Vena Cava Filters: Why Do Usage Rates Vary So Much 
My Take On Filter Removal 

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Faculty Disclosure

- For the 12 months preceding this activity, I disclose the following types of financial relationships:
  - Advisory Board:
    - Bio2, Delcath, Hatch, Javelin
  - Consulted for:
    - Covidien, Guerbet
  - Research study funds from:
    - Guerbet, NIH, WL Gore, Cook
  - Stock ownership
    - Veniti, Endoshape, VuMedi
- I will be discussing products that are investigational or not labeled for use under discussion.
Why This Talk?

- USA: 314 million people in 2012
  - >220,000 IVC filters
  - Approximately 500,000 cases PE in 2005
- Europe: 733 million people in 2012
  - ~ 9,000 IVC filters
  - Approximately 300,000 cases PE in 2007

Wang et al Ann Med 2013;45:474-81
Cohen et al Thromb Haemost 2007;98:756-64
Heit et al Blood 2005;106:Abstract 910
## Differences In PE Diagnosis

<table>
<thead>
<tr>
<th></th>
<th>Europe</th>
<th>US</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yr)</td>
<td>69</td>
<td>55.7</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>PESI I (%)</td>
<td>16.8</td>
<td>35.7</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>CT Scans (%)</td>
<td>62.3</td>
<td>85.4</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Mortality (%)</td>
<td>6.7</td>
<td>5.7</td>
<td>0.62</td>
</tr>
<tr>
<td>PE Mortality (%)</td>
<td>3.3</td>
<td>0.7</td>
<td>.003</td>
</tr>
<tr>
<td>Bleeding (%)</td>
<td>4.5</td>
<td>4.5</td>
<td>0.840</td>
</tr>
</tbody>
</table>

Penazola J Thromb Haem 2012;10:375-81
Filter Utilization - USA

State Trends In Filter Use

Meltzer et al Surgery 2013;153:683-8
Factors Influencing Filter Use

- Prevalence of detected VTE
  - $R^2 = 0.59$, $P < .001$

- Paid medical malpractice claims per capita
  - $R^2 = 0.6$, $P < .001$

- Physicians with endovascular skills per capita
  - $R^2 = 0.335$, $P = .046$
IVC Filters In California, 2006-2010

IVC Filters In California, 2006-2010

• 109 hospitals > expected
• 59 hospitals < expected
• VTE with
  – Bleeding, major surgery, cancer, severe illness, age
  – Large urban hospitals
  – Teaching vs. Kaiser (OR 1.2 (0.8-1.8), 95% CI)
  – Private vs. Kaiser (OR 1.5 (1.1-2.0), 95% CI)

IVC Filters In California, 2006-2010

Shift To Retrievable Filters
But....

- Low retrieval rates
  - 3-44%
- Limited follow-up
  - Especially trauma patients

Improving Retrieval Rates

- Careful patient selection/identification
- Dedicated follow-up
- Patient education
- PCP education
- Impact of dedicated clinic
  - Retrieval pre-clinic: 29%
  - Retrieval post-clinic: 60%

Minocha et al JVIR 2010;21:1847-51
Summary

• Filter utilization varies widely
  – Continent to continent
  – State to state
  – Hospital to hospital
• Too many filters US, too few EU
• Filter retrieval rates are too low
  – *If you put them in, you should take them out*
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