Can Adverse Events Be Extracted From Electronic Anesthesia Records?
Thomas Powell, MD MS
University of Miami Department of Anesthesia, Perioperative Medicine, and Pain Management, Miami, Florida

Abstract

Using information gathered from an anesthesia information management system (AIMS) quality assurance module, we propose a 4-tiered classification scheme for electronically extracted adverse events (AE). Type I AE can be extracted directly from the AIMS clinical data, Type II and III AE have extractible elements, but need further clarification by chart review, and Type IV AE cannot be detected without voluntary disclosures.

Introduction

Anesthesia departments traditionally use voluntary disclosure of adverse events (AE) to detect quality assurance (QA) issues. This method has obtained improvements in anesthesia safety [1,2]. Underreporting the incidence and severity of AE is an accepted limitation of voluntary systems [1,3,4]. Queries of anesthesia information management systems (AIMS) can capture certain AE better than voluntary reporting [4]. The optimal role of man and machine in medical AE detection is yet to be understood. We analyzed our QA indicators and AIMS database to describe the role of man and machine in anesthesia QA reporting.

Methods

We identified the AE currently specified in our AIMS QA module. We defined the clinical criteria necessary for confirmation of each AE (assuming that voluntary reporting was unavailable). We then assessed the availability of the necessary clinical data collection in our AIMS clinical database.

Results

We found that 28.9% of our AE could be confirmed solely by queries of the AIMS database, 28.9% of our AE could only be confirmed by voluntary reporting, and 42.2% of the AE could be confirmed by some combination of AIMS database queries followed by human clarification. Each AE was classified into one of three distinct categories. See Table 1.

<table>
<thead>
<tr>
<th>AE Types</th>
<th>Category Frequency (%)</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type I AE (Data Evidence)</td>
<td>28.9%</td>
<td>The AE can be detected by database query alone.</td>
<td>Hypoxemia (SpO2 &lt; 90% for &gt; 1 min)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hyperthermia (Temp &gt; 38°C)</td>
</tr>
<tr>
<td>Type II AE (Circumstantial Evidence)</td>
<td>42.2%</td>
<td>An AE is suggested by database query, but confirmation by chart review or voluntary disclosure is required.</td>
<td>Drug Allergy (Administered drug and documented drug allergy match)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pneumothorax (pulmonary/vital sign changes exist)</td>
</tr>
<tr>
<td>Type III AE (Human-evidence)</td>
<td>28.9%</td>
<td>Without voluntary disclosure, no database evidence of AE would exist.</td>
<td>Dental Injury Accidental Dural Puncture</td>
</tr>
</tbody>
</table>

Table 1  Anesthesia AE Classification
Classification of AE based upon the clinical criteria necessary to confirm them and information discoverable in the AIMS record. The category definition, frequency, and an example are provided.

Conclusions

Voluntarily identifying AE is the best method to confirm most QA issues, but is limited by low compliance and underreporting. Queries of AIMS records can confirm the presence of certain AE and can be used to guide the investigation of others. The combination of man and machine may offer a superior model to current QA practices.

References

3. Lagasse RS. Anesthesiology. 87(3):722-5, 1997