



Original Research Article

Prevalence of co-morbidities and referral patterns in routine preoperative evaluation: A retrospective observational analysis in a tertiary care government hospital

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ABSTRACT

Introduction: The initial interaction between patients and anaesthesiologists during pre-anaesthesia check-ups (PAC) is a crucial opportunity to diagnose and pre-optimize co-morbidities that might go unnoticed. This proactive approach contributes to safe anaesthesia administration, uneventful intra-operative experiences, and smooth post-operative recovery. Our study assesses the prevalence of diverse co-morbidities within a tertiary care centre's PAC.

Results: After analysing data from 3 months involving 905 patients, 624 individuals exhibited co-morbidities, with 217 cases being newly identified within the PAC clinic. Among female patients, anaemia emerged as the most prevalent anomaly (219 cases), while hypertension dominated among male patients (171 cases). Overall, anaemia constituted the most common co-morbidity (362 cases).

Discussion: A comprehensive clinical assessment during the Pre-Anaesthetic Clinic empowers formulation strategies for pre-optimization and treatment of co-morbidities. Timely intervention is pivotal, not only to prevent surgery delays but also to avert potentially catastrophic outcomes arising from untreated conditions. This approach translates into expedited patient recovery, minimizing anaesthesia-related complications.

Conclusion: The Pre-Anaesthetic Clinic plays a pivotal role in diagnosing and intervening in patient co-morbidities. Beyond diagnosis, it is a crucial early intervention and treatment platform, significantly enhancing the overall surgical recovery process.

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1. Introduction

Routine preoperative evaluation is a critical phase in the continuum of perioperative care, serving as a pivotal opportunity to assess and manage co-existing medical conditions, commonly referred to as co-morbidities. These co-morbidities, encompassing a range of chronic and acute health issues, can significantly influence the success

of surgical procedures, anaesthesia administration, and postoperative recovery. The pre anaesthesia check-up (PAC) represents the initial interaction between patients and anaesthesiologists, during which comprehensive evaluation and pre-optimization of co-morbidities occur, contributing to a holistic approach in ensuring patient safety and well-being throughout the surgical journey. It offers opportunity for establishing rapport with the patient, provides means to alleviate fear and anxiety among patients.¹ Traditionally PAC evaluation, which was conducted a day before elective

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surgery lead to cancellation of surgeries, which leads to financial loss for patient family. Preoperative clinic visits reduce unnecessary testing and consultation^{2,3} and decrease duration of hospital stay.⁴

The recognition of co-morbidities as vital determinants of surgical outcomes has spurred increasing interest in refining preoperative evaluation practices. A robust understanding of a patient's pre-existing health status facilitates tailored perioperative management, thereby reducing complications, optimizing resource utilization, and ultimately improving patient outcomes. Co-morbidities encompass a diverse array of conditions, ranging from cardiovascular diseases, diabetes, and pulmonary disorders to hematological abnormalities, renal dysfunction, and neurological impairments. Addressing these conditions before surgery through appropriate interventions can mitigate potential risks and enhance the effectiveness of anaesthesia and surgery.⁴

In contemporary healthcare paradigms, interdisciplinary collaboration and evidence-based decision-making are central tenets of patient care. The Pre Anaesthesia check-up embodies this collaborative ethos by engaging anaesthesiologists, surgeons, and other specialists to comprehensively assess patients' medical histories, conduct physical examinations, and conduct pertinent investigations. The identification of co-morbidities during this phase informs the selection of anaesthetic techniques, guides intraoperative strategies, and shapes postoperative care plans. As a result, the risk of adverse events is diminished, and patient recovery is expedited.^{5–10}

This retrospective analysis seeks to investigate the prevalence of co-morbidities and discern referral patterns observed within the context of routine preoperative evaluations at a single, prominent tertiary care institute. By delving into a comprehensive dataset spanning a specified timeframe, this study aims to unravel the spectrum of co-morbid conditions encountered during Pre Anaesthesia check-ups. Furthermore, the study endeavours to unveil patterns in the referral of patients to specialized medical disciplines based on identified co-morbidities, shedding light on the collaborative and interdependent nature of perioperative care.

Incorporating insights from this study into clinical practice has the potential to enhance preoperative evaluation protocols, streamline patient management, and heighten surgical success rates. By expanding our comprehension of co-morbidity prevalence and referral dynamics, this research contributes to the continuous evolution of evidence-based practices in perioperative care.^{11,12}

2. Materials and Methods

2.1. Study design and setting

This retrospective analysis was conducted at the Department of Anaesthesiology and Critical Care, Guwahati Medical College, Assam, India, after obtaining ethical approval from the institutional ethical committee. The study spanned two months, from May to June 2022.

Participants: The study included patients of varying age groups and genders who visited the pre-anaesthesia check-up (PAC) clinic during the specified timeframe. Patients referred to other specialized departments and those who did not subsequently report back to the PAC clinic were excluded from the study.

2.2. Data collection

Data were collected from the pre-anaesthesia check-up forms, which were systematically completed for all patients undergoing anaesthesia according to the established departmental protocol. Co-morbid conditions were identified based on specific criteria, including hypertension (blood pressure > 140/90 mmHg), chronic obstructive pulmonary disease (COPD) with or without a smoking history, bronchial asthma, diabetes mellitus, thyroid disorders, and cardiovascular diseases (both ischemic and non-ischemic) diagnosed through electrocardiography (ECG) and echocardiography.

Definition of Co-morbid Conditions: The following criteria were used to define co-morbid conditions:

1. Hypertension: Blood pressure measurement exceeding 140/90 mmHg.
2. Chronic Obstructive Pulmonary Disease (COPD): Presence of COPD with or without a history of smoking.
3. Bronchial Asthma: Clinical diagnosis of bronchial asthma.
4. Diabetes Mellitus: Patients with a confirmed diagnosis of diabetes.
5. Thyroid Disorders: Patients with diagnosed thyroid disorders.
6. Cardiovascular Diseases: Both ischemic (diagnosed by ECG and Echocardiography) and non-ischemic heart diseases.

2.3. Statistical analysis

The collected data were tabulated and analysed using appropriate statistical methods. A population proportion of 12.7% was considered to determine the sample size, with a margin of error of 2% and a confidence interval of 95%. The estimated number of patients visiting the PAC clinic in a year was approximately 6000. The formula for calculating sample size was applied to ensure adequate representation and statistical validity.

$$\text{Finite population: } n' = \frac{n}{1 + \frac{z^2 \times p(1-p)}{\varepsilon^2 N}}$$

where

z is the z score

ε is the margin of error

N is the population size

\overbrace{p} is the population proportion

2.4. Ethical considerations

This study was conducted in accordance with ethical principles and guidelines and after obtaining ethical approval. Patient confidentiality and anonymity were rigorously maintained throughout the data collection and analysis process.

3. Results

3.1. Demographic profile

A total of 905 patients were included in the study, with 550 males and 355 females. The distribution among different age groups was as follows: 0-18 years (244 patients), 19-45 years (218 patients), 46-60 years (308 patients), and above 60 years (135 patients). (Table 1)

3.2. Type of surgery

The distribution of patients based on the type of surgery revealed that general surgery was the most common (44.30%), followed by urology (14.14%), ENT (9.28%), gynecology (9.72%), and sedation/MRI/CT (17.34%). Other specialties such as orthopedics, neurosurgery, plastic surgery, and obstetrics and gynecology constituted smaller percentages. (Table 2)

3.3. Prevalence of Co-morbidities

Among the study population, a significant proportion of patients exhibited co-morbid conditions. In the age group of 1-18 years, 143 patients had co-morbidities, with 76 newly diagnosed during the hospital visit. Similar trends were observed in other age groups: 118 co-morbidities (47 newly diagnosed) in the 19-45 age group, 245 co-morbidities (81 newly diagnosed) in the 46-60 age group, and 118 co-morbidities (13 newly diagnosed) in the >60 age group. Overall, 23.98% of unique new patients out of the total 905 were diagnosed with co-morbidities during their hospital visit. (Table 3)

