



Research article

Impact of COVID-19 on Gynaecological oncology; a global perspective

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ABSTRACT

The coronavirus pandemic caused global devastation with over 2 million deaths and put unprecedented pressure on health care facilities world-wide. The response to the pandemic differed globally as countries faced different challenges. Within Gynaecological oncology, a multitude of guidance was published by various countries and organisations which demonstrated major themes. These consisted of implementations aimed at reducing transmission, managing limited resources, treatment prioritisation whilst continuing urgent oncological surgery where possible and the use of alternative therapies in the management of oncology patients to reduce hospital admission. Due to the novelty of this virus and its global effects, published guidance is currently limited to best practice and small-scale trials. This review aims to summarise the global response to coronavirus with respect to Gynaecological oncology and suggests potential interventions to limit the spread of the virus during resurgence or in the event of a future global pandemic. It also discusses the current trials recruiting relevant to the field of Gynaecological oncology to better inform the specialty on the management of cancer patients during COVID-19.

1. Background

Following the identification of the novel coronavirus and its ensuing COVID-19 disease in late 2019, it quickly became a global pandemic. As each country faced different challenges, new guidance was rapidly published on how to manage patients whilst controlling the spread of the disease. Globally, there are many similarities in how departments responded to this pandemic and this remained true within the field of Gynaecological oncology. Although it is still too early for large trials to publish, this article aims to summarise the current available global guidance for the management of Gynaecological oncology patients throughout the crisis. This review aims to consolidate the advice from global societies within obstetrics, gynaecology, oncology and surgery to provide an overview on how COVID-19 has impacted the field of gynaecology oncology and the measures taken to try to control its spread.

2. Methodology

Electronic literature searches from different search engines (Embase, Medline, Pubmed, and Google Scholar), and respected international Gynaecological Oncology Societies' websites (including guidelines, statements, or comments), including ESGO, IGCS, ESMO, SGO, was performed from January 2020 till January 2021. Key words included were Coronavirus, COVID-19, SARS-COV 19, Gynaecological oncology,

pandemic and guideline/guidance. Evidence was reviewed by the two authors and relevant data were included and summarised. Special emphasis was on how the pandemic affected the care of women with cancer and how the services adapted to the management of patients during the peak of infection. The review did not look at the outcome of the management as the pandemic is still ongoing with far reaching implications for years to come. The authors drew conclusions that are more pragmatic and easily applicable to different healthcare settings.

3. Introduction

Oncology patients are at risk of greater mortality as a consequence of contracting coronavirus, however do not appear to be at a higher risk of developing the illness, with no evidence of increased incidence within this population. The increased risk of mortality is due to the immunosuppressive state of malignancy as well as current or previous administration of chemotherapeutic agents [1]. A study from China has shown that the mortality of COVID-19 with a current cancer is 7.6%, compared to 1.4% if no comorbidities present but was less than associated comorbidities such as cardiovascular disease (13.2%), diabetes (9.2%), hypertension (8.4%) and chronic respiratory disease (8%) [2].

A further study focusing on oncology patients demonstrated that 53% of patients suffered severe events (defined as intensive care unit (ICU) admission, requiring mechanical ventilation or death) and had a

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mortality rate of 28.6%. Those who received anti-cancer treatment in the preceding 14 days were at a greater risk of developing a severe event. It was demonstrated that some of these patients acquired COVID-19 whilst receiving their anti-cancer therapy in hospital [3]. The paper highlighted the need to adequately screen and risk assess patients entering hospital to receive treatment to ensure that the treatment is necessary and that it can be administered safely. In reality, most patients are likely to acquire infection at their retirement homes and nursing homes or at home in case of contact with many people.

Surgical delays may occur due to: concerns about patients contracting COVID-19 peri-operatively, reduced intensive care facilities, reduced staff, reduced theatre availability and to reduce the risk to staff members and current patients. These concerns need to be offset with the risk of a rapidly progressing cancer. A treatment delay could potentially lead to severe complications and disease progression to the point of impacting surgical cure and, therefore, ultimately patient prognosis.

