Vasculator: A Universal Platform For Endovascular Risk Stratification

Conclusion:

Algorithmic guidelines for evaluating surgical risks, including those related to aortic dissections and postoperative infections, have been established. However, their complexity and limited accessibility have impeded widespread clinical adoption, making them difficult to integrate into practice. To bridge this gap, we developed Vasculator.net—a free online platform providing vascular surgeons with a comprehensive repository of algorithms to support informed clinical decision-making and patient education. The platform has since expanded to incorporate multiple risk stratification tools. Moving forward, our goals include validating the predictive algorithms, further expanding the vascular database, and integrating clinical decision-support capabilities.

Methods:

A website was developed using the Flutter Software Development Kit to host a repository of key vascular guideline algorithms. Each algorithm was transformed into an interactive form, enabling physicians to input patient data and instantly calculate risk scores. The applications available aid in risk classification of aortic graft infections, postoperative groin infections, type B aortic dissection severity, PAU, aberrant subclavian artery, and rAAA among others. Examples are shown in the figures below.

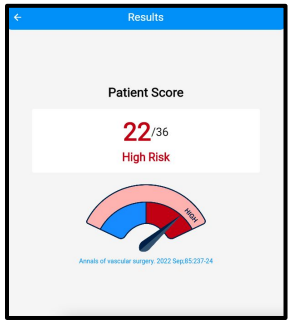

Fig 1. Vasculink

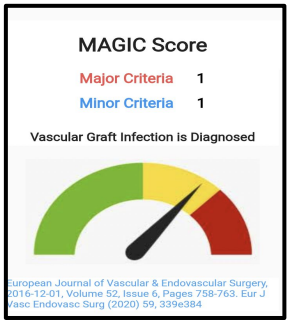

Fig 2. VascuMAGIC

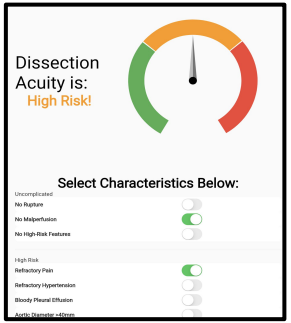

Fig 3. VascuDissection

Data Sources/ Results:

The Surgical Site Infection (SSI) model stratifies patients based on their postoperative infection risk. (Livingston et al, 2022)
The "Management of Aortic Graft Infection Collaboration" (MAGIC) algorithm classifies aortic graft infection by subdividing criteria into "major" or "minor" categories. (Lyons et al, 2016)
The type B aortic dissection algorithm categorizes acuity of dissection by analyzing chronicity, aortic arch anatomy, and additional complications. (Lombardi et al, 2020)
The penetrating aortic ulcer model (PAU) provides a patient risk score based on ulcer dimensions and presence of additional risk factors. (Pandey et al, 2021)
The aberrant subclavian artery app provides a risk score and repair recommendations based on subclavian geometry and presence of additional risk factors (Kumar et al, 2023; Milewski et al, 2014)
The Harborview ruptured abdominal aortic aneurysm (rAAA) app provides a NSQIP 30-day % mortality score and a Harborview 30-day % mortality score based on patient risk factors. (Wong et al, 2023)

Lessons Learned:

Vasculator's algorithm-driven applications assist vascular surgeons by translating key diagnostic criteria into predicted risk scores for 12 vascular conditions. Vasculator's suite of algorithm-driven applications, rooted in current guidelines, offers valuable support to vascular surgeons by providing clinically relevant translations to ultimately improve patient outcomes.

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Scan to visit Vasculator.net: