Environmental Impact of Vascular Surgery Fluoroscopy Digital Subtraction Angiography

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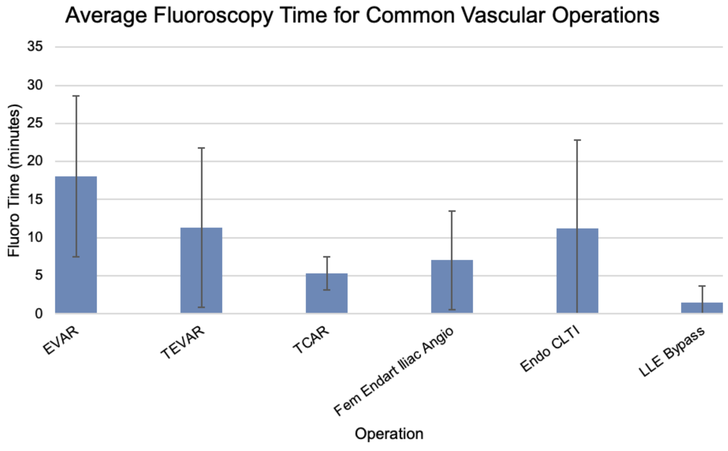
Background

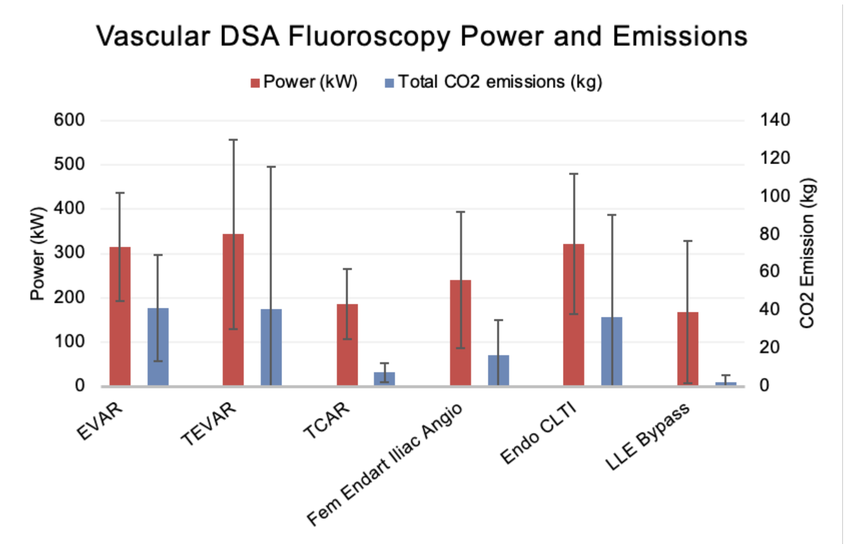
The healthcare setting is a significant contributor to the progression of climate change - accounting for 4-5% of all greenhouse gas production worldwide. In healthcare, operating rooms are responsible for the greatest production of carbon emissions. Fluoroscopy machines, which are heavily used in the field of vascular surgery for medical imaging, consume significant power. Thus, to better understand the contributions of vascular surgery to the carbon footprint of hospitals, this study investigated carbon emissions produced by fluoroscopy across common vascular surgeries.

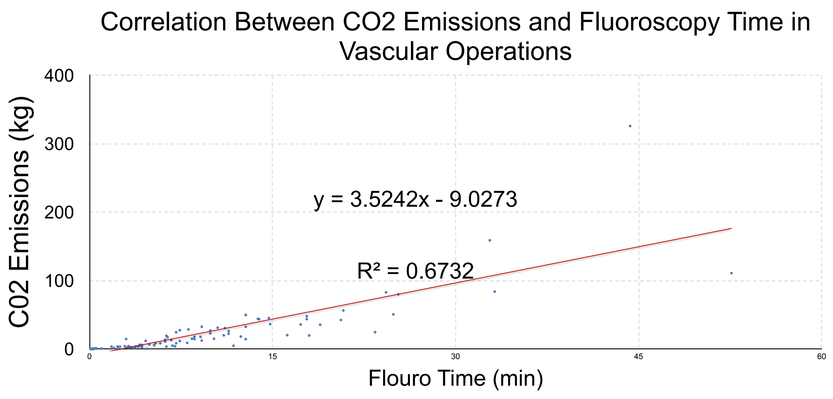
Methods

Vascular operations were surveyed for fluoroscopy digital subtraction angiography (DSA) data retrospectively. The cases were separated into six cohorts: Endovascular Aneurysm Repairs (EVARs), Thoracic Endovascular Aortic Repairs (TEVARs), Transcarotid Artery Revascularizations (TCARs), femoral endarterectomy with iliac intervention (Fem/Iliac), endovascular critical limb threatening ischemia revascularization (Endo CLTI), and lower extremity bypasses. The fluoroscopy time (min), number of DSA runs, amplitude, and voltage were recorded, and power (kW) and energy (kWh) were calculated. Using a certified Greenhouse Gas Equivalencies Calculator from the US Environmental Protection Agency, the carbon dioxide emissions (CO2) for each case were estimated. Results were compared using Chi-squared analysis and logistical regression.

Results







Conclusions

Surgical care is a well-known contributor to CO2 emissions. This study found a correlation between increased fluoroscopy time and increased energy utilization and CO2 emissions. However, case specifics may impact these emissions, as it was seen that TEVAR and EVARs have different fluoroscopy time, yet similar emissions. How each surgeon utilizes fluoroscopy settings may impact CO2 emissions and should be considered, as environmental impacts are more likely to affect patients with low socioeconomic status the most, which often represents patients with greater vascular disease burden.

References

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