172 (**77**)	41 (18)	9 (4)
In your department?	54 (**24**)	152 (68)	16 (7)
Among your own patients?	41 (**18**)	165 (74)	16 (7)

This table shows the impact of COVID-19 pandemic on oncologists and cancer patients
91% regularly attend multidisciplinary tumor (MDT) boards with a monthly MDT number of 4 or more in 62%. Awareness of the virtual clinics, virtual MDT, and virtual prescription encountered in 82%, 79% and 75%, respectively. Respondents who were actually involved in VC were 59%, virtual MDT 64%, and virtual prescription & delivery of drugs 64% (Table 3). Challenges faced by respondents on virtual management were lack of physical examination in 60%, patient's awareness and access in 59%, lack of physical attendance of patients in 42%, IT support in 37% and safety of virtual management in 35%. Four percent had other comments such as the lack of direct doctor-patient encounter, medico-legal aspects, psychological support and privacy (Fig.1).

Table 3. Respondents' reported awareness about virtual management, n (%)

Virtual	Awareness	Have been actually involved
Virtual clinic	182 (**82**)	131 (59)
Virtual tumor board	175 (**79**)	142 (64)
Virtual prescription & delivery of drugs	166 (**75**)	143 (64)

This table shows the oncologists' awareness and actual involvement on virtual management of cancer patients
**Fig.1 Respondents' reported challenges on virtual management.**
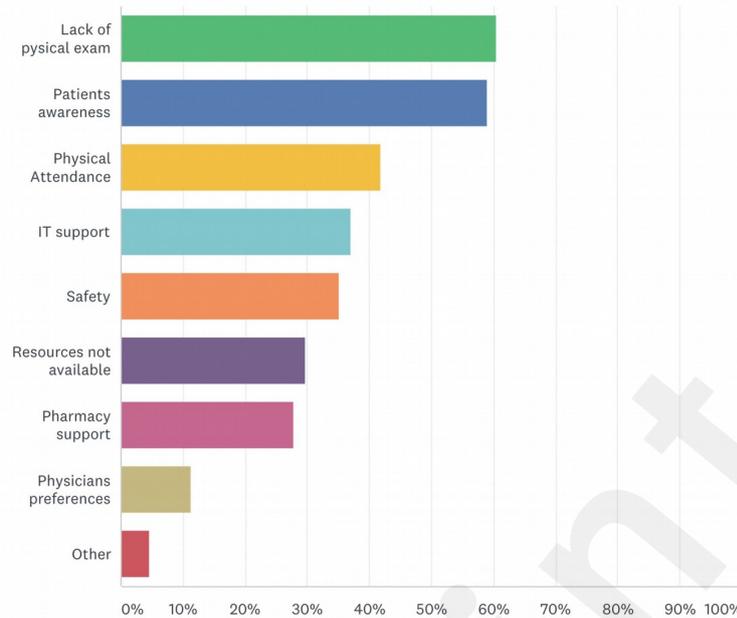
This figure shows the challenges that oncologists reported on virtual management.
Respondents were requested to ''select more than one if apply''. IT = information technology.

Priority of prescribing anti-cancer treatments during COVID-19 pandemic showed that 50% and 48% of oncologists did not prefer virtual prescription of chemotherapy and novel immunotherapy respectively, however, 85%, 74% and 57% of oncologists preferred virtual prescription of hormonal, bone modifying agents and targeted therapy respectively (Fig.2) and (Table 4).

