Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 12s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

A Comparison of Incidence and Factors Associated with Postanesthesia Care Unit Complication in Adult and Paediatric Patients

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Cite this paper as: Mrs. Gnana Nisha Juliet. A, Dr. Kalpana Devi V, Mrs. Janani Gunasekaran, Mrs. Divya Bharathi.P, Mrs. Seethalakshmi. N, Ms. Keerthana. M.S, (2025) Comparison Of Modified Lequesne's False Profile View with Routine Hip Ap to Rule Out Dynamic Hip Instability. *Journal of Neonatal Surgery*, 14 (12s), 756-763

ABSTRACT

Background: A post-anaesthesia care unit (PACU) provides specialized treatment to patients following surgery. The PACU is staffed by competent nurses who recognize patient issues during postoperative and rapid management. The most common PACU complications were respiratory, cardiovascular, and hypothermia. Post-operative nausea and vomiting, as well as the central nervous system. This complication may differ between adult and paediatric patients, depending on ASA grade, age, medication history, anaesthetic agents, type of surgery, duration of operation, intraoperative blood loss, fluid administration, hemodynamic instability, and so on. In the post-anaesthetic care unit, measures are carried out to ensure that the patient is carefully treated following surgery, such as recognizing and treating early anaesthesia and surgery problems before they become life-threatening. Recovering from anaesthesia, decreasing surgical mortality, and delivering high-quality care.

Methods: The study was conducted at A.C.S Medical College & Hospital in Chennai, with a quantitative technique and an observational study research design. Data collection and analysis were conducted on a sample of 100 patients (50 adult and 50 paediatric), utilizing questionnaires. The study excluded patients who were admitted directly to the ICU or ward.

Result: This study had 100 participants, with 50% being paediatrics and 50% being adults. We found significant differences in various PACU complications criteria, including difficulty breathing, postoperative nausea and vomiting, and operation length (p-value > 0.05). The majority of cases were paediatric rather than adult. In the post-anaesthesia care unit, there was a significant difference in post-operative pain assessments between groups, type of anaesthesia, and insomnia following surgery (p-value > 0.05).

Conclusion: This study compares the incidence of post-anaesthesia care unit complications in adult and juvenile patients. The findings clearly indicate that adolescent patients in the post-anaesthesia care unit were more problematic than adult patients. Based on our findings, we recommend the post-anaesthesia care unit team needs to develop area-specific institutional guidelines and protocols to improve the patients' quality of care and outcomes in post-anaesthesia care unit. Improved post-anaesthesia care for paediatric patients may reduce complications, length of hospital stays, and psychological distress.

Keywords: *postanaesthesia care unit complications, PONV, Pediatric patients..*

1. BACKGROUND

In a post-anaesthesia care unit (PACU), patients receive specialized postoperative care. In the post-anaesthesia care unit, actions are carried out to ensure that the patient is carefully treated following surgery, such as recognizing and treating early

