Complications occurring around the anesthetic period, i.e. after premedication, at induction, during the procedure and post-anesthesia have been studied infrequently in veterinary medicine. The most robust multi-center mortality studies performed to date are by Clark and Hall, and Brodbelt et al. Factors found to contribute to anesthetic related death were: the American Society of Anesthesiologists (ASA) physical status, age, weight, breed e.g. brachycephalic breeds, if comorbidities were present at the time of surgery, the urgency of the procedure and body temperature. Other non-animal related factors involved the type of monitoring equipment used, fluid therapy, whether the patient was intubated or not, the time of day surgery was performed and human error.

Death occurred most frequently in the post-anesthetic period as shown in figure 1.

In dogs the percentage of anesthetic deaths occurring during surgery and post-operatively were similar, while in cats and rabbits most deaths occurred after surgery, especially in the first 3 hours.

During the first three hours after surgery and anesthesia, most of the support that the animal received during surgery, such as monitoring of heart rate, respiratory rate, temperature, blood pressure, provision of oxygen and control of the airway and having a trained anesthesia professional constantly observing the patient are withdrawn.
In these studies the cause of death was determined when possible and were categorized into problems relating to the patients’ cardiovascular, respiratory, gastrointestinal, neurological and hepato-renal systems.

Some recommendations resulting from these studies are:

- Cats undergoing short procedures should not be intubated and those having long procedures performed should be intubated.
- Caution should always be taken when inflating the cuff on the endotracheal tube primarily in cats as this has been found to contribute to tracheal tears.
- Due to the availability of the new supraglottic airway device for cats and rabbits (v-gel) there is much less of a concern with causing trauma to the airway as nothing enters the animal’s airway.
- Cardiovascular sparing protocols that reduce the deleterious effects of many anesthetic drugs on the cardiovascular system as well as taking comorbidities into consideration is an important component of planning.
- The patient should also be stabilized as much as possible before the anesthetic event and if not possible due to a poor ASA physical status then measures should be in place to support the animal with blood products and other agents as needed.
- Ensure trained personnel are involved at every step of the case, including the post-anesthetic period.

<table>
<thead>
<tr>
<th></th>
<th>1984 - 1986 (%)</th>
<th>2002 - 2004 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dog</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>0.23</td>
<td>0.17</td>
</tr>
<tr>
<td>Healthy</td>
<td>0.115</td>
<td>0.054</td>
</tr>
<tr>
<td>Sick</td>
<td>3.13</td>
<td>1.3</td>
</tr>
<tr>
<td>Cat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>0.294</td>
<td>0.24</td>
</tr>
<tr>
<td>Healthy</td>
<td>0.181</td>
<td>0.112</td>
</tr>
<tr>
<td>Sick</td>
<td>3.33</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Figure 2: Comparing the odds of death occurring in dogs and cats in two multi-center studies over two time periods

The risk of anesthetic deaths in veterinary medicine is still high but has decreased over time (figure 2).

Further prospective studies are needed to look at the impact of new anesthetic drugs, new techniques for airway management and the impact of monitoring on patient morbidity and mortality and to identify areas that still need attention and improvement.
References: