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## Dr. PR Chauhan

MD (Anaesthesiology), DHM.  
Sr. Consultant, Department of  
Anaesthesia, Indian Spinal  
Injuries Centre, New Delhi,  
India

## Dr. HK Mahajan

MD (Anaesthesiology),  
DHM. HOD & and Chief of  
Anaesthesia, Department of  
Anaesthesia, Indian Spinal  
Injuries Centre, New Delhi,  
India

## Dr. Abhinav Gupta

DNB (Anaesthesiology).  
Associate. Consultant,  
Department of Anaesthesia,  
Indian Spinal Injuries Centre,  
New Delhi, India

## Dr. Shalu Singh

DA, DNB (Anaesthesiology).  
Consultant, Department of  
Anaesthesia, Indian Spinal  
Injuries Centre, New Delhi,  
India

## Dr. Lokesh

MD, DNB (Anaesthesiology).  
Assistant Consultant,  
Department of Anaesthesia,  
Indian Spinal Injuries Centre,  
New Delhi, India

## Dr. Ravinder Dhanerwa

DA, DNB (Anaesthesiology).  
Sr. Consultant, Department of  
Anaesthesia, Indian Spinal  
Injuries Centre, New Delhi,  
India

## Dr. Mrinal

Assistant Consultant,  
Department of Anaesthesia,  
Indian Spinal Injuries Centre,  
New Delhi, India

## Corresponding Author:

### Dr. PR Chauhan

MD (Anaesthesiology), DHM.  
Sr. Consultant, Department of  
Anaesthesia, Indian Spinal  
Injuries Centre, New Delhi,  
India

## A prospective clinical audit on quality of anaesthesia and accidental awareness in patients undergoing elective surgery under general anaesthesia

**Dr. PR Chauhan, Dr. HK Mahajan, Dr. Abhinav Gupta, Dr. Shalu Singh, Dr. Lokesh, Dr. Ravinder Dhanerwa and Dr. Mrinal**

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### Abstract

**Background:** In order to assess and improve quality of patient care in perioperative period, knowledge of patient perspective is most important. A Prospective Clinical Audit was done on Quality of Anaesthesia and Accidental Awareness in patients undergoing elective surgery under General Anaesthesia.

### Aims

- The primary aim is to assess the quality of peri-operative anaesthesia care and patient satisfaction using a validated patient reported outcome measure.
- To establish an estimate of accidental awareness during general anaesthesia.

**Settings and Designs:** This was a cross-sectional, prospective audit on elective post-operative patients who underwent surgery under routine balanced general anaesthesia at a tertiary health care centre. Total 94 post-operative cases, who underwent surgery within last three months, were included in the audit.

**Material and Methods:** Audit protocol was presented to competent Institutional Ethics committee and approval taken. The patients included in the audit had received routine balanced general anaesthesia for their surgery along with prophylactic analgesic, antiemetic and antacid intra-operatively. Anaesthetists randomly visited to the patients 24 hours after surgery and distributed structured questionnaires to the participants. Basic demographic information was collected from medical record and patients. We used Bauer Patient Satisfaction Questionnaires to obtain data regarding anaesthesia related discomfort and Modified Brice Questionnaire was used to assess Accidental Awareness during Anaesthesia.

**Statistical Analysis:** SPSS software for Windows version 21.0 was used for data analysis. Categorical data was presented as frequency and proportion whereas continuous data was presented as mean and Standard Deviation.

**Results:** Mean age of study subjects was- 51.81(16.82). Most of the cases belonged to ASA Grade III&IV (82.9%). When evaluating the questions on anaesthesia-related discomfort, the most frequent complaint of "pain at the surgical site" (54.26%), irritation in throat/sore throat in (39.36%), thirst (36.17%) and (23.40%) patients were drowsy after recovery from anaesthesia. Overall satisfaction rate was 100%, with care provided by Anaesthesia Department. However, 8.51% and 3.19% patients were not satisfied with pain therapy after surgery and information provided by the anaesthetist respectively. More than half (57.45%) could recall the voices they heard was the first thing to happen after waking up from anaesthesia and 9 (9.57%) could feel endotracheal tube in their throat during recovery from anaesthesia. We found one (1.06%) incidence of intraoperative AAA (Accidental Awareness during Anaesthesia).

**Conclusion:** Only one fourth patients were drowsy immediate after surgery and (9.57%) could feel endotracheal tube in their throat during recovery from anaesthesia. High risk group (ASA III and IV) were at higher risk (1.06% in our audit) for Accidental Awareness during Anaesthesia.

**Keywords:** anaesthesia related discomfort, satisfaction, accidental awareness

### Introduction

To assure the quality of anaesthesia care in perioperative anaesthesia practice, patient perspective is most important which can be sought through the administration of patient satisfaction measures. Patient satisfaction comprises a cognitive evaluation and an emotional response to the care received<sup>[1]</sup>. A tool such as a questionnaire is used so that all patients are asked the same questions and responses are rated rather than free text so that quantitative evaluation can be done. A systematic review of patient satisfaction questionnaires concluded

that the Bauer questionnaire (Bauer *et al.*, 2001) [2] was amongst the best for the perioperative assessment of satisfaction (Sarah F. Barnett *et al.*, 2013) [3]. The Modified Brice questionnaire (To assess Accidental Awareness during Anaesthesia) has previously been used and validated in a large randomized control trial (Avidan *et al.*, 2009) [4]. Patient satisfaction is one of the components of quality of care. Enhancing the quality of service improves the satisfaction of patients [5]. However, the quality of service and the satisfaction of customers are key determinants of patient's loyalty [6] and his/her subjective judgment about the care received.

One of the most common concerns of the patients about to undergo anaesthesia is "Awareness under anaesthesia", that they will remember the intraoperative events. Awareness under anaesthesia is a distressing complication with a potential for long-term psychological consequences, and every effort should be undertaken to prevent it. Awareness during anaesthesia may be experienced by 1 or 2 cases out of every 1000 patients who receive general anaesthesia (0.1-0.2%) [7, 8] and in up to 1-2% of patients of high-risk category. Patients undergoing cesarean section, cardiothoracic surgery or emergency surgery, patients with a difficult airway, sicker patients (American Society of Anesthesiologists physical status III-V), female gender and younger patients (age <40 years) [9] and those developing intra-operative hypotension are among those considered to have increased chances of awareness and the incidence in this group may be as high as 1-2% [10].

### Aims and Objectives

- The primary aim is to assess the quality of peri-operative anaesthesia care and patient satisfaction using a validated patient reported outcome measure.
- To establish an estimate of accidental awareness during general anaesthesia.

### Material and Methods

This was a cross-sectional, prospective audit on elective post-operative patients who underwent surgery under routine balanced general anaesthesia at a tertiary health care centre. Total 94 post-operative cases, who underwent surgery within last three months, were included in the audit.

Audit protocol was presented to competent Institutional Ethics committee and approval taken. Neither any drug was used nor intervention done on the patients. Questionnaires did not include topics that might be sensitive, embarrassing or upsetting. They do not present any risk or burden to the patient. In fact it could certainly be considered advantageous to address issues whilst in the care of hospital rather than to allow symptoms of illness, discomfort or adverse memories go unexplored and unexplained or to emerge at a later time. Hence Ethics Committee permitted for audit without consent. However the patients were under no obligation to participate if they did not wish.

The patients included in this audit had received routine balanced general anaesthesia (Premedication-Glycopyrrolate, Midazolam, Fentanyl and injectable 2% Lignocaine, Induction-Injection Propofol/ Etomidate, intubation-Rocuronium Bromide. Maintenance-IPPV + O<sub>2</sub> + N<sub>2</sub>O + Isoflurane + Atracurium + Intravenous fluids) with standard monitoring for their surgery along with prophylactic analgesic, antiemetic and antacid intra-operatively. Anaesthetists randomly visited to the patients 24 hours after surgery. Peer reviewed, worldwide accepted, self-administered, structured questionnaires were distributed to participants. Basic demographic information was collected from medical record and patients. We used Bauer Patient Satisfaction Questionnaires to obtain data regarding anaesthesia related discomfort the questionnaire was subdivided into a set of questions on anaesthesia-related discomfort and another set on satisfaction with anaesthesia care. The questions on discomfort were assessed on a 3-point scale, and those on patient satisfaction on a 4-point scale. Modified Brice Questionnaires was used to assess Accidental Awareness during Anaesthesia.

The data was entered in Microsoft Excel spreadsheet and checked for errors. SPSS software for Windows version 21.0 was used for data analysis. Categorical data was presented as frequency and proportion whereas continuous data was presented as mean and Standard Deviation.

### Results

Total 94 post-operative cases, who underwent surgery under routine general anaesthesia.

**Table 1:** Demography of study population

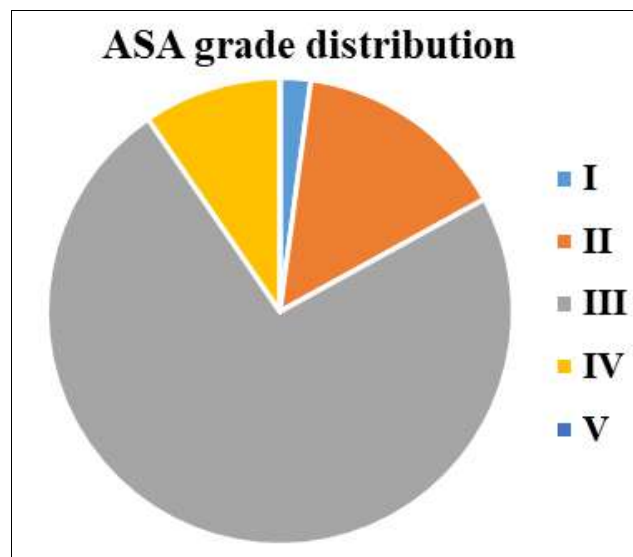
Study population	Total	94	Percentage
Gender	Male	42	44.6%
	Female	52	55.4%
Mean Age and Standard Deviation		<b>Mean age</b>	<b>SD</b>
	Study population	51.81	16.82
	Male	47.57	13.79
	Female	54.92	18.46
Age range	<b>Total Population</b>	<b>Male</b>	<b>Female</b>
18-35 years	20	8	12
36-50 years	20	17	3
51-65 years	34	13	21
66-80 years	18	4	14
>80 years	2	-	2
Surgeries conducted	Spine	53 (56.4%)	
	Orthopaedic	33 (35.1%)	
	Arthroplasty	2 (2.1%)	
	Plastic surgery	2 (2.1%)	
	Urology	2 (2.1%)	
	Abdominal surgery	2 (2.1%)	
ASA Grade	I	2 (2.1%)	

	II	14 (14.9%)
	III	69 (73.4%)
	IV	9 (9.5%)
	V	0
Patients on chronic pain killers	Opioids	2 (2.13%)
	NSAIDS	4 (4.26%)
	On neuropathic pain killers	5 (5.32%)
Post-operative destination	Ward	36 (38.2%)
	HDU	15 (15.9%)
	ICU	43 (45.7%)
Patients with comorbidities.	Yes	60 (63.8%)
	No	34 (36.2%)
Need of antiemetic after reversal from Anaesthesia	Need of antiemetic.	5 (5.32%)
	Antiemetic with steroids.	1 (1.06%)

### Age categories and gender distribution

In total of 94 patients with average age  $51.81 (\pm 16.82)$  years, 55.4% patients were female and 44.6% patients were

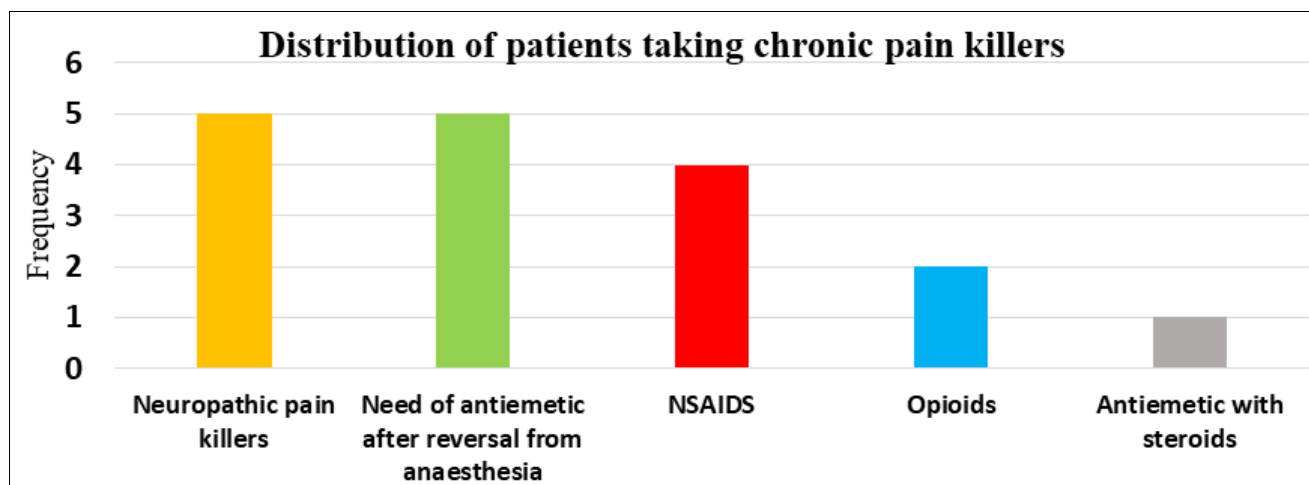
males with mean age  $54.92 (\pm 18.46)$  and  $47.97 (\pm 13.79)$  respectively (Table 1).



**Fig 1:** Pie chart showing ASA grade among operated patients

Maximum number (82.9%) of cases were belonging to American Society of Anesthesiologists physical status III-V

(Figure 1: Pie chart).



**Fig 2:** Bar diagram showing distribution of patients on chronic pain killers and need of antiemetic

Out 94 patients 2 patients were on chronic opioid therapy, 4 patients were on NSAIDs and 5 patients were on neuropathic pain killers. Only 6 (6.38%) patients needed

antiemetic with or without steroid in post-operative period (Figure 2: Bar diagram).

**Table 2:** Showing post-anaesthesia discomfort

Patient Satisfaction Questionnaire	No	Yes (Moderate)	Yes (Severe)
1. Drowsiness	72	17	5
2. Pain at the site of surgery	43	45	6
3. Thirst	60	34	0
4. Hoarseness/Change in voice	83	11	0
5. Sore throat	57	37	0
6. Nausea/Vomiting	88	6	0
7. Feeling cold	71	23	0
8. Confusion/Disorientation	82	9	3
9. Pain at the site of anaesthetic injection	92	2	0
10. Shivering	85	9	0

When evaluating the questions on anaesthesia-related discomfort, the most frequent complaint was of "pain at the surgical site" in 51 (54.26%), irritation in throat/sore throat

in 37 (39.36%), and thirst in 34 (36.17%). In our study, 22 (23.40%) patients were drowsy after recovery from anaesthesia. (Table 2).

**Table 3:** Showing satisfaction with anaesthesia care.

	Very Satisfied	Satisfied	Dissatisfied	Very Dissatisfied
Information provided by the anaesthetist	71	20	3	0
Waking up from anaesthesia	65	29	0	0
Pain therapy after surgery	45	41	8	0
Treatment of nausea and vomiting after operation	81	13	0	0
Care provided by Dept. of Anaesthesia	80	14	0	0

The data on patient satisfaction showed (100%) overall satisfaction rate. However, 8.51% and 3.19% patients were not satisfied with pain therapy after surgery and information provided by the anaesthetist respectively (Table 3).

