Editorial
ASA Physical Status Score: has its time passed?

The American Society of Anaesthesiologists' Physical Status Score (ASA-PS) was originally developed in 1941 by three anesthesiologists: Meyer Saklad, Emery Rovenstine and Ivan Taylor.[1] They did this in response to a request from the ASA to classify operative risk, so as to be able to compare surgical outcomes – essentially, they were asked to develop a risk-adjustment model. They concluded that it was not possible to do this, owing to the myriad of interactions there would be between the patient's health and the surgical procedure undertaken (their deliberations took place during the second world war, preceding Turing's first electronic stored program digital computer and the development of logistic regression modelling in the 1950s, both of which would ideally have been required to address this statistical issue). Therefore, they resolved to determine a classification system for the patients' physical status only, and did so using a 6-grade system. The first four grades approximated to the current ASA 1 to 4 definitions; their original classes 5 and 6 were used to describe emergency patients who were otherwise ASA 1 or 2 (Class 5) or 3 or 4 (Class 6). When the ASA published an updated version in 1963, they dropped the original classes 5 and 6 in favour of adding the suffix 'E' to ASA 1 to 4 grades for emergency cases; they then added the current definition of ASA 5 (moribund patient likely to die without surgery); and later ASA 6 (brain-stem dead organ donor). The ASA-PS has stood the test of time, providing the most commonly used language to describe patient risk; however, as the study led by Dr Singaram and published in this issue of the SAJAA has found, there can be substantial inter-rater variability in estimates of the ASA-PS grade between clinicians. This is not the first study to find this problem – in other countries, they have used similar methodology to Singaram et al, providing simulated scenarios to anaesthetists.[2,3] However, at least one real-world evaluation has also compared ASA grading in the same patient but two different clinical settings (the preoperative assessment clinic and the operating theatre) and again found substantial variation in measurement.[4] These repeated findings required us to consider two questions – what are the implications and what are the solutions?

While the ASA-PS used alone is not a valid predictor of operative risk, it has been incorporated into numerous risk prediction or adjustment systems, including various American College of Surgeons' National Surgical Quality Improvement Program (ACS-NSQIP) risk calculators,[5-7] the Surgical Risk Scale[8] and the Surgical Outcome Risk Tool (SORT).[9] Risk prediction systems are used for two main reasons: first, to help patients and clinicians understand the chances of a poor outcome of a planned treatment, thereby facilitating informed consent and ideally shared decision making; and second, to guide clinical management so as to reduce the risk of the predicted adverse outcomes. Thus, miscalculation of risk can potentially have significant impact. While it is true that in the Singaram study and also previous evaluations, most anaesthetists score patients within one grade of each other, even a one grade difference can have a profound impact on the outputs of some risk prediction models. For example, an elderly ASA 3 patient being considered for complex elective gastrointestinal surgery (e.g. a sigmoid colectomy for cancer) would have a SORT-predicted 30-day mortality risk of 6.9%; if incorrectly down-graded to ASA 2 this risk prediction would drop to 1.77% and if upgraded to ASA 4 would rise to 16.42%. Underestimation of ASA grade could therefore lead to him being inappropriately triaged to a normal ward floor rather than critical care postoperatively; similarly, over-

estimation might lead the perioperative team and patient to decide that the risks of surgery were too high to proceed and therefore cancel the surgery, with potentially life-limiting consequences. A caveat to such concerns is that any objective measurement of risk, whether it be a risk calculator, exercise test, or frailty assessment, must be considered alongside clinical judgement – if the predicted risk seems substantially different from the experienced view of the perioperative team, it may suggest to the clinicians that they need to review the input data. It is interesting to note that Saklad, et al.'s original classification system included example cases to help clinicians conceptualise the grading system; these examples were dropped when the ASA published their updated version in 1963, but in light of repeated studies showing that there remained confusion over how to grade, the ASA House of Delegates developed and published example cases to accompany the classification system in 2014.[10]

There are numerous other problems with the ASA-PS and how it is used in modern practice. It seems highly unlikely that when an anaesthetist talks to colleagues about a patient, that they would use only the ASA grade to describe their physical status (unless they were ASA 1, which implies no past medical history of note). This is because the score cannot tell you about the individual diseases which contribute to the classification, or the implications of these conditions for perioperative risk and management. For example, poorly controlled diabetes is likely to be a much greater risk factor for poor short-term outcome than a promptly recognised and well-managed myocardial infarction which occurred 10 years ago and led to instigation of secondary prevention which has been highly effective – yet both these conditions would lead to an ASA 3 classification. Importantly, it also does not differentiate between a single disease state and multi-morbidity, the latter of which is increasing in our ageing population, and is likely to substantially impact on patient health, fitness and outcome. A related point is that of the inference that the ASA-PS describes physical status or fitness. Functional status, which can be estimated using scores such as the Duke Activity Status Index, or measured using cardiopulmonary exercise testing, is increasingly understood to both predict adverse outcomes, and to be potentially modifiable through exercise training. It is also recognised that many people are deconditioned due to sedentary lifestyles, even if they have no past medical history. Thus, without an estimate of true functional capacity, the ASA-PS may provide a misleading impression of a patient's actual 'fitness'.

Should we throw the ASA grade out the window in favour of being less 'lazy' and undertaking to document and communicate patient risk factors more comprehensively? While it is tempting to say 'yes', we still would have the problem that so many clinical risk calculators which have been repeatedly validated and are widely used, incorporate this seemingly simple variable. So, what can we do to improve the accuracy of ASA-PS measurement in practice? One solution would be to develop further examples to accompany the 2014 modification by the ASA – and indeed to ensure that this modification has been comprehensively communicated to all colleagues – it is well known that even once knowledge is developed, its mobilisation remains a challenge. The second might be to develop technological solutions. Development of a program which would correctly classify any patient upon input of key

variables would be a straightforward supervised machine learning task. Incorporating this with natural language processing into electronic health record systems would solve the problem in organisations lucky enough to have such resources; however, an open-access online solution might suffice for everyone else. Finally, as a perioperative community, perhaps we should put our heads together to consider if a better solution might be available for the modern era. One which deals not just with diagnoses, but their management and impact, and also a patient's true fitness. Developing this as a community or 'citizen science' project[11] might also support acceptance, dissemination and implementation.

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