Surveillance of Anesthetic Related Complications at Srinagarind Hospital, Khon Kaen University, Thailand

Polpun Boonmak, MD*, Suhattaya Boonmak, MD*,
Thepakorn Sathitkarnmanee, MD*, Waraporn Chau-In, MD*,
Duangthida Nonlhaopol, BSc*, Maneerut Thananun, BSc*

** Department of Anesthesiology, Faculty of Medicine, Khon Kaen University, Khon Kaen*

Objective: *To identify the incidence of common anesthetic complications in 2003 at Srinagarind Hospital, Faculty of Medicine, Khon Kaen University, Thailand and find the strategies for prevention.*
Material and Method: *The study was part of a multi-center study conducted by the Thai Royal College of Anesthesiologists to survey anesthetic related complications in Thailand in 2003. The authors collected data from all the cases receiving anesthesia service at Srinagarind Hospital between January 1 and December 31, 2003, to report the incidence of common anesthetic complications and to assess the need to improve the quality of service. This was a prospective, descriptive study. When any anesthetic complications occurred, they were reported by anesthesia personnel and anesthesiologists. The reporting forms comprised four categories of complications, viz.: respiratory, cardiovascular, neurological and others. Each category of complications has a guidebook for reference in order to correctly fill out the form. All the forms were verified by the principal author then included in the present study.*
Results: *A total of 10 607 patients were included and among these 268 incidents were recorded. The common incidents per 10 000 were desaturation (95.22), cardiac arrest (44.31), re-intubation (29.23), equipment failure (19.80) and difficult intubation (18.86). Main contributing factors were insufficient knowledge and inappropriate decisions. Suggested corrective strategies included quality assurance activities, additional training and improved supervision.*
Conclusion: *Despite practical prevention guidelines being in place, the most common anesthesia incident at Srinagarind Hospital was respiratory incident. Continuing quality improvement is needed.*

Keywords: *Anesthesia, Incidence, Complications*

J Med Assoc Thai 2005; 88(5): 613-22
Full text. e-Journal: *http://www.medassocthai.org/journal*

Anesthetic complications can occur anytime during the perioperative period. Some complications are fatal, some are harmless. Each hospital has different anesthetic outcomes, i.e. rates of major events and death [1-3]. Anesthetic complications vary in each hospital depending on anesthesia standards, and the type of surgery and personnel. As a tertiary centre, Srinagarind Hospital has more severe patients and more anesthetic complications. However, with more well-trained staff, trainees and modern equipments, complications can be mitigated. The authors, therefore, surveyed the incidence of complications to identify the risk factors of major complications at Srinagarind Hospital.

Correspondence to : Boonmak P, Department of Anesthesiology, Faculty of Medicine, Khon Kaen University, Khon Kaen 40002, Thailand.

Objective

To identify the incidence of common anesthetic complications in 2003 at Srinagarind Hospital, Faculty of Medicine, Khon Kaen University and find strategies for prevention.

Material and Method

The study was part of a multi-center study conducted by the Royal College of Anesthesiologists of Thailand aimed at the surveillance of anesthetic related complications in Thailand in 2003. The study

included data collection from large hospitals and Faculties of Medicine in Thailand.

The Ethics Committee of Khon Kaen University approved the research proposal. The authors collected data on all of the cases receiving anesthesia service at Srinagarind Hospital between January 1 and December 31, 2003, and calculated the incidence of common complications and probable means to improve the quality of service. The study was both prospective and descriptive. Whenever complications occurred, they were reported by the anesthesia personnel and the in-charge anesthesiologist. The complication report comprised four categories according to the organ system:

1. Respiratory (pulmonary aspiration, esophageal intubation, oxygen desaturation, difficult intubation and re-intubation);

2. Cardiovascular (cardiac arrest, myocardial ischemia/infarction and deathrelated to anesthesia);

3. Neurological (awareness, coma and nerve injury); and,

4. Others (drug error, transfusion mismatch, personnel hazard, equipment failure, anaphylaxis, total spinal block and malignant hyperthermia).

Each category of complication had a guidebook to help fill-in the form. All the forms would be checked and verified by the principal author then included in the study.

Statistical analysis

STATA 6.0 (Stata Corporation, College Station, TX, USA) was used to calculate the frequency and 95% CIs of incidence.

Results

The most frequent anesthetic complication (Table 1) was desaturation at an incidence of 95.22: 10000, occurring mostly during induction and intubation. The authors defined desaturation as a SpO_2 of < 85% or < 90% more than 3 minutes.

The incidence of cardiac arrest was 44.31: 10000. Nearly two-thirds (64%) of cardiac arrests were found in cardiovascular and thoracic surgery; one-half of which were during the postoperative period.

The incidence of re-intubation was 29.23: 10000. It was more common in pediatric, neurological surgery and in those with a high ASA physical status and related to incorrect evaluation before extubation.

Equipment failure incidence was 19.80:10000. The most common cause was human error, such as drug complications.

Difficult airway incidence was 18.86:10000. Problems were more common in plastic and pediatric surgeries - although none of them had any major complications.

Drug error incidence was 12.26:10000 and was more common in pediatric surgery (not emergency surgery). The most common cause was human error but all of the cases experienced complete recovery.

The incidence of awareness was 9.43:10000, which was more common in cardiovascular surgery and those patients with a high ASA physical status.

Table 1. Incidence of anesthetic complications

	Total 10 607 cases	
	Number of incidents	Incidence per 10 000 (95%CI)
Desaturation	101	95.22 (77.62, 115.58)
Cardiac arrest	47	44.31 (32.58, 58.88)
Re-intubation	31	29.23 (19.87, 41.46)
Equipment failure	21	19.80 (12.26, 30.45)
Difficult intubation	20	18.86 (11.52, 29.11)
Drug error	13	12.26 (6.53, 20.95)
Awareness	10	9.43 (4.52, 17.33)
Pulmonary aspiration	7	6.60 (2.65, 13.59)
Esophageal intubation	6	5.66 (2.08, 12.31)
Coma	5	4.71 (1.53, 11.00)
Myocardial infarction/ischemia	2	1.89 (0.23, 6.81)
Nerve injury	2	1.89 (0.23, 6.81)
Transfusion mismatch	1	0.94 (0.02, 5.25)
Anaphylactic reaction	1	0.94 (0.02, 5.25)
Personnel hazards	1	0.94 (0.02, 5.25)
Total spinal block	0	0.00 (0, 3.48)
Malignant hyperthermia	0	0.00 (0, 3.48)

Table 2. Incidence of respiratory complications related to sex, age, ASA physical status, type of surgery, type of operation and place

	Number of cases	Desaturation		Reintubation		Difficult intubation		Pulmonary aspiration		Esophageal intubation	
		Cases	Per 10000	Cases	Per 10000	Cases	Per 10000	Cases	Per 10000	Cases	Per 10000
Total number of cases	10607	101	95.22	31	29.23	20	18.86	7	6.60	6	5.66
Sex											
Male	5141	49	95.31	15	29.18	14	27.23	4	7.78	0	0.00
Female	5466	52	95.13	16	29.27	6	10.98	3	5.49	6	10.98
Aged											
0-1 month	147	6	408.16	0	0.00	1	68.03	0	0.00	1	68.03
1-12 month	338	22	650.89	6	77.51	2	59.17	1	29.59	1	29.59
1-12 years	1245	16	128.51	4	32.13	0	0.00	2	16.06	1	8.03
12-65 years	7628	48	62.93	16	20.98	13	17.04	4	5.24	3	3.93
> 65 years	1249	9	72.06	5	40.03	4	32.03	0	0.00	0	0.00
ASA physical status											
I	4827	21	43.50	3	6.21	4	8.29	3	6.24	3	6.21
II	4289	51	118.91	21	48.96	10	2.33	4	9.33	3	6.99
III	1183	25	211.33	6	50.72	5	42.26	0	0.00	0	0.00
IV	240	4	166.67	0	0.00	1	41.67	0	0.00	0	0.00
V	62	0	0.00	1	161.29	0	0.00	0	0.00	0	0.00
VI	6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Type of surgery											
Elective	8417	71	84.35	23	27.53	17	20.20	6	7.13	4	4.75
Emergency	2190	30	136.99	8	36.53	3	13.70	1	4.57	2	9.13
Type of operation											
General surgery	2751	17	61.80	5	18.17	4	14.54	4	14.54	2	7.27
Cardiovascular surgery	1016	13	127.95	4	3.94	2	19.68	0	0.00	0	0.00
Plastic surgery	535	7	130.84	2	37.38	5	93.46	0	0.00	0	0.00
Pediatric surgery	292	8	273.97	5	171.23	1	34.25	1	34.25	1	34.25
Neurosurgery	477	4	83.86	5	104.82	1	20.96	0	0.00	0	0.00
Orthopedic surgery	1897	8	26.36	1	5.27	2	10.54	1	5.27	1	5.27
Ob Gyn surgery	1786	10	53.30	0	0.00	2	10.66	0	0.00	0	0.00
ENT surgery	1265	27	213.44	8	63.24	3	23.71	0	0.00	2	15.81
Eye surgery	282	5	177.30	1	35.46	0	0.00	1	35.46	0	0.00
Radiological intervention	34	1	294.12	0	0.00	0	0.00	0	0.00	0	0.00
Medical intervention	55	1	181.82	0	0.00	0	0.00	0	0.00	0	0.00
Psychiatric intervention	73	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Dentistry surgery	79	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Pediatric intervention	65	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Period											
Perioperative	10607	76	71.65	11	10.37	20	18.86	7	6.60	6	5.66
Postoperative (PACU)	6436	14	21.75	9	13.98	0	0.00	0	0.00	0	0.00
Postoperative (24 hr)	10607	11	10.37	11	10.37	0	0.00	0	0.00	0	0.00

Table 3. Incidence of cardiovascular complications related to sex, age, ASA physical status, type of surgery, type of operation and place

	Numbers of cases	Death		Cardiac arrest		Myocardial ischemia	
		Cases	Per 10000	Cases	Per 10000	Cases	Per 10000
Total number of cases	10607	37	34.90	47	44.31	2	1.88
Sex							
Male	5141	24	46.68	29	56.41	1	1.95
Female	5466	13	23.70	18	32.93	1	1.83
Aged							
0-1 month	147	4	272.11	4	272.11	0	0.00
1-12 month	338	8	236.69	9	266.27	0	0.00
1-12 years	1245	2	16.06	2	16.06	0	0.00
12-65 years	7628	19	24.91	27	35.40	0	0.00
> 65 years	1249	4	32.03	5	40.03	2	16.01
ASA physical status*							
I	4827	0	0.00	1	2.07	0	0.00
II	4289	4	9.33	10	23.31	2	4.66
III	1183	15	126.80	16	135.25	0	0.00
IV	240	9	3.75	11	458.33	0	0.00
V	62	9	1451.61	9	1451.61	0	0.00
VI	6	0	0.00	0	0.00	0	0.00
Type of surgery							
Elective	8417	9	1.92	16	19.01	2	2.38
Emergency	2190	28	127.85	31	141.55	0	0.00
Type of operation							
General surgery	2751	6	21.81	8	29.08	2	7.27
Cardiovascular surgery	1016	25	246.06	30	295.28	0	0.00
Plastic surgery	535	0	0.00	0	0.00	0	0.00
Pediatric surgery	292	0	0.00	1	34.25	0	0.00
Neurosurgery	477	3	62.89	3	62.89	0	0.00
Orthopedic surgery	1897	0	0.00	1	5.27	0	0.00
Ob-Gyn surgery	1786	1	5.33	2	10.66	0	0.00
Ear nose throat surgery	1265	2	15.81	2	15.81	0	0.00
Eye surgery	282	0	0.00	0	0.00	0	0.00
Radiological intervention	34	0	0.00	0	0.00	0	0.00
Medical intervention	55	0	0.00	0	0.00	0	0.00
Psychiatrically intervention	73	0	0.00	0	0.00	0	0.00
Dentistry surgery	79	0	0.00	0	0.00	0	0.00
Pediatric intervention	65	0	0.00	0	0.00	0	0.00
Period							
Perioperative	10607	13	12.26	23	21.68	1	0.94
Postoperative (PACU)	6436	0	0.00	0	0.00	1	1.55
Postoperative(24 hrs)	10607	24	22.63	24	22.63	0	0.00

The other less common complications were pulmonary aspiration (6.60:10000), esophageal intubation (5.66:10000), coma (4.71:10000), myocardial infarction/ischemia (1.89:10000), transfusion mismatch, anaphylactic reaction and personnel hazards (0.94:10000). Neither total spinal block nor malignant hyperthermia was found.