All patients expressed their desire to recommend our

anaesthesia services to their family/friends if need in future.

#### Data Regarding Accidental Awareness during Anaesthesia.

All the study subjects were expecting to be completely asleep for their surgery.

**Table 4:** The last thing the patient remembered before going to sleep

Being in the pre-op area	4	4.26%
Seeing the operating room	47	50%
Being with family	0	0
Hearing voices	4	4.26%
Feeling mask on face	19	20.21%
Smell of gas	0	0
Burning or stinging in the IV line	20	21.28%
Other [Please write below]	None	0

Half (50%) of study group remembered operation theatre scenario, 29.69% and 31.25% were able to remember feeling of face mask and burning sensation of IV injection, respectively, before going to sleep (Table 4).

**Table 5:** The first thing the patient remembered after waking up from anaesthesia

Hearing voices	54	57.45%
Feeling breathing tube	9	9.57%
Feeling mask on face	4	4.26%
Feeling pain	2	2.13%
Seeing the operating room	10	10.64%
Being in the recovery room	13	13.83%
Being with family	2	2.13%
Being in ICU	0	0
Nothing	0	0
Other [Please write below]	None	0

More than half 54(57.45%) could recall the voices they heard was the first thing to happen after waking up from anaesthesia, 13(13.83%) patient could recall being in the

recovery room, 10(10.64%) patients recall being in the operation theatre after anaesthesia and only 9 (9.57%) could feel endotracheal tube in their throat during recovery from anaesthesia (Table 5).

#### Remembrance of anything between going to sleep and waking up

In our study, we found one (1.06%) incidence of intraoperative AAA (Accidental Awareness during Anaesthesia) among all patients, one (1.06%) patient had a dream during general anaesthesia. This dream was unrelated to surgery and was not disturbing.

In spite of the usual counselling and anxiolytic premedication, 2 (2.13%) patients quoted anxiety as the worst thing related to anaesthesia and surgery.

#### Discussion

This study was conducted under the main objective of assessing the level of satisfaction of patients on perioperative anaesthesia care. These components address particularly the patients' experience and satisfaction about

the peri-operative anaesthesia care.

Most of our cases (>91%) underwent spine and orthopaedic surgeries where surgical duration was up to eight hours or even more with major blood loss. Most of our patients belonged to ASA Grade III&IV (82.9%) and many of age >65years (21.28%). Based on our institutional protocol, 61.7% patients needed post-operative ICU/HDU (Intensive Care Unit/High Dependency Unit) care in view of patient's safety.

When evaluating the questions on anaesthesia-related discomfort, the most frequent discomforts were "pain at the surgical site" (54.26%), out of which 6.38% patients reported severe pain. Many (39.36%) patients complained about something feeling or irritation in throat/sore throat. Few patients (11.70%) complained about change in voice after anaesthesia. Many patients (36.17%) felt "thirst" after recovery from anaesthesia. In our study, (23.40%) patients were drowsy, and out of them in 5.32% patients, drowsiness was severe. Only few patients, (6.38%) developed nausea and vomiting who needed antiemetic with/without steroid.

The data on patient satisfaction showed (100%) overall satisfaction rate. Out of them (>85%) were very satisfied with care provided by Anaesthesia Department. However, 8.51% and 3.19% patients were not satisfied with pain therapy after surgery and information provided by the anaesthetist respectively. The responses to questions on anaesthesia-related discomfort in our study revealed only minor difference to study done by Bauer M. *et al.* [3] where he found "drowsiness" (>75%), "pain at the surgical site" (>55%), and "thirst" (>50%) in his study. The data on patient satisfaction showed (>90%) satisfaction in his study. However, data revealed that the incidence of drowsiness was very low in our study.