Fig.2 Respondents' reported anti-cancer treatments that can be prescribed virtually
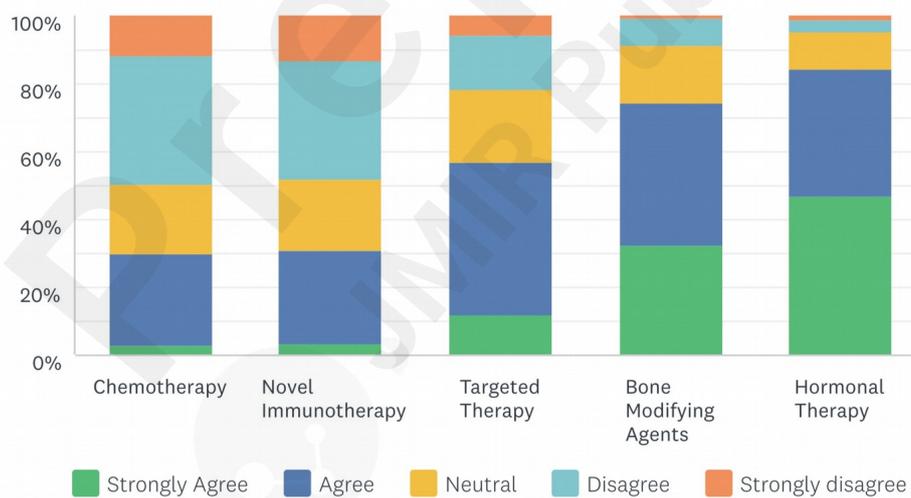
This figure shows oncologists' responses when asked which anti-cancer treatments you can prescribe virtually

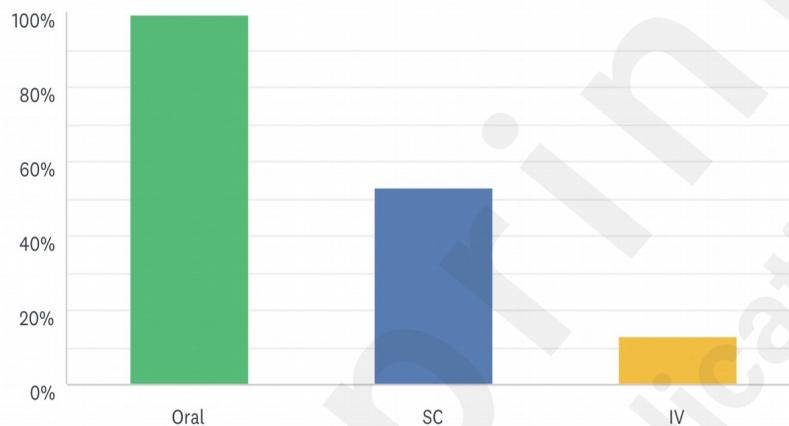**Table 4. Respondents' reported anti-cancer treatments that can be prescribed virtually**

Anti-cancer treatments (n)%	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Chemotherapy	7 (3)	60 (27)	45 (20)	**84 (38)**	**26 (12)**
Novel Immunotherapy	8 (4)	61 (27)	46 (21)	**78 (35)**	**29 (13)**
Targeted Therapy	**27 (12)**	**100 (45)**	47 (21)	36 (16)	12 (5)

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Hormonal Therapy	**104 (47)**	**84 (38)**	24 (110)	8 (4)	2 (10)
Bone Modifying Agents	**72 (32)**	**93 (42)**	38 (17)	18 (8)	1 (0.4)

This table shows oncologists' responses when asked which anti-cancer treatments can you prescribe virtually during COVID-19 pandemic

All respondents preferred oral route and 53% preferred subcutaneous (SC) route. In contrast, 87% of oncologists did not prefer intravenous (IV) route for virtual prescription (Fig.3).

Fig.3 Respondents' reported anti-cancer treatments that can be prescribed virtually

This Figure shows oncologists' responses when asked about the routes used for virtual prescription during COVID-19 pandemic

More than 80% of oncologists preferred to continue neoadjuvant, adjuvant and perioperative treatments (83%, 83%, 80%; respectively) and 53% preferred to continue 1st line palliative treatment. In contrast, 20% and 30% preferred to interrupt 2nd and 3rd line palliative treatment respectively. (Table 5) and (Fig.4)

Table 5. Respondents' reported anti-cancer treatments to avoid interruption

Treatments (n)%	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Neo-adjuvant	**114 (51)**	**70 (32)**	24 (11)	10 (5)	4 (2)
Adjuvant	**77 (35)**	**106 (48)**	29 (13)	8 (4)	2 (1)
Perioperative	**66 (30)**	**110 (50)**	34 (15)	10 (5)	2 (1)
1st line palliative	**25 (11)**	**93 (42)**	75 (34)	27 (12)	2 (1)
2nd line palliative	12 (5)	56 (25)	87 (39)	56 (25)	11 (5)
3rd line palliative	10 (5)	37 (17)	64 (29)	73(33)	38 (17)