The most common contributing factor (Table 7) was insufficient knowledge (23.32%). The second-most common contributing factor was 'inappropriate decision' (16.11%). Factors that minimized incidence were experience (23.32%), cautiousness (26.76%) and skilled assistant (15.10%) (Table 8).

The result of anesthetic complications was complete recovery in most of the patients because of early detection and management. Suggested strategies by the site manager to decrease the incidence were experience (29.83%), cautiousness (26.76%), quality assurance (27.39%) and additional training (20.71%).

Discussion

Respiratory incidents were the most common anesthetic complications (as in the present report)[2]; the main incidents being airway and difficult/failed intubation resulting in desaturation[4-7]. This type of incident was common in pediatric surgery, those with

Table 4. Incidence of neurological complications related to sex, age, ASA physical status, type of surgery, type of operation and place

	Numbers of cases	Awareness		Coma		Nerve injury	
		Cases	Per 10000	Cases	Per 10000	Cases	Per 10000
Total number of cases	10607	10	9.43	5	4.71	2	1.89
Sex							
Male	5141	5	9.73	4	7.78	2	3.89
Female	5466	5	9.15	1	1.83	0	0.00
Aged							
0-1 month	147	0	0.00	0	0.00	0	0.00
1-12 month	338	0	0.00	0	0.00	0	0.00
1-12 years	1245	0	0.00	0	0.00	0	0.00
12-65 years	7628	10	131.10	4	52.44	2	26.22
> 65 years	1249	0	0.00	1	8.01	0	0.00
ASA physical status							
I	4827	2	4.14	0	0.00	2	4.14
II	4289	5	11.66	3	6.99	0	0.00
III	1183	3	25.36	2	16.91	0	0.00
IV	240	0	0.00	0	0.00	0	0.00
V	62	0	0.00	0	0.00	0	0.00
VI	6	0	0.00	0	0.00	0	0.00
Type of surgery							
Elective	8417	8	9.50	4	4.75	0	0.00
Emergency	2190	2	9.13	1	4.57	2	9.13
Type of surgery							
General	2751	2	7.27	1	3.63	0	0.00
Cardiovascular	1016	6	59.05	2	19.68	0	0.00
Plastic	535	0	0.00	0	0.00	0	0.00
Pediatric	292	0	0.00	1	34.25	0	0.00
Neuro	477	1	20.96	0	0.00	0	0.00
Orthopedic	1897	0	0.00	0	0.00	2	10.54
OB Gyn	1786	1	5.33	1	5.33	0	0.00
Ear nose throat	1265	0	0.00	0	0.00	0	0.00
Eye	282	0	0.00	0	0.00	0	0.00
Radiological	34	0	0.00	0	0.00	0	0.00
Medical intervention	55	0	0.00	0	0.00	0	0.00
Psychiatrically intervention	73	0	0.00	0	0.00	0	0.00
Dentistry	79	0	0.00	0	0.00	0	0.00
Pediatric intervention	65	0	0.00	0	0.00	0	0.00
Period							
Perioperative	10607	0	0.00	1	0.94	0	0.00
Postoperative (PACU)	6436	0	0.00	1	1.55	0	0.00
Postoperative (24 hr)	10607	10	9.43	3	2.83	2	1.89

a high ASA physical status, emergency conditions, and the perioperative period, especially during induction of anesthesia. Forrest et al reported that they were more common in patients (especially males) with history of cardiac failure, myocardial ischemia or chronic obstructive pulmonary disease, obesity, smoking, high ASA physical status, abdominal surgery[8,9].

Cardiac arrest incidence was 44.31:10000 in the present report, while in other reports it was between 8.2:10000 and 17:10000[5,10]. Forrest et al reported that events were more common in patients with a history of ventricular arrhythmia, hypertension, cardiac failure, myocardial ischemia, old age, cardiovascular and thoracic surgery[8].

Equipment failure complication should be preventable. Madzimbamuto et al reported an incidence of 21.88:10000: including events in elective surgery (i.e. not in emergency) and in the perioperative period[11]. In some reports, human error was a factor in between 50 and 80 percent of incidents[11,12]. Inadequate checking of equipment as a frequent associated factor was reported by Short et al about incidents of airway, breathing systems, and drug administration, with inadequate checking of equipment[12].

