**Question**
In adult patients with acute asthma treated in the emergency setting, does the addition of intravenous aminophylline to β₂-agonists have an additional bronchodilation effect?

**Data Sources**
Studies were identified using the Cochrane Airways Group register (derived from MEDLINE, EMBASE/Excerpta Medica, and CINAHL standardized searches up to 1999), by hand searching respiratory journals and meeting abstracts, and by reviewing the bibliographies of identified articles.

**Study Selection**
Studies were selected if they were randomized controlled trials comparing intravenous aminophylline with placebo in adults with acute asthma who were already being treated with β-adrenergic agonists with or without corticosteroids.

**Data Extraction**
Data were extracted on patient characteristics, treatment type and dose, main outcome measures, peak expiratory flow (PEF), FEV₁, and adverse effects.

**Main Results**
15 trials met the selection criteria. Treatment groups did not differ for airflow outcomes at any time. Patients in the aminophylline group had higher values of PEF and FEV₁ at 12 and 24 hours, but treatment-group differences were not statistically significant (Table). Neither airflow limitation at baseline nor the use of steroids modified the effect of aminophylline. Patients in the aminophylline group reported higher rates of palpitations or arrhythmias and vomiting, but the groups did not differ for tremor or hospital admissions (Table).

**Conclusion**
In adult patients with acute asthma, the addition of intravenous aminophylline to β₂-agonists does not lead to additional bronchodilation, but some adverse effects were reported more frequently.

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**Intravenous aminophylline (Am) vs placebo in adults with acute asthma***

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Am</th>
<th>Placebo</th>
<th>Weighted mean difference (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEF (L/min, 12 h)</td>
<td>194</td>
<td>184</td>
<td>8.3 (−21 to 37)</td>
</tr>
<tr>
<td>PEF (L/min, 24 h)</td>
<td>216</td>
<td>209</td>
<td>22.2 (−57 to 101)</td>
</tr>
<tr>
<td>FEV₁ (L, 12 h)</td>
<td>2.0</td>
<td>1.6</td>
<td>0.4 (−0.2 to 1.0)</td>
</tr>
<tr>
<td>FEV₁ (L, 24 h)</td>
<td>2.2</td>
<td>1.8</td>
<td>0.4 (−0.1 to 1.0)</td>
</tr>
</tbody>
</table>

` RRI (CI)  RRR (CI)  NNH (CI)  NNT (CI)
Arhythmia/palpitations† | 25% | 10% | 44% (4 to 29) | 7 (4 to 24) |
Vomiting† | 31% | 9% | 225% (112 to 368) | 5 (3 to 10) |
Tremor† | 44% | 35% | 29% (−7 to 67) | Not significant |
Hospitalized | 21% | 28% | 35% (−1 to 61) | Not significant |

*PEF = peak expiratory flow. Other abbreviations defined in Glossary; RRI, RRR, NNH, NNT, and CI calculated from data in article.
†Follow-up time not provided.

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**Commentary**
Intravenous aminophylline is commonly used in emergency settings in combination with other medications in the management of acute asthma. The benefit attributable to aminophylline added to β₂-agonists has been evaluated in the Cochrane review by Parameswaran and colleagues. The review pooled 15 mostly small randomized controlled studies that met selection criteria, although information about dropouts, blinding, and randomization methods were unclear in many of the studies. This review shows no respiratory benefit of intravenous aminophylline in terms of PEF or FEV₁ (either absolute or percentage predicted) at 0.5, 1, 1.2, and 24 hours. Indeed, at 30 minutes, FEV₁ is 0.26 liters (95% CI 0.029 to 0.491) lower in the aminophylline group. Only 2 studies could be pooled, however, for this 0.5-hour outcome. Furthermore, at baseline, the intervention group started with a lower FEV₁, according to 9 pooled studies (by 0.104 L, CI 0.017 to 0.191), suggesting that randomization was not fully successful, with patients who had more severe asthma entering the aminophylline group.

The review clearly shows that vomiting and palpitations were more common in the aminophylline group than in the control group (approximately 30% vs 10% of patients for each of these symptoms). The findings do not support the addition of intravenous aminophylline to β₂-agonists in the management of acute asthma in adults.

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