anaesthetic and surgery issues before they become life-threatening. Recovering from anaesthesia, decreasing surgical mortality, and delivering high-quality care. Respiratory, cardiovascular, and hypothermia were the most commonly reported PACU complications. Postoperative nausea and vomiting, as well as the central nervous system. This complication may differ between adult and paediatric patients depending on their ASA grade, age, history of medications, anaesthetic drugs, kind of surgery, duration of operation, intraoperative blood loss, fluid administration, hemodynamic instability, and so on.[1] Globally, an estimated 230 million surgical procedures are conducted each year. Nearly 18% of surgical patients experience a serious postoperative problem. Many issues might develop in the postoperative anaesthesia care unit (PACU). According to statistics, the three most prevalent complications were airway events, hemodynamic instability, and postoperative nausea and vomiting (PONV)[2]. Several factors affect the incidence of postoperative complications, including surgical procedures. In general, the risk factors or complications are more affected by health and the type of anaesthesia used than by the procedure. Smoking, high blood pressure, obesity, diabetes, stroke, seizures, obstructive sleep apnoea, any kidney, lung, or heart disease condition, drug allergies, anticoagulants, a history of GA allergy, and poor nutrition can all be risk factors for anaesthesia. Nowadays, due to the discovery of modern anaesthetic techniques and sophisticated monitoring equipment, safe anaesthetic agents have markedly reduced anaesthetic risk. However, morbidity and mortality rates are declining; the incidence of minor and more common complications has not changed significantly. Common side effects include vomiting, dry mouth, sore throat, nausea, muscle aches, itching, shivering, sleepiness, mild hoarseness, mild dysphagia, drowsiness, dental damage, peripheral nerve injury, and superficial thrombosis. [3] The postoperative complications in children are unknown. Complications are more likely in children under three years old and in babies. Postoperative complications have been significantly reduced with the introduction of monitors, particularly the pulse oximeter, into clinical practice. The availability of newer, faster-acting medications such as sevoflurane, desflurane, and propofol has further lowered the frequency of problems by allowing for faster recovery. However, problems such as laryngospasm and the onset of delirium (ED) are more common with inhalational drugs.[5]

RESPIRATORY COMPLCATIONS:

Postoperative respiratory complications have multiple etiologies, are commonly occurring, and are potentially life-threatening complications of anaesthesia. Adverse outcomes associated with respiratory complications are a leading cause of malpractice claims. Appropriate response to respiratory complications in the post-anaesthesia care unit (PACU) involves early intervention, the development of a differential diagnosis, and an organised approach to pulmonary support and patient disposition. [6]

Definition:

Respiratory complications that occur within 48–72 h following surgery. After surgery, respiratory conditions can adversely affect the patient's clinical course. Any pulmonary abnormality occurring in the post-operative period that produces identifiable disease or dysfunction that is clinically significant and adversely affects the clinical course. [7]

CARDIOVASCUAR COMPLICATION:

Cardiac complications occurring in the post-anaesthetic care unit (PACU) are typically due to hypotension, hypertension, and dysrhythmias. Patients with known coronary artery disease or congestive heart failure are more prone to these complications after a surgical procedure. [8]

Hypotension: Myocardial ischemia with acute heart failure and ventricular or valvular dysfunction can also lead to hypotension. This may be associated with tachycardia and ST segment changes on electrocardiogram decreased intravascular volume, or hypervolemia is due to inadequate intravenous fluid administration or blood loss. Patients can be resuscitated with crystalloids, colloids, and various blood products. If fluid resuscitation is inadequate to perfuse end organs, then vasopressors and inotropes should be added. [8]

Hypertension: Pain is a common cause of hypertension in the PACU. Surgical trauma and pain cause increased sympathetic tone leading to hypertension and tachycardia. Hypercarbia from respiratory failure also leads to hypertension. Treatment includes promoting effective gas exchange via invasive or non-invasive, positive pressure ventilation. Urinary retention and bladder distension are a common cause of hypertension in the PACU. It is more common after inguinal hernia repair, neuraxial anesthesia, and in elderly men with prostatic obstruction. Patients may require bladder catheterization. Patients, who remain intubated in the PACU, if not adequately sedated, may become hypertensive from irritation of the endotracheal tube.

Arrhythmias: It can be occurring in PACU and some can be life threatening. If cardiac arrest should occur, PACU treatment may have to be tailored to accommodate surgical incisions. Thorough review of current Advance Cardiac Life Support (ACLS) algorithms should be reviewed. [8]

POSTOPERATIVE NAUSEA&VOMITING:

Post-operative nausea and vomiting (PONV) is a major cause of morbidity, including patient suffering, prolonged hospital stay, dehydration, electrolyte disturbances, increased bleeding, wound dehiscence, graft failure, aspiration, and oesophageal

rupture.[13]

Postoperative nausea and vomiting usually summarized as PONV remain one of the most common and distressing complications after surgery. Post-operative nausea and vomiting can be prevented and treated through a set of measures ranging all the way from pre-admission to post-operative care. The most common minor post-operative side effects include nausea, vomiting, sore throat or dental issues from the usage of endotracheal intubation, shivering and sleepiness. Nausea is a state of discomfort often followed by the expulsion of stomach contents, also known as vomiting. [11]

TREATMENT:

These measures are the use of antiemetic medicine throughout the care and proper hydration through I.V. fluids. In the post-operative phase, depending on the circumstance, the patient can be kept Nil per oral (NPO), nothing by mouth, to prevent further nausea, although the use of ice chips will aid in the prevention. [11]

POST-OPERATIVE PAIN:

Pain has been defined as 'an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage' commonly, post-operative pain is caused by surgical factors. Post-operative patients are also at an increased risk of non-surgical complications. Scoring systems include numerical scales (0–3 or 0–10), verbal rating scales (mild/moderate/severe), and visual scales. Paediatric pain severity can be estimated using pictorial scales and behavioural assessment scales. [13]

The FACES scale is a visual tool for assessing pain with children and others who cannot quantify the severity of their pain on a scale of 0 to 10 Rating Scale. "Face 0 doesn't hurt at all. Face 2 hurts just a little. Face 4 hurts a little more. Face 6 hurts even more. Face 8 hurts a whole lot. Face 10 hurts as much as you can imagine, although you don't have to be crying to have this worst pain."[9]

Hypothermia:

The overall incidence of postoperative hypothermia around the world ranged from 6–80%. The definition of hypothermia is an involuntary drop in body temperature below 35^0C. Symptoms will vary depending on the severity of hypothermia. Severity is defined based on core temperature as mild (32^0C to 35^0C), moderate (28^0C to 32^0C), and severe (under 28^0C), with some experts also categorizing certain individuals with profound (less than 24^0C) hypothermia. More severe symptoms, morbidity, and mortality are associated with worsening degrees of hypothermia. Hypothermia may also be due to drugs like general anaesthetics, beta-blockers, meperidine, clonidine, neuroleptics, and alcohol. Primary hypothermia &Secondary Hypothermia are two classifications. Paediatric patients are more prone to hypothermia (shivering) [10]

Hemodynamic Instability:

In the post anesthesia care unit can result in serious complications. It is an independent risk factor of long-term patient morbidity and prolonged hospital stay. The incidence of hemodynamic instability in the post anesthesia care unit as 21.1%–56.5%. In general, the incidence of hemodynamic instability was high. The preoperative use of beta-blockers, intraoperative HDI, ASA class III, post-operative respiratory adverse events, neurologic and gynaecologic procedures, use of regional anesthesia and prolonged duration of procedures were predictors of hemodynamic instability in the post-anesthesia care unit.[2]

2. METHODS:

The study is performed to analysis the post anaesthesia complications in surgical patients. The study was conducted at the A.C.S Medical College & Hospital using a quantitative approach and observation study research design. A sample of 100 patients (50 Adult and 50 paediatric), using questionnaires, was selected for data collection and analysis. The study excluded patients those who are directly admitted to ICU & Ward. During the data collection phase, the subjects were asked to sign an informed consent form. Confidentiality and anonymity of the responses were assured. Data were collected by observation study and questions method in Performa using g-form and for Paediatric patient's questions asked to the parents and Nurses. The study includes two sections, the first section contains - Demographic variables and second section included - The scales for interpretation of pain scale, postoperative nausea &vomiting score (structured), respiratory complications, cardiovascular complications and central venous system complications are used.

STATISTICAL ANALYSIS:

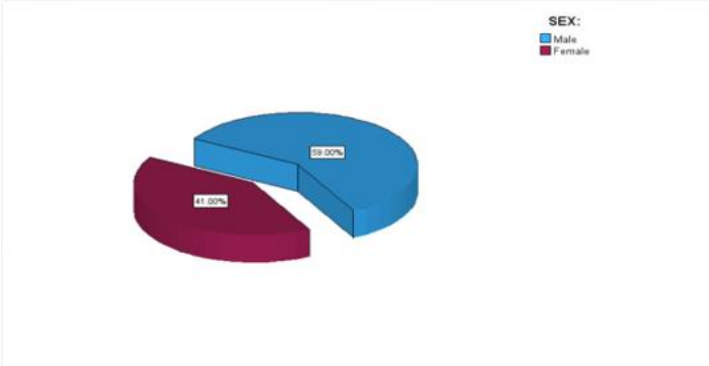
Statistical analysis was carried out using SPSS. Among the nominal variables, the number and percentage were presented. Chi-square test and descriptive statistics method used to analyse the collected data and the probability of belonging to the aware or unaware groups. A significance level of $p<0.05$ was used.

3. RESULT:

This study included 100 participants, half of them were paediatrics and the other half were adults. The majority (22% of

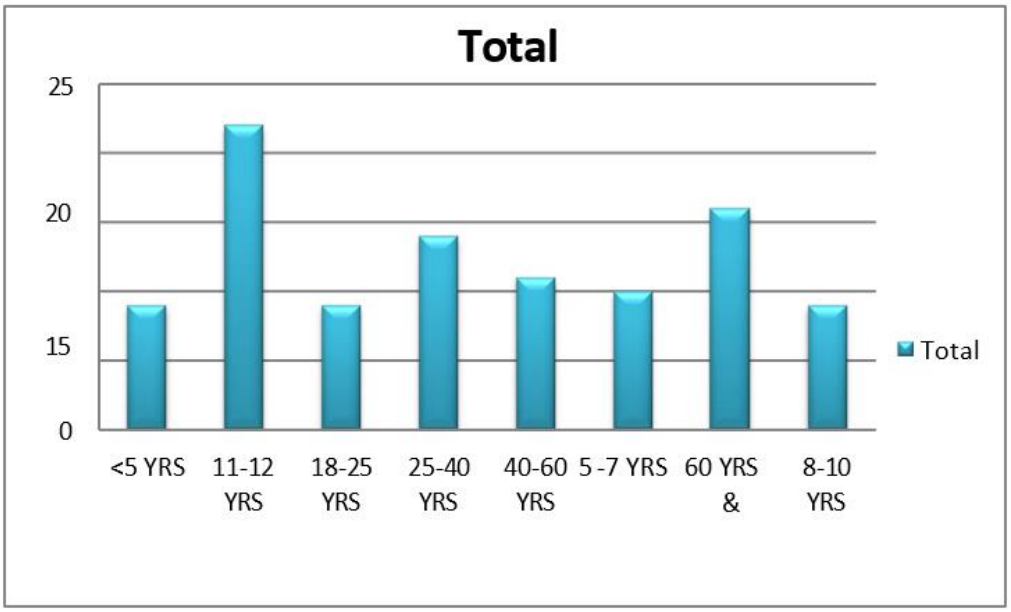
them) were in the age group 11-12 years, followed by 16% in the group 60 years and above, 14% in the group 25-40 years, 11% in the group 40-60 years, 10% in the group 5-7 years, and 9% in the groups <5 years, 8-10 years, and 18-25 years old. (Graph 1) Adults account for 36% of the participants' pre-medical history, while children account for 25% and adults for 35% (Graph 2). According to our findings, respiratory and airway disorders, particularly difficulty breathing, accounted for 17.7% of PACU issues, which is statistically significant.

DISTRIBUTION OF PATIENT GENDER:



Graph 1: Represent the percentage of gender Female (41%) and where Male (59%) is more.

DISTRIBUTION OF PATIENT AGE:



Graph 2: Represent the Number of Age where 11-12 years is more.

