Implementing risk calculators – time for the Trojan Horse?

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This edition of the BJA sees the publication of Kluyt et al's manuscript detailing the development and internal validation of the ASOS surgical risk calculator. (1) This publication arises from the African Surgical Outcomes Study (ASOS), (2) which recorded prospective risk and outcome data on 11,422 adult patients undergoing surgery in 247 hospitals from 25 countries on the African continent. This was a complex endeavour, which required excellent coordination and leadership as well as the unpaid contribution of more than a thousand healthcare professionals working in very challenging conditions. For this substantial effort in the spirit of 'citizen science', and the quality of the outputs so far, the authors and collaborators are to be congratulated.

Let us now take a moment to revisit the purpose of developing risk calculators. First, a key rationale is to be able to predict risk so that perioperative care can be appropriately planned. The potential benefits are neatly demonstrated using the example of whether to triage patients to critical care after surgery. (3) (4) The jury is still out on which postoperative patients are most likely to benefit from critical care internationally; (5) however, it is hard to argue against the hypothesis that complications could be prevented through enhanced surveillance, and in particular, more favourable nurse: patient and doctor: patient ratios. The differences in staffing provision between normal wards and critical care units are much more significant in low and middle income countries (LMICs), where normal wards rely heavily on patients' relatives for basic care needs, and the number of nurses and doctors per capita is a fraction of that in high income areas. (2) Further, given the lower provision of critical care beds in African hospitals compared with high income countries (HICs), (6) accurate triaging to ensure best use of this precious resource becomes even more important.

Secondly, risk calculators can support the communication of risk, and therefore the aspiration of shared decision making between clinicians and patients, or at the very least, informed consent. (7) The first ASOS analysis showed clearly that the risks of surgery, even to younger, fitter patients, are magnified when compared with the rest of the world. (2) Therefore in some circumstances, and where different treatment options are available, patients and families in LMICs may choose a less invasive approach, which carries a lower risk of complications which might limit a patient's ability to work, particularly in the absence of a comprehensive social care system. While this notion may seem absurd given the known

challenges of providing equitable access to surgery in Africa, an alternative view would again emphasise the particular importance in low-resource settings, of ensuring the right patient gets the right treatment for them every time – and shared decision making is an important part of this process. (8)

Finally, risk models can be used for case-mix adjustment in clinical audit – in other words, to account for patient risk factors (which are assumed to be non-modifiable by the time of surgery) and therefore be able to compare outcomes fairly, in order to identify unwarranted variation, shine a light on good or bad performance and most importantly, to facilitate quality improvement. This is particularly important in LMICs, where clinical outcomes may be systematically adversely influenced by lack of resources. Measurement of processes and outcomes, with risk adjustment, is an important first step towards addressing the need. It is wrong to assume that all systems and technologies used in high income settings will lead to improvements elsewhere; however, availability of data from the LMIC context demonstrating a relationship between poor outcomes and lack of resources (e.g. critical care beds, or the availability of basic monitors such as pulse oximeters and capnography) (9), might further support efforts to address these issues. This is particularly important when considering the competition for limited public finances that exists in Africa and similar settings.

Taking each of these aims in turn, we can now consider the challenges which lie ahead when implementing the ASOS calculator with the aim of improving perioperative care in Africa, and how the experience of high-income nations might inform future plans. In the U.K. and internationally, perhaps the biggest challenge around using risk calculators to inform clinical decision-making, is actually getting them implemented into clinical practice at all. In HICs there can be enthusiasm for more complex (and expensive) methods of risk evaluation, such as cardiopulmonary exercise testing, with longitudinal U.K. data demonstrating a dramatic rise in the proportion of hospitals offering this service. (10, 11) However, we somehow find it much harder to widely implement the much simpler, and probably equivalent (12) approach of using calculators, just like the ASOS Surgical Risk Calculator, which are freely available to all clinicians and patients, and cost almost nothing to implement at scale. Specific initiatives such as the National Emergency Laparotomy Audit in the UK (www.nela.org.uk) have had some success in bucking this trend, and improving the preoperative evaluation and

documentation of risk in patients undergoing high risk, time-sensitive surgery. (13–15) Part of this change is likely to be due to the dissemination of knowledge through the implementation of a national measurement programme. Similarly, the first report of the UK's national Perioperative Quality Improvement Programme (www.pqip.org.uk) found that around two-thirds of patients had an individualised risk assessment – the aim for years 2 and 3 is to nudge this up towards 100%. (16)

While using predicted risk to guide patients and clinicians in the consent process is a laudable, patient-centred ambition, in a resource limited environment, this could yet be a double-edged sword. In the NHS, because of our 'free at the point of delivery' system, we are fortunate that shared decision making between clinicians and patients focuses on true treatment 'choices' – and balancing risks and benefits from a personal, and often quality of life perspective. In other settings, decision-making may involve choices about where to have treatment, and in particular, whether to be transferred from a resource-poor local hospital to a private healthcare facility. Although the chances of survival might be higher, such transfers carry the potential for crippling cost to be incurred by patients and their families, with the longer term economic, social, and potentially health harm that this can bring.

Finally, evidence from high-income nations suggests that while potentially beneficial, the systematic auditing and reporting of risk-adjusted outcomes also has some caveats and carries some risks. Ideally, healthcare measurement should be about quality improvement - that is, the continuous evaluation of processes (the delivery of care), which should translate to improved outcomes. However, in the NHS and many other high income healthcare systems, we have got into the habit of measuring for assurance – i.e. trying to find underperformers, such as through the publication of funnel plots, at both hospital and individual surgeon levels. Advocates of this approach cite the importance of protecting the public from harm, and of transparency – patients have a right to know the best and worst surgeons and hospitals. Detractors suggest that this approach can breed complacency (in the majority who are doing OK) or worse, gaming of the system, including the avoidance of challenging cases, thereby potentially leading to patient harm. (17) The 'truth' is likely to be more nuanced. Of course, we should be transparent with patients, but there is little evidence that the public uses this type of information to inform their decision making about where to

seek medical help (18) – they are more likely to rely on their own previous experience, word-of-mouth, general characteristics of a hospital (e.g. proximity, size and teaching hospital status) and other factors unrelated to surgical performance. (19) (20) On the other hand, steps have been taken to reduce the risk of surgeons avoiding difficult cases in specialties where it was feared this was an issue, (21) and recent evidence suggests that surgical behaviour is no more risk-averse since publication of surgeon-specific mortality data in colorectal surgery. (22)

However, and perhaps more pertinent to LMICs, there is evidence that the behaviour of staff throughout the multidisciplinary team might be affected by the perception that measurement is about performance management. In particular, concerns about blame and fairness are pervasive and reduce the potential for data to be used for improvement. (23) In low and middle income settings, the hierarchical structure of healthcare, with dominance of doctors - and particularly surgeons - over other health professionals, can exaggerate these problems, and lead to inaccurate documentation and lack of reporting of real problems. (20) (24) Put plainly, if hospitals and healthcare professionals think they are being judged, they may deliberately or accidentally manipulate their data in order to look better, avoid reprisal and therefore save their job and their reputation. This is true of all healthcare settings, but likely to be more of a problem in settings which are plagued by corruption and a 'blame' culture, both of which, regrettably, are more likely in low and middle income countries. (25) (26)

So, can perioperative healthcare improvers in LMIC settings learn from high income setting experiences? Possibly. Investing time and energy into local engagement, and appropriate incentivisation may help when considering how to implement the ASOS calculator. Returning to the vanguard hospitals which worked so hard to contribute the data which led to the development of the calculator, and formatively evaluating the barriers and enablers would provide important pointers which might support successful implementation elsewhere. Reassurance about the purpose of collecting data, when implementing QI initiatives based on ASOS, and when using the ASOS calculator to support risk-adjustment, is critical to honest reporting. Enabling hospitals to see national averages or other appropriate summary statistics, but without public disclosure of hospital-level data, might maintain the benefits of

being able to compare their own performance against others, without the threat of exposure for underperforming. (27) Further data collection to help understand generalisability of the calculator to hospitals and countries which contributed few or no patients to ASOS would also be an important goal – but, we acknowledge, enormously challenging. Finally, it might be worth considering how information about the calculator can be disseminated widely, and the purpose and potential benefits 'sold' to a new audience. Linked to this, the implementation of the calculator also needs to come with some guidance about what to do with the results, particularly in order to reduce cynicism – i.e. answering the 'so what?' test. To that end, we suggest that a key barrier to implementation of any risk prediction system is the lack of impact studies – i.e. does risk-based treatment using risk assessment tools actually improve patient outcomes? While the literature is overwhelmed with dozens of risk prediction tools and thousands of validation studies, it is also desperately short of research which investigates their impact on patient outcomes. (28) Our examples above illustrate the potential for both benefit and harm – and therefore, the particularly pressing need for impact assessment, despite its many challenges, in this resource-poor environment.

So, as a next step, Kluyts and colleagues might consider simple innovations to support both implementation and evaluation. One option might be to try to embed the calculator, and brief guidance, into the safer surgery checklist. It is true that the checklist is not universally applied, and even when it is, there can be concerns over the faithfulness with which it is implemented – i.e. boxes are ticked, but appropriate actions not taken. (24) (29) But protagonists of the ASOS calculator could test the theory that embedding it into the checklist might not just support implementation of a tool which could help clinicians appropriately allocate their limited resources, but in so doing, also reduce checklist fatigue. Could we consider the checklist as a Trojan horse, maybe? We are not aware of any studies which have tried this approach – the nearest example is the implementation of the SURPASS checklist - a comprehensive system which covers the entire patient pathway from outpatient-based preoperative planning through to postoperative hospital discharge. SURPASS includes items which are specific to the evaluation of risk and recording how these risks have been considered and mitigated; implementation of this system as a whole was found to be of patient benefit in a high-income healthcare system in a well-conducted randomised trial. (30) Implementation of a leaner (and therefore potentially more widely acceptable) intervention

which incorporates risk calculation into the safer surgery checklist, also provides an opportunity for the evaluation of this simple innovation, not just in Africa, but internationally in both HICs and LMICs. (31) Such an approach might also provide the infrastructure for continued measurement of risk and outcome which would facilitate regular re-calibration of the calculator, as both patient risk factors and healthcare delivery inevitably evolve. The work which has gone into the ASOS calculator story so far is substantial and laudable – taking the next steps will potentially be harder still – but a worthy aspiration.

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CONFLICTS OF INTEREST

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