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Centralized services and large patient volumes are clinical necessities for a better outcome in pediatric brain tumors

Ibrahim Qaddoumi, MD,MS

Department of International Outreach Program Department of Oncology MS 260 St. Jude Children's Research Hospital 262 Danny Thomas Place Memphis, TN 38105 USA Tel: (901) 595-3300 Fax: (901) 521-9005 ibrahim.qaddoumi@stjude.org

I read with interest Dr. Zaghloul's commentary [1] on our paper [2], and I thank him for his perspective. I also agree with him and want to emphasize the following points related to his letter. First, the Children's Cancer Hospital, Egypt (CCHE) is an amazing phenomenon in the region that changed the landscape of childhood cancers and is inspiring many in Africa and other regions to follow in its footsteps. CCHE is similar to St. Jude Children's Research Hospital (SJCRH), a non-profit organization where patients are supported for housing, meals, and transportation and are not expected to pay for treatment or procedures. These are crucial factors for the success of CCHE and should be considered by any country or foundation desiring to establish a similar hospital. In developing countries, building a cancer center alone is not enough because access to care is a major challenge for patients and families. For example, Dr. Zaghloul reports that the hospital treated 1114 children with CNS tumors in 5.5 years (203 patients/year). Considering that Egypt has 28.2 million children younger than 14 years (www.cia.gov) and the expected incidence of 30.7 CNS tumors per million children younger than 15 years [3], Egypt should have at least 866 CNS tumors in this age group. This means that three-quarters of children with CNS tumors in Egypt are not treated at CCHE. I propose, as Dr. Zaghloul suggested, that a “few” cancer centers may be needed because, in some countries, one center may not be enough due to population size (as in Egypt) or geography (as in Chile, where the country stretches over 7800 km).

Second, I think that the main advantage of centralized services in cancer, specifically neuro-oncology, is the increased patient load. Having more patients helps the multidisciplinary team improve patient care in every discipline as was demonstrated in the literature in developed countries. The neurosurgeons were pioneers in showing that patient load and centralized services positively affect patient care at both the individual neurosurgeon's and institutional levels.

Hospitals with higher volumes experience lower ventricular shunt failures [4] and lower post–brain tumor surgery mortality rates [5]. Surgeons with higher volumes can achieve more tumor resections with lower complications [6] and lower mortality post–brain tumor craniotomy [5]. Although not as well documented in other disciplines, evidence suggests that the same principle applies to all aspects required for optimal care of children with brain tumors. In a study by Packer et al. [7], the outcome of patients with incomplete neuroimaging evaluation was significantly worse than that of patients who received proper neuroradiologic staging. In my opinion this is related to the patient load for a specific

neuroradiology service. On central review of 172 tumor samples from the CCG-945 study for high-grade gliomas, 51 of these tumors received a different diagnosis by the expert reviewer [8]. A study from Ontario [9] showed that medulloblastoma patients' outcomes could be influenced by center size. Our group demonstrated that in developing countries, higher patient loads translated into significantly better chances of having a dedicated multidisciplinary team and access to treatment protocols [10]. In conclusion, I propose that childhood brain tumors should be viewed as rare neoplasms, and we all should promote a paradigm shift from fragmented small-size services to centralized, large-volume centers.

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