Postoperative nausea and vomiting are statistically significant parameters (p = 0.01**), and surgery duration (p = 0.02**). In comparison to adults, the majority of cases were paediatric. In the post-anaesthesia care unit, there was a significant difference in post-operative pain assessments between the groups (p=0.04*), type of anaesthesia (p=0.03*), and sleeplessness following surgery in PACU (p=0.02**). There was no significant difference in the kind of operation in the post-anaesthesia care unit (p=0.76), intraoperative complication (p=0.82), pain swelling around IV in PACU (p=0.15), shivering in PACU (p=0.84), or cardiovascular difficulties in PACU (p=0.33). Monitoring was complicated (p=0.16). Table 1&2.

Table 1: Distribution Of Hemodynamic Variables

	CATEGORIES	**PAEDIATRIC**		**ADULT**	
		FREQUENCY		**FREQUENCY**	
		(n)	**(%)**	**(n)**	**(%)**

VITALS	**BLOOD PRESSURE**	BEFORE ANAESTHIA	Hypertension	15	30%	6	12%
			Hypotension	20	40%	3	6%
			Normal Range	15	30%	41	82%
		INTROPERATVIE ANAESTHIA	Hypertension	5	10%	9	18%
			Hypotension	20	40%	14	28%
			Normal Range	25	50%	27	54%
		POST-ANAESTHESIA ANAESTHIA	Hypertension	1	2%	7	14%
			Hypotension	6	12%	7	14%
			Normal Range	43	86%	36	72%
	TEMPERATURE	BEFORE ANAESTHIA	Hyperthermia	6	12%	0	0%
			Hypothermia	8	16%	0	0%
			Normal Range	36	72%	50	100%
		INTROPERATVIE ANAESTHIA	Hyperthermia	4	8%	2	4%
			Hypothermia	15	30%	8	16%
			Normal Range	31	62%	40	80%
		POST-ANAESTHESIA ANAESTHIA	Hyperthermia	6	12%	7	14%
			Hypothermia	6	12%	5	10%
			Normal Range	38	76%	38	76%
	HEART RATE	BEFORE ANAESTHIA	Bradycardia	6	12%	3	6%
			Normal Range	27	54%	44	88%
			Tachycardia	17	34%	3	6%
		INTROPERATVIE ANAESTHIA	Bradycardia	12	24%	2	4%
			Normal Range	32	64%	44	88%
			Tachycardia	6	12%	4	8%
		POST-ANAESTHESIA ANAESTHIA	Bradycardia	2	4%	4	8%
			Normal Range	42	84%	41	82%
			Tachycardia	6	12%	5	10%
	SATURATION	BEFORE ANAESTHIA	<90%	5	10%	2	4%
			90-95%	8	16%	4	8%
			95-100%	37	74%	44	88%
		INTROPERATVIE ANAESTHIA	<90%	2	4%	1	2%
			90-95%	5	10%	3	6%
			95-100%	43	86%	46	92%
		POST-ANAESTHESIA	<90%	0	0%	1	2%
			90-95%	1	2%	0	0%

		ANAESTHIA	95-100%	49	98%	49	98%

QUESTIONS		**ADULT**	**PAEDIATRIC**	**CHI SQUARE TEST**
Have you experienced any pain after surgery?	No Hurts	12	4	0.04
	Hurts	20	15	
	More Hurts	12	18	
	Hurts Even More	5	5	
	Hurts Lot	1	5	
	Hurts Worst	0	3	
Type of surgery	Emergency	7	6	0.76
	Elective	43	44	
Duration of surgery	<2hrs	31	25	0.02
	3hrs	11	22	
	4hrs	3	3	
	>6hrs	5	0	
Have you felt any nausea & vomiting?	No Nausea and Vomiting	9	5	0.01
	Nausea Present and No Vomiting	27	33	
	Present Nausea and Vomiting	14	12	
Intra operative complications	No	35	36	0.82
	Yes	15	14	
Types of Anesthesia	GA	27	44	0.03
	CSE	2	0	
	EA	2	0	
	LA	2	0	
	SA	17	5	
	TIVA	0	1	
Do you feel any difficulty in breathing?	No	22	11	0.01
	Yes	23	39	
Is there any pain or swelling around IV?	No	34	27	0.15
	Yes	16	23	
Is there any shivering after surgery (Hypo/Hyper Thermia)?	No	26	25	0.84
	Yes	24	25	