This table shows oncologists' responses when asked about the anti-cancer treatments don't want to interrupt during COVID-19 pandemic

Fig.4 Respondents' reported anti-cancer treatments to avoid interruption
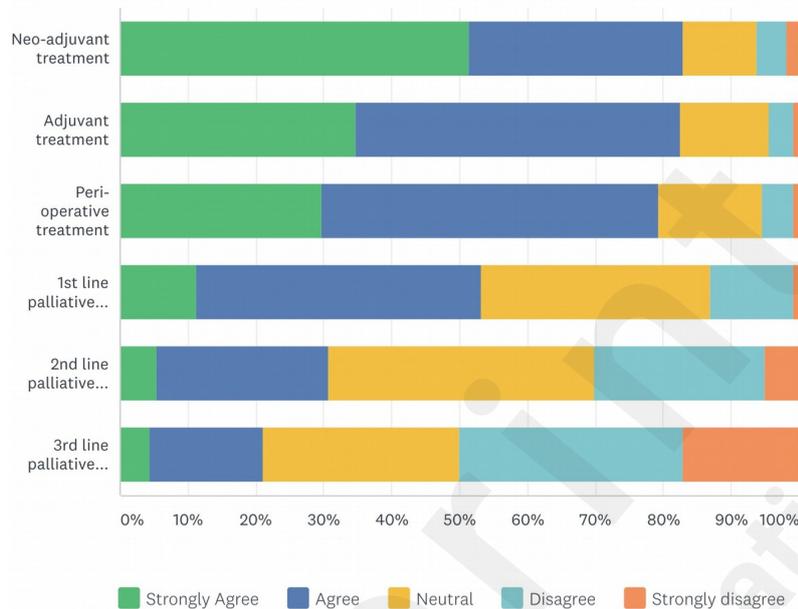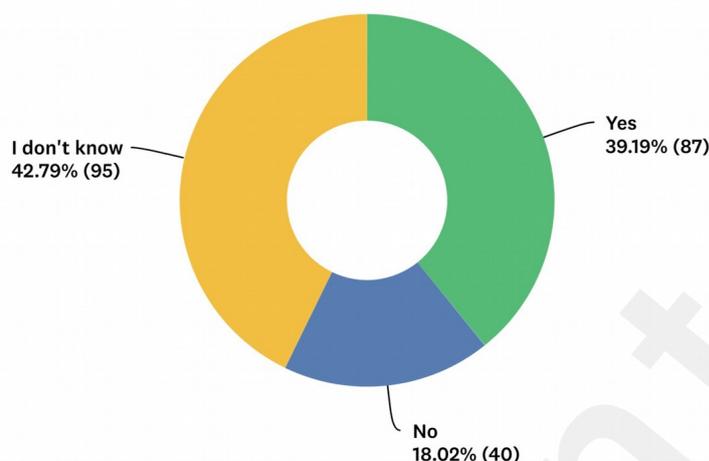

This Figure shows oncologists' responses when asked about the anti-cancer treatments don't want to interrupt during COVID-19 pandemic

Overall, oncologists were asked if they prefer to manage cases virtually, 46% responded definitely, 30% responded probably, 10% undetermined, and 11% probably not and 3% definitely not (Fig.5). Thirty-nine percent (39%) reported that patients were satisfied with VM (Fig.6). 36% of responders were more likely to continue VM after the pandemic (Fig.7)

