Implementation and Evaluation of a Multidisciplinary Difficult Airway Response Team

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ABSTRACT

Objective: Difficult airways are both a challenge to the provider and a source of morbidity and mortality to the patient. We sought to demonstrate the effectiveness of a multidisciplinary Difficult Airway Response Team (DART) initiative in improving our hospital’s responses to difficult airway emergencies. The goals were to 1) improve coordination of resources, including personnel and equipment; 2) identify system defects and apply safety programs to improve patient care; and 3) ensure sustainability through an educational program and simulations.

Study design: Descriptive and retrospective database analysis.

Methods: Root-cause analysis of airway sentinel events at our institution revealed lack of a systematic approach to communication and response to difficult airways. A multidisciplinary DART was therefore implemented to provide a systems-based approach to airway safety. Outcomes including surgical airways and sentinel events were studied.

Results: There were 65 DART calls in Year 1 and 58 calls in Year 2. Emergency surgical airways decreased from three in Year 1 to two in Year 2, compared to at least six in the preceding three years. There have been no sentinel events in the two years since the initiative began.

Conclusions: At our institution, a multidisciplinary difficult airway response team has been effective in improving management of airway emergencies, improving hospital safety through practice-based teaming and a systems-based approach.

INTRODUCTION

Difficult airway events can be catastrophic for all involved, including patients, their families, and healthcare professionals. A high proportion of airway events lead to devastating results, including death or anoxic brain injury. In addition, poor outcomes can lead to litigation and high-profile negative publicity.

A series of sentinel airway events at our institution from 2005 to 2008 identified a need for a coordinated airway management program to prevent adverse outcomes from such events. We established the multidisciplinary Difficult Airway Response Team (DART) initiative to improve our hospital’s responses to difficult airway emergencies. All sentinel events from 2005 to 2008 were reviewed retrospectively to identify potential areas for improvement, and this analysis was used in developing the DART initiative. After the initiative was implemented, outcomes for airway events were studied prospectively for the subsequent two years.

METHODS

Root-cause analyses were performed of all airway sentinel events at our institution from 2005 to 2008. Sentinel events were defined as any unexpected occurrence involving death or serious physical or psychological injury, or the risk thereof.

After factors contributing to these sentinel events were identified, the DART initiative was created. A multidisciplinary difficult airway response team was assembled, involving the departments of otolaryngology, anesthesiology, trauma surgery, and emergency medicine.

The goals of the DART initiative were:

1) Improve coordination of resources, including personnel and equipment.
2) Identify system defects and apply safety programs to improve patient care.
3) Ensure sustainability through an educational program and simulations.

Outcomes of all DART responses from July 2008 to July 2010 were reviewed, including the number of sentinel events and the number of emergent surgical airways.

THE DART INITIATIVE

The key components of the DART initiative are:

1) Operations
   - To coordinate resources to make airway experts, information, and equipment immediately available for the management of difficult airways. Current operations resources include:
     - Expert personnel – OHNS, Anesthesiology, Trauma surgery, ED, OR, ICU staff
     - Infrastructure of existing emergency response teams
     - Eleven standardized Adult Emergency Airway carts (Figure 1)
     - Multiple communication methods – Paging system, Single DART #, Hopkins Access Line
     - Data management/reporting tools – ACCM Quality Assurance encounter reporting, EMR difficult airway alerts, Patient ID band

2) Safety
   - To prevent adverse events by identifying and analyzing potential sentinel events, in order to specifically address the problems noted. Current safety resources include:
     - ACCM Quality Assurance encounter reporting
     - Patient Safety Network
     - M&M conferences

3) Education
   - To teach fundamentals of airway management through lectures and simulation-based training. The current training program targets all residents and attending physicians with airway responsibilities within the institution and includes:
     - Four core lectures related to emergency airway management
     - Skills stations – Basic airway management, Endotracheal and videoscopic intubation, Pig trachea cricothyrotomy, Flexible fiberoptic intubation
     - In situ simulation-based training – SimMan mannequins

RESULTS

FIGURE 2. Airway events by category. OR difficult airway events do not activate the DART response.

<table>
<thead>
<tr>
<th></th>
<th>Before DART</th>
<th>After DART</th>
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</thead>
<tbody>
<tr>
<td>Code Responses</td>
<td>132</td>
<td>636</td>
</tr>
<tr>
<td>DART Responses</td>
<td>65</td>
<td>58</td>
</tr>
<tr>
<td>Sentinel Events</td>
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<td>0</td>
</tr>
<tr>
<td>Emergent Surgical Airways</td>
<td>≥6</td>
<td>3</td>
</tr>
</tbody>
</table>

TABLE 1. Key metrics before and after implementation of the DART initiative

There have been several actual and near miss events related to airway management at our institution since 2005.

Root-cause analyses of these sentinel events revealed the lack of a systematic approach to communication and response to difficult airways. All events occurred outside the operating room environment, and all events involved the departments of otolaryngology, anesthesiology, trauma surgery, and emergency medicine. Several common themes arose, including inconsistencies in:

- Paging system
- Availability of advanced airway equipment
- Provider training and experience in managing and performing airway procedures
- Enlistment of more experienced physicians
- Definition of roles in patient events involving multiple departments

In Year 1 after the DART initiative was implemented, there were 65 DART responses (10% of all airway events). In Year 2, there were 58 DART responses (7%) (Figure 2). There have been zero sentinel events in the two years since the initiative began. The number of emergent surgical airways decreased from three in Year 1 to two in Year 2, compared to at least six in the preceding three years (Table 1).

DISCUSSION / CONCLUSIONS

Root cause analyses of the sentinel airway events at our institution identified several common contributing issues, including delayed access to airway equipment, inadequate provider experience and training, inconsistent access to more senior providers, and lack of a cohesive multi-disciplinary approach to such emergencies.

These issues were addressed using a multidisciplinary difficult airway response team.

The DART initiative has been effective in improving management of airway emergencies, improving hospital safety through practice-based learning and a systems-based approach, and reducing the incidence of adverse airway events.

REFERENCES


FIGURE 1. Adult Emergency Airway cart (Operations)