There are several identified themes that remain consistent between different countries and are applicable to Gynaecological oncology as a whole. The guidance has been adapted from global societies such as the National College of French Gynaecologists and Obstetricians, the British Gynaecological Cancer Society, the European Society for Medical Oncology, the Spanish society for Obstetrics and Gynaecology (SEGO), the European society for Gynaecological Endoscopy, COVIDSURG – part of the Global Health Research Unit on Global Surgery and the American and British Society for Colposcopy and Cervical Pathology. Each of these sources are based on sound evidence where possible, however research within COVID is still in its infancy due to its novel nature. From these global resources there have been many common themes identified:

1. Reduce transmission
2. Managing limited resources including staffing
3. Treatment prioritisation and continuation of cancer surgery
4. Exploration of alternative therapy

3.1. Reduce transmission

The main way this is achieved is through the reduction of direct contact among people. This includes staff members and patients and as such, current practice required to be changed to improve safety within the healthcare environment.

Prior to the advent of a vaccine or availability of effective medication, prevention strategies in the general population had to play a major part in reducing transmission, including hand washing, wearing face masks and implementation of social distancing.

A study performed in Serbia at the beginning of the pandemic demonstrated factors affecting citizen preparedness for a pandemic, including knowledge, preparedness, risk perception and preventive measures. The respondents reported significant changes in their behaviour in response to the pandemic, including wearing face masks and adhering to social distancing guidance [4]. This shows these methods of reducing transmission are acceptable to the general population.

There has now been the development of several vaccines against coronavirus, with an efficacy of more than 90% demonstrated in clinical trials [5].

Between December 2020 and January 2021, the UK approved three coronavirus vaccines Pfizer/BioNTech, Oxford/AstraZeneca and the Moderna vaccines. So far, nearly 20 million people have been given at least the first dose of the vaccine. The other vaccines including the Chinese (Sinopharm) and the Russians (Sputnik V) have also been approved in some countries and showed reasonable efficacy in protecting individuals against the severe form of COVID 19 disease.

It is recommended that all patients receiving systemic anticancer therapy (SACT) are considered for COVID 19 vaccination. The Pfizer/BioNTech vaccine is not a live vaccine. The Oxford University/AstraZeneca vaccine is a recombinant replication deficient adenovirus which

should not be considered as a live vaccine in terms of the risks of SACT co-administration. However, neither vaccine has been trialled in patients receiving SACT. However many cancer patients receiving SACT will fall into the clinically extremely vulnerable category and therefore the overall consensus is that the benefits of the vaccine will potentially outweigh the risks. Furthermore, treatment should not be deferred or delayed due to vaccination. The Medicine and Healthcare Regulatory Agency in the UK (MHRA) advised that any person with a history of anaphylaxis to a vaccine, medicine or food should not receive the Pfizer/BioNTech vaccine. A second dose should not be given to anyone who has experienced anaphylaxis following administration of the first dose of this vaccine". Specific advice for the Oxford University/AstraZeneca vaccine has not been so prescriptive; however, patients with a history of anaphylaxis or angioedema were excluded from clinical trials.

The preventative strategies mentioned above remain extremely important as mass vaccination implementation takes time and with the emergence of mutant strains of coronavirus, there are concerns regarding the effectiveness of existing vaccinations.

Where possible, meetings should be minimised and performed virtually to prevent direct contact. Within oncology, multidisciplinary team (MDT) meetings are integral to the management of oncology patients so are required to continue throughout the pandemic. Where possible, these should occur over teleconferencing or video links to reduce the risk of transmission [6, 7, 8].

Outpatient activity should be reduced to limit the risk of cross-infection, particularly of high-risk/vulnerable patients, and alternatives such as telephone consultations or patient-initiated follow-up should be considered [9]. Fast track referrals can be triaged and, where possible, postponed until the risk of COVID transmission is deemed acceptable. If postponement is not appropriate, patients should be seen in a facility where diagnostic tests, such as hysteroscopy or biopsy, can be performed during that visit (one stop clinics) to reduce attendances [10].

Patients should be screened for symptoms of coronavirus on entry to the hospital or, where possible, telephoned prior to the appointment to ensure they are asymptomatic and able to attend. Protective equipment and personal hygiene practices (eg. hand-washing) should be maintained despite negative symptom screening questions because in up to a third of cases patients remain asymptomatic. Clinic attendance should be without visitors where possible and entry/exit points minimised in order to control the number of people entering the hospital environment [8, 11].

Patients with a confirmed diagnosis of COVID-19 should not attend for outpatient appointments [10] and should have their surgical treatment postponed for at least 15 days [6]. Only when asymptomatic and have completed this time of isolation should their case be reviewed.

For patients whose surgeries are indicated to proceed, where possible, they should be operated on in a negative-pressure theatre and this should be a dedicated theatre, free from cross-contamination. In the UK, Covid-protected 'Cancer Hubs' were established whereby screening was performed 72 h in advance of admission for oncological surgery in order to allow the continuation of vital services. Often these hubs were established within the private sector [13]. In the West Midlands, there is a virtual regional Hub of Gynaecological Oncology Surgeons from 5 cancer Centres meets regularly weekly to discuss and facilitate transfer of cancer patients between Centres in order to avoid delay of their operations.

Post-operatively, patients should be transferred to dedicated COVID-free wards and the route of transfer should be carefully considered to reduce cross-infection whilst transferring patients around the hospital [10]. Staff should receive training on how to appropriately use personal protective equipment (PPE) to ensure their safety is maintained [12].

Follow-up should be minimised and conducted over the telephone or online, unless a recurrence of cancer is strongly suspected. Additional tests should be postponed until after the pandemic, except where symptoms require these to be performed or for disease monitoring [14]. Additionally, post-operative follow-up can be delayed for up to 2 months for women with cervical and vulval tumours who require clinical examination [6].

It may be beneficial to initiate regular non-contact multidisciplinary meetings between hospital management and key departments such as pathology and infectious disease teams, intensive care and the emergency department in order to discuss current issues surrounding the management of COVID and patient flow throughout the vital areas of the hospital. Appointing dedicated COVID staff could reduce transmission to non-infected patients and there should be regular reviews by each department on published literature and protocols in order to ensure all staff are keeping up to date with recommended guidance. Research should be encouraged within all units to further our knowledge on this virus and its wider effects [15].

3.2. Managing limited resources including staffing

It has been estimated that approximately a third of staff may be off at any one time as a result of COVID-19 and as such surgical teams need to plan appropriately for this potential reduction in workforce [14]. Within oncology, many services are highly skilled, such as complex surgical procedures and the administration of radiotherapy. These treatments require specialist staff and equipment, making this discipline highly vulnerable to fluctuations in staffing levels secondary to staff illness or redeployment to areas of high need within the hospital [16]. Consideration to minimum staffing requirements should be made and close communication between management and clinicians is needed to ensure this requirement is met. Reduction in elective surgical procedures reduces the number of inpatients in both general wards and intensive care units whilst freeing theatre space for increased ICU capacity where necessary. It also allows surgical staff to support those in high-intensity areas, such as ICU, and allows for flexibility within the surgical teams to allow for a potential reduction in staff. Lastly, but very importantly, it reduces the risk of cross-infection of COVID from patients admitted to the hospital for elective procedures and from the hospital to the community setting. Where surgical procedures are required to proceed, they should be performed by a senior team in order to reduce the operating time and reduce the risk of complications to help with a reduction in the length of the post-operative admission [10].

In addition, there may be shortages of vital medication such as chemotherapy and narcotics, which affects the prognostic outcome and quality of life [11]. As of 21st March 2020 there were 26 oncology medications on the FDA Drug Shortages list [17], demonstrating this to be a real concern early in the COVID pandemic. This can be managed through clear communication between the drug companies and health providers in order to manage supplies effectively [11].

The importance of the mental wellbeing of staff working within the COVID units should not be underestimated and psychology services should be available to help staff deal with the burden of managing such severely ill patients within the context of a pandemic [15].

3.3. Treatment prioritisation and continuation of cancer surgery

Surgery for benign procedures should not continue to direct resources to areas of greatest need [18]. The pro's and con's of surgery versus pursuing alternative treatment options or delaying definitive surgery need to be clearly discussed with the patient and within the MDT. Consideration must be given to the patients' risk with aspects such as co-morbidities, age, cancer load, performance status and frailty being taken into account. Any potential for intensive care support needs to be identified as this may not be possible due to the demand secondary to COVID-19. Continuation of surgery in the presence of COVID-19 infection is associated with high morbidity and mortality rate, with an ITU admission of over 40% and mortality of 20% reported in the literature [19, 20]. Patients undergoing surgery with a diagnosis of COVID-19 had post-operative respiratory complications in more than 50% of cases, which was associated with a greater mortality risk; of those that died, over 80% had respiratory complications. Cancer patients within this cohort were identified as a particularly vulnerable group with a higher

risk of 30-day mortality [20]. Additionally, less invasive surgical procedures such as sentinel lymph node biopsy should be considered rather than complete lymphadenectomy as the latter is associated with greater morbidity and requires prolonged hospital stay, increasing the risk of COVID-19 exposure [7].

3.3.1. Prioritisation of surgery

Surgery within oncology is time-sensitive; a delay in receiving surgery is associated with a greater mortality from cancer. This risk however, needs to be weighed against the risk of admission to hospital and subsequent COVID-19 exposure and the likelihood to be able to receive chemotherapy post-operatively, as per standard practice [1]. Guidance has been published to help prioritise surgery for patients with Gynaecological cancers to take into consideration the associated risks. It is also advisable to avoid laparoscopic procedures due to the potential risk of aerosol formation with pneumoperitoneum [21].

A similar priority grading system has been proposed within other malignancies, such as breast and head and neck cancers, and includes both surgical and medical treatments [12, 22, 23, 24].

Surgical procedures can therefore be prioritised into the following categories:

1. Priority level 1a (emergency): operation needed within 24 h, such as anastomotic leak, bowel perforation, torsion or rupture of ovarian cyst [7, 25].
2. Priority level 1b (urgent): operation required within 72 h, such as bowel obstruction or impending perforation. Operations for Gynaecological cancers should only be considered if it is deemed curative or there are no other options available [7]. 'Urgent' surgery should be scheduled for diagnostic procedures to enable either chemotherapy or definitive surgery to be considered [21, 25].
3. Priority level 2: operation required within 4 weeks. The aim is for cure [7]. In Gynaecological oncology this would include germ cell ovarian tumours, discrete pelvic mass highly suspicious of cancer, early stage cervical cancer [26] and high-grade endometrial cancers [7, 25].
4. Priority level 3: this includes elective cases that can be delayed for 10–12 weeks.

3.3.2. Colposcopy services

Primary screening within the community should be withheld [1, 27, 28]. Referrals should only be made if high-grade changes on smear, borderline nuclear change in endocervical cells, possible glandular neoplasia or suspicion of invasive disease [27]. In addition, women with high-grade changes must be seen within 3 months [26].

A large loop excision of transformation zone (LLETZ) is safe to perform as there is no evidence of viral particles in the smoke, however laser ablation and excision should be avoided due to the risk of vapourisation. Where possible, 'see and treat' procedures should be performed in one clinic attendance to reduce the number of times patients are attending [27].

