AUDIT ARTICLE

Current practice of pre-operative assessment at a public sector hospital in Pakistan – a clinical audit

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Abstract

Objective: To assess the practice of ordering unnecessary laboratory investigations by primary surgical teams.

Method: The clinical audit was conducted from December 17, 2022, to January 15, 2023, at the Civil Hospital, Karachi, and comprised primary surgeons working in different surgical units who ordered laboratory investigations for patients as a part of preoperative assessment. Data was collected using a self-administered questionnaire. Data was analysed using SPSS 20.

Results: Of the 280 surgeons approached, 249(89%) responded. The units covered were General surgery 96(38.5%), Gynaecology 74(29.7%), Neurosurgery 5(2.0%), Ear, Nose and Throat 19(7.6%), Plastic surgery 15(6.02%), Paediatric surgery 13(5.2%), Vascular surgery 8(3.21%), Oromaxilofacial 9(3.61%), Opthalmology 6(2.4%), and Orthopaedics 4(1.60%).As part of baseline investigations, 244(98%) surgeons ordered complete blood count, 173(69.5%) ordered urea and creatinine, 229(92%) ordered viral markers, 197(78.7%) ordered fasting and random blood glucose, and 178(71.5%) focussed on cardiac fitness.

Conclusion: A need was found to establish standard protocols for pre-surgery evaluation so that unnecessary investigations may be avoided.

Key Words: Preoperative, Investigation, Guidelines, Assessment, Audit.

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Introduction

Preoperative investigations and assessment remain the cornerstone practice of surgeons across the globe. The mainstay of preoperative investigations is to collect information for formulating suitable perioperative anaesthetic management of patients, so that safe anaesthesia can be administered and morbidity and mortality can be reduced[1]. Thus, routine laboratory investigations, such as complete blood count (CBC), urea and creatinine (U&C), prothrombin time (PT), serum electrolyte (ELE), fasting and random blood glucose (FBG and RBG), electrocardiogram (ECG) and chest X-ray (CXR), are highly common[2].

However, majority of the preoperative investigations are not always necessary as they do not always relate to the safety of a surgical procedure[3]. The American Society of Anaesthesiologists (ASA) recommends avoiding routine baseline investigations in healthy subjects, or those with mild systemic disease categorised as ASA I or II in low-risk surgeries, specifically CBC, metabolic investigations and coagulation profile, if a minimally invasive surgery is being planned and minimal blood loss is expected[4].

Therefore, it has been recommended that patient's assessment, comprising history, examination and previous medical record, should be considered and assessed in detail rather than ordering unnecessary baseline investigations for elective procedures, especially if it does not affect the perioperative anaesthetic management of the patient[5,6]. The practice of ordering unnecessary investigations for pre-surgical assessment of patients is quite prevalent in institutions, most commonly due to old traditions, risk of delays, case cancellations as well as owing to vested interests[7].

This unnecessary preoperative workup puts a lot of economic burden on individuals and healthcare systems, especially in low- and middle-income countries (LMICs), like Pakistan[8]. Hence, there is a need to have clear guidelines for primary surgical teams for preoperative preparation of low-risk patients on the elective list.

The current study was planned to assess the practice of ordering unnecessary laboratory investigations by primary surgical teams related to various surgical sub-specialties.

Subjects and Methods

The clinical audit was conducted from December 17, 2022, to January 15, 2023, at the Civil Hospital, Karachi

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(CHK), and comprised primary surgeons working in different surgical units who ordered laboratory investigations for patients as a part of preoperative assessment. Exemption was obtained from the ethics review committee of Dow University of Health Sciences (DUHS). The sample size was calculated with a hypothesised frequency of outcome (65+10%) with a design effect of 1.4 with 95% confidence level. The calculated sample size was doubled to meet the estimated population size of roughly 3,000 doctors at CHK with confidence interval of 5%.[9] The sample size was calculated using OpenEpi V.3.[10]

The sample was raised randomly, using convenience sampling technique from among surgeons working in different surgical units, including General surgery (GS), Gynaecology (GYN), Neurosurgery, Ear, Nose and Throat (ENT), Plastic surgery, Paediatric surgery, Vascular surgery, Oromaxilofacial surgery, Opthalmology and Orthopaedics. Those included were residents, medical officers and consultants who were willing to participate in the study. House-officers, nurses and paramedical staff as well as those who refused to give consent were excluded.

After taking informed consent, data was collected using a self-administered questionnaire that was developed after extensive literature review of previous related studies.[7-9,11,12] The questions relevant to the study were asked specific to laboratory, radiology and cardiology investigations conducted as part of the preoperative assessment at our institution. All efforts were made to make it brief and participant-friendly. The subjects, who were approached directly, were required to respond to all questions in accordance with their understanding and experiences without the assistance of any external help or device.

Common preoperative investigations explored were CBC, U&C, liver function test (LFT), viral markers, RBG, PT, activated partial thromboplastin time (APTT), international normalized ratio (INR), CXR and electrocardiography (ECG).

The current practices of the CHK surgical team were assessed in the light of guidelines developed by the National Institute of Clinical Excellence NICE or ASA[4,11].

