

Evaluation of Perioperative outcomes of Delayed Recovery Cases from GA and their Correlation with Standard Anaesthesia Scoring Systems: An Observational Study

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Abstract

Context: The critical period for a patient who was given general anaesthesia is the time during immediate recovery from anaesthesia. The PACU is a dynamic entity that greatly benefits the delayed recovery patients from research directed interventions to guide the next level of care for post-operative health status. **Aim:** The aim of this study is to determine peri-operative risk factors, morbidity and mortality of delayed recovery cases and correlate the outcomes of these patients with ASA physical status and Modified Aldrete's recovery scores in the Post Anaesthesia Care unit (PACU) **Methodology:** After institutional ethics committee approval and written, informed consent, 434 adult patients belonging to both genders posted for general surgical elective procedures were included in this observational study. Delayed recovery patients were identified at the end of surgery using Modified Aldrete's Recovery Score and shifted to PACU for further follow up until their discharge and morbidity and mortality was recorded. **Results:** Mean intra-operative blood loss and mean duration of surgery were proportionally increased as the ASA physical status is high = 0.000, statistically significant. As the pre-operative ASA physical status grading is increased the percentage of patients that had more than 48 hrs PACU stay also increased and it was statistically significant with $p = 0.029$. As the ASA grade increases the recovery scores were inversely proportional, $p = 0.029$ statistically significant. **Conclusion:** Preoperative co-morbid conditions, ASA physical status and Modified Aldrete's Recovery Scores are good predictors of postoperative outcomes for patients given general anaesthesia.

Keywords: Delayed Recovery; Post Anaesthesia Care Unit; ASA Grading; Modified Aldrete's Recovery Score.

Introduction

The critical period for a patient who has been administered general anaesthesia is the time during immediate recovery from anaesthesia. In 1950, Dr. Philip Lowenthal and Dr. Arch Russel, presented guidelines for recovery area that are still relevant today [1]. Now-a-days, Post Anaesthesia Care Unit is the preferred location for the immediate recovery of post-operative patients requiring intense observation to enable early detection of complications from surgery [2]. Despite the recent advances in the field of clinical anaesthesiology with availability of sophisticated equipment, improved

standards of monitoring systems and newer anaesthetic agents, delayed recovery has still been a continuous problem even today [3]. Several factors can be attributed to delayed recovery from general anaesthesia. Preoperative ASA physical status, surgical procedure and duration, type and choice of anaesthesia, intra-operative blood loss, certain metabolic, endocrine and electrolyte imbalances and patients' tolerance to anaesthetics and various medications are all the factors which contribute to delayed recovery from general anaesthesia [4,5]. The PACU is a dynamic and evolved entity that greatly benefits the delayed recovery patients from research directed interventions to guide the next level of care for post-operative health status [6]. A study done

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on large no. of patients determined that the ASA classification system has good inter-rater reliability and is a valid predictor of patients' pre-operative health conditions [7]. Quantitative assessment tools like Aldrete's recovery score are widely used in predicting post-operative outcomes that may help guide medical and anaesthetic interventions [8].

The aim of this study is to determine peri-operative risk factors, morbidity and mortality of delayed recovery cases and correlate the outcomes of these patients with standard anaesthesia grading and scoring systems like ASA physical status and Modified Aldrete's recovery scores in the Post Anaesthesia Care unit (PACU).

Methodology

After institutional ethics committee approval and written, informed consent, 434 adult patients belonging to both genders posted for general surgical elective procedures over a period of 4 months in general surgical operation theatres complex in a tertiary care hospital were included in this single centered, prospective, observational study. The patients who had delayed recovery from general anaesthesia were identified at the end of surgery using Modified Aldrete's Recovery Score and have been shifted to Post Anaesthesia Care Unit (PACU) for further monitoring and follow up until their discharge to the surgical ward or critical care unit. Patients who satisfied the recovery scores at the end of surgery were shifted to the recovery area, observed for 2 hours and then shifted to the surgical ward.