Fig.5 Respondents' reported preferences to manage cancer patients virtually
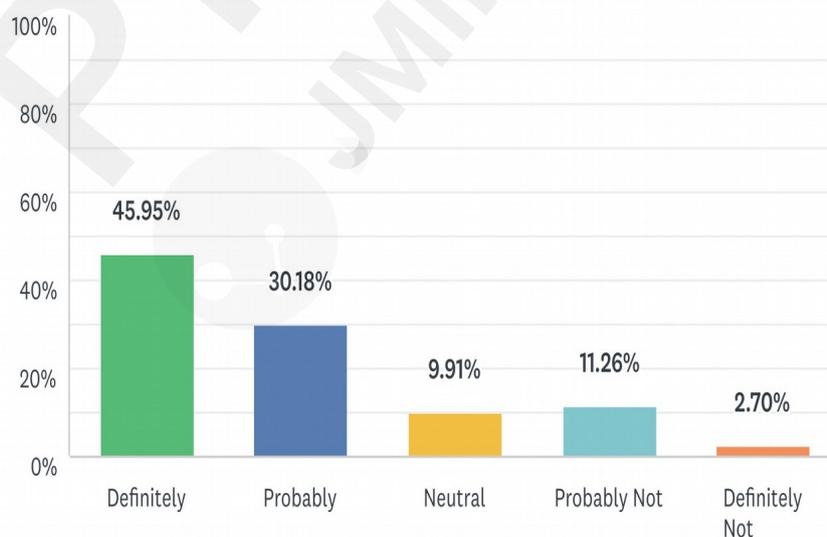
This figure shows oncologists' responses when asked if prefer to manage cancer patient virtually

Fig.6 Respondents' view on satisfaction of patients with virtual management

This Figure shows oncologists' responses when asked if patients are happy with virtual management during COVID-19 pandemic

Fig.7 Respondents' view on continuation of virtual management after the pandemic
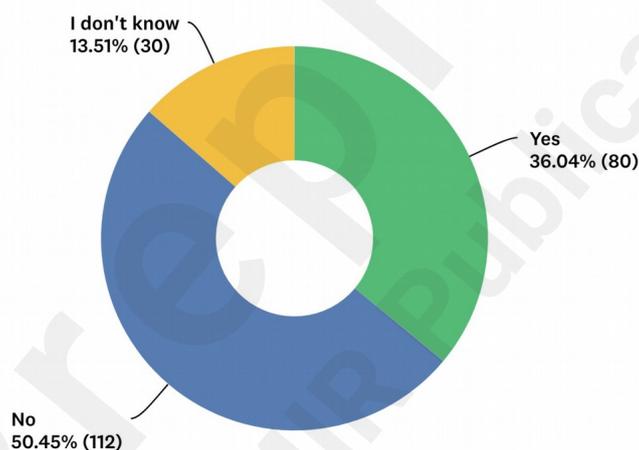
This Figure shows oncologists' responses when asked if should continue with virtual management after the COVID-19 pandemic

Discussions:

During COVID-19 curfew, oncologists need to weigh the risks and benefits of anti-cancer treatments. Patients from distant geographical areas are affected the most, virtual management "telemedicine" has been shown to reduce health costs and improve access to care. Examples of successful technology applications include symptoms management and supervising satellite anti-cancer infusion suites[7]. To our knowledge, oncologists' views about virtual management (VM) during COVID-19 pandemic were not described before.

Our work demonstrates that oncologists have high level of awareness of virtual clinics, virtual multidisciplinary teams (MDT) and virtual prescriptions encountered in 82%, 79% and 75%, respectively as shown in (Table 3), however, despite the higher level of awareness, the actual involvement was significantly lower as shown in (Table 3); virtual clinic 59%, virtual MDT 64%, and virtual prescription & delivery of drugs 64%. We anticipate these differences related to the major challenges faced by respondents on VM as shown in (Fig.1); lack of physical examination in 60%, patient's awareness and access in 59%, lack of physical attendance of patients in 42%, IT support in 37% and safety of VM in 35%.

Nonetheless, we found that 46% of the oncologists responded "definitely" they prefer to manage some cases virtually as in (Fig.5), 36% will continue VM after the pandemic (Fig.7), we cannot explain why the low proportion, however, challenges and preferences with VM might be potential reasons.

To our knowledge again, no studies have previously described oncologists' views about the priority of anti-cancer treatments during COVID-19 pandemic. The results of our survey demonstrated that, more than 80% of oncologists preferred to continue neoadjuvant, adjuvant and perioperative treatments and 53% reported their preference to continue 1st line palliative treatment, in contrast to 20% and 30% preferred to interrupt 2nd and 3rd line palliative treatment respectively (Table 5) and (Fig.4). These results are consistent with Hanna et al, when proposed resources utilization, allocation and prioritization of anti-cancer treatments, high priority vs low priority for curative and palliative treatments respectively[16]. Of note, this model was not tested before in clinical studies. Other studies have shown that delaying adjuvant treatments were associated with inferior survival in colon cancer[17] and breast cancer[18].