In the Western world, the incidence of intra-operative awareness with explicit recall has been reported to be between 0.1% and 0.2% in the general surgical population with up to 1–2% in high-risk category, for this complication. On awareness, in the Indian population hardly one or two studies have been done (Reshma P. Ambulkar *et al.*) [11].

In our audit all the study subjects were expecting to be completely asleep for their type of surgery. More than half (56.4%) of our study subjects were for only spine surgery and many other types of surgeries, where surgical duration was up to 8 hours or more and position during surgery was prone or other positions which would have been uncomfortable or impossible for an awake patient. Half (50%) of study group remembered operation theatre scenario, 29.69% and 31.25% were able to remember feeling of face mask and burning sensation of IV injection, respectively, before going to sleep. Because of amnestic medication (Benzodiazepine) given after entering in operation theatre most of the patients were not able to recall events happening further.

More than half (57.45%) could recall the voices they heard and 13.83% patient could recall being in the recovery room, were the first things to happen after waking up from anaesthesia. Out of 94 patients, 9 (9.57%) could feel endotracheal tube in their throat during recovery from anaesthesia. All these patients were having independent risk factors for awareness (ASA III, IV Difficult airway).

In our study, we found one (1.06%) incidence of intraoperative AAA (Accidental Awareness during Anaesthesia). Patient could recall feeling of surgery without pain. This patient was of very poor general condition and

haemodynamically unstable requiring very low dose of anaesthetic medicines. The outcome of our study can be compared with the high range of the studies published in recent years [12, 13, 14], especially where bispectral index (BIS) monitoring were included [15]. It should be noted that patients considered at risk for AAA [16, 17] like emergency surgery, severely ill surgical, and hypovolemic trauma patients were not included. In this study group, 78(82.98%) patients were considered to be having independent risk factors for awareness such as sicker patients (American Society of Anesthesiologists physical status III-V), female gender and younger patients (age <40 years) [9].

There have large studies been conducted globally but most of the incidence rates for awareness cited by research papers are based on studies conducted in the UK or the USA. In China, a multi-centred observational study was done on 11,101 patients in 2009 and found 46 (0.41%) cases of definite awareness, and 47 (0.41%) cases of possible awareness. [18] It appears that AAGA rates in China are two or three times higher than those reported by similar studies in the UK or USA. In Brazil, a study of 1259 patients who underwent general anaesthesia, was also identified higher rates of AAGA (32 patients, 2.5%) [19]. Similarly, a Spanish multi-centre study of 4001 patients identified 39 (1.0%) cases of definite awareness (similar to that of in our study), and an additional five (0.1%) cases of possible awareness, it indicates that incidence rates of AAGA differ between countries [10].

In our study, one (1.06%) patient had a dream during general anaesthesia. This dream was unrelated to surgery and was not disturbing. DREAMING is a common, and fascinating part of the anesthetic experience, but its cause and timing is very difficult to find out. Patients typically report that they were dreaming during anesthesia, but the actual timing of anesthetic dreaming is unknown. However, evidence supports that the incidence of dreaming has decreased as anesthetic techniques have improved [12, 20], and dreamers exhibit more clinical signs of light anesthesia [20] or report more awareness than non-dreamers;

In our study, in spite of the usual counseling and anxiolytic premedication, 2(2.13%) patients quoted anxiety as the worst thing related to anesthesia and surgery, which significantly increased as patients moved from ward to preoperative holding area and then the operation room.

**Strength and Limitations:** Patients were randomly visited by anaesthetist after surgery (subjects were not selected pre-operatively) so that we could avoid bias in the audit. This gives strength to our audit. However satisfaction with Anaesthesia care is a subjective factor which is a limitation of our study.

## Conclusion

Only one fourth patients were drowsy immediate after surgery and (9.57%) could feel endotracheal tube in their throat during recovery from anaesthesia. High risk group (ASA III and IV) were at higher risk (1.06% in our audit) for Accidental Awareness during Anaesthesia.

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