3.4. Exploration of alternative therapy

Whilst the ability to perform operative interventions is restricted, MDT's need to consider the use of alternative therapies in order to manage Gynaecological malignancies. Alternative therapies such as the levonorgestrel intra-uterine system have been used in patients with early endometrial cancer when surgical intervention is not possible [7, 14, 29]. These options should be considered more widely whilst the availability of a definitive treatment is reduced. Where surgical intervention is possible, minimally-invasive surgery should be the gold standard [6]. For intermediate or high-risk endometrial tumours, consideration should be given to vaginal hysterectomy with bilateral salpingoophorectomy or minimally invasive surgery with sentinel lymph node biopsy as this reduces recovery time, thus reducing patient exposure and use of resources [14].

Table 1. Registered trials on coronavirus of interest to the Gynaecological Oncology community.

Trial name	Design	Aim	Recruitment	Collaborating sites	Primary outcome
COVIDSurg Cohort study	Observational cohort – retrospective and prospective	To understand the outcomes of COVID-19 positive patients undergoing surgery	Currently over 20,000 patients	Over 700 sites operating within over 70 countries	30-day mortality
COVIDSurg Cancer study	Observational cohort – retrospective prospective	To understand the impact of COVID-19 on the care of cancer patients requiring surgery	Included with above trial	Included with above trial	30-day post-operative COVID-19 infection
The impact of coronavirus on patients with cancer NCT04330521	Observational cohort – retrospective	To understand the impact of COVID-19 on cancer patients through use of a survey	Aim 50 patients	Stanford University, USA	Semi-structured interviews detailing impact on patients
Outcomes of Elective Cancer Surgery During the COVID-19 Pandemic Crisis (CovidSurg-Can)NCT04384926	Observational cohort	to evaluate the 30-day COVID-19 infection rates in elective cancer surgery during the COVID-19 pandemic.	Aim 1000 patients	University of Birmingham, UK Hospital del Henares, Madrid, Spain	30-day COVID-19 infection rates in elective cancer surgery
Correlative Study on Patients and Healthcare Professionals Exposed to Infection by Severe Acute Respiratory Syndrome-Corona Virus 2 (SARS-Cov-2), COVID-19 Causative Agent. (CORSa) NCT04345315	Observational cohort – retrospective and prospective Translational	1) to study epidemiological aspects of the spread of the disease 2) to identify infection-related genetic factors	Aim 500 patients	UO Microbiologia, CentroServiziPievesestina, AUSL Romagna Cesena, Italy Irrstccs, Meldola, Italy	Investigate the epidemiology of the infection in an asymptomatic population including both healthy individuals at high risk of infection and oncological patients by assessing the seroprevalence of IgG and IgM antibodies against the SARS-CoV-2
COVID-19 detection test in Oncology (EVIDENCE) NCT04367870	Observational cohort – prospective	To identify if cancer patients exposed to COVID-19 develop an effective immunity	Aim 2500 patients	UNICANCER, multiple centres throughout France	To evaluate the ability of SARS-CoV-2 immunoassays, following a positive result, to identify patients with very low risk of recurrence of COVID-19 within 3 months

For early ovarian tumours, minimising surgery for those women considered to be at high risk of malignancy (RMI>250) is suggested to remove the primary tumour and to obtain a histological diagnosis, however those women deemed to be at a lower risk of cancer (RMI<250) can be deferred until deemed safe to operate upon [29]. Following this, staging can be completed with imaging or future definitive surgery with the consideration of commencing neoadjuvant therapy [6, 14] or prolonging current chemotherapy prior to definitive surgery [6, 7, 14, 29]. Evidence suggests that the outcomes associated with primary surgery versus neoadjuvant chemotherapy are similar and as such the latter represents a viable option if surgery is expected to be delayed [30].

The UK Coronavirus Cancer Monitoring Project (UKCCMP) data indicated that COVID-19 mortality in cancer patients was mainly driven by advancing age and the presence of other non-cancer comorbidities. At a population level, the results of this work did not suggest that chemotherapy or anticancer treatments would necessarily increase the risk of mortality from COVID-19. This could give confidence to oncologists and other clinicians that delivery of effective anticancer regimens should continue during the pandemic [31].

