

# Risk reduction in anesthesia and sedation—An analysis of process improvement towards zero adverse events

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## ABSTRACT

**Introduction:** Anesthesia is a complex domain that is highly technical and skill based. Primary Care Physicians often have to do the initial evaluation of surgical patients they encounter during their daily practice before referring them to the surgical team. Thus, the Primary Care Physician's preliminary knowledge in anesthesia processes, risks involved and interventions that can be done to minimize these risks can improve patient-centered care and ultimately patient safety. **Materials and Methods:** The study was conceptualized and conducted in the Department of Anesthesiology from January 2018 to December 2018 in a 600 bed Multispecialty teaching hospital in Bihar, India. The study aimed towards Anesthesia Care related Risk Identification and Reduction and encompassed process improvements. **Results:** Risk Severity Analysis of the Critical Steps of Anesthesia Care was done. The average Hazard Score reduced from 21.59 during January 2018 to March 2018 to 8.23 during April 2018 to June 2018 subsequently to 3.53 during July 2018 to September 2018 and finally to 2.12 during October 2018 to December 2018. Thus, there was an overall reduction of 90.18% in the Hazard Score from April'18 to June'18 quarter to October 2018 to December 2018 quarter. **Conclusion:** Adverse Anesthesia/Sedation Events reported during the period from January 2019 to December 2019 was "Zero". A systematic approach towards Risk Reduction not only lead to reduction in Hazard Score and Process Improvement but also made the Anesthesia Care Safe which is evident in the consistency of reporting "Zero" Adverse Anesthesia/Sedation Events for the last one year.

**Keywords:** Anesthesia care, hazard score, patient safety, risk reduction

## Introduction

Anesthesia is a complex domain that is highly technical and skill based. The practice of anesthesia not only demands a thorough pre-operative assessment of every patient, meticulous calculation of drug dosage, drug handling, and administration with utmost safety, handling of sophisticated equipment with dexterity but also quick decision making in critical situations and precise response to care demands.<sup>[1]</sup>

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Primary Care Physicians often encounter patients requiring surgical interventions during the course of their day to day practice. Thus, it is important that the Primary Care Physicians do the initial evaluation of patients before referring them to the surgical team. Hence, a preliminary knowledge about the basics of anesthesia care and preoperative evaluation process can help the Primary Physicians in anesthesia risk identification and optimizing patient care. This also helps in better communication and liaison with the anesthesiologist and the surgeon. Moreover, often the patients have more faith on the Primary Care Physicians due to their long and at times association as Family Physicians. So, a knowledge of the Primary Care Physicians on the risks involved in anesthesia care helps their involvement with the surgical team to plan for the mode of anesthesia and

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perioperative care and motivate patients better. Thus, the Primary Care Physician's knowledge in anesthesia process, risks involved and interventions that can be done to minimize these risks can improve patient-centered care and ultimately patient safety.<sup>[2,3]</sup>

In Healthcare, an adverse event is defined as “any injury to the patient that could cause damage”<sup>[4]</sup> The quality of Anesthesia Care has been traditionally measured by the “absence of complications.”<sup>[5]</sup> The European Board of Anesthesiology and the European Society of Anesthesiology came up with the Helsinki Declaration on Patient Safety in Anesthesia in 2010. Subsequent initiatives to improve the quality of anesthesia care reduced anesthesia related morbidity and mortality down the years.<sup>[6]</sup>

Current literature reveals that the incidence of minor complications is 18–22% during anesthesia, severe complications is 0.45–1.4% and the mortality rate is 1 : 100 000. Though these figures are quite acceptable, yet as majority of these events are preventable through detection and elimination of the risk factors scopes of further improvement always exist and are justifiable.<sup>[7,8]</sup>

Davis *et al.* defines “Risk” as “the chance or probability of a poor outcome. This may be either fatal (death) or nonfatal (dysfunction), with the latter classified as disease, discomfort, and dissatisfaction” and “Risk Management” as “the anticipation and limitation of risk so as to decrease both the chance of suffering loss and the size of the loss when it does occur.” Adverse Anesthesia Events are the main focus of risk management in anesthesia.<sup>[9,10]</sup> The concept of risk associated with anesthesia has changed with time, from individual-based, to operating room-based, to system-based.<sup>[11]</sup>

A review article on adverse anesthesia events concluded that meticulous planning and an effective communication aimed towards an integrated team approach are crucial to prevent these.<sup>[12]</sup>

A research article on the reported adverse anesthesia events, root cause analysis, and preventive actions from over 130 hospitals in the United States, pointed out the need for process standardization, use of checklists, and improving safety of anesthetic medications to reduce adverse anesthesia events.<sup>[13]</sup>

A retrospective study in a tertiary care institution in the United States accepted the fact that adverse anesthesia events still occur despite these being an area of utmost concern related to patient safety. This study further highlighted that many of these events are preventable through proper identification, detailed analysis and proper interventions and resource allocations with an aim towards patient safety.<sup>[14]</sup>

This study was thus undertaken with an aim towards process improvement of anesthesia care in a teaching hospital in India.

