An Audit on Unnecessary Preoperative Investigations and Their Cost in Dental Hospital Peradeniya Sri Lanka

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ABSTRACT

Preoperative investigations are important elements of preoperative evaluation to determine the fitness for anaesthesia and surgery. [1,2,3].

The objectives were to assess the number of unnecessary preoperative investigations carried out and repeated in Dental Hospital, Peradeniya and to analyze the cost of investigations that are performed unnecessarily. Reference guidelines were the NICE Preoperative Investigations Guideline (2016) [4] and the National Preoperative Investigations Guideline (2022) [5].

The study was carried out on patients undergoing elective surgeries in the main theatre complex of Dental Hospital, Peradeniya, over a month. Pediatric surgeries, emergency surgeries, repeated surgeries and ICU-bound patients undergoing surgeries were excluded.

Forty-nine cases were performed during the study period (11 minor, 26 intermediates, and 12 major cases). According to the results; FBC- 15, BU-12, SCr- 20, SE (Na, K)- 25, SCl- 9, AST/ALT- 4, PT/INR- 9, CXR- 6, ECG- 11, 2D echocardiogram- 1, FBS/CRP- 1 were performed unnecessarily. The total unnecessary cost was 107,400 LKR over that month. This reveals an average of 2200 LKR unnecessary investigation costs per surgery. In conclusion, a considerable number of inappropriate investigations are performed in an elective preoperative setting which also has cost implications.

Keywords: Preoperative, Investigations, National guidelines

Introduction

To determine the fitness for anaesthesia and surgery, preoperative routine investigations are considered an important element of the preoperative evaluation of patients awaiting elective surgeries. It also helps us identify patients with a high risk of intra and post-operative morbidity and mortality. [1,2,3]

The preoperative investigations may be divided into two categories according to the American Society of Anesthesiologists (ASA) Task Force on Pre anaesthesia Evaluation – 2002; as routine (screening) and as indicated (diagnostic) [4]. Routine tests are those done in the absence of any specific clinical indication or purpose (i.e. tests intended to discover a disease or disorder in

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Received: 10/09/2023
Accepted: 27/09/2023
DOI: http://doi.org/ 10.4038/slja.v31i2.9240

an asymptomatic patient. E.g.: panel of blood tests, urine tests and CXR, ECG). Indicated tests are defined as tests done for a specific clinical indication or purpose, e. g. to confirm a clinical diagnosis, to assess the severity and progress of the disease, and effectiveness of therapy.

Clinicians are advised only to order preoperative investigations that are really indicated and that may affect the peri operative care, following a careful and detailed assessment of the patient. To guide the choice of the investigations, National Institute for Health and Care Excellence (NICE) issued a guideline in 2016 [4]. It suggests basic preoperative investigations (FBC, HbA1C, clotting profile, renal profile, liver profile, ECG, 2D echocardiogram, chest Xray, polysomnography, pregnancy test and urine tests) based on the ASA grade of the patient and the planned surgery (minor, intermediate or major).

It is frequently observed that many unnecessary investigations are being ordered by clinicians before elective surgeries. Several studies done worldwide have shown the adverse effects of unnecessary preoperative investigations and their impact on health care setting [2,3,6,7,8]. Some common disadvantages are false positivity, postponement of surgeries, and not affecting anaesthetic management [1,2,3].

Other than the shortcomings mentioned above, for a third world country like ours, cost for those investigations, and increased workload for ward staff and the laboratory staff will have an adverse effect.

Dental hospital Peradeniya is one of the leading institutions in Sri Lanka, which provides care for oro-maxillary facial conditions. The institute, being the only university affiliated teaching institute related to dental surgery in Sri Lanka, carries out a number of major surgical procedures per month. The admission clerking and ordering pre-operative investigations are done by dental doctors with limited medical background. All patients are reviewed by anaesthetic team prior to surgery. It has been observed by the anaesthetic team that there are number of unnecessary investigation and repetition of investigations in this institution.

Considering the above observation, this clinical audit was conducted with the aim of detecting the number and extent of unindicated investigations that are being carried out by Dental Hospital, Peradeniya for patients who are awaiting elective surgeries, compared with the NICE preoperative investigation guideline 2016 and National perioperative investigations guideline issued by College of Anaesthesiologist and Intensivists of Sri Lanka, 2022.

Methods

An institutional clinical audit was carried out in Dental Hospital, Peradeniya and in the aim of assessing the number of unnecessary pre-operative investigations carried out and repeated, and to analyze the cost for the unnecessary investigations performed.

All elective surgeries carried out in the main theatre complex of Dental Hospital, Peradeniya for a period of one month from 15.06.2022 to 14.07.2022 was taken into account. Paediatric surgeries, emergency

surgeries, repeated surgeries and ICU bound patients undergoing surgeries were excluded.

All data was collected by registrars in Anaesthesia, with a sound knowledge in NICE guidelines and local guidelines on Pre operative investigations. A data collection form that includes demographic details, clinical details and details related to investigations was used for the data collection. Data collection was done on the day of surgery using details in the bead head tickets.

The necessity of the investigations was decided compared to the NICE preoperative investigations guideline (2016) and national preoperative investigations guideline (2022).

Data was analyzed using SPSS 20 (statistical package for social sciences 20.0).

