Title : MULTI-HOSPITAL STUDY OF PREVENTABLE ANESTHESIA MISHAPS

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Introduction. Although studies of anesthetic risk indicate that a substantial fraction of anesthesia-related mortality and morbidity is due to human error, little is known of the etiology of that error. We recently reported on a method for collecting information about preventable anesthetic mishaps, i.e., those due to human error or equipment failure, and we presented preliminary results from one teaching hospital[1]. We have now studied two additional hospitals with the objectives of increasing our retrospective database and of allowing interhospital comparisons. Some results are presented here to demonstrate the character of information collected and its potential usefulness in suggesting actions and strategies to reduce the likelihood of serious mishaps.

Methods. Using a modified form of the critical incident technique[1,2], interviews were conducted with staff, residents and CRNA's from one large and one small teaching hospital and from one hospital served by a private-practice anesthesia group. Each interviewee was asked to describe preventable anesthesia-related incidents that had negative or potentially negative outcomes, and in which they were a participant or observer. Each incident was "deidentified" for anonymity and numerically coded for computer entry and subsequent analysis.

Results. 49 staff, 30 residents and seven CRNA's were interviewed and 627 incidents reported. 83% of the incidents had no known consequence beyond the operative procedure. Overall, 76% of the incidents involved human error, 12% involved disconnections of the breathing circuit or intravenous apparatus and 11% involved equipment failure. Incidents were summarized according to type of equipment or procedure involved, the specific incident type, when incidents occurred during the surgical procedure, etc. Incidents such as those involving disconnection of the breathing circuit during mechanical ventilation, syringe interchange, or the replacement of one anesthetist by another were examined separately. The most frequent incident types are given in Table I. All sample data presented below refer to the 502 incidents that occurred at the interviewee's present hospital.

The site of most (70%) breathing circuit disconnections was the endotracheal tube connection to an elbow or Y-piece. In syringe interchange incidents, relaxant drugs or their antagonists were involved 65% of the time. In the process of relief, replacement anesthetists were more likely to have discovered a problem or its source than to have caused a problem (80% of 30 incidents). In 79% of the incidents, at least one, and as many as 8, potentially predisposing (associated) factors were identified as being present at the time of the incident. The six most frequent such factors are given in Table 2.

Discussion. Our data indicate that similar incident patterns occurred at the three hospitals. Differences among the hospitals in relative frequency of specific incidents and associated factors could often be attributed to differences in clinical practices or equipment. Although still in a developmental stage, this technique is already useful for identifying problems and elucidating patterns associated with errors.

TABLE I - MOST FREQUENT INCIDENTS

INCIDENT TYPE	% of Intrahospital Incidents		
	Hospital A	Hospital B	Hospital C
Breathing circuit disconnection.....	8	9	15
Incorrect drug dose.	8	8	5
Gas flow setting....	7	3	3
Gas supply problem..	5	3	3
Syringe swap.....	3	5	1
IV disconnect.....	3	4	2
Laryngoscope malfunction.....	3	2	1
Breathing circuit misconnection.....	2	3	4
Hypovolemia.....	3	2	2
Tracheal airway device position change...	3	6	2
Other drug swap.....	1	4	7
Ventilator malfunction.....	1	0	5
% of Intrahospital Incidents	47	49	50

TABLE 2 - MOST FREQUENT ASSOCIATED FACTORS

FACTOR	% of Intrahospital Incidents		
	Hospital A	Hospital B	Hospital C
Inadequate clinical experience.....	20	18	4
Inadequate familiarity with equipment...	13	11	9
Haste.....	8	15	13
Poor communication.	8	8	8
Fatigue.....	7	3	3
Failure to check...	6	16	14

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References.

1. Cooper JB, Newbower RS, Long CD, et al: Preventable Anesthesia Mishaps: A Study of Human Factors. Anesthesiology 49:399-406, 1978

2. Flanagan JC: The critical incident technique. Psychol Bull 51:327-358, 1954