## Materials and Methods

The study was conceptualized and conducted in a 600 bed Multispecialty teaching hospital in Bihar, India involving the department of Anesthesiology during the period from January 2018 to December 2018. The study was initiated following approval of the Institutional Ethics Committee. The study aimed towards Risk Reduction of Anesthesia Care and encompassed process improvements. Thus, all planned cases receiving anesthesia during the study period from January 2018 to December 2018 totaling to 9,864 or procedural sedation for doing MRI, Upper GI Endoscopy, Colonoscopy, ERCP and Bronchoscopy during the same period totaling to 1872 were considered in the study. The emergency operations and emergency procedures done under sedation were excluded from the study.

Literature review did not reveal too many studies done utilizing similar concept which makes this study unique. The study was built upon the basic concept of Risk Management involving Risk identification; Risk Quantification; Doing a Root Cause Analysis; Taking actions towards risk mitigation and Risk Monitoring.<sup>[11,14]</sup>

Risk Identification, Risk Quantification, Root Cause Analysis was completed through a series of six intra-departmental meetings on a fortnightly basis conducted between January 2018 to March 2018 which was considered the Base Period. These meetings were presided over by the Departmental Head, and attended by the Faculty Members, Residents and Post Graduate Trainees in the Department of Anesthesiology.

Risk identification was done through a detailed process mapping of the existing Anesthesia Care and critical steps requiring modifications were identified through the method of brain storming and reference to the incidents reported to the Administration Office through the Incident Report Form as per the Organization Protocol. Risk Quantification was done using the concept of Risk Severity Analysis where Probability of an Adverse Anesthesia Event occurring due to failure of the process was rated in a Scale of 10 – Lowest being 1; Moderate being 5 and Highest being 10 (as in the Process Flow below and in Table 1). The Severity of an Adverse Anesthesia Event occurring due to failure of the process was rated in a Scale of 10 – Uneventful is 1; Require Post anesthesia/sedation monitoring – 3, Require Intervention – 5, Require Critical Care – 8, Death – 10. Hazard Score was obtained multiplying Probability x Severity as in the Process Flow A and B below and in Table 1. A detailed root cause analysis was done for the relevant incident reports using the standard technique of Fish Bone Diagram for cause identification and to ascertain if those are preventable.

Necessary actions were delineated and implemented from April 2018 onwards with an aim towards risk mitigation. A Risk Register was introduced in the Operation Theatre to make the reporting of the relevant incidents easy. This was in addition to the Organization protocol of Incident Reporting. Risk

Monitoring was done through Quarterly Risk Audits to assess the effectivity of the risk management process followed by Status Review Meetings held at quarterly intervals till December 2018 with an aim towards a consolidated report generation on the progress of the risk management initiative. Individual actionable against each of the critical steps were also reviewed and necessary actions taken with an aim towards reinforcement/modification of the actionable as was deemed necessary.

The outcome measure was Percentage of Adverse Anesthesia/Sedation Events which was monitored as an indicator through monthly reporting. It was defined as follows:

(Number of Adverse Anesthesia Events/Total number of Anesthesia Administered) X100 and (Number of Adverse Sedation Events/Total number of Sedation Administered) X100

Adverse Anesthesia Event for the purpose of this study included Intermediate or Major morbidity or mortality in the perioperative period (within 48 hours of the operation) that can be linked to administration of anesthesia. It includes serious distress, prolongation of hospital stay, or both, without permanent sequelae (e.g., dental injury) or permanent disability and sequelae (e.g., spinal cord injury) or death from anesthesia.<sup>[15]</sup>

## Results

### Risk reduction tool

Probability of an Adverse Anesthesia Event occurring due to

failure of the process. Scale of 10 – Lowest is 1; Moderate is 5; and Highest is 10

The Severity of an Adverse Anesthesia Event occurring due to failure of the process. Scale of 10 – Uneventful is 1; Require Post anesthesia/sedation monitoring – 3, Require Intervention – 5, Require Critical Care – 8, Death – 10.

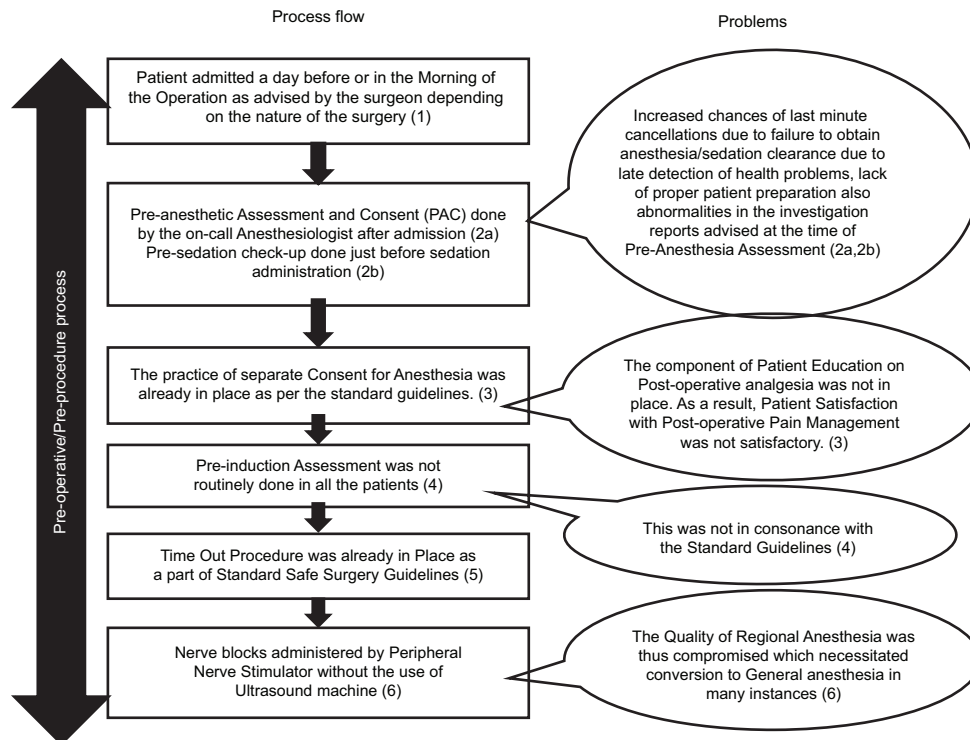
Hazard Score is multiplying Probability x Severity