The risks of surgery to both the patient and resources need to be considered and weighed against the risk of immunosuppression associated with chemotherapy. It has been suggested that mortality from chemotherapy is at least doubled in the presence of COVID-19 [18].

Where possible, women should be managed with spinal anaesthesia, such as in the management of cervical cancer, whereby treatment options such as wide conisation, simple trachelectomy and vaginal hysterectomy can be considered depending on stage of disease. Radical hysterectomy/trachelectomy for early stage cervical cancer should be considered as a high priority operation. Patients with high body mass index and other co-morbidities can be offered an alternative treatment with chemoradiotherapy [6, 14, 29]. Consideration needs to be given to the intensity of treatment, side effects and

the associated multiple hospital attendances and therefore subsequent risk of exposure to COVID-19 by the patient. Equally with vulval cancer, many patients can be postponed as their lesions may be indolent. However, those patients that cannot be deferred can largely be managed with spinal anaesthesia with preference to undertake sentinel lymph node biopsy if required in order to reduce morbidity and length of admission associated with complete groin node dissection. If the tumour requires extensive surgery with reconstruction, neoadjuvant chemoradiotherapy is advised [14].

Trophoblastic tumours should be managed without delay, however low-risk women (FIGO <6) can have their methotrexate injection administered at home, whilst high-risk women are advised to continue their treatment as planned [6].

Where possible, chemotherapy should be reassessed on a patient-by-patient basis and if possible, have their chemotherapy switched from an intravenous route to an oral route to reduce hospital admissions. Where resources allow, chemotherapy administration at home is another potential option [11]. If patients are asymptomatic for COVID and have advanced disease, their treatment should not be postponed where possible [8]. The administration of radiotherapy is very vulnerable to disruption due to its extended nature and this may negatively impact patient prognosis. Disruption may occur due to patient illness, reduced capacity in order to sufficiently disinfect the equipment between patients and staffing shortages secondary to COVID infection or self-isolation. Treatment courses can be altered on an individual patient basis and has been described in detail elsewhere [16].

For patients who are COVID-positive but are in need of emergency treatment or cannot have their treatment postponed or altered, multi-disciplinary discussions should be held and decisions made on an individual patient basis. If treatment is to proceed, it should do so in an isolated setting with staff wearing full PPE [9].

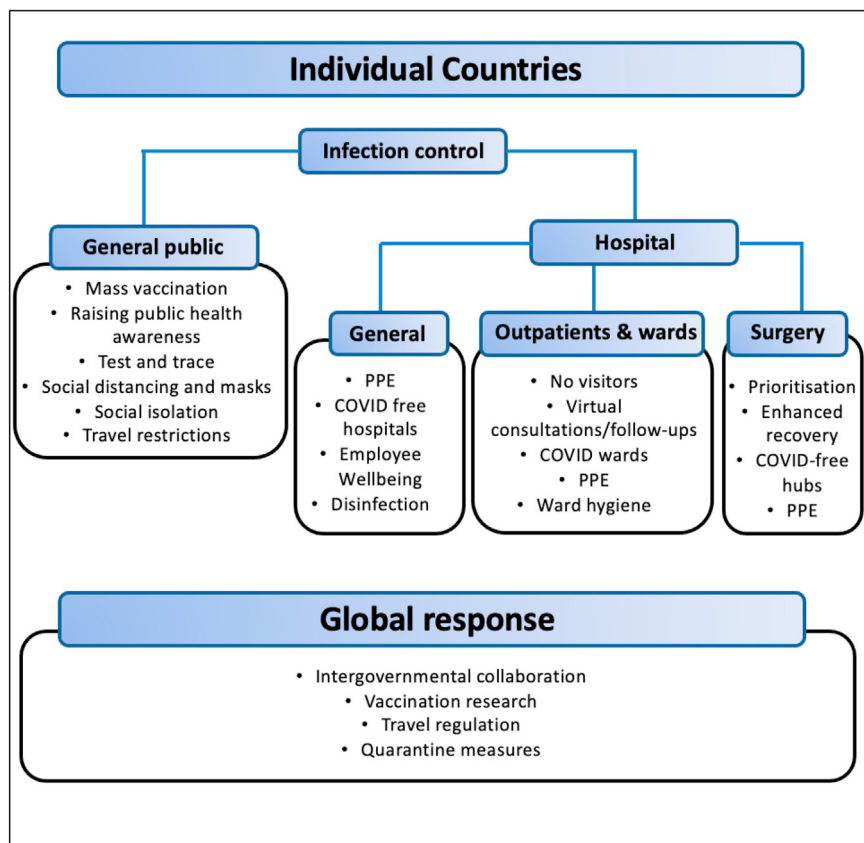


Figure 1. Response to COVID 19 pandemic.

4. Discussion

Global pandemics, such as the coronavirus, SARS or MERS, present a unique and diverse challenge for healthcare world-wide. Whilst on one hand the treatment and care of patients with the virus is vital, this has to be balanced against the needs of patients suffering from other life-threatening illnesses. In order to achieve the optimal balance of these opposing forces, hospitals and care providers need to collaborate and pool resources in order to be as prepared as possible for the potential future impact.

Consideration must be given to planning for the months following the peak of the pandemic as there is inevitably a backlog of patients requiring urgent surgery who will need to be prioritised as soon as practicable.

For all women going through the cancer pathway it is an extremely stressful time. Having to go through it during this time of uncertainty and fear is likely to cause significant emotional distress and this needs to be appreciated by the attending healthcare professionals and support provided to the patient and their families where possible. The importance of keeping patients updated on their care and involved in the discussions surrounding their treatment cannot be understated.

As a healthcare organisation, the NHS has been pushed to its limits to effectively manage the effects of the coronavirus pandemic. All guidance we have to date is reliant on small studies and expert advice and further research is required to provide evidenced-based guidance to improve preparedness for any future resurgence or alternative pandemic.

There are well-established guidelines published by the World Health Organisation regarding infection control and these measures should be implemented regardless of the infective agent causing the epidemic or pandemic. The most basic precaution that should be taken by health care professionals is good hand hygiene to limit the spread of infectious particles, along with the use of personal protective equipment (PPE) where applicable. PPE should be used following a risk assessment to ensure it is sufficient for the level of risk of exposure. The general public should also adhere to strict hand hygiene rules, especially when entering a health care setting, and should adhere to respiratory hygiene and cough etiquette whereby one should cough or sneeze into a tissue, dispose of this and wash their hands. Safe distancing should be implemented between patients symptomatic of the index disease and consideration should be given to cohorting infected patients into particular zones to limit the further spread of the infectious agent. When performing aerosol-generating procedures, patients should be cared for in a separate single room with good ventilation and ultimately, healthcare staff and the general public should be vaccinated as soon as possible to reduce further the infection rate and gain herd immunity within the community [32].

5. COVID 19 research applicable to Gynaecological oncology

In the current climate, all ongoing trials within the field of Gynaecological oncology have been suspended. In the UK, the NHS in collaboration with Universities are focusing their resources on coronavirus-related trials.

There are many research trials underway globally investigating how coronavirus has impacted services involved with Gynaecological oncology. Although still recruiting, these will be an important learning resource for future guidance and to tailor our current guidance to align with scientifically conducted research. Table 1 briefly describes each of these current ongoing studies.

The results from these studies and future research will hopefully provide us with best practice guidance about the safety of operating on and managing oncology patients during an infective pandemic and will better inform us on prognosis and outcome of patients whose care has been disrupted during this time and the impact this has had on quality of life. A focus needs to be on the subsequent effect on prognosis and outcome, as this will better inform clinicians and the healthcare system as a whole as to which patients need prioritisation and who will be greatest affected by disruption to their care. This can be applied to any pandemic

situation where resources are limited and these difficult decisions are mandated.

