INTERVENTIONS AND COSTS ASSOCIATED WITH SIVA-DEFINED ADVERSE EVENTS DURING PROCEDURAL SEDATION IN FIVE COUNTRIES

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INTRODUCTION
Procedural sedation is common during gastrointestinal procedures to reduce patient discomfort.
- Sedation may increase the risk of cardiorespiratory adverse events (AEs).
- The world SIVA task force has standardized definitions for AEs during sedation.1
- The cost of these AEs and their impact on healthcare resource use is unknown.

AIM
To quantify the cost of SIVA-defined AEs during procedural sedation in France, Germany, Italy, the UK, and the USA.

METHODOLOGY
Online surveys conducted with providers (nurses and physicians) and payers (Figure 1).
- Author-created survey administered online by 3rd party to ensure double-blind process.
- Respondents screened to ensure that they had the expertise to complete the survey.
- Payers provided costs for staff, procedures, and interventions (drugs and devices).
- Providers detailed treatment practices for monitoring, sedatives, and AEs.

RESULTS
101 providers and 26 payers were surveyed.
- Payers, 88% hospital based, reported the mean cost of a procedural sedation to be EUR 74 to USD 2,030 (Figure 3).

Figure 2. Direct cost of bradycardia in Germany

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Call anaesthesiologist</th>
<th>CPAP</th>
<th>Oral/Nasal airway</th>
<th>Laryngeal mask</th>
<th>Bagmask</th>
<th>Atropine</th>
<th>IV fluid</th>
<th>Reversal agent</th>
<th>Oxygen</th>
<th>Additional sedative</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost (€)</td>
<td>1.53 per min</td>
<td>0.20</td>
<td>0.84</td>
<td>0.23</td>
<td>0.19</td>
<td>0.12</td>
<td>0.10</td>
<td>0.80</td>
<td>0.18</td>
<td>0.19</td>
<td>0.00</td>
</tr>
<tr>
<td>Resolution time (min)</td>
<td>1.6</td>
<td></td>
<td></td>
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<tr>
<td>Staffing costs (€/min)</td>
<td>3.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

The sum product of costs and treatment patterns gave the overall mean cost of an AE. See Figure 2, using bradycardia as an example common AE.

Figure 3. Payer-reported procedural sedation cost by country.

The mean direct cost ranged from EUR 12 for bradycardia in Germany to USD 3,877 for cardiac arrest in the USA.
- Even minor events led to substantial delay (poster 5311) or procedure termination.
  - This occurred in 3.8% and 4.1% of bradycardia cases in Germany and France, respectively.
  - “Fully loaded” costs (including costs for outcomes, delays, and cancellations but not legal costs) were much higher than direct costs (Table 1).
    - The median direct cost over all AEs in EUR countries was EUR 40 (IQR: 29-67).
    - “Fully loaded” this was EUR 301 (IQR: 115-738).

CONCLUSIONS
- Results provide the first estimate of healthcare burden from sedation-related AEs.
- In all countries surveyed, costs of sedation-related AEs were considerable.
- Even AEs considered minor can disrupt patient flow and provider efficiency.
- Practices to prevent sedation AEs may increase in importance given data presented.

Table 1. Mean cost of select adverse events by country. All data are direct cost; fully loaded cost

<table>
<thead>
<tr>
<th>Country, currency</th>
<th>Hypotension</th>
<th>Mild desaturation</th>
<th>Severe desaturation</th>
<th>Bradycardia</th>
<th>Prolonged apnoea</th>
<th>Cardiac arrest</th>
</tr>
</thead>
<tbody>
<tr>
<td>France, EUR</td>
<td>32; 173</td>
<td>23; 471</td>
<td>79; 1994</td>
<td>17; 131</td>
<td>53; 490</td>
<td>137; 11,936</td>
</tr>
<tr>
<td>Germany, EUR</td>
<td>23; 193</td>
<td>18; 212</td>
<td>92; 1288</td>
<td>12; 39</td>
<td>118; 807</td>
<td>274; 4,765</td>
</tr>
<tr>
<td>Italy, EUR</td>
<td>41; 111</td>
<td>32; 98</td>
<td>59; 201</td>
<td>33; 93</td>
<td>43; 99</td>
<td>101; 1,195</td>
</tr>
<tr>
<td>UK, GBP</td>
<td>69; 537</td>
<td>34; 606</td>
<td>93; 1,258</td>
<td>35; 362</td>
<td>80; 631</td>
<td>658; 8,984</td>
</tr>
<tr>
<td>US, USD</td>
<td>247; 841</td>
<td>463; 1,456</td>
<td>529; 1,715</td>
<td>83; 358</td>
<td>394; 1,262</td>
<td>3,877; 19,722</td>
</tr>
</tbody>
</table>