The average Hazard Score reduced from 21.59 during January 2018 to March 2018 to 8.23 during April 2018 to June 2018 (reduction of 61.88% over a span of 3 months), subsequently to 3.53 during July 2018 to September 2018 (reduction of 57.11% over a span of next 3 months) and finally to 2.12 during October 2018 to December 2018 (reduction of 39.94% over a span of next 3 months). Thus, there was an overall reduction of 90.18% in the Hazard Score from April'18 to June'18 quarter to October 2018 to December 2018 quarter. This could be achieved by targeting the critical steps in Anesthesia Care with an aim towards improvement as has been depicted in Table 1.

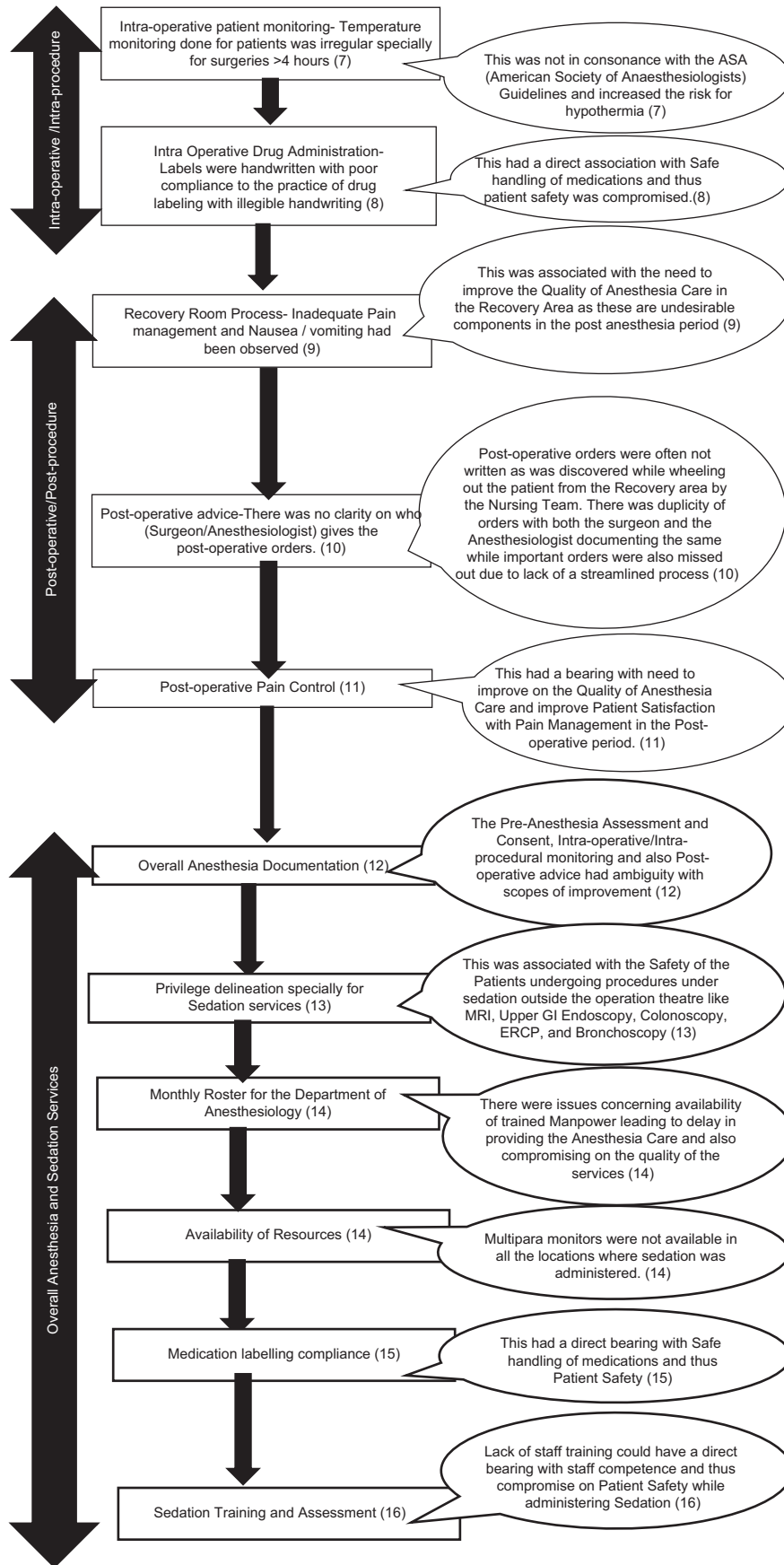
The declining trends of the Hazard Score in the Pre-operative/Pre-procedure process is depicted in Figures 1a to 1e.

The declining trends of the Hazard Score in the Intra-operative/Intra-procedure process is depicted in Figures 2a and 2b.

The declining trends of the Hazard Score in the Post-operative/Post-procedure process is depicted in Figures 3a to 3c.



Process Flow A: Continued on next page...



Process Flow A and B: The Critical steps in the Existing Process of Anesthesia Care for planned operations/procedures done under sedation during the period preceding April 2018 with problems highlighted is depicted above

The declining trends of the Hazard Score in the Overall Anesthesia/Sedation Care process is depicted in Figures 4a to 4f.

## Discussion

The MGM Medical College and LSK Hospital, Kishanganj, Bihar reported “Zero” Adverse Anesthesia/Sedation Events during the period from January 2019 to December 2019.

In the event, it is important to analyze the continuous risk reduction and process improvement that we have been able to achieve between April 2018 to December 2018 thus strengthening the Anesthesia Care in the Department.

Not only have we worked on risk reduction over the period of past few months from April 2018 to December 2018 with various actionable but also aimed at sustaining the risk reduction strategies as is evident from the consistent reporting of “Zero” Adverse Anesthesia/Sedation Events during the period from January 2019 to December 2019.

Based on the problems identified, the following actions were taken between April 2018 and December 2018 as has been depicted in Table 1:

### Actions taken to improve Anesthesia Care in the Pre-anesthesia/Pre-sedation process

The Pre-anesthesia Assessment Clinic was made operational in consonance with the OPD timings from 9 AM to 5 PM. A circular was issued by the Principal of the Institution to the Head of the Departments of all the disciplines stating that the patients planned for operation/any procedure to be done under sedation will have to be referred to the Pre-anesthesia Assessment Clinic. A circular was issued through the Head of the Department of Anesthesia, that Pre-anesthesia/Pre-Sedation Assessment and Consent (PAC) will be have to be completed at least 24 hours before any planned operation/procedure to be done under anesthesia/sedation respectively. Thus, patient assessment, counseling, and investigations were advised well ahead of the posted operation/procedure leading to not only reduction in last minute cancellations but also improving anesthesia care and increasing patient safety.

Post-operative Analgesia Education was incorporated in the PAC Form so that the same is not missed out during anesthesia planning, patient counseling, and consenting process. A Patient and Family Education (PFE) Pamphlet on Post-operative Analgesia was introduced in English and the regional dialect of Hindi to improve patient understanding on the same.

Pre-induction Assessment was made mandatory for all patients by incorporating a section and signature by the Anesthesiologist in the Anesthesia Booklet.

A dedicated ultrasound machine was procured for the operation theatre to popularize and improve on the quality of Regional

anesthesia. This led to reduction in failed nerve blocks which previously required conversion to General anesthesia in many instances.

### Actions taken to improve Anesthesia Care in the Intra-operative/Intra-procedure process

Intra-operative patient monitoring form was made more structured with provision for monitoring of vitals every 5 minutes in consonance with the universal guideline with documentation in the intraoperative assessment records. Streamlining the temperature monitoring and documentation, in all surgeries beyond 30 minutes of general anesthesia made mandatory as per ASA guidelines thereby reducing the risk of hypothermia in patients, leading to faster extubation time. This improved the anesthesia care through better intraoperative patient monitoring.

Color-coded pre-printed Labels with the names of the commonly used Anesthesia drugs were incorporated. Signature of the Anesthesiologist with date and time in the allotted space was made mandatory after drug administration. This practice ensured safe handling of medications having a direct impact on Patient Safety and the Anesthesia care.

### Actions taken to improve Anesthesia Care in the Post-operative/Post-sedation process

A pre-structured component in the post-operative records for monitoring of vitals and pain assessment every 15 minutes in the recovery area and allotting a dedicated recovery area nurse improved the quality of care including pain management and management of nausea/vomiting in the recovery area.

Signoff by an Anesthesiologist through proper patient assessment and discharge from the recovery area was made mandatory through documentation in the Anesthesia Booklet.

The post-operative advice was made structured as much as possible and a mandate was made for documentation by the Anesthesiologist if required following discussion with the surgeon to avoid duplicity and missing out on important orders. The anesthesiologist had to put his legible signature with date and time in the section for post-operative advice before the patient was wheeled out of the recovery area.

Use of specialized nerve blocks has improved pain management. Clear procedure and policy on PCA has been developed, circulated and implemented.

