



## A single well-equipped pediatric oncology center may improve the results in low-/middle-income countries

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Dear Editor:

Elhassan et al. [1] in a well-written manuscript explicitly described the pattern, treatments, and long-term outcome of pediatric CNS tumors in a single academic institution in Sudan, one of the low-/middle-income countries (LMIC). It is clear from the facilities mentioned by the authors that, though of the efforts to maximal utilization, it is still much lacking and not fulfilling the standard of care in the Western centers. The diagnosis time is expected to be shorter in developed than developing countries mainly due to the presence of well-implemented strategies to establish medical awareness of parents and healthcare professionals that reduced much the time elapsed to detect CNS tumors in children. Diagnostic resources should be widely expanded in the country and efficiently used together with the reliable efficient referral system. Elhassan et al. [1] reported a modest clinical outcome compared to high-income countries (HIC) and even many of African and LMIC who own better facilities. They relay these inferior results to the relative deficiencies of some facilities including radiodiagnosis, neuropathology, and modern radiotherapy. They added other important factors like abundance and lower level of parents' medical awareness and even that of the primary healthcare giver. This issue was discussed previously in many articles. Stefan et al. [2] showed how the lack of adequate diagnostic and therapeutic facilities in LMIC lead to underdiagnosis of childhood cancer particularly brain tumors. Gilli et al. [3] determined the average time elapsed from onset of symptoms until seeking medical advice, in 217 pediatric CNS, as 96 days. Furthermore, these patients needed an average of another 33 days to be referred to a specialized or tertiary hospital. They emphasized that the education level of the parents and their health awareness together

with the awareness of health care professional towards the interpretation of signs and symptoms that may be similar to minor childhood disease are crucial for early diagnosis and successful treatment of CNS tumors.

Furthermore, in Africa, there are too few dedicated children's cancer centers, too few pediatric oncologist or neurooncologist, too few pediatric radiation oncologists, and few trained pediatric oncology nurses together with the lack of medical information system and woeful under-funding [4]. Therefore, the affected children are usually diagnosed late that definitely lead to decreased clinical end results. Moreover, the deficiency of the necessary medical equipment for diagnosis (i.e., computed tomography, magnetic resonance imaging, immunohistochemical stains, laboratory testing) or therapeutic facilities (surgical theaters and necessary tools, linear accelerators, CT simulators, treatment planning system (TPS), fixation tools, chemotherapeutic agents, and supporting tools and drugs) will definitely lead to a decrease in treatment results even if you have skillful personnel. The condition will be much worse if the managing staff are fewer than optimal or their training is not up to the needed level. Most of the LMIC lack specialized neuro-oncology or specialized pediatric cancer centers equipped to offer a multidisciplinary service performed by well-trained staff and according to recognized treatment protocols. Egypt (a lower middle-income country) built a large comprehensive pediatric cancer hospital and started treating patients since 2007. Children's Cancer Hospital, Egypt (CCHE), continues growing, improving management quality. The hospital is now capable of treating more than 3000 new pediatric cancer patients according to the recommended international protocol and achieving results reaching the internationally published outcome. This success is mainly due to the cumulative experience of the staff in one place. The presence of all equipment in one place may be considered as economical, saving reputation and ensuring optimal use of such expensive machines [5]. The concentration of efforts in one specialized place may be necessary for LMIC to save effort and money and ensure a better outcome.

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## Compliance with ethical standards

**Conflict of interest** None.

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