

was older with more comorbidities than their non-long COVID counterparts. We also noted any differences regarding sex, race, ethnicity, severity of acute COVID-19 symptoms, vaccination status, as well as some analysis regarding medications taken. **DISCUSSION/SIGNIFICANCE:** This profile can be utilized to decisively define long COVID as a clinical diagnosis and will lead to consistence in future research. Elucidating an actionable model for long COVID will help clinicians identify those in their care that may be experiencing long COVID, allowing them to be admitted into more intensive monitoring and treatment programs.

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### Where are the viral loads? Searching for additional HIV laboratory results in South Africa's National Health Laboratory Services Database

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**OBJECTIVES/GOALS:** Guidelines suggest people with HIV (PWH) receive routine HIV viral load (VL) testing at least yearly and upon diagnosis with multidrug-resistant tuberculosis (MDR-TB). Many PWH and MDR-TB in South Africa seem to be missing VL results. This study's goal was to find results which may be available from the National Health Laboratory Service (NHLS). **METHODS/STUDY POPULATION:** We abstracted HIV laboratory results, specifically baseline VL and CD4 count and VL at MDR-TB cure, from PWH enrolled in a cluster-randomized clinical trial of nurse case management for PWH and MDR-TB in South Africa who were cured of MDR-TB. For any participant missing one or more of these results, we thoroughly searched the electronic NHLS database using multiple separate searches varying terms including patient name, surname, date of birth, medical record number where available, and South African identification number. Returned results were compared to results abstracted from the parent study and any additional results were entered into the parent study data. **RESULTS/ANTICIPATED RESULTS:** Of 929 PWH cured of MDR-TB, 879 (94.6%) were missing at least one expected VL or CD4 result in the parent study database. Though our search strategy was successful in identifying participants and returning CD4 and VL results, we rarely found additional results that were not already in the parent study database. Following the search and entry of the few additional results retrieved, 116 (12.4%) participants were missing a baseline CD4, 309 (33.3%) missing baseline VL, and 385 (41.4%) missing VL at MDR-TB cure, representing 572 individuals or 61.6% of participants with at least one unavailable result. This high level of unavailability of key laboratory results used to guide MDR-TB and HIV treatment suggests that these tests were either not ordered, not collected, or not completed due to electronic gatekeeping at NHLS. **DISCUSSION/SIGNIFICANCE:** Unknown CD4 count or VL leaves PWH open to including MDR-TB treatment failure and death. Our search strategy found additional results but was time-consuming and cumbersome. Limitations included lack of information on why laboratory results were missing, which limits our ability to make recommendations for better collection and reporting.

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### Derivation and Validation of a Novel Hospital Capability Score for Sepsis

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**OBJECTIVES/GOALS:** Regionalized sepsis care could improve sepsis outcomes. There are no measures of sepsis capability to guide the identification of hospitals that can best serve sepsis patients. We derived Capability-Based (CB) scores from specific hospital characteristics and evaluated their performance as system predictors of mortality among adults with sepsis. **METHODS/STUDY POPULATION:** We used the 2018 State Inpatient Databases to identify 90051 adult sepsis encounters at 157 non-federal NY hospitals (derivation cohort), and 130,249 sepsis encounters at 220 hospitals in FL and MA (validation cohort). We used Principal Component Analysis to analyze to reduce 14 hospital-level resource use characteristics to 3 interpretable, linear data combinations (principal components (PC)). We calculated CB scores for each hospital as a sum of standardized values for each component multiplied by the respective PC loading. We evaluated the correlation of sepsis volume and each CB score with hospital mortality and with outward sepsis transfer proportions. We fitted linear, nested, predictive models to compare the system predictive abilities of CB scores and sepsis volume in relation to hospital mortality. **RESULTS/ANTICIPATED RESULTS:** In the derivation cohort, 83963 (93.2%) patients were non-transferred, of which 20230 (24.1%) died. The mean (range) score was 0 (-3 - +5) with higher scores denoting more capable hospitals. Higher scores were weakly and inversely correlated (spearman's [r]: - 0.28) with outward sepsis transfer proportions. Higher scores had weak but better positive correlation with hospital mortality (r: 0.33), than sepsis volume (r: 0.24). CB scores explained more variation in sepsis mortality ( $R^2 = 0.24$ ,  $P$  **DISCUSSION/SIGNIFICANCE:** Capability-based hospital scores account for three times more variation in sepsis mortality than sepsis volume and outperform sepsis volume as a system predictor of mortality. With further refinement and validation, these scores may find utility for improving system-based approaches to sepsis care.

