Global study predicts more than 50 percent rise in chemotherapy demand by 2040

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To deliver optimal treatment by 2040, a significant expansion of the chemotherapy workforce is needed.

Between 2018 and 2040, the number of patients requiring first-line chemotherapy treatment each year is predicted to rise from 9.8 million to 15 million (53%) globally, if there were full application of evidence-based guidelines. This is according to a modelling study published in *The Lancet Oncology* journal, which is the first study to estimate the scale of chemotherapy provision needed at national, regional, and global scales to respond to this situation.

By 2040, two-thirds (67%, 10.1 million out of 15 million) of patients requiring chemotherapy will reside in low- or middle-income countries. Of the additional 5.2 million people needing treatment by 2040, an estimated 75% will reside in these countries.

Existing evidence has shown the global number of cancer cases are expected to rise, particularly in low- and middle-income countries. As a crucial component of cancer care, chemotherapy treatment is likely to benefit a large proportion of these cases.

To respond to rising demand globally, the study estimates the number of physicians needed in 2018 and 2040 to provide chemotherapy to all patients who would benefit from it (the actual number of practising cancer physicians worldwide is unknown). Their results show that workforce requirements to deliver optimal chemotherapy will increase from approximately 65,000 cancer physicians in 2018 to 100,000 in 2040.

"The rising global cancer burden is undoubtedly one of the major health crises of today. Strategies are urgently needed to equip the global health workforce to enable safe treatment of current and future patients," says Dr. Brooke Wilson, from University of New South Wales and the Collaboration for Cancer Outcomes, Research and Evaluation at the Ingham Institute for Applied Medial Research, Australia, who is the first author on the study.

"Countries and institutions should use our data to estimate their future cancer physician workforce requirements and chemotherapy needs and plan national, regional, and global strategies to ensure all those who need it will have access to chemotherapy treatment."

The authors used best-practice guidelines, patient characteristics and cancer stage data from the USA and Australia to calculate the proportion of newly diagnosed cases of cancer who would benefit from chemotherapy. They applied these rates to international estimates of global incidences of adult and paediatric cancer from 2018 up to 2040 (GLOBOCAN) to provide estimates of global chemotherapy demand.

Therefore, these estimates assume that delivery of cancer care to the level of service provision in high-income nations is an achievable goal for all countries. The authors argue that they should be used as markers of the highest standard of care that should be aimed for in the coming decades.

Globally, 58% (9.8 million out of 17 million) of new cancer cases required chemotherapy in 2018. In 2040, the authors of the study predict the number of new cases of cancer to rise to 26 million, of which 53% (15 million out of 26 million)—an additional 5.2 million new cancer cases—are expected to need chemotherapy.

Of the 15 million people requiring chemotherapy in 2040, more than one

third will live in eastern Asia (5.2 million, 35%). Furthermore, 12% (1.7 million) will reside in south central Asia, 10% (1.4 million) in northern America, 7% (980,646) in south eastern Asia, 6% (922,452) in South America, and 5% (810,084) in western Europe.

The findings are of particular concern for regions expected to have the greatest increases in new cases requiring chemotherapy—doubling or more in eastern Africa (115%, 184,289 to 395,519), middle Africa (114%, 50,932 to 108,896), western Africa (100%, 123,565 to 247,051), and western Asia (99%, 227,992 to 454,820).

In 2040, the most common cancers needing chemotherapy will be lung (16.4%, 2.5 million), breast (12.7%, 1.9 million) and colorectal cancer (11.1%, 1.7 million), and the greatest absolute increases in new cases will occur for these same three types of cancer.

The authors predict the required workforce to optimally deliver this chemotherapy demand will rise from 65,000 in 2018 to 100,000 in 2040, assuming each doctor saw 150 new chemotherapy patients (a safe workload). However, the actual workload of cancer physicians varies significantly worldwide, so the authors produced additional estimates based on 100 or 300 new patients per year needing chemotherapy. Therefore, estimates for the required workforce ranged from 32,600 to 97,800 physicians in 2018 and 50,000 to 150,000 in 2040.

The authors acknowledge that actual chemotherapy use is generally lower than the optimal use based on guidelines for a variety of reasons, including patients' and clinicians' treatment preferences, expenses, cultural acceptance, lack of access to services, and regional variations in practice. In addition, this difference is even greater in low- and middle-income countries, as many individuals cannot afford the costs of chemotherapy and are without health insurance. There are also other barriers, including scarcity of drugs, infrastructure for delivery,

supportive pathology and radiotherapy services, and trained workforce.

The authors note some limitations of their study. Cancer stage data from US and Australia was applied globally, but cancer is often diagnosed at a later stage of disease in low- and middle-income countries. This may increase the demand for chemotherapy by 7-24% compared to the baseline predictions, according to the sensitivity analysis performed in this study.

The authors also highlight that population growth and changes in distributions of cancer types by country were the leading factors driving increased chemotherapy demand. Patient factors like age distribution and health status may change by 2040, but is not accounted for in the model. The model also assumed that treatment guidelines are constant between 2018 and 2040, as future changes based on scientific advances are unpredictable.

Lastly, they note that the accuracy of their predictions depends on the reliability of the GLOBOCAN data. Despite being the most robust estimates available, only a quarter of the world's population is covered by cancer registries and coverage is particularly poor in low- and middle-income countries.

Commenting on the study, Dr. Melina Arnold from the International Agency for Research on Cancer, France, says "All in all, this study will help to further guide policy makers and stakeholders in priority settings involved in setting up health infrastructure and strengthening and educating the future workforce. To leverage the full potential of this type of global prediction study, it would be useful to estimate costs of and strategies for scaling up health services for optimal patient management, not only for chemotherapy, but also throughout the full continuum of cancer care."

More information: Brooke E Wilson et al, Estimates of global chemotherapy demands and corresponding physician workforce requirements for 2018 and 2040: a population-based study, *The Lancet Oncology* (2019). DOI: 10.1016/S1470-2045(19)30163-9