3.4. Co-morbidity distribution

Diabetes Mellitus (DM) exhibited the highest prevalence among individuals aged 46-60 (69 cases), followed closely by the >60 age group (61 cases). Anaemia emerged as the most prevalent co-morbidity across all age groups, with 119

cases in the 1-18 age group, 89 cases in the 19-45 age group, 87 cases in the 46-60 age group, and 67 cases in the >60 age group. Females tend to be more anemic than males, whereas males showed to have hypertension and diabetes than females in the study group. Asthma/COPD demonstrated its highest incidence within the 46-60 age group, accounting for 18 cases. Thyroid disorders displayed their peak prevalence in the 19-45 age group (59 cases), closely followed by the 46-60 age group (37 cases). Renal dysfunction was primarily noted in the 46-60 age group (9 cases) and the >60 age group (12 cases). Hypertension (HTN) was most pronounced in the 46-60 age group (184 cases), followed by the >60 age group (118 cases). Ischemic Heart Disease (IHD) and Non-ischemic Heart Disease were more prevalent among individuals aged 46-60 and >60. Chronic Liver Disease (CLD) predominantly manifested in the 19-45 age group, with a solitary case. (Tables 4 and 5)

3.5. Preoperative laboratory tests

Preoperative laboratory testing was defined as any laboratory test obtained within 90 days of surgery. Laboratory tests included in the study were Hemoglobin, Serum electrolytes and Serum Thyroid Stimulating Hormone (TSH). Preoperative laboratory testing was defined as any laboratory test obtained within 90 days of surgery. Laboratory tests included in the study were Hemoglobin, Serum electrolytes and Serum Thyroid Stimulating Hormone (TSH). Abnormality in lab values was considered if Hemoglobin<11g%, S.Na+<137-145mmol/L>, S.K+<3.5-5.1mmol/L> and TSH<0.465-4.680mIU/L>. 40% of the study population was found to be anemic, which was followed by thyroid disorders (14.47%) and then abnormalities in electrolyte panel (6.29%) (Table 6)

Among the new illnesses detected in the PAC, 12.37% were found to have anaemia, closely followed by diabetes mellitus (6.10) and then others such as hypertension, thyroid disorders; etc (Table 7). Postponement of surgery was highest due to referral to the Cardiology department for hypertension as well as other cardiac issues (total average delay being 21.7 days); this was followed by delay due to referral to Nephrology (9.5 days), then Pulmonary Medicine, Endocrinology etc (Table 8).

4. Discussion

The primary objective of the study was to assess the significance of a thorough preoperative evaluation through a Pre-Anaesthetic Clinic (PAC) in the context of centralized medical information and coordinated perioperative care. Over the years, the evolution of preoperative evaluation techniques has transitioned from a focus on history taking and physical examination to incorporating laboratory tests, reflecting the changing dynamics of medical practice and

Table 1: Demographic profile of the patients

Age (in years)	Male	Female	Total
0-18	137	107	244
19-45	130	88	218
46-60	195	113	308
>60	88	47	135
	550	355	905

Table 2: Type of surgery

Type of surgery	No of patients(unique)	% of total study population
General Surgery	401	44.30
Orthopaedics	7	0.77
Neurosurgery	4	0.44
Urology	128	14.14
ENT	84	9.28
Gynae	88	9.72
Plastic Surgery	34	3.75
OBG	2	0.22
Sedation/ MRI/ CT	157	17.34

Table 3: Comorbidities among patients

Age group (in years)	No. of patients with co-morbidities	Newly diagnosed in hospital visit	No comorbidities	% of unique new patients (out of 905)
1-18 (244)	143	76	101	8.40
18-45(218)	118	47	100	5.19
45-60(308)	245	81	63	8.95
>60(135)	118	13	17	1.43
				23.98

Table 4: Comorbidities among various age groups

Co-morbidity	1-18 yrs(244)	19-45(218)	46-60(308)	>60yrs(135)
DM	3	43	69	61
Anemia	119	89	87	67
Asthma/COPD	14	8	18	19
Thyroid disorder	17	59	37	18
Renal dysfunction	3	0	9	12
HTN	3	25	184	118
IHD	0	4	15	19
Non-ischemic HD	1	7	9	12
CLD	0	1	2	0
	160	236	430	326