This study was designed to evaluate the relative importance of peri-operative factors affecting delayed recovery from general anaesthesia and their correlation to standard anaesthesia scoring systems like ASA grading and Modified Aldrete's Recovery Scoring. This study was undertaken for a period of four months i.e.; from September 2017 to December 2017. The surgical procedures performed on the patients were general surgeries including thyroid surgeries, breast surgeries, laparotomies, laparoscopic cholecystectomies etc; Thorough preoperative evaluation was done in all the patients in their routine pre-anaesthetic check up with respect to history, physical examination, systemic examination and general examination. Routine Laboratory investigations like haemogram, blood grouping and typing, renal function tests, electrocardiogram, chest x-ray etc; were done. Specific evaluation of cardiac or pulmonary system through echocardiography or

pulmonary function tests and Thyroid profile, serum amylase or liver function tests were done pre-operatively. Patients with co-morbid conditions were optimised appropriately depending up on their disease. All the patients were administered standard general anaesthetic regimen comprising of Glycopyrrolate, Fentanyl, Propofol, Vecuronium, Sevoflurane, Nitrous oxide- oxygen @ 60:40% and reversed with reversal agents Neostigmine and Glycopyrrolate according to standard doses per/kg body weight.

Patients were extubated in the operating room if they met the criteria for extubation at the end of surgical procedure and then they were shifted to PACU for further observation and monitoring. Patients were shifted to PACU with endo tracheal tube insitu if they did not meet the extubation criteria and connected to the ventilator or T-piece breathing system if needed.

On arrival at PACU, the following parameters were recorded in all patients:-

- Pre-operative ASA physical status (represented in Table 1) to stratify the overall risk.
- Glass Gow Coma Scale Scoring to ascertain the level of consciousness.
- Modified Aldrete's Recovery Scoring to assess the recovery condition of the patient (represented in Table 2).
- Any uneventful intra-operative history was noted.
- Review of pre-operative Pre-anaesthetic check up data, investigations and co-morbid conditions
- Necessary emergency investigations to identify the cause of delayed recovery from general anaesthesia like Arterial Blood gases, Serum electrolytes, Random blood sugar etc; were done as dictated by the patients' general condition.

In the PACU all the cases were followed up till their discharge and morbidity and mortality was recorded.

Statistical Analysis

All the data was tabulated and analysed using the software graphpad.com. Demographic data was analysed using Fischer exact test. Mean intra-operative blood loss, Mean duration of surgery and length of PACU stay were analysed with One-way ANOVA test. $p < 0.05$ was considered statistically significant. Categorical data was represented as percentage.

Results

A total of 434 patients posted for general surgical cases under general anaesthesia were included in this Prospective, Single Centered and Observational study. Out of 434 patients, 30 patients had delayed recovery in the immediate post anaesthesia recovery phase as assessed by Modified Aldrete's Recovery score (represented in Table 2). All the 30 patients who had delayed recovery from general anaesthesia were shifted to PACU and followed up for complications and continuously monitored until their discharge from PACU.

Population Demographics like age, weight, height, ASA grading, Male: Female ratio were expressed as Mean or absolute numbers or Ratio and represented in Table 3. Different surgical interventions that lead to delayed recovery were represented in Table 4.

Intra-operative factors like mean duration of surgery and mean intra-operative blood loss in relation to ASA grading were represented in Table: 5. Mean intra-operative blood loss and mean duration of surgery were proportionally increased as the ASA physical status is high, $p = 0.000$, statistically significant. The length of PACU stay with respect to ASA physical status is represented in table 6. As the pre-operative ASA physical status grading is increased the percentage of patients that had more than 48 hrs PACU stay also increased and it was statistically significant with $p = 0.029$.

Post-operative factors in relation to ASA grading was represented in Table 7 which indicates that percentage of patients that required mechanical ventilation post-operatively, percentage of patients that required tracheotomy and percentage of patients that died in the Critical Care Unit were proportional to ASA grade. Modified Aldrete's recovery scores in the PACU were depicted in Figure 1. During the first 24 hours of PACU stay 80% (24) of patients satisfied recovery criteria according to Aldrete's ≥ 9 compared to 20% (6) of patients who did not satisfy the recovery scores (<9) and they had to be followed up further in the PACU. Preoperative risk factors were shown in table: 8. Out of the 30 patients that had delayed recovery, 17 patients (56.6%) had pre-operative risk factor for anaesthesia and surgery which suggests that was a strong correlation between pre-operative co-morbid condition and postoperative outcome. Modified Aldrete's Recovery scores were correlated with ASA physical status, there was a positive correlation as it was represented in Table 9. As the ASA grade increases the recovery scores were inversely proportional, $p=0.029$ statistically significant. Peri-operative complications were represented in figure: 2. Length of stay in PACU was plotted against modified aldrete's recovery score (MARS) in figure: 3 which shows that 80% (24) Patients with $MARS \geq 9$ in the PACU were discharged to the ward in the first 24 hours or less while 20% (6) patients with $MARS <9$ had prolonged stay in the PACU for 48 hrs or more.

Table 1: ASA Physical status Grading

ASA Physical status	Definition	Examples
ASA I	A normal healthy patient	Healthy, non-smoking, no or minimal alcohol use
ASA II	A patient with mild systemic disease	Examples include (but not limited to): current smoker, social alcohol drinker, pregnancy, obesity ($30 < BMI < 40$) etc;
ASA III	A patient with severe systemic disease	poorly controlled DM or HTN, COPD, morbid obesity ($BMI \geq 40$), active hepatitis, alcohol dependence or abuse, implanted pacemaker, moderate reduction of ejection fraction etc;
ASA IV	A patient with severe systemic disease that is a constant threat to life	Recent (< 3 months) MI,CVA,TIA,CAD/stents, ongoing cardiac ischemia or severe LV dysfunction, Sepsis, DIC etc
ASA V	A moribund patient who is not expected to survive without the operation	Examples include (but not limited to): ruptured abdominal/thoracic aneurysm, massive trauma, intracranial bleed with mass effect, ischemic bowel in the face of significant cardiac pathology or multiple organ/system dysfunction
ASA VI	A declared brain-dead patient whose organs are being removed for donor purposes	

*The addition of "E" denotes Emergency surgery: (An emergency is defined as existing when delay in treatment of the patient would lead to a significant increase in the threat to life or body part) ASA Grading: American society of physical status grading

Table 2: Modified Aldrete’s Recovery Score

Parameter	Modified criteria	score
Activity Level	Moves all extremities voluntarily /on command	2
	Moves two extremities	1
	Cannot move extremities	0
Respirations	Breathes deeply and coughs freely	2
	Is dyspnoeic with shallow limited breathing	1
	Is apnoeic	0
Circulation	Blood Pressure \pm 20 mmHg of normal	2
	Blood Pressure \pm 20 - 50 mmHg of normal	1
	Blood Pressure $>$ \pm 50 mmHg of normal	0
Consciousness	Fully awake	2
	Arousable on calling	1
	Not responsive	0
Oxygen saturation as determined by pulse oximetry	SpO ₂ $>$ 92% on room air	2
	SpO ₂ $>$ 90% on oxygen	1
	SpO ₂ $<$ 90% on oxygen	0

Maximum score is 10, A score of \geq 9 is required for discharge

Table 3: Population Demographics

Demographic variable	Mean/Absolute Numbers/Ratio
Age in years	42.4
Weight in Kgs	69.6
Height in cms	156.9
Male : female ratio	2:3
ASA I/II/III	10/16/4

Table 4: Types of surgeries

Type of surgery	Number of cases(30)
Thyroid surgery	6
Laparoscopic cholecystectomy	5
Modified radical mastectomy	5
Whipples Procedure	2
Sub acute intestinal obstruction	4
Incisional hernia	3
Partial gastrectomy	4
Benign retroperitoneal mass resection	1

Data expressed in absolute numbers

Table 5: Surgical factors in relation to ASA grading

Surgical factor	ASA I	ASA II	ASA III	p-value
Mean duration of surgery (min)	135	155	245	0.000*
Mean intra-operative blood loss (ml)	850	1225	2050	0.000*

Data expressed as Mean /SD
ANOVA test, *p-value $<$ 0.05, statistically significant

Table 6: Length of PACU Stay in relation to ASA grading

Factor	ASA I (n =10)	ASA II (n=16)	ASA III (n=4)	p-value
No of patients $<$ 48 hrs of PACU stay	9	14	1	0.029*
No. of patients $>$ 48 hrs of PACU stay	1	2	3	