Changing the route from IV to oral without compromising the outcomes were reported in the literature[19] and in our study we found that, 50% and 48% of oncologists did not prefer virtual prescription of chemotherapy and novel immunotherapy respectively "majority are parenteral drugs", however, 85%, 74% and 57% of oncologists preferred virtual prescription of hormonal, bone modifying agents and targeted therapy respectively, in contrast, "majority are oral drugs" (Fig.2) and (Table 4). All responders preferred oral route in keeping with Hofheinz et al, and 53% preferred SC route for virtual prescription. In contrast, 87% of oncologists did not prefer IV route for virtual prescription (Fig.3).

This study has several strengths. First, we described the views of oncologists on VM and priority of anti-cancer treatments during the COVID-19 pandemic, which has not been reported before. Second, we have used rigorous methodology for our instrument development, validation and administration as no available instrument currently exists. Third, we have used virtual snowball sampling to identify experts in the field of oncology in the region, as there are no lists or other obvious sources for locating all practicing oncologists who are members of societies or non-members. It is difficult to estimate the total size of the sample.

The limitations of our study include, the number of participants in the study was relatively small and they were mostly from Saudi Arabia. One inherent weakness of this study is its restricted participation to Arab world. A single site geography limits inferences that can be drawn from the data. Another important limitation is that there were differences in responded specialties medical oncology, hematology, pediatric oncology and half of the study group from medical oncology. However, we tried to control for these by inviting more respondents to participate. Future research could be done with more specialties and different geographic regions involved.

Our study adds to the previous knowledge that oncologists have high level of awareness about VM, however, with lower actual involvement on virtual clinics, virtual MDTs and virtual prescriptions. Our results confirm that oncologists' views on priority of anti-cancer treatments are consistent with evolving literature during COVID-19 pandemic.

VM could be implemented as an evolving method to manage selected group of cancer patients who live in remote locations, Mclean et al, showed no differences in outcomes between tele-health-care and usual care[20]. This would reduce the risk of hospital visits and infection transmisson. Examples of successful implementation include survivorship care, palliative care, symptoms management and supervising satellite anti-cancer infusion suites[7][8][9]. Similarly, this could be implemented for patients on routine follow ups and low risk of relapse in addition to patients on oral targeted treatment, hormonal treatment and bone modifying agents.

Challenges to VM should be addressed to improve the care of cancer patients and to enhance actual

involvement on VM by improving patient's awareness & access, IT support, assess the safety of VM and finding solutions to adopt the need of physical attendance and physical examination. A number of questions remain unanswered, such as the safety of VM since cancer care is complex, the need for direct doctor-patient encounter, clinical examination, medico-legal aspects, psychological support, privacy, adequate infrastructures to support logistics, and feasibility and applicability as it is not clearly available in all institutions. Virtual prescription These are possible avenues for future research and to understand how these factors translate into improvement of cancer care.

Taken together, VM is an evolving tool for caring of cancer patients in certain circumstances, if implemented in the appropriate venues will improve access to care[6] and reduce the health care burden on cancer patients. Virtual prescription of anti-cancer treatments during COVID-19 pandemic has not been addressed before and is worth pursuing in further research.

Conclusions:
In this regional survey we found that oncologists have high level of awareness about VM, however, with lower actual involvement on virtual clinics, virtual MDTs and virtual prescriptions. While 2nd and 3rd line palliative treatments should be interrupted, treatments in neoadjuvant, adjuvant, peri-operative and 1st line palliative should continue. Our results confirm that oncologists' views on priority of anti-cancer treatments are consistent with evolving literature during COVID-19 pandemic. Challenges to VM should be addressed to improve the care of cancer patients.

Acknowledgements: we thank all oncologists in the MENA region who participated in this survey

Conflicts of interests: the authors declare that they have no financial or other conflict of interest related to the contents of this article

Authors contributions: all authors contributed equally to the conception and design of the study, acquisition of data, analysis, and interpretation. Drafting the article and final approval of the submitted version.

Attachments:
Appendix 1, survey available as supplementary material

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Supplementary Files