### Actions taken to improve overall anesthesia care

Compilation of all the Anesthesia forms used in the Pre-operative, Intra-operative, and Post-operative period into an Anesthesia Booklet and making the Booklet pre-structured as much as possible based on standard anesthesia practice and guidelines was done. This improved the overall Anesthesia documentation.



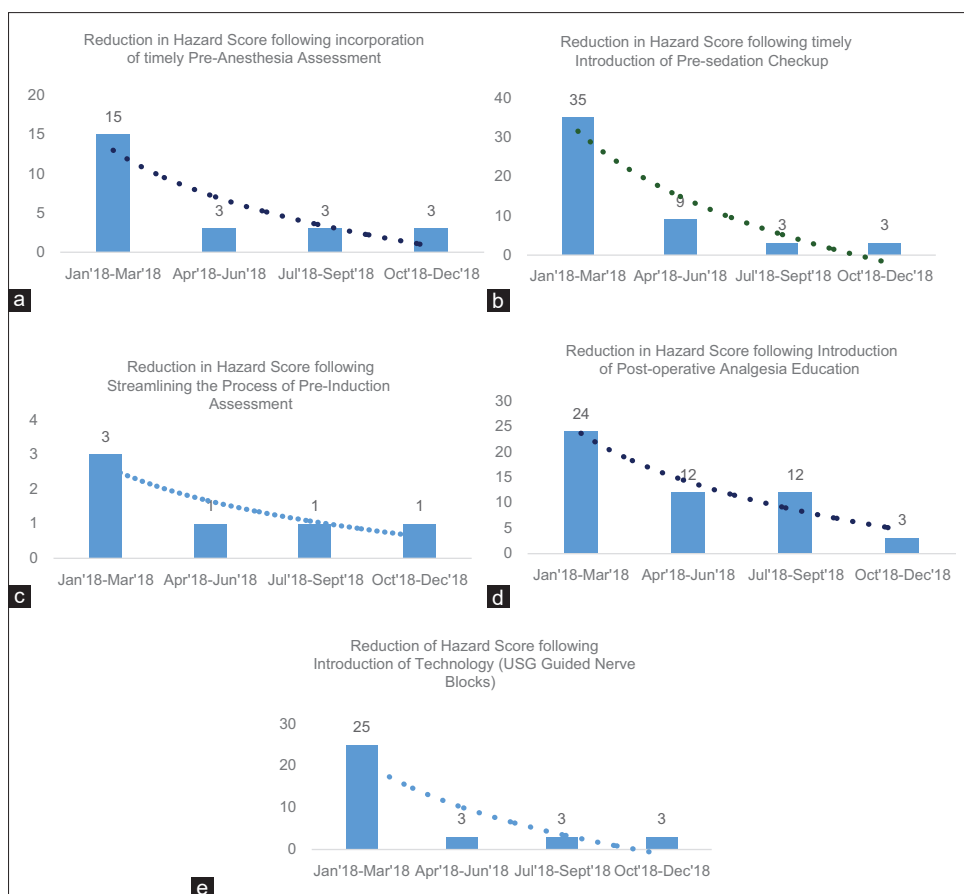
**Table 1: Risk Severity Analysis of the Critical Steps under the Domain of the Anesthesia Care**

Anesthesia Processes	Pre-operative/Pre-procedure process														
	January-March 2018 (base period)			April-June 2018			July-September 2018			October-December 2018			Steps Taken (in different months/period)		
	Probability	Severity	Hazard-Score	Probability	Severity	Hazard-Score	Probability	Severity	Hazard-Score	Probability	Severity	Hazard-Score			
Pre-Anesthesia Assessment	5	3	15	3	1	3	3	1	3	3	1	3	PAC Clinic was made operational. Same day cancellations reduced/explanation of the procedure improved (Apr'18-June'18)		
	7	5	35	3	3	9	3	1	3	3	1	3	Same day cancellation reduced/explanation of the procedure improved (Apr'18-June'18)		
	3	1	3	1	1	1	1	1	1	1	1	1	This has been made a mandate for every patient and control over the process has improved over the period of time (Existing-made Mandatory April'18-June'18)		
Post Operative Analgesia Education	8	3	24	4	3	12	4	3	12	1	3	3	Post Operative Analgesia Patient and Family Education pamphlet introduced (Oct'18-Dec'18)		
	1	1	1	1	1	1	1	1	1	1	1	1	Process existing		
	5	5	25	3	1	3	3	1	3	3	1	3	Failed nerve blocks have reduced after introduction of Ultrasound guided nerve blocks (Conversion to General Anesthesia) has reduced due to introduction of USG Guided Regional Anesthesia techniques (Apr'18-June'18)		
Anesthesia Processes	Intra-operative/Intra-procedure Process														
	January-March 2018 (base period)			April-June 2018			July-September 2018			October-December 2018			Steps Taken (in different months/period)		
	Probability	Severity	Hazard-Score	Probability	Severity	Hazard-Score	Probability	Severity	Hazard-Score	Probability	Severity	Hazard-Score			
Intra Operative Monitoring	5	3	15	3	3	9	1	3	3	1	1	1	Previous - Temperature monitoring done for patients was irregular specially for surgeries >4 hours/Change - All surgeries beyond 30 minutes (G.A), temperature monitoring made mandatory as per ASA guidelines - reducing the risk of hypothermia in the patients - leading to faster extubation time. (Apr'18-June'18)		
	7	5	35	5	3	15	3	1	3	1	1	1	Previous - No color codes and hand written, illegible drug labeling, compliance poor/Change - color coded, pre labeled stickers - compliance improved over the period/The anesthetist now signs after administering the medication (Apr'18-June'18)		

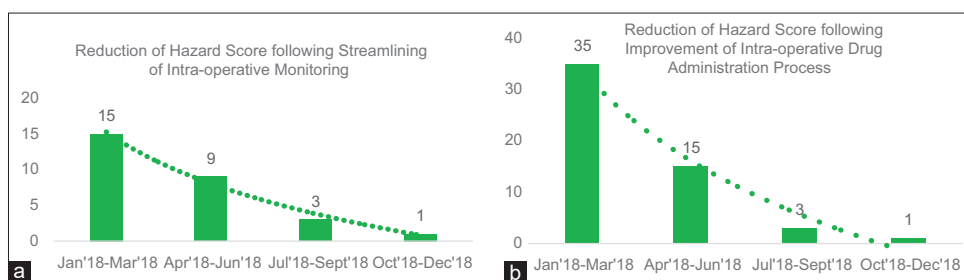
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Table 1: Contd...

Anesthesia Processes	Post-operative/Post-procedure Process												
	January-March 2018 (base period)		April-June 2018		July-September 2018		October-December 2018		Steps Taken (in different months/period)				
	Probability	Severity	Hazard-Score	Probability	Severity	Hazard-Score	Probability	Severity	Hazard-Score	Probability	Severity	Hazard-Score	
Recovery Room processes	5	3	15	3	3	9	3	3	9	3	3	9	Inadequate Pain management and Nausea/vomiting were observed. Steps have been taken to lessen the pain and vomiting. (Apr'18-June'18)
Postoperative Advice	7	8	56	3	1	3	1	1	1	1	1	1	Previous - blank form; no clarity on who writes what where;/Change - putting formats/duplication reduced/missed out drugs and orders also improved. (Apr'18-June'18)
Postoperative Pain control	3	3	9	3	3	9	3	3	9	3	1	3	Use of specialized nerve blocks has improved pain management. Clear procedure and policy on PCA developed. (Oct'18-Dec'18)
Overall Anesthesia/Sedation Care													
Anesthesia Processes	January-March 2018 (base period)		April-June 2018		July-September 2018		October-December 2018		Steps Taken (in different months/period)				
	Probability	Severity	Hazard-Score	Probability	Severity	Hazard-Score	Probability	Severity	Hazard-Score	Probability	Severity	Hazard-Score	
Overall Anesthesia Documentation	5	3	15	3	3	9	3	1	3	2	1	2	The anesthesia form had lot of ambiguity and was changed in April 2018 (Apr'18-June'18)
Privilege delineation	5	5	25	3	5	15	1	1	1	1	1	1	This has improved the Safety of Sedation services. (July'18-Sept'18)
Monthly roster	5	3	15	5	3	15	1	1	1	1	1	1	The anesthesia department provides a monthly roster for all sedation and anesthesia areas (July'18- Sept'18)
Availibility of resources	3	3	9	3	3	9	3	1	3	1	1	1	The multipara monitors for sedation monitoring have been made available in all areas as required (July'18-September'18)
Overall Medication labeling compliance	7	5	35	5	3	15	3	1	3	1	1	1	Previous - No color codes and hand written, illegible drug labeling; compliance poor/Change - color coded, pre labeled stickers - compliance improved over the period (Apr'18-Jun'18)
Sedation Training and Assessment	7	5	35	3	1	3	1	1	1	1	1	1	The Anesthesia Head conducted the training for all junior doctors in the department who can provide sedation and evaluated their competency assessment (April'18-Jun'18)
Total	5.18	3.76	21.59	3.18	2.41	8.23	2.23	1.47	3.53	1.65	1.24	2.12	



**Figure 1:** (a) As depicted in Figure 1a, Hazard score following Incorporation of timely Pre-Anesthesia Assessment serially decreased from 15 during January 2018 to March 2018 to 3 during April 2018 to June 2018 and sustained thereafter till October 2018 to December 2018. (b) As depicted in Figure 1b, Hazard score following timely Introduction of Pre-Sedation Check-up decreased from 35 during January 2018 to March 2018 to 9 during April 2018 to June 2018 and to 3 during July 2018 to September 2018 and sustained thereafter till October 2018 to December 2018. (c) As depicted in Figure 1c, Hazard score following Streamlining the Process of Pre-induction Assessment decreased from 3 during January 2018 to March 2018 to 1 during April 2018 to June 2018 and was sustainable thereafter till October 2018 to December 2018. (d) As depicted in Figure 1d, Hazard score following introduction of Post-operative Analgesia Education decreased from 24 during January 2018 to March 2018 to 12 during April 2018 to June 2018 and July 2018 to September 2018 and thereafter following introduction of the patient education pamphlet on Post-operative Analgesia to 3 during October 2018 to December 2018. (e) As depicted in Figure 1e, Hazard score following Introduction of Technology (USG guided nerve blocks) decreased from 25 during January 2018 to March 2018 to 3 during April 2018 to June 2018 and sustained thereafter till October 2018 to December 2018

