Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
**Table 1.** This table shows the Google queries and their corresponding SVIs for states that have the highest and lowest number of confirmed COVID-19 cases

| Google Queries                          | States most affected by COVID-19 (# of confirmed cases) | States least affected by COVID-19 (# of confirmed cases) | Mean SVI for top 5 states (SD) | Mean SVI for bottom 5 states (SD) | P-value |
|-----------------------------------------|--------------------------------------------------------|---------------------------------------------------------|-------------------------------|----------------------------------|---------|
| "Do I have coronavirus"                 | New York (732) Washington (643) California (426)      | Oklahoma (7) Hawaii (6)                                 | 76 (7)                        | 54 (11)                          | 0.005   |
|                                         | Massachusetts (164) Colorado (131)                     | Id (5) Missouri (5) Wyoming (3)*                       |                               |                                  |         |
|                                         |                                                        | Alaska (1)* North Dakota (1)*                          |                               |                                  |         |
| "How to get tested for coronavirus"    | 59 (5)                                                 | 38 (14)                                                 |                               |                                  | 0.01    |
| "Signs and symptoms of coronavirus"    | 28 (4)                                                 | 45 (16)                                                 |                               |                                  | 0.05    |
| "What is coronavirus"                  | 81 (7)                                                 | 85 (10)                                                 |                               |                                  | 0.48    |
| "How is coronavirus spread"            | 56 (7)                                                 | 65 (13)                                                 |                               |                                  | 0.21    |

* For some queries, these states did not yield an SVI due to insufficient data in Google Trends and were therefore not included in the analysis.

Further hypothesis that heparinase R-time, a VEM measurement that may detect glyocalyx degradation, will be associated with organ dysfunction.

Methods: Patients >18 years old with a diagnosis of sepsis were recruited from an urban ED (~55,000 visits per year) as part of an ongoing observational study of a convenience sample of patients. After informed consent was obtained, blood samples are to measure VEM. VEM measurements include the R time, K time, alpha angle, maximum amplitude (MA), lysis percent at 30 minutes (LY30), and change in R time with the addition of heparinase (ΔR). We also collect demographic information, comorbidities, sepsis severity, the information necessary to determine the Sequential Organ Failure Assessment (SOFA) score, and mortality data. We calculated descriptive statistics for VEM measurements, and Pearson correlations between VEM measurements and SOFA score on enrollment and on days 1-3.

Results: We have enrolled 79 subjects thus far (study is ongoing). The baseline VEM parameters, expressed as median (IQR), are as follows: R, 5.3 minutes (4.2-6.4); K, 1.2 minutes (0.9-1.8); alpha angle, 72.0 degrees (65.7-75.8); MA, 68.3 millimeters (63.2-73.5); and LY30, 0.1 percent of maximum amplitude (0.1). The baseline ΔR is 0.4 minutes (IQR, 0.1-0.5). For patients enrolled to date, ΔR was correlated with day 1 SOFA score (r = 0.21, p < 0.03). Additionally, K was correlated with SOFA score on day 1 (0.22, p < 0.02 and day 2 (0.26, p < 0.03). Further results, delayed due to the impact of coronavirus on this project, will be available at the time of the Research Forum.

Conclusion: It is feasible to obtain VEM measurements in patients with sepsis. Our ongoing work will recruit additional patients, measure syndecan-1 levels (a marker of glyocalyx degradation), determine illness severity scores (using Sequential Organ Failure Assessment scores) on days 0-3 and mortality outcomes, and determine whether syndecan-1 levels, VEM measurements, and patient outcome measurements are associated.

**EMF**

**284** Thromboelastography to Assess Coagulopathy and Glyocalyx Degradation in Sepsis

Tyler PD, Uchimade R, Hippenstein JA, Burke RC, Lindsell CJ, Linhardt RJ, Schmidt EJ, Shapiro NI/Beth Israel Deaconess Medical Center, Boston, MA; University of Colorado, Denver, CO; Vanderbilt University Medical Center, Nashville, TN; Rensselaer Polytechnic Institute, Troy, NY

Study Objectives: Sepsis is a common and deadly clinical syndrome that affects many patients presenting to the emergency department (ED). Sepsis-induced inflammation leads to abnormal coagulation. Additionally, one potential mechanism for abnormal coagulation and organ dysfunction in sepsis is injury to the endothelial glyocalyx: the glyocalyx contains heparans which are released during degradation and may cause mild coagulopathy. We hypothesize that coagulation abnormalities detected by bedside viscoelastic monitoring (VEM), such as thromboelastography, are associated with organ dysfunction and death (suggesting abnormal coagulation as a mediator). We further hypothesize that heparinase R-time, a VEM measurement that may detect glyocalyx degradation, will be associated with organ dysfunction.