Data expressed as percentage and absolute numbers
3 \times 2 Fischer exact test, *p-value $<$ 0.05, statistically significant

Table 7: Post-operative factors in relation to ASA grading

Factor	ASA I (n =10)	ASA II (n=16)	ASA III(n=4)
No. Of patients required mechanical ventilation	-	1(3.3%)	2(6.6%)
No. Of patients underwent tracheotomy	-	1(3.3%)	-
No of patients died in the ICU	-	1(3.3%)	1(3.3%)

Data expressed as percentage and absolute numbers

Table 8: Pre-operative Risk factors

Co-morbid condition	Total no of Patients, n = 30 No of Patients(percentage) with risk factors
Diabetes under control	6(20%)
Hypertension under control	4(13.3%)
Known hypothyroid on Eltroxin	3(10%)
Known epileptic on Eptoin	2(6.6%)
Obstructive Jaundice	2(6.6%)

Data expressed as absolute numbers and percentage

Table 9: Modified Aldrete’s Recovery Score as a function of ASA grading

ASA Status	MARS ≥ 9	MARS < 9	
ASA I (n=10)	9	1	*p-value 0.029
ASA II (n=16)	14	2	
ASA III (n=4)	1	3	

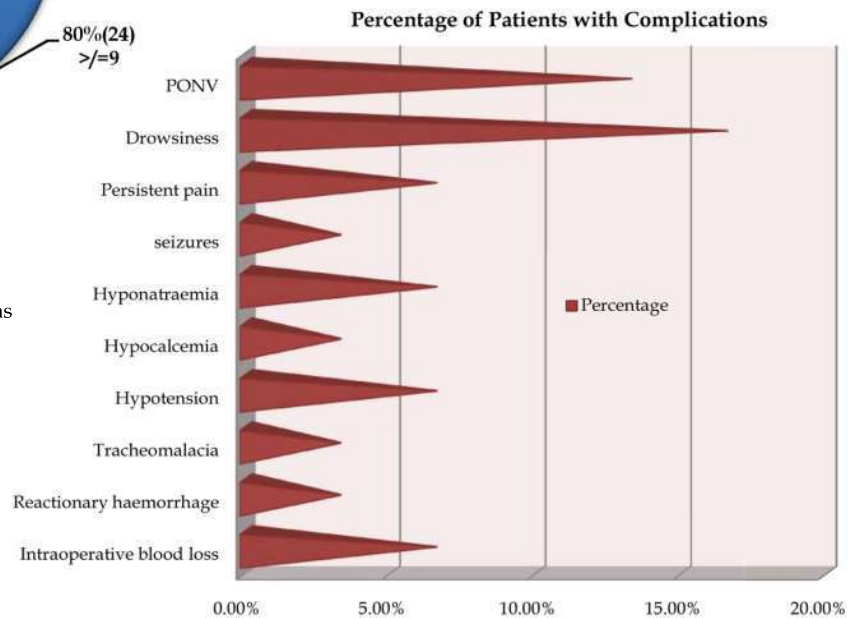
3×2 contingency table, Preoperative ASA status correlated well with Recovery scores Data expressed as absolute numbers. *p-value significant statistically.

Modified Aldrete's Recovery Score



Fig. 1: Modified Aldrete’s Recovery Scores in PACU
Data expressed as absolute numbers and percentage