*numbers do not indicate unique patients

Table 5: Co-morbidity and gender

Co- morbidity	Male(550)	Female (355)
DM	119	57
Anemia	143	219
Asthma/COPD	41	18
Thyroid disorder	22	109
Renal dysfunction	17	7
HTN	171	159
IHD	27	11
Non-ischemic HD	19	10
CLD	2	1

*numbers do not indicate unique patients

Table 6: Abnormality in laboratory parameters

Lab parameters	ref range	No of samples	No of abnormal results	% of abnormal results
Hb%	13.00-15.00	905	362	40
S. Electrolyte (mmol/ltr)	Na=137-145, K=3.5-5.1	905	57	6.3
S TSH (mIU/Ltr)	0.465-4.680	905	131	14.5

Table 7: Distribution of the comorbidities in the population

Details of New Illness	No of new illness	% out of total study population
DM	57	6.10
Anemia	112	12.37
Asthma/COPD	18	1.98
Thyroid disorder	23	2.54
Renal dysfunction	3	0.33
HTN	26	2.87
IHD	6	0.66
Non-ischemic HD	9	0.99
CLD	3	0.33

Table 8: Type of surgery and average delays

Reason for postponement of Surgery	Average delay in days
Incomplete Investigations	3.2
Investigations not done	4.3
Refer to Cardiology for HTN	10.4
Refer to Endo for DM	7.2
Refer to Cardio for other cardiac disorders	11.3
Refer to Pulmonary Med for Asthma, COPD,etc	5.9
Refer to Nephrology	9.5
Refer to Endo for thyroid	5.6

knowledge. The establishment of PAC, a concept that gained prominence between 1940-1960, aimed to ensure that patients were thoroughly evaluated before elective surgeries, thereby reducing delays and complications arising from unaddressed medical conditions. Our study, aligned with this historical progression, aimed to identify prevalent and newly diagnosed co-morbid conditions while assessing the impact of referral delays to various departments for condition optimization, in accordance with institutional protocols.

It is noteworthy that a significant portion of our studied population (27%) belonged to the age group of 45-60 years. This demographic was also the most affected by newly diagnosed co-morbidities, particularly with an increased prevalence of 8.95%. The prevalence of anaemia emerged as a common factor, resonating with findings from previous studies. Mathews Jacob et al. found anaemia to be the most prevalent condition in their study, while Reazaul Karim et al.¹³ also noted anaemia to be common, along with ECG changes. Similarly, our study revealed anaemia as the most prevalent condition (40%), possibly linked to the region's lack of awareness about iron deficiency, chronic disease-related anaemia, and helminthiasis.

Further examination of the co-morbid landscape in our study indicated the prominence of diabetes, hypertension, and thyroid disorders, particularly among males aged 45 and above. Lifestyle choices, carbohydrate-rich diets, and subclinical hypothyroidism appeared to contribute to this trend. In line with this, Haq ZA et al.¹⁴ observed cardiac abnormalities as frequent co-morbidities, with hypertension topping the list. Our study mirrored this, with hypertension being the most common co-morbidity, especially among males.

The issue of delay in elective surgeries due to referrals for medical condition optimization was a significant concern in our study. Patients being referred to departments such as Cardiology, Nephrology, and Endocrinology experienced varying delays, with Cardiology referrals causing the longest average delay (21.7 days). Complex investigations and consultations were often required before surgical clearance, contributing to this delay. This delay could potentially result in heightened patient anxiety, fear, and cognitive dysfunction, accentuating the stress of impending surgery.

Our study highlighted that a substantial proportion of patients (28.1%) had medical issues identified for the first

time during their PAC assessment. This number contrasts with the 17% reported by Correll et al.,¹⁵ underlining the PAC's role as a primary setting for detecting and sometimes treating pre-existing medical conditions. Addressing the issue of referral-induced delays could be facilitated by implementing fixed timetables for specialty surgeries and consultations, streamlining the process and enhancing the patient-doctor experience.

