Study Protocol

An Evaluation of the POSSUM Score's Efficacy in Predicting the Outcome of Patients Undergoing a Laparotomy - A Study Protocol

Abstract

Background: POSSUM Score is used to assess the outcome of complication, surgical intervention and the proportion between predicted and observed morbidity and mortality.Such scoring systems have been especially designed to compare patient's severity of illness, predict mortality, morbidity and to plan an effective treatment protocol.

Objectives:

- **a.** To assess applicability of POSSUM score (morbidity and mortality) in surgical practice in a tertiary care centre in a rural area.
- **b.** To assess utility of POSSUM score in clinical management.

Methodology:
The complications included in the study will be assessed in patients undergoing laparotomy during the hospital stay irrespective of the period of stay. The severity of these complications will be predicted using POSSUM score. The cases developing complications will be randomly selected to make a total participant size of 100.

Results:
At the end of the study, we expect easy applicability of POSSUM score in assessment of morbidity and mortality in patients undergoing laparotomy.

Conclusion: We hope that POSSUM score is an easy tool which can be applied to assess the morbidity and mortality in patients undergoing laparotomy.

Keywords: POSSUM SCORE, MORBIDITY, MORTALITY, LAPAROTOMY

Introduction:

Background/rationale: At a time, when resources are constrained, and expectations from medical personnel are insurmountable [1], it is important to quantify the risk of peri-operative morbidity and mortality [2]. The prime ~~purpose~~ concern of any surgical procedure is the curtailment of morbidity and mortality rates, [3] thus assisting in the faster adaptation of more effective treatment regimens [4].

Therefore, attention has been focused on the development of scoring systems that standardize patient data thus allowing meaningful comparisons [5].The formation of such scoring systems has been designed specifically to compare populations and severity of illness, thus predicting mortality, morbidity and helping to form a treatment strategy [6].

One of the scoring systems so developed is POSSUM SCORE (Physiological and Operative Severity Scoring system for the enUmeration of Morbidity) which assesses the outcomes of surgical ~~involvement~~ procedures, ~~its~~ their complications and the proportion of predicted and observed morbidity and mortality in a range of ~~the~~ population who receives medical care. [7,8,9,10].

Possum score was found in early nineties by Copeland and his colleagues at Department of General Surgery at Warrington Hospital, UK.

It includes a 2-part scoring system:
Physiological score which consists of 12 parameters scored during pre-operative period.
Operative score which includes 6 parameters scored during the operative period.

This prospective study was taken up in a district hospital (AVBRH-Acharya Vinoba Bhave Rural Hospital) catering mainly to the rural population (Sawangi,Meghe, Wardha,Maharashtra) [11].

Objectives: To assess applicability of POSSUM score (morbidity and mortality) in surgical practice in a tertiary care centre in a rural area.
To assess utility of POSSUM score in clinical management.

Methods:

Study design: Prospective Observational Study

Comment [I1]: Background needs to be written in a funnel technique, narrowing down to the rationale of this study.
Rationale of this study means the need for this particular study keeping in view any gaps in available literature on the subject.
Please write down the rationale for this study in clear terms.

Comment [I2]: It would be appropriate to mention other scoring systems here eg; CLIP or E-PASS.

Comment [I3]: that

Comment [I4]: Portsmouth POSSUM score has since been developed and has overtaken the POSSUM score in terms of predictive accuracy. Any study on POSSUM would be incomplete without mentioning and comparing with P-POSSUM.
Ref:
Prytherch DR, Whiteley MS, Higgins B, Weaver PC, Prout WG, Powell SJ. POSSUM and Portsmouth POSSUM for predicting mortality. Physiological and Operative Severity Score for the enUmeration of Mortality and morbidity. Br J Surg. 1998 Sep;85(9):1217-20. doi: 10.1046/j.1365-2168.1998.00840.x. PMID: 9752863.

