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ASA-ECOG as a combined tool for peri-operative risk stratification in COVID-19 survivors – A step towards optimizing healthcare resource utilization



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The impact of COVID-19 on patients extends far beyond the initial infection. A significant proportion of the infected continue to be saddled with long-term sequelae of COVID-19. The so-called ‘Long Haulers’ continue to suffer a myriad of symptoms including fatigue, dyspnoea, chronic lung fibrosis, myocardial fibrosis or scarring, arrhythmias, focal neurological symptoms, thromboembolic events, autonomic dysfunction, and cognitive impairment [1].

Given the high peri-operative morbidity and mortality among those who have recently recovered from COVID-19, the COVIDSurg Collaborative has recommended an interval of at least seven weeks between the infection and elective surgeries to reduce the morbidity and mortality rates [2]. Interestingly, their data indicates that patients who continued to exhibit symptoms even after seven weeks were at a higher risk of mortality (13.12%) than those whose symptoms resolved completely and those who were asymptomatic when infected (3.93% and 2.04% respectively) [2]. Given the grave implications of these sequelae in the peri-operative period, it becomes imperative to incorporate additional tools to enable optimal risk stratification for practicing anaesthesiologists.

Current evidence reveals a global trend to fortify the assessment by using tests to measure the degree of functional impairment and assess vital organ damage. The 6-min walk test is a popular choice to assess functional impairment, while organ damage is assessed using biomarkers such as Troponin –I, NT pro-BNP, D-dimer and imaging such as 2D echocardiography, and CT scans [3,4]. Lamentably, while these investigations would undeniably add value to pre-operative evaluation, they are expensive, time-consuming and put a strain on healthcare resources.

ASA grading (Table 1), which is universally used to describe comorbidities in patients undergoing surgery, is also an independent predictor of mortality [5]. Robust data from a study recruiting over 2 million patients surmised that for every grade of increase in ASA, the risks of morbidity and mortality increase by 42.6% and 112% respectively for each standard deviation [6].

Given the high morbidity and mortality in COVID-19 survivors, ASA grade may not be enough to enable anaesthesiologists in predicting peri-operative risks since this grading does not take into account functional impairment and deconditioning after COVID-19. An additional tier of classification to indicate the level of functional impairment might allow better risk prediction and further help to ensure the judicious use of healthcare resources. The Eastern Co-operative Oncology (ECOG) scoring (Table 1) is used to help oncologists to assess fitness for anti-cancer therapy, and to predict prognosis. Patients with a higher pre-operative ECOG score have been found to have a higher risk of post-operative mortality [7].

The authors believe that when the ASA - ECOG score is used together, anaesthesiologists can be provided with a more robust strategy to stratify peri-operative risks, which will help them to plan necessary prehabilitation to optimise patients. Young et al. too found the ASA-ECOG to be a significantly better predictor of extended hospital stay in patients undergoing colorectal surgeries, than either one of the two when used alone [8].

Based on the ASA and ECOG grades assigned to patients, the authors propose the following strategy: Patients with ASA III and beyond would unquestionably require additional evaluation irrespective of the ECOG scores, as their comorbidities would have rendered them more vulnerable to the ravages of COVID-19. Since the incidence of post-operative complications is significantly higher in patients with high ECOG scores [2–4], the authors recommend that for ASA I and II patients, the above mentioned additional investigations be carried out only in those with an ECOG score of 2 or more, and they should be flagged with a ‘+’ sign after their ASA grade; for example, ‘ASA II +’ [7]. It could still be argued that another factor which could potentially impact pre-operative risk stratification is the severity of COVID-19 infection. However, we believe that on recovery, manifestations of any residual sequelae, deficits or functional impairments due to COVID-19, would alter the ECOG scores as well. The proposed classification and risk stratification process is elaborated in Fig. 1.

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Table 1
Eastern Co-operative oncology group (ECOG) score and American society of anesthesiologists (ASA) grading.

Grade	American Society of Anesthesiologists Grading	ECOG Performance Status
0	Not Applicable	Fully active, able to carry on all pre-disease performance without restriction
1	A normal healthy patient.	Restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature, e.g., light house work, office work
2	A patient with a mild systemic disease.	Ambulatory and capable of all selfcare but unable to carry out any work activities; up and about more than 50% of waking hours
3	A patient with a severe systemic disease that is not life-threatening.	Capable of only limited selfcare; confined to bed or chair more than 50% of waking hours
4	A patient with a severe systemic disease that is a constant threat to life.	Completely disabled; cannot carry on any selfcare; totally confined to bed or chair
5	A moribund patient who is not expected to survive without the operation. The patient is not expected to survive beyond the next 24 hours without surgery.	Dead
6	A brain-dead patient whose organs are being removed with the intention of transplanting them into another patient.	Not Applicable

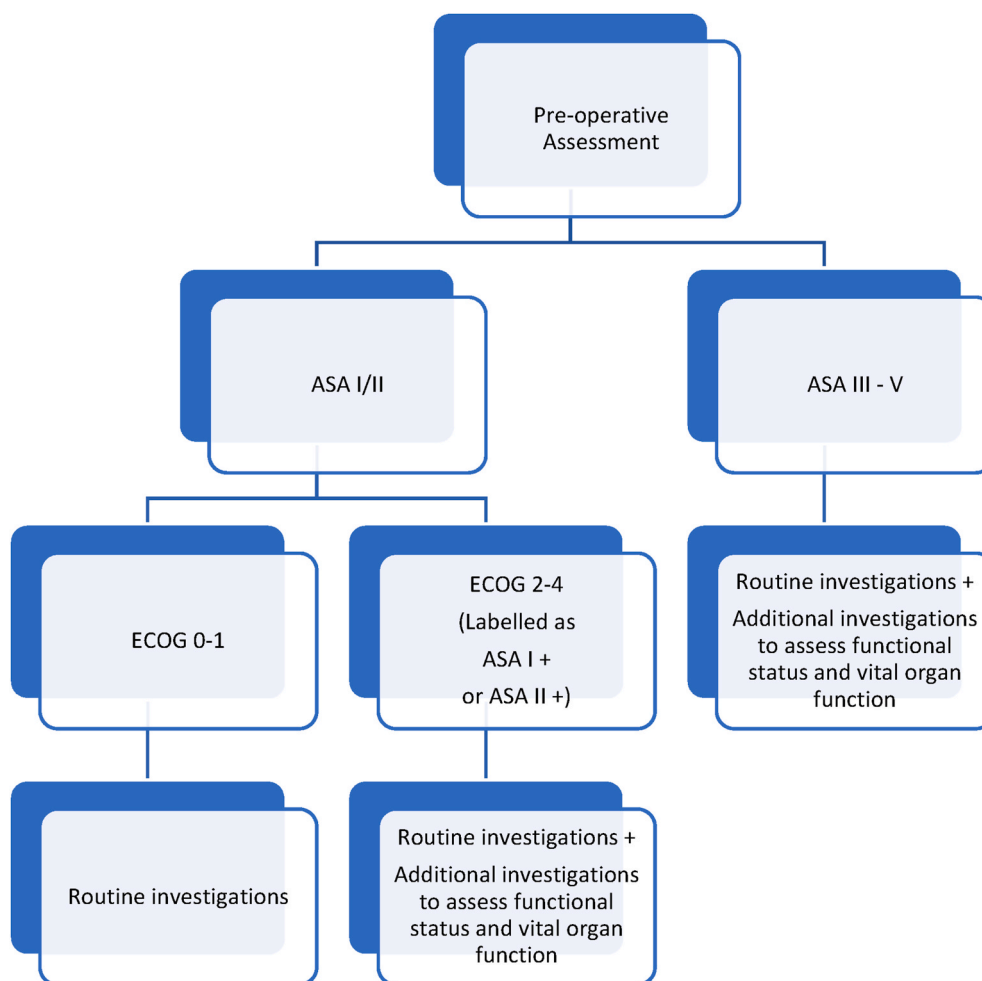


Fig. 1. Optimizing pre-operative investigation strategies.

The impact of the COVID-19 pandemic will continue to be felt for a long time. The peri-operative management of COVID-19 survivors promises to pose as much a challenge as were the challenges we faced in understanding COVID-19 and in formulating management strategies. Augmenting the pre-operative risk stratification by using ASA and ECOG together will hopefully ease the burden on the healthcare system.

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References

- [1] A. Nalbandian, K. Sehgal, A. Gupta, M.V. Madhavan, C. Mcgroder, J.S. Stevens, et al., Post-acute COVID-19 syndrome, *Nat Med* [Internet 27 (2021) 601, <https://doi.org/10.1038/s41591-021-01283-z>, 15. Available from:..
- [2] D. Nepogodiev, D. Nepogodiev, Timing of surgery following SARS-CoV-2 infection: an international prospective cohort study, *Anaesthesia* 76 (6) (2021) 748–758.
- [3] A.S. Wajekar, S.L. Solanki, J.V. Divatia, Pre-anesthesia Re-evaluation in post COVID-19 patients posted for elective Surgeries : an online , cross-sectional survey, *Indian J Surg Oncol* 1–6 (2021).
- [4] N. Bui, M. Coetzer, K.J. Schenning, A.Y.O. Glasser, Preparing previously COVID-19-positive patients for elective surgery : a framework for preoperative evaluation, *Perioperat. Med.* 10 (1) (2021) 2–5.
- [5] J. Shah, F.-H. Jo, Peri-operative care series, *Ann. R. Coll. Surg. Engl.* 93 (3) (2011) 185–187.
- [6] N.J. Hackett, GS De Oliveira, U.K. Jain, J.Y.S. Kim, ASA class is a reliable independent predictor of medical complications and mortality following surgery, *Int. J. Surg.* 18 (2015) 184–190, <https://doi.org/10.1016/j.ijso.2015.04.079>. Available from:..
- [7] M. Cihoric, L.T. Tengberg, N.B. Foss, I. Gögenur, M. Tolstrup, M. Bay-nielsen, Functional Performance and 30-day Postoperative Mortality after Emergency Laparotomy — a Retrospective , Multicenter , Observational Cohort Study of 1084 Patients, 2020, pp. 1–11.
- [8] J. Young, T. Badgery-Parker, T. Dobbins, M. Jorgensen, P. Gibbs, I. Faragher, et al., Comparison of ECOG/WHO performance status and ASA score as a measure of functional status, *J. Pain Symptom Manag.* 49 (2) (2015) 258–264, <https://doi.org/10.1016/j.jpainsymman.2014.06.006>. Available from:..

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