EARLY DIAGNOSIS OF CHILDHOOD CANCER

SUPPLEMENTAL INFORMATION ON BRAIN TUMORS IN CHILDREN

This short document is a supplement to the PAHO manual on "Early Diagnosis of Childhood Cancer", which provides information to primary care providers on early signs and symptoms of childhood cancer to enable timely referral. This supplement provides additional information on warning signs for brain tumors in children.

The manual *Early Diagnosis of Childhood Cancer* can be accessed on the PAHO website at:
http://goo.gl/NSLr7T

Additional information to consider for brain tumors in children

1- The triad of headache, nausea/vomiting, and papilledema occurs in only about 30% of children with brain tumors.
2- Many children with brain tumors do not experience typical headaches, which awaken them during the night, or are more intense in the morning.
3- About 50% of pediatric brain tumors are low-grade gliomas. They are slow-growing tumors that could require years to be diagnosed. Many other pediatric tumors (e.g., craniopharyngioma, germinoma or histiocytosis) can also grow slowly.
4- The ability of children to compensate and the plasticity of their brains are superior to that seen in adults, making it challenging to identify symptoms of brain tumors.
5- The chronic nature, or waxing and waning of symptoms, should not cause the primary care provider to exclude a brain tumor as a possible diagnosis (consider points 3 and 4 above).
6- If a diagnosis of an acute process, such as gastroenteritis or sinusitis is given, then the family should be instructed to return if the child's symptoms do not resolve within the expected time frame, as this could be a misdiagnosis of a brain tumor.
7- Concerns or symptoms reported by parents should be taken seriously. A few studies have shown that parents more accurately suspect their child has a brain tumor than do the primary health care provider.
8- When taking a child's history, it is important to inquire about visual and ocular symptoms, school performance, behavioral issues, sleep patterns, regression of milestones, unexplained spinal symptoms, diabetes insipidus, growth curves, and sexual maturity.

9- Any unexplained neurological problem should be taken seriously.

10- If the child has a genetic condition that predisposes him/her to a brain tumor, such as neurofibromatosis or tuberous sclerosis, the suspicion of a brain tumor should be raised, if history and physical examination suggest it.

11- Many low-grade gliomas are difficult to detect by CT scan or MRI, so good communication with the radiologist is required. If the suspicion of a brain tumor is high, then not even a previous negative imaging exam should exclude the possibility of diagnosis. Low-grade gliomas can be small and non-enhancing when they first develop, but after months or years of slow growth, they can be detected on subsequent scans.

12- The acronym “LOW OR PAY” could be used to improve the ability to suspect brain tumors in children. See attached table to see how ‘’LOW OR PAY’’ can be used as a mnemonic to “think LOW-grade glioma, OR patient will PAY the price’’.

So in summary, kids are different than adults. Think low-grade gliomas, take a thorough medical history, perform a good medical exam, and believe the parents.

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Table 1: Symptoms to consider for brain tumors in children

Letter	Stands for	Explanation/Example
L	**L**ocal symptoms	Any focal motor, sensory, or facial symptom should be taken seriously even if relapsing and remitting.
O	**O**ngoing or long-term symptoms	Symptoms that continue for months or years should not exclude a suspicion of a brain tumor.
W	**W**orsening of existing symptoms	Unexplained worsening of existing seizures or headaches, behavioral or migraine headaches.
O	**O**ther, associated signs or symptoms	Vomiting with headache, headache with behavioral issues, visual symptoms with head tilt, or any combination of 2 or more neurologic signs/symptoms.
R	**R**elapsing and remitting	Recurrence of arm weakness that resolves after physical therapy. Recurrence of headache that improves with pain medication. Recurrence of vomiting after treatment for gastroenteritis. On and off head tilt, headache, or visual symptoms.
P	**P**ersistent	Sinus headache that persists after resolution of presumed sinusitis.
A	**A**ltering or changing; Adolescence	Change in school performance, sleep patterns, or behavior. A monthly headache that becomes daily. A change in frequency or type of existing seizures. An unexplained change in corrective glasses prescription. Adolescents should receive extra attention.
Y	**Y**oung or new	Any new symptoms should be followed to seek resolution after 2-3 weeks.

Reference: Arnautovic A, Billups C, Broniscer A, Gajjar A, Boop F, Qaddoum I. Delayed diagnosis of childhood low-grade glioma: causes, consequences, and potential solutions. Childs Nerv Syst. 2015. Jul;31(7):1067-77.