Comment [I5]: developed or formulated

Comment [I6]: Objectives need to be worded in a SMART format, ie;
*S*pecific
*M*easurable
*A*chievable
*R*eproducible
*T*ime bound

Comment [I7]: A robust study adopts a methodology that:
-Takes pains to eliminate all biases
-Is detailed in description of all steps in data collection, selection criteria, data analysis etc.

Setting: Present study will be conducted in Acharya Vinoba Bhave Rural Hospital(AVBRH), a tertiary care teaching hospital situated in rural area of Wardha district, in central India attached to Jawaharlal Nehru Medical College, Sawangi Meghe Wardha over a period of 2 years. Among the above cases, those developing complications will be randomly selected to make total participant size of 100. The complications included in the study will be assessed in patient undergoing laparotomy during the hospital stay irrespective of the period of stay.
Variables: Mode of Surgery, Electrolyte imbalance, Blood pressure, Haemoglobin.
Data sources/ measurement: Data will be obtained form the patients records, laboratory records. Data will be entered in the master sheet as per the format and will be fed to appropriate statistical programme for analysis.
Bias: Selection bias and observer bias are expected to occur and will be dealt to avoid any bias.
Study size:100
Quantitative variables: All the variables will be put into the formula to calculate the morbidity and mortality for the selected patients.
Statistical methods: The correlation will be calculated with appropriate statistical test.

Comment [I8]: Please elaborate this point. Wouldn't random selection give rise to bias? Would there be any criteria for this random selection? Which complications would be included or excluded from selection?

Comment [I9]: Are these the only variables? These are some of the physiological parameters only. What about the operative parameters?

Comment [I10]: Please specify the statistical program for analysis. Also the statistical methods or tests to be utilized in data analysis for various parameters

Comment [I11]: How would it be done? Please be specific

Comment [I12]: Needs elaboration. Also, wouldn't it be appropriate to include this under the above heading of Variables.

Comment [I13]: Elaborate

Expected Outcomes/Results:
In this study we expect to see a strong co-relation between morbidity(12) and mortality calculated through POSSUM score(13) giving an idea about the prospectus of a patient undergoing laparotomy in a rural setting with limited resources. We also expect to see POSSUM score to be standardised for any patient undergoing surgery to predict an outcome after any surgery.

Discussion:
In an era of resource limitations and low economic status(14), POSSUM score with its parameters can become an easy and effective tool to preoperatively predict the outcome of patients undergoing laparotomy pre operatively. POSSUM score can give an idea of possible complications, thus helping the heathcare provider to take appropriate measures to decrease the postoperative morbidity and mortality.

References:

1. Thirunavukkarasu S, Subramanian AM. Efficacy of the P-POSSUM scoring system in prediction of post-operative mortality and

morbidity in patients undergoing emergency laparotomy in a tertiary institute. Int Surg J 2018; 5:2523-7.

2. Barnett S, Moonesinghe SR. Clinical risk scores to guide perioperative management. Postgrad Med J. 2011;87(1030):535–541. doi: 10.1136/pgmj.2010.107169.

3. Hota PK, Yellapragada H. Assessment of surgical outcome in emergency gastrointestinal surgeries using P-POSSUM score. Int J Res Med Sci 2017;5:3007-11.

4. Rana DS, Singh A, Gupta P, Singh V, Bandyopadhyay G. Evaluation of POSSUM Score for Outcome Prediction in Patients Undergoing Emergency Laparotomy. Ann. Int. Med. Den. Res. 2018; 4(4): SG01-SG05.

5. Prytherch DR, Sutton GL, Boyle JR. Portsmouth POSSUM for abdominalaortic aneurysm surgery. Br. J Surg 2001; 88(7): 958-963.

6. Batra P, Ravi Batra, UtaalMS.Possum scoring system for predicting prognosis inpatients of perforation peritonitis. Int Surg J2016;3:2115-9.