Table 5. Incidence of other complications related to sex, age, ASA physical status, type of surgery, type of operation and place

	Numbers of cases	Equipment failure		Drug error		Transfusion mismatch		Anaphylactic reaction		Personnel hazards	
		Cases	Per 10000	Cases	Per 10000	Cases	Per 10000	Cases	Per 10000	Cases	Per 10000
Total number of cases	10607	21	19.80	13	12.26	1	0.94	1	0.94	1	0.00
Sex											
Male	5141	11	21.40	8	15.56	1	1.95	0	0.00	0	0.00
Female	5466	10	18.29	5	9.15	0	0.00	1	1.83	0	0.00
Aged											
0-1 month	147	1	68.03	1	68.03	0	0.00	0	0.00	0	0.00
1-12 month	338	0	0.00	1	29.59	0	0.00	1	29.59	0	0.00
1-12 years	1245	3	24.10	5	40.16	0	0.00	0	0.00	0	0.00
12-65 years	7628	13	17.04	6	7.87	0	0.00	0	0.00	0	0.00
> 65 years	1249	4	32.03	0	0.00	1	8.01	0	0.00	0	0.00
ASA physical status											
I	4827	6	12.43	7	14.50	0	0.00	0	0.00	0	0.00
II	4289	13	30.31	6	13.99	1	2.33	1	2.33	0	0.00
III	1183	2	16.91	0	0.00	0	0.00	0	0.00	0	0.00
IV	240	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
V	62	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
VI	6	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Type of surgery											
Elective	8417	21	95.89	12	14.26	1	1.19	1	1.19	1	1.19
Emergency	2190	0	0.00	1	9.13	0	0.00	0	0.00	0	0.00
Type of surgery											
General	2751	5	18.18	4	14.54	1	3.63	0	0.00	0	0.00
Cardiovascular	1016	3	29.53	2	19.68	0	0.00	0	0.00	0	0.00
Plastic	535	1	18.69	1	18.68	0	0.00	0	0.00	0	0.00
Pediatric	292	0	0.00	1	34.25	0	0.00	0	0.00	0	0.00
Neuro	477	1	20.96	0	0.00	0	0.00	1	20.96	0	0.00
Orthopedic	1897	2	10.54	2	10.54	0	0.00	0	0.00	0	0.00
Ob-Gyn	1786	3	15.99	1	5.33	0	0.00	0	0.00	1	5.33
Ear nose throat	1265	4	31.62	1	7.90	0	0.00	0	0.00	0	0.00
Eye	282	2	70.92	1	35.46	0	0.00	0	0.00	0	0.00
Radiologic intervention	34	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Medical intervention	55	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Psychiatric intervention	73	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Dentistry	79	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Pediatric intervention	65	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Period											
Perioperative	10607	21	19.80	12	11.31	1	0.94	1	0.94	1	0.94
Postoperative (PACU)	6436	0	0.00	1	1.55	0	0.00	0	0.00	0	0.00
Postoperative (24 hr)	10607	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Table 6. Long-term outcome after complication

Long-term outcome	Incidence (n)										
	Esophageal intubation (%)	Reintubation (%)	Desaturation (%)	Pulmonary aspiration (%)	Difficult intubation (%)	Myocardial ischemia (%)	Cardiac arrest (%)	Coma (%)	Awareness (%)	Drug error (%)	Equipment failure (%)
Hospital stay after event	0	25.0	13.16	28.57	10	0	5.88	0	0	13.33	0
Unplanned ICU admission	0	17.5	4.38	0.00	0	50	11.76	0	0	0.00	0
Psychic trauma	0	2.5	0.88	0.00	0	0	0.00	0	0	0.00	0
Disability	0	2.5	0.88	0.00	0	0	0.00	60	0	0.00	0
Brain death	0	0.0	0.00	0.00	0	0	0.00	0	0	0.00	0
Death	0	2.5	1.75	0.00	0	0	72.55	0	0	6.67	0
Others morbidity	0	20.0	0.88	0.00	0	0	0.00	0	0	13.33	0
Complete recovery	100	30.0	78.07	71.43	90	50	9.81	40	100	66.67	100
Number (n)	6	31	101	7	20	2	47	5	10	13	21

Table 7. Contributing factors

Contributing factor	Proportion (%)
Insufficient knowledge	23.32
Poor judgment	16.11
Emergency condition	12.50
Poor patient preparation	10.82
Inefficient equipment	10.10
Inexperience	9.61
Haste	8.17
No enough equipment	5.77
Communication problem	2.88
Unfamiliar place and environment	0.48
Unskilled personnel	0.24
Total	100.00