Fig. 2: Peri-operative complications
Data expressed as percentage



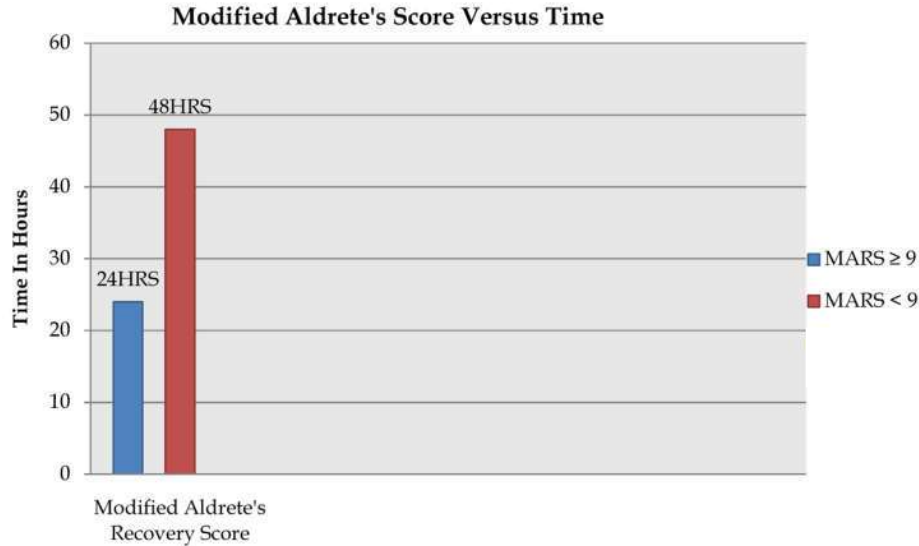


Fig. 3: Modified Aldrete's Recovery score versus PACU stay

Discussion

The present study demonstrates that delayed recovery from general anaesthesia, though rare can lead to significant morbidity and also mortality in the peri-operative period, despite of meticulous peri-operative anaesthetic management and advances in the speciality of clinical anaesthesiology.

Thirty cases of delayed recovery due to various peri-operative factors were reported over a period of 4 months in general surgical operation theatres and they were followed up in the Post Anaesthesia Care Unit (PACU) till discharge. Various factors related to the patient per se like pre-operative co-morbid conditions, factors related to surgical procedure and duration of surgery, factors related to anaesthetic technique and anaesthetic drugs, preoperative metabolic status etc; are all the factors responsible for delayed recovery and subsequent physical health of the patients [9]. Standard anaesthesia grading and scoring systems like ASA physical status and Modified Aldrete's Recovery Score were used to correlate the outcomes of patients with delayed recovery in the present study.

One of the important goals of this study is to identify factors that have contributed to delayed recovery. Out of 30 cases of delayed recovery, 70% (21) were observed to have peri-operative complications, of them 13.3% (4) of complications were major due to peri-operative blood loss, tracheomalacia and reactionary haemorrhage and rest of them were minor. In this study, the length of

PACU stay was proportionately increased to the severity of peri-operative complications. Several clinical trials reported the factors that contribute to delayed discharge but no universal definition for increased length of stay was established [10]. Duration of general anaesthesia, duration of surgery and intra-operative cardiac events are the common factors identified in different studies to be the cause for delayed discharge from PACU [11]. In the present study, none of the patients had delayed discharge due to peri-operative cardiac events.

Pre-existing co-morbidities are important factors that lead to delayed recovery and prolonged length of PACU stay [12]. In the present study 56.6% of patients had pre-existing co-morbid conditions which have correlated well with the rate of peri-operative complications that have lead to prolonged length of PACU stay. Type of surgical procedure and also duration of surgery significantly correlated with the length of PACU stay in this study. Though the anaesthetic technique is similar in all the patients, duration of surgery definitely has its impact on the recovery as the duration of anaesthesia also increases.

Frost EA in his review mentioned that antiepileptic drugs are known to reduce the responsiveness of non depolarising neuromuscular blocking drugs administered chronically [13]. In this study, 2 patients with pre-existing epilepsy on Eptoin 100mg for more than 5 years were observed to have delayed recovery and stayed in the PACU for less than 48 hrs, later met the discharge criteria and were shifted to the surgical ward. Electrolyte

imbalances like hypocalcaemia occurred after thyroid surgery and hyponatraemia occurred after Whipple's operation in this study. Wolters et al studied the association between ASA physical grading, peri-operative risk factors and peri-operative outcomes in surgical patients and showed a significant correlation between ASA grading and factors like intra-operative blood loss, duration of post-operative ventilation and duration of PACU stay [14]. Wolters et al findings were correlated with the observations of our study when ASA grading was related to peri-operative factors like mean duration of surgery ($p=0.000$) and mean intra-operative blood loss ($p=0.000$) as represented in table 5 and length of PACU stay ($p=0.029$) as represented in table 6. The morbidity of the patients assessed by the percentage of patients required mechanical ventilation, percentage of patients required tracheotomy and percentage of patients died also correlated well with the pre-operative ASA physical status as well as Modified Aldrete's Recovery scores in this study.

ASA grading has been found in some studies to be a good predictor of post-operative resource utilisation and mortality in numerous surgical fields [15]. Also considerable variations in the ASA classification has been reported in the previous clinical trials as ASA physical status neither takes in to account the demographic characteristics, the nature of surgical procedure and expertise of the anaesthesiologist nor the facilities for adequate postoperative management of patients [18]. Association between ASA physical status and post-operative mortality at 48 hrs was studied by Thomas J Hopkins et al and they observed that mortality risk within 48 hrs is decreased for elective and emergency procedures for ASA IIE through ASA IVE and increased for ASA VE as surgeries were offered to high risk cases in ASA grade V [17]. They analysed that the possible causes of improvement in the mortality risk is due to the improvement in the perioperative standard of care to the patients and improvement in the public health. In spite of variable opinions of researchers about ASA physical status, various studies proved that ASA Physical status is a good predictor of post-operative outcome similar to the observations of this study.

Modified Aldrete's criteria is a quantitative assessment and traditional scoring method of evaluating patients in the immediate post-anaesthetic recovery period (Phase-I) for discharge of patients either from the operating room or from the Post Anaesthesia Care Unit [18]. It is simple to implement, easy to memorise, poses low burden on

PACU staff, applicable to all post-operative patients and accepted internationally. B Burke and M Kyker evaluated recovery in outpatients with Speeds criteria versus Modified Aldrete's, screening tests were highly specific in identifying patients who would require nurse and patient interventions [19]. In this study, 80% of patients with Modified Aldrete's recovery scores ≥ 9 were discharged from the PACU at or before 24 hours while 20% of patients with Modified Aldrete's recovery scores < 9 had to stay in the PACU for 48 hours and even more.

In this study, 4 (13.3%) patients required mechanical ventilation, 1 (3.3%) patients required tracheotomy and 2 (6.6%) patients died after shifting them to the ICU, indicating that Modified Aldrete's recovery scores well correlated with the outcomes like length of PACU stay, requirement of mechanical ventilation, requirement of tracheotomy and mortality. The above observations have correlated well with the studies of B Burke and Mark Kyker as well as other studies [20]. The limitation of Aldrete's score is, it does not take in to consideration about most common problems in the post-operative period like PONV, postoperative pain and drowsiness. As all the patients in this study are in-patients, they were treated appropriately for these complications in the PACU. According to previous studies, Pain, PONV and drowsiness significantly contribute to increased length of PACU stay, an observation which correlates with this study [21,22].

The main limitation of this study is, this is a single centered study, hence not generalizable, sample size is also small and population belonging to ASA IV and higher grade are not represented in this study. Though the ASA grading and Modified Aldrete's scoring are internationally accepted, due to their limitations, a quantitative clinical scoring system that meets the dynamic needs of surgical population and easy to be used by the PACU staff is recommended for future implications.

Conclusion

To summarise this study demonstrated that

- Preoperative co morbid conditions well correlated with the postoperative outcomes for patients of delayed recovery from General anaesthesia
- ASA physical status has correlated with the perioperative morbidity, no. of post operative interventions and mortality as well.

- Modified Aldrete's Recovery Score strongly correlated with the length of PACU stay, no. Of postoperative interventions and mortality of delayed recovery cases in the PACU
- There was positive correlation between ASA physical status and Modified Aldrete's Recovery Score though each of the tools has their own limitations.

Hence it can be concluded that preoperative comorbid conditions, ASA physical status and

Modified Aldrete's Recovery Scores are good predictors of postoperative outcomes for patients given general anaesthesia for general surgical procedures.

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Conflicts of Interest: Nil.

Key Message

ASA physical status classification is a valid predictor of surgical risk and Modified Aldrete's recovery score is a valid quantitative assessment tool to predict postoperative outcomes in surgical patients.