Methods: Patients >18 years old with a diagnosis of sepsis were recruited from an urban ED (~55,000 visits per year) as part of an ongoing observational study of a convenience sample of patients. After informed consent was obtained, blood samples are to measure VEM. VEM measurements include the R time, K time, alpha angle, maximum amplitude (MA), lysis percent at 30 minutes (LY30), and change in R time with the addition of heparinase (ΔR). We also collect demographic information, comorbidities, sepsis severity, the information necessary to determine the Sequential Organ Failure Assessment (SOFA) score, and mortality data. We calculated descriptive statistics for VEM measurements, and Pearson correlations between VEM measurements and SOFA score on enrollment and on days 1-3.

Results: We have enrolled 79 subjects thus far (study is ongoing). The baseline VEM parameters, expressed as median (IQR), are as follows: R, 5.3 minutes (4.2-6.4); K, 1.2 minutes (0.9-1.8); alpha angle, 72.0 degrees (65.7-75.8); MA, 68.3 millimeters (63.2-73.5); and LY30, 0.1 percent of maximum amplitude (0.1). The baseline ΔR is 0.4 minutes (IQR, 0.1-0.5). For patients enrolled to date, ΔR was correlated with day 1 SOFA score (r = 0.21, p < 0.03). Additionally, K was correlated with SOFA score on day 1 (0.22, p < 0.02 and day 2 (0.26, p < 0.03). Further results, delayed due to the impact of coronavirus on this project, will be available at the time of the Research Forum.

Conclusion: It is feasible to obtain VEM measurements in patients with sepsis. Our ongoing work will recruit additional patients, measure syndecan-1 levels (a marker of glyocalyx degradation), determine illness severity scores (using Sequential Organ Failure Assessment scores) on days 0-3 and mortality outcomes, and determine whether syndecan-1 levels, VEM measurements, and patient outcome measurements are associated.

**285** Deployment of Artificial Intelligence for Radiographic Diagnosis of COVID-19 Pneumonia in the Emergency Department

Carlisle M, Hurt B, Hsiao A, Hogarth M, Longhurst C, Danoff C/UC San Diego, San Diego, CA; UC San Diego, San Diego, CA; UC San Diego Health, San Diego, CA

Study Objectives: The surge and long tail of patients in acute respiratory distress during the coronavirus-19 (CoVID19) pandemic has inspired new innovations in diagnosing, treating and dispositioning patients during high census conditions with constrained resources. During the first wave of the pandemic, we deployed an artificial intelligence (AI) algorithm for assisted interpretation of chest x-ray for use by radiologists and emergency department (ED) physicians. We report first experiences of physician interaction with this novel AI algorithm designed to enhance physician abilities to identify ground glass and consolidation on chest radiographs.

Methods: Design: We created a fully-automated pipeline into the clinical environment to provide AI augmentation of chest x-ray, utilizing a previously developed deep learning-based AI algorithm. Trained with 22,000 annotations by radiologists, the algorithm overlays X-rays with color-coded maps that indicate pneumonia probability. This was provided alongside standard chest x-ray images for physicians to use in real-time at the point of care with existing imaging software. For
this prospective observational study, we developed a 3-point survey to characterize experiences with the tool regarding ease of use and impact on clinical decision-making.

Setting: Surveys were conducted during a one-month period surrounding the projected CoVID-19 surge locally (April 8-May 9) at two academic hospitals in Southern California. A federal declaration of emergency occurred March 13, 2020 and the tool was urgently deployed on March 25.

Types of Participants: Emergency medicine resident and attending physicians surveyed in real time by telephone.

Results: Of the 5,125 total visits and 1,960 chest radiographs obtained in the ED during the study period, 1,855 were analyzed by the algorithm. Among these, emergency physicians were surveyed for their experiences on 202. Real-time computation and delivery of the tool took four minutes on average.

Overall, 86% either strongly agreed or somewhat agreed that the algorithm impacted their clinical decision making. In general, resident physicians found the AI implementation easier to use than attendings (Mann Whitney U, p=0.005). Descriptive statistics regarding further impact are summarized below (table 1).

Conclusion: This AI technology was rapidly deployed in a large academic health system in the first wave of a global pandemic. Surveyed ED physicians found this implementation easy to use within existing workflows. Twenty percent of physicians reported that the tool changed clinical decision making, and approximately one third of those found that it impacted diagnostic testing decisions and treatment plans. Several physicians reported ordering COVID-19 PCR testing as a direct result of the AI, resulting in positive tests and subsequent quarantining of patients who otherwise might not have been appropriately diagnosed. To our knowledge, this is the first published study evaluating the impact of medical imaging AI on clinical decision making in the ED setting and may prove to be a powerful tool during the pandemic response.

**Table 1. Healthcare resource utilization for children ages 0–18 on or after the first year post-firearm injury**

| Type of Resource | Pre | Post | Difference |
|------------------|-----|------|------------|
| Outpatient | 5,123 | 6,160 | 1,037 |
| Inpatient | 2,096 | 2,823 | 727 |

**Additional Notes:**
- The tool was urgently deployed on March 25.
- Eighty-six percent of respondents reported that the algorithm impacted their clinical decision making.
- Twenty percent of physicians reported that the tool changed clinical decision making, and approximately one third of those found that it impacted diagnostic testing decisions and treatment plans.
- Several physicians reported ordering COVID-19 PCR testing as a direct result of the AI, resulting in positive tests and subsequent quarantining of patients who otherwise might not have been appropriately diagnosed.
- To our knowledge, this is the first published study evaluating the impact of medical imaging AI on clinical decision making in the ED setting and may prove to be a powerful tool during the pandemic response.

**Methods:**
- Cohort study of children 0-18 years identified using ICD-9/ICD-10 diagnosis codes for firearm injury in the ED or inpatient setting from 2010-2016 in the Medicaid MarketScan (IBM Watson, Armonk, New York) claims database.
- Subjects met inclusion criteria if they were continuously enrolled in Medicaid with data availability one year before and one year after a firearm injury during the study period.
- We identified index injuries by ensuring that each child did not have a firearm injury diagnosis in the year prior. Outcomes included: 1) difference in health care encounters for one year before and after injury (outpatient visits, physical, occupational and mental health therapy, emergency department visits, and inpatient admissions); 2) difference in health care expenditures pre- and post-firearm injury.

**Conclusion:**
- Children who experience firearm injury show increases in health care encounters and expenditures one-year after the injury.
- Public health programs that reduce the incidence and impact of childhood firearm injury can also lead to considerable savings in health care expenditures.

**286 Firearm Injuries: Long-Term Health Outcomes and Health Care Expenditures for Children**

Pulcini CD, Goyal MK, Hall M, Gruhlke H, Chaudhary S, Alpern E, Fein JA, Fleegler E/Children’s Hospital of Philadelphia, Philadelphia, PA; Children’s National Medical Center, Washington, DC; Children’s Hospital Association, Topeka, KS; Lurie Children’s Hospital, Chicago, IL; Children’s Hospital of Boston, Boston, MA

**Study Objectives:** To evaluate health care encounters and expenditures for children one year before and following firearm injury.

**Methods:** Cohort study of children 0-18 years identified using ICD-9/ICD-10 diagnosis codes for firearm injury in the ED or inpatient setting from 2010-2016 in the Medicaid MarketScan (IBM Watson, Armonk, New York) claims database. Subjects met inclusion criteria if they were continuously enrolled in Medicaid with data availability one year before and one year after a firearm injury during the study period. We identified index injuries by ensuring that each child did not have a firearm injury diagnosis in the year prior. Outcomes included: 1) difference in health care encounters for one year before and after injury (outpatient visits, physical, occupational and mental health therapy, emergency department visits, and inpatient admissions); 2) difference in health care expenditures pre- and post-firearm injury. Descriptive statistics characterize patient demographics. Health services and expenditures utilized before and after firearm injury evaluated with Wilcoxon Sign Rank Tests.

**Results:** Of 3,296 children, 83.4% were male (n=2,750), and approximately half were 15-18 years of age (n=1,646) and non-Hispanic African-American/black (n=1,699). Healthy children with low prior health care utilization were the largest subgroup (n=2,823). For the entire cohort there were 109,320 health care encounters during the entire study period (Table 1); 47,660 before the firearm injury and 61,660 afterward (p<0.001). There was a higher rate of inpatient encounters (post-pre=0.9 visits/patient, p<0.001) and outpatient encounters (post-pre=0.7 visits/patient, p<0.001) after the firearm injury. Concomitantly, there was an overall increase of $18.5 million in health expenditures for the entire cohort one-year post-firearm injury, 80% of which were for inpatient health care encounters ($14.7 million). Healthy children with low prior health care utilization who were injured by a firearm experienced the largest and most significant increases in inpatient health care encounters and expenditures after their injury.

**Conclusion:** Children who experience firearm injury show increases in health care encounters and expenditures one-year after the injury. Public health programs that reduce the incidence and impact of childhood firearm injury can also lead to considerable savings in health care expenditures. Future research is needed to more fully elucidate the long-term impact of firearm injuries on children, families, health care utilization, and expenditures.