Table 8. Factors minimizing incidence

Factors minimizing incidence	Proportion (%)
Good experience	29.83
Caution	26.76
Skilled assistant	15.10
Adequate equipment	5.69
Equipment check-up	5.69
Good communication	5.50
Equipment maintenance	4.92
Consultation	2.68
Training improvement	2.49
Adequate personnel to rest	1.34
Total	100.00

Table 9. Suggested corrective strategies

Suggested corrective strategies	Proportion (%)
Quality assurance activity	27.39
Additional training	20.71
Improved supervision	19.60
Practice using guidelines	7.13
Equipment maintenance	6.46
Improved communication	6.24
More manpower	6.01
Loss data correction	5.57
Good referral system	0.89
Total	100.00

Difficult airway incidence was 18.86:10000. Webb et al reported an incidence of between 13:10000 and 15:10000[5]. The most important point was to identify the patients at risk and the plans for management of a difficult airway.

Arbous et al reported the incidence of death related to anesthesia in the 24-hour postoperative ranged between 1.4:10000 and 8.8:10000. Most cases were associated with cardiovascular involvement[13]. In the present study, the incidence was 34.88:10000 but the absolute association with anesthesia or surgery could not be concluded.

Pediatric anesthesia had more incidence than any other type. Most incidents happened in healthy children scheduled for elective surgery. But critical incidents in infants under 1 year of age occurred four times more frequently than in older children[14]. Sinclair et al reported obstetric anesthesia was over-represented with respect to accidental dural puncture, post-dural puncture headache, failed intubation in emergency situations and the incidence of certain types of "wrong drug" error[15]. However, the present survey did not show the same increased trend.

Kluger et al reported that the most common presenting problems in the recovery room are related to respiratory/airway issues, cardiovascular problems and drug errors as did the authors[16]. In some reports, one-half of the incidents were detected by anesthetists and one-third by monitoring equipment[12].

The most common contributing factor was insufficient knowledge. This is not uncommon in medical schools; therefore, practice guidelines are in place to guide the practice of less experienced personnel. Guidelines would be useful for this category as well. In other reports, contributing factors included errors in judgment, communication failure and inadequate pre-operative preparation[16], inadequate supervision of juniors, stress, poor morale, drug shortages, poor equipment and electrical power failure[11].

Comparable to other reports, most of the incidents were considered preventable[16-19]. The use of pulse oximetry and/or capnography could have prevented 18% of all complications apart from dental injuries[19]. More sophisticated risk assessments had so far failed to more accurately predict than the well-established ASA grading system[20]. The discovery of common incidents can be used to identify risk factors and minimize repetition of such incidents[4].

Human error was a major cause of complications and was identified as the main factor contributing to the occurrence of adverse incidents[4]. Human error contributed to more than one-half of the incidents in some reports[6,18,21]; therefore, human error could not be prevented simply by increased reporting without improvements to the reporting system[5].

However, reporting is a main factor in studying incidence. Common concerns with the system included a need to simplify the reporting process and to ensure that information is managed to provide a useful outcome[2]. Physician self-reporting is the most reliable method[6,22]. As in the present study, reporting was the main mechanism to validate incidence. The authors' self report form may have less compliance and be more complicated. In order to improve compliance, the incident report forms should be made available on each anesthesia machine and the staff should be made more aware of the fact that reportable incidents are not limited to events which harm the patient, but include events which might affect patient safety in any way[23]. Compliance was high with more serious events and poor in the case of common events, or when successful recovery had occurred[22]. "No blame" and/or "anonymous reporting" have been observed to increase reporting[23]. The authors next focus should be on the common causes of claims and minor adverse events[24], in order to identify the factors that improve the quality of anesthesia.

Acknowledgment

The authors wish to thank Mr. Bryan Roderick Hamman for assistance with the English-language presentation of the manuscript.

References

1. Cohen MM, Duncan PG, Pope WD, Biehl D, Tweed WA, MacWilliam L, et al. The Canadian four-centre study of anaesthetic outcomes: II. Can outcomes be used to assess the quality of anaesthesia care? Can J Anaesth 1992; 39: 430-9.
2. Yong H, Kluger MT. Incident reporting in anaesthesia: a survey of practice in New Zealand. Anaesth Intensive Care 2003; 31: 555-9.
3. Pausawasdi S. Morbidity and mortality of anaesthesia in Thai patients. J Med Assoc Thai 1986; 69: 407-14.
4. Choy YC, Lee CY, Inbasegaran K. Anaesthesia incident monitoring study in Hospital Kuala Lumpur - the second report. Med J Malaysia 1999; 54: 4-10.
5. Webb RK, Currie M, Morgan CA, Williamson JA, Mackay P, Russell WJ, et al. The Australian incident monitoring study: an analysis of 2000 incident reports. Anaesth Intensive Care 1993; 21: 520-8.
6. Katz RI, Lagasse RS. Factors influencing the reporting of adverse perioperative outcomes to a quality management program. Anesth Analg 2000; 90: 344-50.

7. Raksakietisak M, Chinachoti T, Vudhikamraksa S, Svastdi-Xuto O, Surachetpong S. Perioperative desaturation: incidence, causes, management and outcome. J Med Assoc Thai 2002; 85(Suppl 3): S980-6.
8. Forrest JB, Rehder K, Cahalan MK, Goldsmith CH. Multicenter study of general anesthesia. III. Predictors of severe perioperative adverse outcomes. Anesthesiology 1992; 76: 3-15.
9. Tritrakarn T, Lertakyamanee J. Perioperative myocardial infarction in Thai patients; mortality and morbidity following anesthesia and surgery. J Med Assoc Thai 1988; 71: 593-601.
10. Aroonpruksakul N, Raksakiatisak M, Thapenthai Y, Wangtawesaup K, Chaiwat O, Vacharaksa K, et al. Perioperative cardiac arrest at Siriraj Hospital between 1999-2001. J Med Assoc Thai 2002; 85(Suppl 3): S993-9.
11. Madzimbamuto FD, Chiware R. A critical incident reporting system in anaesthesia. Cent Afr J Med 2001; 47: 243-7.
12. Short TG, O'Regan A, Lew J, Oh TE. Critical incident reporting in an anaesthetic department quality assurance programme. Anaesthesia 1993; 48: 3-7.
13. Arbous MS, Grobbee DE, van Kleef JW, de Lange JJ, Spoormans HH, Touw P, et al. Mortality associated with anaesthesia: a qualitative analysis to identify risk factors. Anaesthesia 2001; 56: 1141-53.
14. Tay CL, Tan GM, Ng SB. Critical incidents in paediatric anaesthesia: an audit of 10000 anaesthetics in Singapore. Paediatr Anaesth 2001; 11: 711-8.
15. Sinclair M, Simmons S, Cyna A. Incidents in obstetric anaesthesia and analgesia: an analysis of 5000 AIMS reports. Anaesth Intensive Care 1999; 27: 275-81.
16. Kluger MT, Bullock MF. Recovery room incidents: a review of 419 reports from the Anaesthetic Incident Monitoring Study (AIMS). Anaesthesia 2002; 57: 1060-6.
17. Short TG, O'Regan A, Jayasuriya JP, Rowbottom M, Buckley TA, Oh TE. Improvements in anaesthetic care resulting from a critical incident reporting programme. Anaesthesia 1996; 51: 615-21.
18. Chinachoti T, Suraseranivongse S, Valairucha S, Tritrakarn T. Quality assessment of anesthesia service at Siriraj Hospital. J Med Assoc Thai 2002; 85(Suppl 3): S866-74.
19. Wang LP, Hagerdal M. Reported anaesthetic complications during an 11-year period. A retrospective study. Acta Anaesthesiol Scand 1992; 36: 234-40.
20. Derrington MC, Smith G. A review of studies of anaesthetic risk, morbidity and mortality. Br J Anaesth 1987; 59: 815-33.
21. Chopra V, Bovill JG, Spierdijk J, Koornneef F. Reported significant observations during anaesthesia: a prospective analysis over an 18-month period. Br J Anaesth 1992; 68: 13-7.
22. Jayasuriya JP, Anandaciva S. Compliance with an incident report scheme in anaesthesia. Anaesthesia 1995; 50: 846-9.
23. James RH. 1000 anaesthetic incidents: experience to date. Anaesthesia. 2003; 58: 856-63.
24. Cass NM. Medico legal claims against anaesthetists: a 20 year study. Anaesth Intensive Care 2004; 32: 47-58.

การเฝ้าระวังภาวะแทรกซ้อนทางวิสัญญีในโรงพยาบาลศรีนครินทร์ คณะแพทยศาสตร์ มหาวิทยาลัยขอนแก่น ประเทศไทย

พลพันธ์ บุญมาก, สุหัทยา บุญมาก, เทพกร สาธิตการมณี, วราภรณ์ เชื้ออินทร์, ดวงธิดา นนท์เหล่าพล, มณีรัตน์ ธนานันต์

วัตถุประสงค์: *ศึกษาอัตราการเกิดภาวะแทรกซ้อนทางวิสัญญีวิทยาในโรงพยาบาลศรีนครินทร์ คณะแพทยศาสตร์ มหาวิทยาลัยขอนแก่นในปีพ.ศ.2546 เพื่อหาทางแก้ไขและป้องกันการเกิดภาวะแทรกซ้อนที่สามารถหลีกเลี่ยงได้*

วัสดุและวิธีการ: *การศึกษานี้เป็นส่วนหนึ่งของการศึกษาการเฝ้าระวังภาวะแทรกซ้อนทางวิสัญญีในประเทศไทยของราชวิทยาลัยวิสัญญีวิทยาแห่งประเทศไทย เพื่อหาภาวะแทรกซ้อนทางวิสัญญีวิทยาในประเทศไทย การศึกษานี้ทำการรวบรวมข้อมูลในส่วนของโรงพยาบาลศรีนครินทร์ คณะแพทยศาสตร์ มหาวิทยาลัยขอนแก่น ตั้งแต่ 1 มกราคม ถึง 31 ธันวาคม พ.ศ. 2546 รายงานข้อมูลภาวะแทรกซ้อนที่พบบ่อยและศึกษาหาปัจจัยที่เกี่ยวข้อง โดยมีรูปแบบการวิจัยแบบ prospective และ descriptive study เมื่อมีภาวะแทรกซ้อนเกิดขึ้นจะถูกรายงานโดยบุคลากรทางวิสัญญีวิทยา โดยภาวะแทรกซ้อนแบ่งออกเป็น 4 ระบบ คือ ระบบทางเดินหายใจ ระบบไหลเวียนโลหิต ระบบประสาท และระบบอื่น ๆ ซึ่งแต่ละส่วนจะได้รับการบันทึกข้อมูลตามคู่มือการลงข้อมูลโดยผู้ประสบเหตุการณ์ และตรวจสอบซ้ำโดยผู้ร่วมวิจัยหลัก*

ผลการศึกษา: *ผู้ป่วยที่ได้รับการวางยาระงับความรู้สึกทั้งสิ้น 10,607 ราย มีภาวะแทรกซ้อนเกิดขึ้น 268 ครั้ง ภาวะแทรกซ้อนที่พบบ่อยที่สุด (ต่อ 10,000 ราย) คือ ภาวะความเข้มข้นของออกซิเจนในเลือดแดงต่ำ (95.22) ภาวะหัวใจหยุดเต้น (44.31) การใส่ท่อหายใจซ้ำ (29.23) อุปกรณ์ทำงานบกพร่อง (19.8) การใส่ท่อหายใจลำบาก (18.86) โดยมีปัจจัยที่ส่งเสริมคือ ขาดความรู้ และตัดสินใจไม่เหมาะสม ส่วนแนวทางการแก้ไข คือ การจัดให้มีการประกันคุณภาพบริการ การมีการฝึกอบรมอย่างต่อเนื่อง การจัดให้มีการฝึกอบรมเพิ่มเติมอย่างต่อเนื่อง*

สรุป: *ในขณะที่มีแนวทางปฏิบัติเพื่อป้องกันภาวะแทรกซ้อนจากการปฏิบัติงานของภาควิชาวิสัญญีวิทยาที่โรงพยาบาลศรีนครินทร์ แต่ก็ยังพบภาวะแทรกซ้อนเกิดขึ้น และที่พบบ่อยที่สุด ได้แก่ ภาวะแทรกซ้อนที่เกี่ยวข้องกับระบบทางเดินหายใจ ดังนั้นการพัฒนาบุคลากรด้านวิสัญญีวิทยาอย่างต่อเนื่องจึงเป็นสิ่งจำเป็น*