7. Copeland GP, Jones D, Walters M. POSSUM: a scoring system for surgical audit. The British journal of surgery. 1991;78(3):355-60.

8. Copeland GP. Comparative audit: Fact versus fantasy. British Journal of Surgery. 1993;80(11):1424-5.

9. Copeland GP. Surgical scoring, risk assessment and the surgeon. J R Coll SurgEdinb. 1992; 37(3):145-8.

Comment [I14]: Please use standard abbreviations for a particular journal eg, Br J Surg

10. Copeland GP. The POSSUM system of surgical audit. Arch Surg. 2002;137(11):15-9.

11. Mohil RS, Bhatnagar D, Bahadur L, Rajaneesh, Dev DK, Magan M. POSSUM and P-POSSUM for risk adjusted audit of patients undergoing emergency laparotomy. Br J Surg. 2004; 91:500-3.

12. Khanam, Najnin, Vasant Wagh, Abhay MotiramjiGaidhane, and SyyedZahiruddinQuazi. “Assessment of Work-Related Musculoskeletal Morbidity, Perceived Causes and Preventive Activities Practiced to Reduce Morbidity among Brick Field Workers.”

13. Taksande, .A. “A New Scoring System for the Diagnosis of Pulmonary Arterial Hypertension.” *EUROPEAN HEART JOURNAL* 38, no. 1 (August 2017): 158–59.

14. Regmi, Pramod R., Edwin van Teijlingen, PreetiMahato, Nirmal Aryal, Navnita Jadhav, PadamSimkhada, Quazi Syed Zahiruddin, and Abhay Gaidhane. “The Health of Nepali Migrants in India: A Qualitative Study of Lifestyles and Risks.” *INTERNATIONAL JOURNAL OF ENVIRONMENTAL RESEARCH AND PUBLIC HEALTH* 16, no. 19 (October 2019).

Comment [I15]: Incorrectly cited reference

Comment [I16]: Incorrectly cited

Annexures:
Tables:

Table 1: Physiological Severity Score

Sr. No.	Variables	1	2	4	8
1)	Age(years)	<60	61-70	>71	-
2)	Cardiac history/signs Chest radiograph	No failure Normal	Diuretic, digoxin antianginal or hypertensive therapy -	Peripheral oedema, warfarin therapy Borderline cardiomegaly	Raised JVP Cardiomegaly
3)	Respiratory history Chest radiograph	No dyspnoea Normal	Dyspnoea on exertion Mild COAD	Limiting dyspnoea Moderate COAD	Dyspnoea at rest(>30/min) Fibrosis or consolidation
4)	Blood pressure(systolic)	110-130	131-170	>171	-
5)	Pulse(beats/min)	50-80	81-100	101-120	>120
6)	GCS	15	12-14	9-11	<9
7)	Haemoglobin(gm%)	13-16	11.5-12.9	10.0-11.4	<10.0
8)	W.B.C (x1000)	4-10	10.1-20.0	>20.1	-
9)	Urea (mg%)	<21	21-28	28-42	>42
10)	Sodium	>136	131-135	126-130	<126
11)	Potassium	3.5-5.0	5.1-5.3	5.4-5.9	>5.9
12)	Electrocardiogram	Normal	-	Atrial fibrillation=60-90	Any other abnormal rhythm or >5 ectopics/min

Table 2: Operative Severity Score

Sr. No.	Variables	1	2	4	8
1)	Operative severity	-	Moderate	Major	Supra major
2)	Multiple procedures within 30 days	1	-	2	>2
3)	Total blood loss(ml)	<100	101-500	501-999	>1000
4)	Peritoneal soiling	None	Minor(serous fluid)	Local pus	Free bowel content(pus/blood)
5)	Presence of malignancy	None	Primary only	Nodal metastasis	Distant metastasis
6)	Mode of surgery	Elective	-	Emergency resuscitation of >2 hr possible	Emergency(<2 hrs surgery needed)