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PURPOSE: Pressure injuries cause a significant health and economic burden. Quality improvement projects focusing on pressure injury prevention have been effective in reducing pressure injury in critically ill patients. The purpose of this project was to implement evidence based quality improvement interventions in critically ill patients and prospectively evaluate whether this led to a decrease in significant pressure injury incidence.

METHODS: A combined retrospective and prospective cohort study was performed in the surgical intensive care unit (SICU). Retrospective data served as control (pre-intervention). Data obtained prospectively allowed for assessment of intervention effectiveness (post-intervention). Variables collected during both study periods included: demographics, pressure injury risk assessment, and daily pressure injury grading. Significant pressure injury was defined as pressure injury grades of 3, 4, unstageable, or deep tissue injury. The intervention bundle consisted of a multimodal approach that encompassed all five evidence-based interventions: leadership initiatives, visual tools, pressure injury staging, skin care, and nutrition. Compliance with implementation of interventions was assessed via self-reported questionnaires and staff feedback was collected anonymously for protocol optimization. Differences between pre-intervention versus post-intervention were assessed with 2-sample t-test for continuous variables or by Fisher’s exact test or chi-square test for discrete variables with p-value = 0.05. Cox proportional hazards model was used to explore risk factors associated with development of pressure injuries.

RESULTS: 505 patients were admitted to the SICU during the 12 month study period, 172 patients in first 4 months prior to and 333 patients in remaining 8 months following implementation of interventions. Patients in the post-intervention cohort were significantly older and had significantly higher rates of vasopressor use and shock or need for resuscitation upon admission. Despite the higher number of risk indicators and higher age of the post-intervention group, a decrease in significant pressure injury incidence was observed from pre-intervention to post-intervention. SICU staff reported compliance with implementation of interventions 80% of the time. After adjusting for time-dependent covariates and baseline differences, the following variables were found to be significant in pressure injury development: shock or resuscitation (HR = 2.4, p = 0.016), vasopressor use (HR = 2.5, p = 0.012), history of diabetes mellitus (HR = 2.6, p = 0.005), serum glucose levels on admission (HR = 2.7, p = 0.007), and total Braden scale score (HR = 0.79, p = <0.0001).

CONCLUSION: Several unavoidable comorbidities were associated with higher risk of pressure injury development while higher Braden scale score was associated with a lower risk of pressure injury development. Implementation of evidence based quality improvement interventions for pressure injury prevention were effective in decreasing significant pressure injury incidence in critically ill patients. Further studies are needed to assess the effectiveness of the interventions long-term.

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Clinical and Radiological Safety of Retained Implantable Doppler Devices After Free Flaps

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PURPOSE: The implantable Cook Swartz Doppler is a commonly used, reliable technique for free flap monitoring. The device is removed once microvascular monitoring is no longer necessary. Occasionally there is difficulty retrieving the device and the use of further tension is avoided due to concerns about disrupting the anastomosis. In these cases, the metallic filament is cut at the skin level and a portion is retained in the soft tissues. Magnetic resonance imaging (MRI) is often strongly indicated in the postoperative followup of these patients who may be treated for malignancy or osteomyelitis, and the presence of retained probes raises some level of concern for MRI safety.
Outcomes of retained probes, as well as safety when using MRI have not been studied. We present a series of retained Cook Swartz devices examining outcomes, clinical MRI safety and image quality.

**METHODS:** A retrospective chart review was conducted of patients who underwent microvascular free tissue transfer and placement of an implantable Cook Swartz Doppler probe from July 2007 to August 2018. Routine postoperative imaging was reviewed for all patients to identify incidental findings of a retained probe. Demographics, post-operative complications, and follow up period were reviewed. Any subsequent MRIs performed on patients who we positively identified to have a retained probe were reviewed by a radiologist to detect any degradation of image quality.

**RESULTS:** A total of 323 patients underwent microsurgery followed by Cook Swartz monitoring. Eighteen (5.6%) patients were identified with an incidental radiographic finding of a retained probe and were included in this study. The retained device was detected on various imaging modalities on average 21 months (1–65) following surgery. Mean age was 49 years (25–67) with mean follow-up of 34.4 months (2–122). The indications for free tissue transfer were esophageal reconstruction (n=5), breast reconstruction (n=5) extremity reconstruction (n=5), and facial reconstruction (n=3). Removal of the device was attempted on average 36 days (5–165) following surgery. Device-related complications occurred in only 1 patient who underwent lower extremity reconstruction when the filament caused a draining sinus that resolved after surgical device removal. One other asymptomatic patient underwent elective device removal due to concerns with potential imaging quality for cancer follow-up. A total of 32 MRIs were performed in 8 patients with retained devices, including 6 patients who underwent MRIs of the surgical site. On independent review of these MRI images and the medical record, there were no complications related to the scans, and we found no significant degradation of image quality.

**CONCLUSION:** Retained Cook Swartz Doppler probes were not associated with substantial negative clinic outcomes after free tissue transfer for extremity, breast and esophageal reconstruction. Retained filaments did not affect MRI image quality of the surgical site at follow-up. Additionally, no patient who underwent MRI with a retained probe experienced any MRI-related complications due to heating or motion. If MRI is to be considered in situations with a known retained probe, we recommend that patients should be awake and communicative for the study due to the potential heating effects.

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**INTRODUCTION:** Breast cancer (BC) is the most common non-skin cancer in females, affecting 12.5% of women throughout their lifetime. Partly due to a lack of models that accurately mimic the tumor microenvironment of individual patients, many preclinical successes fail translation into the clinic. Current two-dimensional models fail to replicate the cellular behaviors and interactions that occur in vivo, and newer three-dimensional systems, though promising, all lack vascularization which is crucial to understanding the mechanisms of tumor cell invasion and metastasis. We have engineered an advanced three-dimensional biomimetic platform derived from patient specific tissues that contains all components of the breast tumor microenvironment (glandular organoids, adipocytes, stromal vascular fraction (SVF)) surrounding engineered vascular structures that can be precisely positioned at predetermined distances from BC spheroids (BCS) allowing for highly novel ex-vivo investigations of the interactions between human tumor cells and blood vessels.

**METHODS:** Polymethylsiloxane (PDMS) wells were created using 3D-printed molds that include stages for localization of BCS, and putative vascular channels (VC). Type I collagen was neutralized at 0.3% and 0.6% w/v. Red-fluorescent MDA-MB-231 cells were mixed with 0.6% collagen at a density of 40,000 cells/uL; 1uL of the collagen/cancer cell mix was plated on stages of the PDMS molds and allowed to nucleate. A biomimetic platform made with BODIPY stained adipocytes and all other patient-derived tissue components mixed within both

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