Data was analysed using SPSS 20. Data was expressed as frequencies and percentages.

Results

Of the 280 surgeons approached, 249(89%) responded. The units covered were General surgery 96(38.5%), Gynaecology 74(29.7%), Neurosurgery 5(2.0%), Ear, Nose and Throat 19(7.6%), Plastic surgery 15(6.02%), Paediatric surgery 13(5.2%), Vascular surgery 8(3.21%), Oromaxilofacial 9(3.61%), Opthalmology 6(2.4%), and Orthopaedics 4(1.60%).

Table-1: Surgeons ordering baseline investigations.

Speciality	CBC	U&C	ELE	PT & APTT	LFT	Viral markers	Random blood glucose
ENT n=19	19(100.0%)	19(100.0%)	19(100.0%)	8(42.1%)	4(21.1%)	19(100.0%)	4(21.1%)
GS n=96	96(100.0%	58(60.4%)	72(75.0%)	51(53.1%)	22(22.9%)	79(82.3%)	77(80.2%)
GYN n=74	74(100.0%)	72(97.3%)	64(86.5%)	58(78.4%)	52(70.3%)	74(100.0%)	74(100.0%)
NEUROSURGERY n=5	5(100.0%)	3(60.0%)	5(100.0%)	5(100.0%)	2(40.0%)	5(100.0%)	4(80.0%)
OPHTHALMOLOGY n=6	6(100.0%)	2(33.3%)	4(66.7%)	6(100.0%)	2(33.3%)	6(100.0%)	2(50.0%)
OROMAXILOFACIAL n-9	9(100.0%)	9(100.0%)	9(100.0%)	9(100.0%)	4(44.4%)	9(100.0%)	9(100.0%)
ORTHO n=4	4(100.0%)	1(25.0%)	3(75.0%)	3(75.0%)	3(75.0%)	3(75.0%)	3(75.0%)
PAEDS n=13	13(100.0%)	Nil	Nil	Nil	Nil	11(84.6%)	2(15.4%)
PLASTIC SURGERY n=15	15(100.0%)	5(33.3%)	14(93.3%)	9(60.0%	12(80.0%)	15(100.0%)	13(86.7%)
VASCULAR SURGERY n=8	3(37.5%)	4(50.0%)	8(100.0%)	3(37.5%)	5(62.5%)	8(100.0%)	6(75.0%)
Total n=249	244(98.0%)	173(69.5%)	198(79.5%)	152(61.0%)	106(42.6%)	229(92.0%)	196(78.7%)

ENT: Ear, nose and throat, GS: General surgery, GYN: Gynaecology, ORTHO: Orthopaedics, PAEDS: Paediatrics, CBC: Complete blood count, U&C: Urea and creatinine, ELE: Electrolytes, PT: Prothrombin time, APTT: Activated partial thromboplastin time, LFT: Liver function tests.

Table-2: Surgeons ordering ECG and CXR.

Surgical Speciality	What baseline investigation you feel advise for every on-list patient	
	ECG	CXR
ENT	19(100.0%)	19(100.0%)
GS	63(65.6%)	70(72.9%)
GYN	66(89.2%)	65(87.8%)
NEUROSURGERY	5(100.0%)	5(100.0%)
OPTHALMOLOGY	4(66.7%)	2(50.0%)
ORAL MAXILOFACIAL	9(100.0%)	9(100.0%)
ORTHO	2(50.0%)	3(75.0%)
PAEDS	Nil	9(69.2%)
PLASTIC SURGERY	14(93.3%)	8(53.3%)
VASCULAR SURGERY	6(75.0%)	3(37.5%)
Total	188(75.5%)	194(77.9%)

ENT: Ear, nose and throat, GS: General surgery, GYN: Gynaecology, ORTHO: Orthopaedics, PAEDS: Paediatrics, ECG: Electrocardiogram, CXR: Chest X-ray.

As part of baseline investigations, CBC was ordered by 244(98%) surgeons, U&C 173(69.5%) ELE 198(79.5%), PT and APTT 152(61%), LFT 106(42.6%), RBG 196(78.7%) and viral markers by 229(92%) (Table 1).

ECG was ordered by 188(75.5%) surgeons and CXR by 194(77.9%) (Table 2). Cardiac fitness was focussed upon by 178(71.2%) surgeons (Table 3).

Table-3: Surgeons opting for cardiac fitness.

Surgical Specialties	NPO with non-cardio fitness	NPO with cardio fitness
ENT	2 (10.5%)	17 (89.5%)
GS	35 (36.5%)	61 (63.5%)
Neurosurgery	5 (6.8%)	69 (93.2%)
Ophthalmology	Nil	5 (100%)
Oral	4 (66.7%)	2 (33.3%)
Maxillofacial	Nil	9 (100%)
Orthopaedic	1 (25.0%)	3 (75.0%)
Paediatric	11 (84.6%)	2 (15.4%)
Plastic surgery	10 (66.7%)	5 (33.3%)
Vascular surgery	3 (37.5%)	5 (62.5%)
Total	71 (28.5%)	178 (71.1%)

ENT: Ear, nose and throat, GS: General surgery, GYN: Gynaecology, ORTHO: Orthopaedics, PAEDS: Paediatrics, NPO: Nil per oral.