Do you feel and cardio vascular problems?	No	46	43	0.33
	Yes	4	7	
Is there any complication in monitoring?	Unstable	9	15	0.16
	Stable	41	35	
Do you feel any sleeplessness after surgery?	No	12	4	0.02
	Yes	38	46	
Is there any bleeding or wound infection in surgery site?	No	36	46	0.09

4. DISCUSSION

- In a total of 100 post-anaesthesia patients, 50 (Adult patients) and 50 (paediatric patients) had undergone to the surgery they are observed in post-anaesthesia care unit.
- They are selected by random sampling technique. Informed and written consent was gained. Demographic data are collected. Then the patients were asked questions and noted in G-form and rate their pain using pain scale and post-operative nausea and vomiting using the PONV impact score scale.
- Cardiovascular complication, Paediatric patients have a greater risk of cardiovascular complications than adult patients. Bradycardia and tachycardia are more prevalent in paediatric patients than in adults. Adults have higher levels of hypertension than children, and both groups have a high incidence of hypotension. Oxygen saturation has normal values in both adult and paediatric patients.
- Respiratory complications: paediatric patients have more difficulty breathing than adults. Difficulty in breathing in the post-anaesthesia care unit; there was a significant difference in post-operative respiratory measurements between the groups ($p = 0.01^{**}$). These findings are consistent with earlier research (Incidence and variables related with post-anaesthesia care unit complication in resource-limited setting: An observational study) Bisrat abdede et al (1). The rate of complications among surgical patients admitted to the PACU was 54.8%. The most prevalent PACU problems were respiratory-related and postoperative nausea/vomiting. Females had a considerably higher risk of experiencing PACU problems.
- The patients were asked to rate their postoperative pain using VAS to rate the pain. Paediatric patients have the worst pain compared to adult patients. Paediatric patients hurt a lot more compared to adult patients. Adult and paediatric pain scale in the post-anaesthesia care unit, there was a significant difference in post-operative pain measurements between the groups ($p = 0.04^{*}$).
- Postoperative nausea and vomiting: Compared to the PONV impact score scale, adult patients have more vomiting and nausea than juvenile patients, who have more nausea but no vomiting. Postoperative nausea and vomiting in the post-anaesthesia care unit showed a significant difference between the groups ($p = 0.01^{**}$). Post-operative shivering is a little higher in paediatric patients than adult patients.
- Postoperative infection is higher in adult patients than paediatric patients.
- Sleeplessness after surgery in the post-anaesthesia care unit Most of the paediatric patients answered yes compared to the adult patients; there was a significant difference in postoperative measurements between the groups ($p = 0.02^{**}$). In this finding Paediatric patients are more likely than adults to develop post-anaesthesia care unit problems.

5. CONCLUSION

This study compares the incidence of post-anaesthesia care unit complications in adult and juvenile patients. The identified risk factors for complications in surgical patients admitted to the post-anaesthesia care unit are adult and paediatric patients, where general anaesthesia patients are higher in both groups and elective procedures are higher in both groups. The findings clearly indicate that adolescent patients in the post-anaesthesia care unit were more problematic than adult patients. Patients who developed complications had a long stay in the post-anaesthesia care unit. Based on our findings, we recommend the post-anaesthesia care unit team needs to develop area-specific institutional guidelines and protocols to improve the patients'

quality of care and outcomes in post-anaesthesia care unit. Improved post-anaesthesia care for paediatric patients may reduce complications, length of hospital stays, and psychological distress.

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