Computed Tomography (CT) Scan in First Nonfebrile Seizure - Critically Appraised Topic (CAT)

PICOT Question:

For the child who presents to the ED after a first nonfebrile seizure should a computed tomography (CT) be obtained as part of the acute evaluation?

Clinical bottom line based on literature appraisal below:

The most recent AAN Practice Parameter (Hirtz et al, 2000) states CT scans should not be routinely obtained for the child with a first nonfebrile seizure who has returned to baseline. Children who have not returned to baseline are excluded from this guideline.

The literature was searched for studies that addressed this question since 2000 and three studies were identified. The Hsieh et al., (2010) and Khodapanahandeh & Hadizadeh, (2006) are VERY LOW quality. Hsieh et al, (2010) included children who had more than one seizure who do not meet inclusion criteria for this CPG. Khodapanahandeh & Hadizadeh, (2006) is a retrospective case-series Of the twelve children with abnormal neuroimaging, 10 (83%) also had an abnormal neurological exam, and do not meet the inclusion criteria for this CPG. Sharma, Riviello, Harper, & Baskin, (2003) was graded as LOW quality evidence. It was a cohort, and children with predisposing conditions that do not meet the inclusion criteria for this CPG were included in the analysis. It identified three variables that increase the likelihood of a finding on radiologic imaging. They are age of the patient, children < 33 months, the seizure in focal in nature or have a predisposing condition are high risk to have a radiologic finding.

The included studies do not suggest obtaining a CT will provide information that will change treatment. Therefore the Nonfebrile CPG teams concurs with the AAN Practice Parameter (Hirtz et al, 2000) and recommends that CT scans should not be routinely obtained in children with a first nonfebrile seizure who has returned to baseline.
### Synthesis of relevant studies:

<table>
<thead>
<tr>
<th>Author, date, country, and industry of funding</th>
<th>Patient Group</th>
<th>Strength of Evidence (GRADE)</th>
<th>Research design</th>
<th>Significant results</th>
<th>Limitations</th>
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<tbody>
<tr>
<td>(Hirtz et al., 2003)</td>
<td>Children and adolescents with first unprovoked seizure</td>
<td>The guideline was reviewed by two team members using the AGREE tool. The consensus was to accept the guideline with alterations</td>
<td>Guideline</td>
<td>The Practice Parameter addresses the following: Laboratory studies- may be obtained when history or clinical findings such as vomiting, diarrhea, or dehydration are present. Lumbar puncture (LP)- should not be obtained unless meningitis is suspected. EEG- should be performed as part of the evaluation of first non-febrile seizure. Timing of the study (within the first 48 hours or later) is not clear. Neuroimaging- CT scan and MRI- should not be routinely obtained for the child with a first non-febrile seizure who has returned to baseline.</td>
<td>*Concerns with the AAN Guideline (Hirtz et al., 2000) include: The development group did not include Pediatric Emergency Medicine, patient/parent/family representatives. Methods for formulating the recommendations, cost implications and conflicts of interest are not reported transparently.</td>
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<tr>
<td>(Hsieh et al., 2010) USA</td>
<td>317 infant subjects (range 1-24 months) urban population</td>
<td>Low- It is a cohort study based on a clinical guideline.</td>
<td>Prospective cohort</td>
<td>EEG (all subjects) abnormalities were found in half CT (298/317 obtained) abnormalities were found in a third MRI (182/317 obtained) abnormalities were found in 57% Of the 193 normal CTs, 97 underwent MRI of which 32 (33%) had an abnormal MRI</td>
<td>The majority had more than one seizure upon presentation. The incidence of seizures lasting longer than 20 minutes was 8.5% 30 subjects had a history of prematurity. Increased likelihood of</td>
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<table>
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<th>Study</th>
<th>Study design.</th>
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<tr>
<td>(Khodapanahan deh &amp; Hadizadeh, 2006) Iran</td>
<td>125 subjects, children mean age 53 ±48 months (range 1 month-15 years)</td>
<td>Low</td>
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<td>(Sharma, Rivielo, Harper, &amp; Baskin, 2003) USA</td>
<td>500 subjects with new-onset afebrile seizure median age (16 mo range (0-21 years))</td>
<td>Low</td>
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partitioned the subjects into 4 groups  
Variables  
Presence of pre disposing condition, focality of the seizure and age  
Groups  
Predisposing condition- High risk  
No predisposing condition  
Non-focal seizure- low risk  
Focal seizure- age dependent  
Age > 33 months low risk  
Age < 33 months high risk  

References:  
74/2/150 [pii]  

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