Discussion

The purpose of preoperative evaluation is to assess patients at risk and to optimise them before a surgery. Evaluation must include a detailed history, a thorough physical examination and relevant laboratory investigations if the particular laboratory investigation has the potential to alter the intraoperative management of the patient. The current study was conducted in line with an Indian study that assessed preoperative investigations ordered by anaesthesiologists and surgeons through an online survey in which 94.82% of the participants ordered baseline investigations.[9] In the current study, 98% of the surgeons requested baseline investigations in preoperative setting. Kling et al. found unnecessary preoperative testing of healthy patients having no significant correlations of laboratory tests with surgical plan and its outcome[12]. The current study highlighted the issue of ordering unnecessary laboratory investigations by the primary surgical team which resulted in added financial burden.

CBC is one of the most common tests ordered in a hospital setup, and the current found that 98% surgeons ordered preoperative CBC. The purpose of CBC is to check haemoglobin (Hb) level, infection status and primary haemostasis. However, proper history-taking regarding blood transfusion, haemostatic disorders, signs of infections, and a detailed physical examination is enough to rule out haematological disorders. NICE guidelines have elaborated the necessary preoperative laboratory investigations with respect to ASA status of patient and the type of surgery being performed, recommending checking Hb levels in ASA III-IV patients only as they have a higher risk of mortality[11].

CXR and ECG are the investigations recommended by the NICE guidelines in ASA III-IV cases with cardiac, renal and respiratory diseases undergoing major surgeries. The aforementioned investigations are not necessary for ASA III-IV patients if they undergo minor surgical procedures[13]. On the contrary, the current study found that 78% surgeons ordered preoperative CXR and 76% ECG even before admitting the patient to the ward.

NICE guidelines also recommend haemostatic profiling of patients undergoing intermediate to complex surgeries with chronic liver disease, but neurosurgical patients have been excluded owing to the precise site of surgery and special considerations needed[11]. However, the current study found that 100% neurosurgeons in the study ordered coagulation profile for their patients. Although coagulation studies provide an insight to the anaesthetists for assessing the bleeding risk, focussing on clinical examination, family history, history of bleeding from minor trauma in a previous surgery and physical examination better predict the risk of abnormal bleeding, and, therefore, such data should be obtained in every patient undergoing an invasive procedure[14,15].

Nice guidelines have also recommended ordering kidney function tests, which include urea, creatinine, electrolytes and glomerular filtration rate (GFR), in all ASA patients undergoing major surgery and in ASA II-IV patients undergoing intermediate surgery[11]. The current study found that 64% surgeons ordered routine U&C in preoperative workup irrespective of the type of surgery being performed.

LFTs were advised by 42% of the surgeons among whom orthopaedic surgeons and gynaecologists were the leads (70-75%). However, the guidelines recommend assessing liver function both by clinical grading system, such as Model for End-Stage Liver Disease (MELD) score, Child-Pugh score, and by dynamic biochemical parameters for patients undergoing liver surgeries for better surgical decision-making[16-19].

In the current study, 92% surgeons ordered preoperative viral markers for screening hepatitis B and C. This can be attributed to the endemic state of the country for hepatitis B and C, with one in every 20 being infected with hepatitis C, and the main modality of transmission being

healthcare-related procedures. Therefore, preoperative testing holds special considerations in such cases [20,21].

NICE guidelines also recommend against routine preoperative testing of glycated Hb (HbA1c) levels in non-diabetic patients. RBG testing has been largely abandoned for the detection and optimisation of diabetes mellitus[11]. However, 75% of the current surgeons routinely ordered FBG and RBG. Since Pakistan has the 3rd highest diabetes
burden in the world,[22], it may necessitate preoperative assessment of blood glucose patterns for making case finding easier for patients and clinicians either using glucose-based criteria or HbA1c [22,23].

Regarding the need for performing full risk assessment for cardiac clearance, the NICE guidelines state that it should only be performed in patients who have underlying cardiovascular disorder, aged >40 or having estimated 10-year cardiovascular disease (CVD) risk 10% or more[24]. In the current study, 71.5% surgeons ordered cardiac fitness of the on-list patients irrespective of the ASA status of the patient.

The current study has a few limitations. The study only highlighted the actual number of surgeons prescribing various laboratory tests without considering the risk of surgery (high, moderate, low), invasion level (highly invasive, minimally invasive) and type of anaesthesia to be given (general, spinal, local). Also, the data was collected from only one public-sector hospital. Besides, the actual economic burden in terms of money was not calculated. Multi-centre studies are required to validate the findings.

Conclusion

There was found a need to incorporate standards of ordering investigations. Local hospital-based protocols should be generated in the light of NICE or ASA guidelines.

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Author's Contributions
SU: Concept, design, drafting, review.
AM: Concept, design, review, final approval.
SAS: Drafting, editing, review.
RK: Intellectual content, drafting.
AN: Data collection, entry, submission, drafting.