Results

During the study period from 15.06.2022 to 14.07.2022, forty-nine cases were performed in the dental theatre. Of them, 11, 26 and 12 were minor, intermediate and major cases respectively. Demographic data related to the surgeries are presented in Table 1. Out of the forty-nine patients who underwent surgery 11, 26 and 12 were ASA 1, ASA 2 and ASA 3 patients (table 2)

Table 1: *Demographic data of the surgeries*

Type of surgery	*Number (n)*	*Percentage (%)*
Minor	11	22.4%
Intermediate	26	53.06%
Major	12	24.4%
Total	*49*	*100%*

Table 2: *Data related to the fitness of the patients*

Type of surgery	*Number (n)*	*Percentage (%)*
ASA 1	11	22.4%
ASA 2	26	53.06%
ASA 3	12	24.4%
Total	*49*	*100%*

Information related to the surgery, the patient's clinical fitness and performed investigations were assessed according to the reference guidelines and the necessity of each investigation was decided. According to the findings, 15 FBCs (Full Blood Count), 12 BUs (Blood Urea), 20 SCrs (Serum Creatinine), 25 SEs (Serum Electrolytes), 9 SCls (Serum Chloride), 4 AST/ALTs (Alanine & Aspartate aminotransferases) , 9 PT/INR (Prothrombin Time International Normalized Ratio), 6 CXRs (Chest X-Ray), 11 ECGs (Electro Cardiogram) and 1 2D echocardiogram were unnecessarily performed (table 3).

***Table 3**: Data of unnecessary investigations*

Investigation	*Number (n)*	*Cost*
FBC	15	400 LKR *15 = 11,250 LKR
BU	12	750 LKR *12 = 9,000 LKR
S.Cr	20	750 LKR *20 = 15,000 LKR
SE	25	1,400 LKR *25 = 35,000 LKR
S.Cl	9	450 LKR *9 = 4,050 LKR
AST/ALT	4	1,600 LKR *4 = 6,400 LKR
PT/INR	9	1,600 LKR *9 = 14,400 LKR
CXR	6	750 LKR *6 = 4,500 LKR
ECG	11	400 LKR *11 = 4,400 LKR
2D echocardiogram	1	3,400 LKR *1 = 3,400 LKR
Total	*112*	*107,400 LKR*

The total cost for the unnecessary investigations was calculated to be 107,400 LKR considering the commercial value of the ordered investigations. This revealed an average of 2,200 LKR unnecessary costs per patient per surgery.

Discussion

Preoperative investigations play an important role in the management of patients undergoing surgery. It helps clinicians to identify the patients who are at risk of morbidity and mortality following anaesthesia and surgery.

Although laboratory tests can help in ensuring optimal preoperative conditions, routine screening tests have several shortcomings.

The tests ordered in the absence of clinical indication, while frequently abnormal, fail to predict perioperative complications and rarely influence anaesthetic management. Nonselective testing produces many false positive, false negative, or borderline results and further evaluation or repeat test may cause unnecessary psychological and economical burden and postponement of surgery. False negative tests lead to a sense of security and may result in unfavorable outcome. Frequently, the abnormalities detected are not pursued and the clinicians proceed with anesthesia and surgery ignoring them. Abnormalities detected if not pursued leaves the clinicians open to more medico-legal liability than if the test was not ordered in the first place [1]. Therefore, clinicians are advised to order only the necessary investigations after a careful assessment of the patient. Patient's ASA grade and the planned surgery should be considered before ordering the relevant investigations [4].

According to the results of our study, there were total of 112 unindicated preoperative investigations performed. There may be several reasons for above result. Firstly, preoperative investigations are ordered by junior doctors. They may not have knowledge of recent guidelines and recommendations. Lack of institutional guidelines may also contribute to this. An audit cycle performed at Gloucestershire Hospitals NHS Foundation Trust, United Kingdom demonstrated 21% reduction of over investigating preoperative patients after implementation of a "Pre-Admission Handbook", for use by junior doctors and nurse practitioners in the pre-operative setting[3].

Secondly, fear of cancellation of surgeries due to lack of investigations might also be a cause for ordering unnecessary investigations.

We performed our study in a Dental Hospital, in which dental graduates are responsible for clerking patients and ordering basic investigations. Their limited understanding on systemic pathologies and basic anaesthetic requirements may also be a cause for the above result. Early input from anaesthetists in the preoperative setting can be beneficial in reducing the number of unnecessary investigations. A similar intervention was observed in a study carried out in Perth, Western Australia comparing the rate of unnecessary investigations before and after implementing an anaesthetist-led preoperative assessment clinic. There were significant reductions in most types of investigations ordered with clinic intervention. This resulted in an estimated reduction of preoperative investigation costs by 38% [8].

Our study showed a total cost of 107,400 LKR for unindicated tests with an average cost of 2200 LKR per person per surgery. This is a considerable waste of money for a third-world country like ours, especially considering the current economic crisis.

Conclusion

A considerable number of inappropriate investigations are performed in elective preoperative settings which showed cost implications as well. Raising awareness of NICE guidelines (2016) and National Guidelines (2022) on preoperative investigations among the medical population, implementation of institutional guidelines and

guiding patients through an anaesthetist lead preoperative clinic are recommended to reduce the number and cost.

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