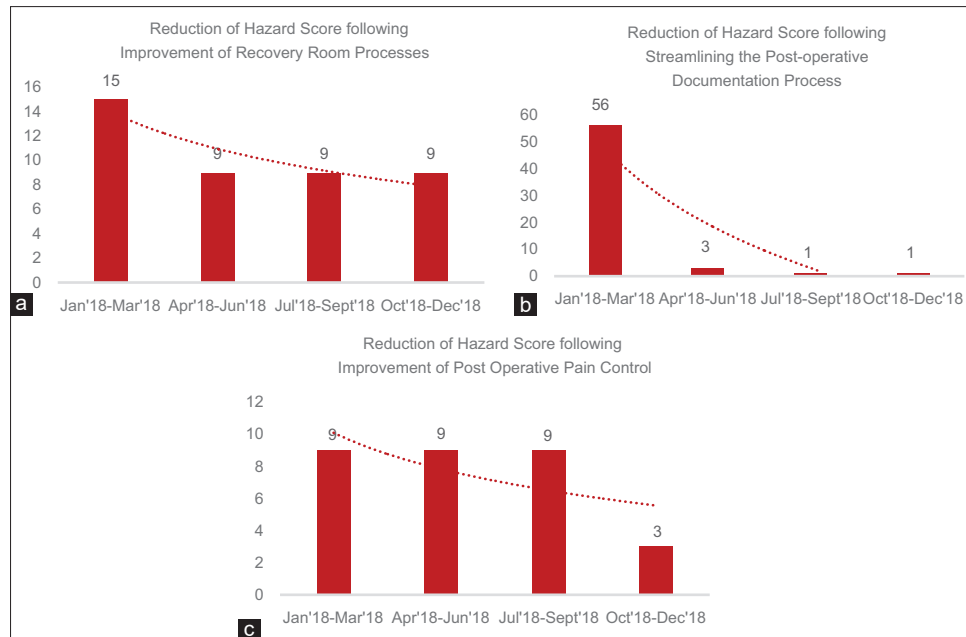


**Figure 2:** (a) As depicted in Figure 2a, Hazard score following Streamlining of Intra-operative Monitoring decreased from 15 during January 2018 to March 2018 to 9 during April 2018 to June 2018, subsequently serially to 3 during July 2018 to September 2018 and thereafter to 1 during October 2018 to December 2018. (b) As depicted in Figure 2b, Hazard score following Improvement of Intra-operative Drug Administration Process decreased from 35 during January 2018 to March 2018 to 15 during April 2018 to June 2018, subsequently serially to 3 during July 2018 to September 2018 and thereafter to 1 during October 2018 to December 2018

The concept of Privilege delineation improved the Safety of the Patients undergoing procedures under sedation outside the operation theatre like MRI, Upper GI Endoscopy, Colonoscopy,

ERCP, Bronchoscopy. Only anesthesiologists trained in airway management and resuscitation services were given privilege for the same by the Privileging Committee. The staffs working in





**Figure 3:** (a) As depicted in Figure 3a, Hazard score following Improvement of recovery Room Process like analgesia and control of vomiting decreased from 15 during January 2018 to March 2018 to 9 during April 2018 to June 2018 which was sustainable during July 2018 to September 2018 and during October 2018 to December 2018. (b) As depicted in Figure 3b, Hazard score following Streamlining the Post-operative Documentation Process decreased from 56 during January 2018 to March 2018 to 3 during April 2018 to June 2018, subsequently serially to 1 during July 2018 to September 2018 and thereafter to 1 during October 2018 to December 2018. (c) As depicted in Figure 3c, Hazard score following Improvement of Post Operative Pain Control decreased from 9 during January 2018 to March 2018, April 2018 to June 2018 and July 2018 to September 2018 to 3 during October 2018 to December 2018. This was also linked to the Post-operative Analgesia Pamphlet introduction

the respective departments requiring sedation services were given access to the list of privileges against the doctors.

A monthly roster including the oncall roster approved by the Head of the Department, Anesthesiology allotting anesthesiologists in the operation theatres and in areas requiring sedation services was submitted to the office of the Principal for circulation across the hospital. This process was directly monitored by the Office of the Principal to ensure uninterrupted and quality anesthesia care.

Multipara monitors were installed in all the locations where sedation was administered. This improved better patient monitoring during sedation. The Post Graduate Trainees and Senior Residents in the Department of Anesthesiology were trained in BLS and ACLS followed by evaluation and in-house certification by the Head of the Department who is an AHA certified ACLS instructor. This was aimed at providing trained support while administering anesthesia/sedation services and thus improved anesthesia care.

An audit team reporting directly to the Principal through the Head of the department of Anesthesiology did regular audits to ensure and sustain compliance.