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### Detecting Parkinson's Disease Using Computer Vision

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**OBJECTIVES/GOALS:** Can we detect Parkinson's-disease-related motor impairments using computer vision and machine learning? **METHODS/STUDY POPULATION:** A sample of 29 people with Parkinson's disease (PD) and 29 non-Parkinson's disease (non-PD) controls were recruited from the University of Iowa Movement Disorders Clinic. Videos of 3 motor assessment tasks performed using the hands were recorded and hand location information was abstracted using the computer vision program MediaPipe. Measures from the raw data series and FFT were used as features to

train a model using boosted trees to classify each video as PD or non-PD. Model performance was evaluated using leave-one-out cross-validation. Additionally, we used recursive feature elimination to reduce model complexity. **RESULTS/ANTICIPATED RESULTS:** A model using two features identified by recursive feature elimination yielded a model with an overall accuracy of 81% in cross-validation. In our sample, the model had 86.2% sensitivity, 75.9% specificity, and an AUC of 0.839. Additional improvement may be possible with more data processing, especially in the time-domain. **DISCUSSION/SIGNIFICANCE:** We built a classifier that was able to reliably and accurately discriminate between videos of motor assessments in people with Parkinson's and people without. This may provide a low cost screening tool in rural areas or primary care clinics with limited access to neurologist expertise.

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### **Echinococcosis in US patients: retrospective analysis of a neglected zoonosis with regional animal spillover risks**

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**OBJECTIVES/GOALS:** Our objective is to address the gaps in our epidemiologic understanding of Echinococcosis, a neglected and emergent zoonotic parasite in the US. Comparing regional differences in human cases with known Echinococcus genotypes in canine reservoirs will reveal landscape-level transmission risks. **METHODS/STUDY POPULATION:** Retrospective analysis of de-identified diagnosis codes for human echinococcosis in the US from 2002-2022 in a federal multi-healthcare network database (TriNetX). Analyses included Kaplan-Meier survival and specific parasite species cohort comparisons with descriptive summaries of demography and co-morbidities, and odds ratios for interventions (surgery, anti-parasitics, cyst aspiration) and complications (anaphylaxis, sepsis, etc.) Mitochondrial genomes of Echinococcus spp. from next-generation sequencing ova-positive archival animal scat (National Park Service), along with sequences from published sources in the US, will be used to compare regional genotypic and reservoir host differences. **RESULTS/ANTICIPATED RESULTS:** Over 36,000 US patients were diagnosed with Echinococcosis in the past twenty years. Most cases had an unspecified parasite species, primarily affecting pediatrics (average age 16y +/- 10y) in the South/Southeast US, with very few interventions or medical complications reported. Patients with specific parasite species diagnoses (*E. granulosus* or *E. multilocularis*, N=500) had higher rates of mortality (11.7% at 10y), surgical (8.8%) and medical (18.2%) interventions, and complications (2%-17.2%), with demographic differences noted. Sequencing data and analysis pending for 47 Echinococcus positive wolf samples, with 78 additional sequences available for two types of Echinococcus spp. in wildlife, and lacking data for domestic dog-adapted strains in the US.

**DISCUSSION/SIGNIFICANCE:** This study revealed a higher-than-expected burden of Echinococcosis in the US, confirming it is an under-recognized neglected and emergent disease. Future studies will address gaps regarding the origin of unspecified infections, with targeted surveillance of domestic dogs in high-risk areas.

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### **Finite Element Analysis of a Porous Dual Component 3D-Printed Bone Graft for Alveolar Ridge Augmentation**

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**OBJECTIVES/GOALS:** Our goal was to assess the ability of a 3D-Printed dual cover-core design alveolar ridge bone graft, to withstand the average maximum masticatory force of a healthy person. To this end, we characterized the materials, ran a finite element analysis (FEA) model, and validated it using a resin 3D-printed version tested under compression with strain gauges. **METHODS/STUDY POPULATION:** A tricalcium-phosphate/hydroxyapatite paste and mixed methacrylated alginate-gelatin were used for the core, and polycaprolactone for the cover. These were characterized using ASTM standards D695 and D638 for compression, tensile, and rheological testing. Then we converted cone CT-scan images of a mandibular alveolar ridge defect to an .stl file, and designed the cover and core in Meshmixer. The model was then imported into ANSYS 11.0, and a downward compression force of 500 N, the maximum masticatory force of a healthy adult, was applied on the graft and mandible's top ridge. The different models included solid and porous covers and cores, as well as comparing screws on one or both sides of the cover, then validated by compressing a resin 3D-printed versions. **RESULTS/ANTICIPATED RESULTS:** The FEA model provided maximum displacements, Von Mises stress (VMS), and stress/strain values for each model. The highest maximum displacement was found on the solid covers with a combination of both buccal and lingual screws, at 0.162 mm. The lowest maximum displacement was found in the porous cover at 0.085 mm. All VMS values were below the tensile yield strength, meaning that the materials would not yield. The highest maximum stress was found on the porous cover at 13.52 MPa, the lowest was 1.06 MPa on the cover with no screws. The highest strain was found on the porous model at 0.010, which was 5.6x higher than the solid cover. The porous cover also showed less stress shielding, thus allowing a beneficial mechanical stimulation of the bone, and the lowest maximum displacement, possibly due to flexion through the pores. **DISCUSSION/SIGNIFICANCE:** Preliminary FEA models demonstrated that for the considered materials, a cover-core design of the mandibular implant would sustain the desired 500 N of force without yielding. The porous cover provides the most benefits, causing the least stress shielding and allowing diffusion of biological factors to support the osteoinductive role of the core.