6. Preparing for future pandemics

In order to develop our healthcare service, it is vital that we learn from this experience to improve our preparedness for future pandemic situations. There is growing belief that the COVID infection will not be eradicated in the near future. The UK has now experienced 3 waves of infection, with the third over the winter months being worse than the initial wave in terms of numbers of infection and mortality. One of the major issues that affected the global response and increased the number of fatalities to COVID was the lack of preparation and the low resources dedicated to the health care systems worldwide. Following this pandemic, it is perceivable that medical practice will change indefinitely, including increased reliance on telemedicine, reduced international travel with more online conferences and networking events and a change in how research is conducted [33], for example having trial-related follow-up over telephone consultations [9].

One of the main lessons learned is the utilisation of available, albeit limited, resources in order to appropriately manage the pandemic situation, whilst maintaining sufficient services to allow the treatment of patients with time-critical illnesses. Current plans for resuming routine work and dealing with operative and cervical screening backlogs should be underway in parallel with plans to tackle any future peaks of COVID infection. Geographical organisation, workforce planning and preparing for staff sickness and absence are vital in order to maintain the service in the event of future exacerbations. Regular reviews of the staffing levels, resources, number of COVID positive patients, those requiring hospitalisation and intensive care should be performed and measures taken appropriately to direct resources where needed.

A global response with intergovernmental collaboration will be required for future responses. Transparency and collaboration between governments, researchers, health care professional and industry will be required. Public and patients' commitment in implementing guidance and reducing the risk of infection are integral to a successful future response.

Regardless of the variations in state and wealth of the healthcare systems worldwide, during any pandemic scenario, the main aim should be to comply with the advice outlined by the World Health Organisation (WHO) in order to limit the spread of infection, including vaccinations, strict hand hygiene, the appropriate use of PPE, zoning infected patients into separate areas, using single, well-ventilated rooms for aerosol-promoting procedures and reducing external visitors to the hospital (Figure 1). These measures have been enforced and proven effective through various infectious disease outbreaks and present us with the greatest evidence base in managing pandemics [19]. A particular focus needs to be upon adequate provision of personal protective equipment available for frontline workers in order to allow staff to work in a safe environment, and on the streamlining and improvement of testing and tracing of coronavirus cases. At present, the testing procedure is not straightforward or evidence-based and as such this needs urgent review to better equip for future resurgence of COVID-19 or other infective agent.

7. Conclusion

The COVID-19 pandemic has put unprecedented pressure on health care systems globally and the consequence of this upon cancer patients is yet to be determined. Worldwide, the care of oncology patients has been greatly affected and at present it is difficult to determine if enough has been done to protect and adequately manage this particularly vulnerable group. It is evident that where published protocols have been available, these have been implemented effectively, such as the guidance produced on infection control by the WHO. Where there is limited research available, such as the prognostic outcomes of oncology patients following

disruption of treatment, current ongoing research will hopefully be able to better inform us of this for future. In this respect, more needs to be done in order to fulfil this requirement fully. In addition, more work is needed to improve the testing and tracing of cases in order to help limit spread as this has been a challenge faced by many nations.

Gynaecological oncology services are required to manage their patients in a sensitive and empathetic manner, acknowledging how stressful it is to undergo oncology treatment during such disruption. In addition to the clinical disruption, it is necessary to appreciate the psychological impact of social isolation secondary to quarantine rules and the subsequent lack of visitors and family support on the well-being of the patient.

Services and protocols should be regularly audited and amended to keep pace with changing demands in order to ensure the best care is provided to all patients. Finally, individual institutions and countries are required to collaborate in order share information and services to advance knowledge and treatment during such times of stress for the greater good of the population.

Declarations

Author contribution statement

Alaa A El-Ghobashy: Conceived and designed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Danielle O'Neill: Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Declaration of interests statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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