## Conclusion

Despite anesthesia safety being of utmost importance in the practice of anesthesia, there is a need to relook into the existing processes as there are always scopes of improvement which can

make anesthesia care safer. A series of problems in the existing process of Anesthesia Care identified through brainstorming and subsequent actions taken with an aim towards process improvement along with risk monitoring can lead to a substantial decrease in the Hazard Score and make Anesthesia care safer. Use of structured forms and formats, labels, incorporating technology, investing in resource allocation, training, and utilization can play pivotal roles in improving anesthesia care and patient safety.

## Limitations of the study

The Probability and Severity scores used for calculating the Hazard Score were assigned through brain storming which is a standard group creativity technique and is thus dependent on consensus subjective perception. The use of Risk Reduction is thus fraught with its own limitations.

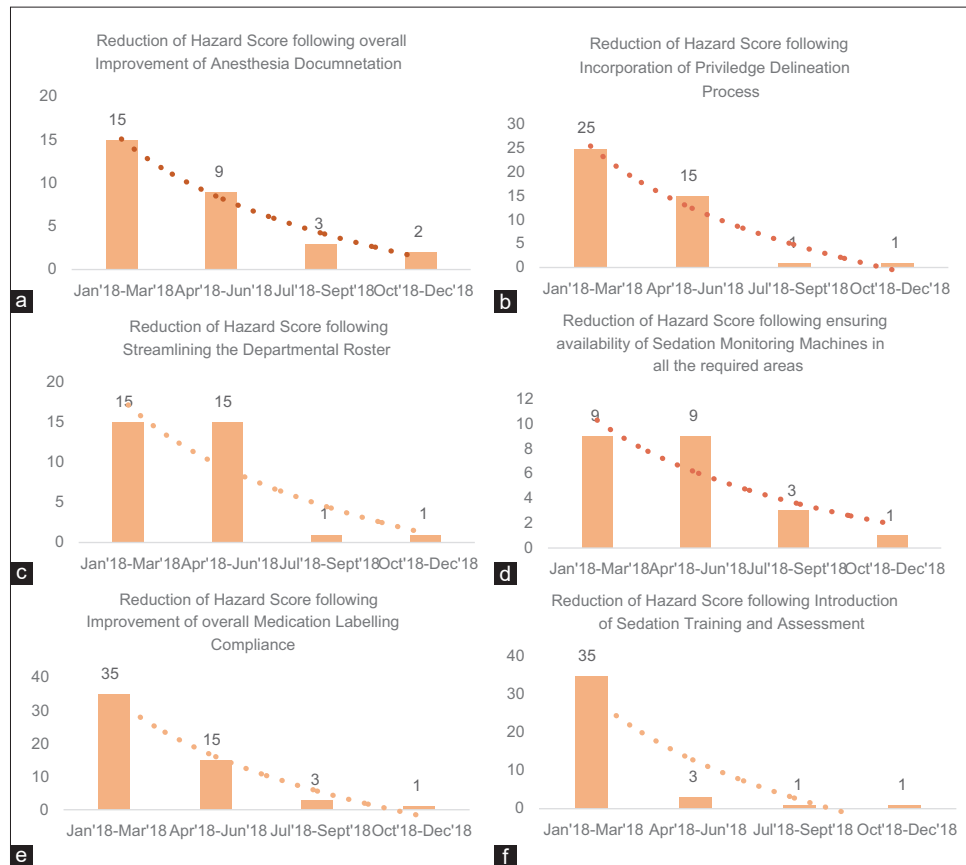
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Nil.



**Figure 4:** (a) As depicted in Figure 4a, Hazard score following overall Improvement of Anesthesia Documentation decreased from 15 during January 2018 to March 2018 to 9 during April 2018 to June 2018, subsequently to 3 during July 2018 to September 2018 and 2 during October 2018 to December 2018. (b) As depicted in Figure 4b, Hazard score following Incorporation of Privilege Delineation Process decreased from 25 during January 2018 to March 2018 to 15 during April 2018 to June 2018 and subsequently to 1 during July 2018 to September 2018 and during October 2018 to December 2018. (c) As depicted in Figure 4c, Hazard score following Streamlining of Departmental Roster decreased from 15 during January 2018 to March 2018 and during April 2018 to June 2018 to 1 during July 2018 to September 2018 and during October 2018 to December 2018. (d) As depicted in Figure 4d, Hazard score following ensuring availability of Sedation Monitoring Machines decreased from 9 during January 2018 to March 2018 and during April 2018 to June 2018, subsequently to 3 during July 2018 to September 2018 and 1 during October 2018 to December 2018. (e) As depicted in Figure 4e, Hazard score following Improvement of overall Medication Labelling Compliance decreased from 35 during January 2018 to March 2018 to 15 during April 2018 to June 2018, subsequently to 3 during July 2018 to September 2018 and 1 during October 2018 to December 2018. (f) As depicted in Figure 4f, Hazard score following Introduction of Sedation Training and Assessment decreased from 35 during January 2018 to March 2018 to 3 during April 2018 to June 2018, subsequently to 1 during July 2018 to September 2018 and during October 2018 to December 2018

### Conflicts of interest

There are no conflicts of interest.

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