Hence, our study underscores the vital importance of comprehensive preoperative evaluations through PACs to detect and address co-morbid conditions, which can lead to better perioperative care outcomes and reduced delays in elective surgeries. The historical evolution of preoperative evaluation techniques aligns with the significance of PACs in modern medical practice. Efforts to minimize referral delays could enhance the overall patient experience and contribute to more efficient perioperative care management.¹⁶

5. Conclusion

In summary, Gauhati Medical College and Hospital's role as a regional referral center underscores the importance of a Pre-Anaesthetic Clinic (PAC) for effective doctor-patient rapport and comprehensive preoperative care. An outpatient-based PAC Clinic enables meaningful discussions, easing patient anxieties and improving surgical outcomes. Assigning specific days for PAC anesthesiologists in operating theaters enhances continuity and minimizes elective surgery cancellations. PAC clinics not only assess fitness but also diagnose and treat co-existing medical conditions, reducing cancellation rates. Moreover, PAC Clinics can evolve into screening units, addressing prevalent conditions. Incorporating a PAC-OPD is vital for Anesthesiology departments to optimize perioperative care, alleviate patient stress, and ensure holistic well-being during surgical procedures.

6. Source of Funding

None.

7. Interest of Conflicts

None.


References


- Jacob M, Paul D, Jacob M, Krishnakumar M, Kulkarni SN. The Prevalence of Different Comorbidities among Patients Reporting To Preanaesthetic Clinic in a Tertiary Care Hospital: A Prospective Observational study. *Int J Biomed Res.* 2016;7(9):658–62.
- Fischer SP. Development and effectiveness of an anesthesia preoperative evaluation clinic in a teaching hospital. *Anesthesiology.* 1996;85(1):196–206.
- Tsen LC, Segal S, Pothier M, Hartley LH, Bader AM. The effect of alterations in a preoperative assessment clinic on reducing the number

- and improving the yield of cardiology consultations. *Anesth Analg.* 2002;95(6):1563–8.
- Halaszynski TM, Juda R, Silverman DG. Optimizing postoperative outcomes with efficient preoperative assessment and management. *Crit Care Med.* 2004;32(4 Suppl):76–86.
- Benarroch-Gampel J, Sheffield KM, Duncan CB, Brown KM, Han Y, Jr CT, et al. Preoperative laboratory testing in patients undergoing elective, low-risk ambulatory surgery. *Ann Surg.* 2012;256(3):518–28.
- Kristoffersen EW, Opsal A, Tveit TO, Berg RC, Fossum M. Effectiveness of pre-anaesthetic assessment clinic: a systematic review of randomised and non-randomised prospective controlled studies. *BMJ Open.* 2022;12(5):518–28.
- Babitu UQ, Cynaam. Patients' understanding of technical terms used during the pre-anaesthetic consultation. *Anaesth Intensive Car.* 2010;38(2):349–53.
- Burman AL. A pre-anaesthetic clinic. *S Afr Med J.* 1968;42(13):315–7.
- Ehsan-Ul-Haq M. Role of pre-anaesthesia outpatient clinic in reducing pre-operative anxiety. *J Coll Physicians Surg Pak.* 2004;14(4):202–4.
- Conway JB, Goldberg J, Chung F. Preadmission anaesthesia consultation clinic. *Can J Anaesth.* 1992;39(10):1051–7.
- Gibby GL, Gravenstein N. 13 Pre-anaesthetic evaluation. *Baillière's Clin Anaesthesiol.* 1998;12(3):503–21.
- Dhesi JK, Swart M. Specialist pre-operative assessment clinics. *Anaesthesia.* 2016;71(Suppl 1):3–8.
- Reazaulkarim HM, Prakash A, Sahoo SK, Narayan A, Vijayan V. Abnormal routine pre-operative test results and their impact on anaesthetic management: An observational study. *Indian J Anaesth.* 2018;62(1):23–8.
- Haq ZA, Murthy P, Malik I, Lahori VU, Chaudhary S, Ahuja S, et al. Detection of comorbid illnesses during pre-anaesthesia evaluation in a university teaching hospital: A prospective observational study. *National Med J India.* 2014;27(5):256–8.
- Correll DJ, Bader AM, Hull MW, Hsu C, Tsen LC, Hepner DL, et al. Value of preoperative clinic visits in identifying issues with potential impact on operating room efficiency. *Anesthesiology.* 2006;105(6):1254–9.
- Emanuel A, Macpherson R. The anaesthetic pre-admission clinic is effective in minimising surgical cancellation rates. *Anaesth Intensive Care.* 2013;41:90–4.

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