References

1. Lowenthal L PH, Russell AS. Recovery room: life saving and economical. *Anesthesiol.* 1951;12:470.
2. Smedley P. Patient risk assessment in the PACU: an essential element in clinical decision making and planning care. *Brit J Anaesth Recovery Nurs.* 2012 February;13:21-29
3. Denlinger Jk. Prolonged emergence and failure to regain consciousness. In: Orkin FK, Cooperman LH, editors, *Complications in Anaesthesiology.* Philadelphia, United States of America: JB Lippincott; 1983. pp.368-78.
4. Miller RD, editor: *Miller's Anesthesia.* 7th ed. United States of America: Elsevier, Churchill; 2010. pp.2722-3.
5. Nichoiau D. Postanesthetic recovery. In: Stoelting RK, Miller RD, editors. *Basics of Anaesthesia.* 5th ed. Philadelphia, United States of America: Churchill Livingstone, Elsevier; 2007. pp.577-8.
6. Phillips NM, Street M, Kent B, Haesler E, Cadeddu M. Post-anaesthetic discharge scoring criteria: key findings from a systematic review: *Int J Evid Based Healthc.* 2013;11:275-84.
7. Sankar A, Johnson SR, Beattie WS, Tait G, Wijeyesundera DN. Reliability of the American Society of Anesthesiologists physical status scale in clinical practice. *Br J Anaesth.* 2014; 113:424.
8. Aldrete JA. The post-anesthesia recovery score revisited. *J Clin Anesth.* 1995; 7:89-91. Ullhas Sudhakar rao Misal, Suchita Annasaheb Joshi and Mudassir Mohd Shaikh.
9. Delayed recovery from anesthesia: A post graduate educational review. *Anesth Essays Res.* 2016 May-Aug;10(2):164-172.
10. Janet Pavlin D, Sujanne E Rapp et al. Factors affecting discharge time in adult out Patients. *Anesth Analg* 1998; 87:816-216.
11. Barone CP, Barone GW, Pablo CS. A history of the PACU. *J Perianesth Nurs.* 2003;18:237-241.
12. Sahoo S, Kaur M, Sawhney C, Mishra A. An unusual cause of delayed recovery from anesthesia. *J Anaesthesiol Clin Pharmacol.* 2012;28:415-6.
13. Frost EA. Differential diagnosis of delayed awakening from general anesthesia. A Review. *Middle East J Anesthesiol.* 2014;22:537-48. [PubMed: 25668997].
14. Wolters U, Wolf T, Stützer H, Schroder T. ASA classification and peri-operative variables as predictors of postoperative outcome. *Br J Anaesth.* 1996 Aug; 77(2):217-22.
15. Kay HF, Sathiya kumar V, Yoneda ZT, Lee YM, Jahangir AA, Ehrenfeld JM et al. The affects of American society of Anesthesiologists physical status on length of stay and inpatient cost in surgical treatment of isolated orthopaedic fractures. *J Orthop trauma* 2014;28:153-9.
16. Irlbeck T, Zwibler B, Bauer A. ASA classification: Transition in the course of time and depiction in the literature. *Anaesthesist.* 2017 Jan;66(1):5-10. doi: 10.1007/s00101-016-0246-4.
17. Thomas JH, Karthik R, Atilio B, Mark S, Rebecca S, Katherine G et al. Association between ASA physical status and postoperative, mortality at 48 hours. *Perioperative medicine* 2016;5:29.
18. Imad T. Awad, Frances Chung. Factors affecting recovery and discharge following ambulatory surgery. *Can J Anesth* 2006;53(9):858-872
19. Brent Burke, Mark Kyker. Speeds Criteria vs. Modified Aldrete and Fast-Track Criteria for Evaluating Recovery in Outpatients. *Open Journal of Anesthesiology,* 2013;3:309-14.
20. Michaloliakou C, Chung E. Does a modified post anesthetic discharge scoring system determine home-readiness sooner? *Can J Anaesth* 1993;40:A32.
21. Michael T Ganter, Stephan Blumenthal, Seraina Dübendorfe, Simone Brunnschweiler, Tim Hofer, Richard Klaghofer, Andreas Zollinger and Christoph K Hofer. The length of stay in the post-anaesthesia

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care unit correlates with pain intensity, nausea and vomiting on arrival. Perioperative Medicine 2014;3:10.

22. Khalid Samad, Mueenullah Khan, Hameedullah, Fauzia A. Khan, Mohammad Hamid, Fazal H Khan.

Unplanned Prolonged Post anaesthesia Care Unit Length of Stay and Factors affecting it. J Pak Med Assoc 2006Mar;56(3):95-8.
