Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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LETTERS TO THE EDITOR

Multidisciplinary tumor boards present technical and financial challenges in the COVID-19 era

We read with interest the commentary by Gross et al.[1] regarding multidisciplinary tumor (MDT) boards as videoconferences during the coronavirus disease 2019 (COVID-19) pandemic. Of note, the authors mention that MDT performance is variable and dependent on several factors including clinical inputs, radiology, pathology, and meeting management.[2] Videoconference tumor boards may become more common due to mitigation of travel time, easier involvement for multiple specialists, and ability to share comprehensive diagnostic data among participants. However, we would add that these MDTs are not without substantial financial costs.

We utilized available salary data for physicians, mid-level providers, and registered nurses.[3] Published average hours for various health care providers were used to calculate hourly wages, and collectively, these data were used to estimate mean costs per MDT, as well as annual costs for MDTs across nine subspecialties at a single academic center. We found that the estimated annual cost of these nine tumor board meetings was $648 182.52 for physician compensation, and $797 667.56 annually for all providers (Table 1).

We agree with Gross and others that in oncology, MDT boards are a commonly promoted practice in management and decision making for the complex care of cancer patients.[4] However, it is important to recognize that technical issues, participant issues, and limitations affecting the interactions among decision makers can pose challenges, which could have negative implications for patient outcomes. Therefore, the introduction of videoconferences in routine MDT boards could benefit from standardized procedures, and as the authors suggest, distribution of these regulations among attendees could improve efficiency while simultaneously bolstering patient-centered care and reducing related financial costs.

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Table 1. Total costs of MDTs for all providers annually

Provider	Mean annual salary	Annual MDT costs ($)
Gynecologic oncology	320 000.00	59 758.40
Medical oncology	380 000.00	165 039.88
Neurological surgery	617 000.00	34 449.48
Neurology	292 000.00	12 450.88
Pathology	318 000.00	93 232.60
Pulmonology	343 000.00	6059.04
Radiation oncology	486 000.00	144 479.76
Radiology	428 000.00	81 393.60
Surgical oncology	384 000.00	59 285.60
Thoracic surgery	584 000.00	20 164.56
Urology	422 000.00	7870.72
	Physician total	684 184.52
Advanced practice registered nurses	108 000.00	55 382.40
Registered nurse	80 000.00	57 100.64
	Nonphysician total	112 483.04
	All providers annual total	796 667.56

Mean annual salaries for physicians, advanced practitioner registered nurses, and registered nurses are presented. Annual multidisciplinary tumor (MDT) board costs were created from average number of providers per meeting and number of meetings per year.

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Estrogen and COVID-19: friend or foe?

We have read the paper by Montopoli et al.[1] reporting the possible coronavirus disease-19 (COVID-19) protective role of antiestrogenic therapy in women treated for breast and ovarian cancer. Since the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection outbreak in December 2019, it has been shown that the majority of patients hospitalized for COVID-19 are males.[2] These

observations, confirmed worldwide, defined a clear sex difference associated with COVID-19 morbidity and mortality.[2] In particular, the prevalence of pre-menopausal women among COVID-19 patients is very low,[3] suggesting a 'protective' role of estrogens linked to different mechanisms of action such as the reduction of expression of angiotensin-converting enzyme 2 (the SARS-CoV-2 receptor on target cells) by estradiol, the modulation of the immune response by estrogen, and the presence of different X-linked genes involved in inflammatory response.[3] The 'protective' role of estrogens in SARS-CoV-2 infection has been reported previously during SARS-CoV and Middle East respiratory syndrome coronavirus (MERS) epidemics.[3] Furthermore, animal studies showed that estradiol reduction or the use of estrogen receptor antagonists favored SARS-CoV infection.[3]

Thus, data regarding COVID-19 patients seem to indicate a gender difference in morbidity and mortality with males being more susceptible to SARS-CoV-2 infection complications and females, above all in pre-menopausal women, being protected from the severe forms of the disease. In this regard, as reported by the Italian National Institute of Health (10 February 2021),[4] SARS-CoV-2-positive women aged 60-69 years (menopausal) show a lethality index 15 times higher than that of SARS-CoV-2-positive women aged 40-49 years [non-menopausal, odds ratio (OR) 15.5, 95% confidence interval 13.6-17.9, $P < 0.0001$], with a much higher OR if we consider women younger than 40 years of age.

Furthermore, when considering SARS-CoV-2 infection, Montopoli et al. compared hormone-driven cancer patients treated with selective estrogen receptor modulators (SERMs), aromatase inhibitors, and luteinizing hormone-releasing hormone agonist (LH-RHa). These drugs do not function in the same way in the modulation of estrogen receptor, since SERMs are a class of drugs that act on the estrogen receptor but can function as an agonist or antagonist differently in various tissues, thus selectively inhibiting estrogen action or stimulating it.[5] On the contrary, aromatase inhibitors and LH-RHa do not have the same selective effects of SERMs, leading to the same effect in all tissues by suppressing estrogen production. Thus, data from SERM-treated cancer patients could not be fully comparable with those from patients treated with aromatase inhibitors and LH-RHa.[5]

With all these considerations in mind, the conclusions by Montopoli et al. seem in contrast to many different published studies demonstrating that estrogens seem 'protective' of COVID-19 severity. Consequently, the suggestion to use SERM as a therapeutic option in COVID-19 is somehow hasty, above all considering the huge number of published studies reporting the opposite, i.e. that non-menopausal women show a quite low risk of developing COVID-19.

The supposed direct 'protective' effect of estrogens in non-menopausal women has to be definitely proven and of course other factors might be involved such as systemic risk factors and associated diseases that are more frequent in older menopausal women than in pre-menopausal women. Thus, the suggestion that estrogens might represent an ideal preventive treatment for COVID-19 has to be taken with caution.[6] On the other hand, it cannot be excluded that the conclusions of Montopoli et al. are not due to a 'protective' role of antiestrogen therapy but due to other still unknown conditions of the patients, such as a blunted immune response due to cancer itself or associated chemo- and/or immuno-suppressive therapies, conditions that could reduce the so-called cytokine storm characterizing severe COVID-19 forms, thus leading to a milder disease. Nonetheless, all these observations should push researchers to investigate further the mechanisms leading to the lower prevalence of women among COVID-19 patients and above all the factors protecting pre-menopausal women.

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