101 Thromboelastography versus Conventional Coagulation Tests in Pit Viper Envenomation and Antivenom Response

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Study Objectives: Pit viper envenomations represent a significant burden of disease worldwide, leading to severe hematologic derangements such as venom-induced consumptive coagulopathy (VICC). Recognizing this problem, the WHO recently launched a campaign to cut snake bite deaths in half by 2030. Immediacy in detection and treatment of coagulopathy with antivenom is paramount to reducing morbidity and mortality. Traditionally, administration of the pit viper antivenom, CroFab®, has been based on clinical signs and symptoms and conventional coagulation tests (CCT) such as fibrinogen, PT, PTT and INR. The purpose of this study was to assess the efficacy of TEG in detecting response to antivenom administration.

Methods: Blood samples from 25 healthy adult volunteers were mixed with different concentrations of western diamondback rattlesnake (Crotalus atrox) venom (50% and 100% LD50). Each group of envenomated blood samples was treated with 4, 6, and 10 vial equivalents (vial$_{eq}$) of CroFab®. All samples were assessed with CCTs including: PT, PTT, INR and Fibrinogen, as well as with TEG measures of reaction time (R), amplification (k), rate of clot formation (alpha angle), and clot strength (MA). Data was analyzed to determine the rate of return to normal range CCT and TEG values as a surrogate for return to normal coagulation.

Results: For the 50% LD50 group, CCT parameters of PT, PTT and INR returned to normal in 24%-32% of samples across all CroFab® doses. For the same group, 72% of Fibrinogen samples returned to normal at 4 vial$_{eq}$ with a max of 88% at 10 vial$_{eq}$. TEG parameters R, k, alpha angle and MA returned to normal at a rate of 80%-96% across all CroFab doses. For the 100% LD50 group, CCT parameters of PT, PTT, and INR had a maximum of 24% return to normal for all CroFab® doses. For the same group, 16% of Fibrinogen samples returned to normal at 4 vial$_{eq}$ with a max of 88% at 10 vial$_{eq}$. TEG parameters showed incremental increases towards normal range with 92-96% of samples in range at 10 vial$_{eq}$.

Conclusion: Pit viper envenomations are a global health threat with significant morbidity and mortality and suboptimal methods to guide the utilization of the expensive and often limited CroFab® antivenom. In this in vitro model, TEG was shown to be more sensitive than CCTs in tracking antivenom-induced recovery from VICC. Additionally, our findings represent a step towards developing a dose-response curve for antivenom administration with the potential to reduce both the amount of antivenom used and the side effects associated with its use.

EMF
102 Expected versus Actual Concentrations of Ketamine and Propofol during Procedural Sedation in the Emergency Department

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Study Objectives: Target-controlled infusion (TCI) uses pharmacokinetic/pharmacodynamic (PK/PD) models to calculate and deliver optimal medication doses to achieve and maintain predefined target plasma drug concentrations associated with adequate sedation. No published adult study has tested the accuracy of TCI predictions in the relatively short procedures routinely performed in the emergency department (ED). This study evaluates the accuracy of TCI predictions against actual concentrations achieved with manual medication administration in patients requiring procedural sedation with propofol and/or ketamine in the ED.

Methods: A prospective cohort of non-pregnant, non-anemic adult patients 18 years of age and older undergoing a procedural sedation with ketamine, propofol, or a combination of ketamine and propofol in the ED were consented for a collection of blood samples during the sedation. These samples were collected one minute after the initial medication administration then every five minutes throughout the procedure to a maximum of 5 samples. Patients who received both agents had the sample split between two different tubes based on laboratory specifications. Vital signs, time of medication administration, and the modified observer's alertness/sedation scale (mOASS) were also recorded throughout the sedation. Computational simulations of

effect site TCI and measured manual bolus injections (MBI) for both ketamine and propofol were performed using RUGLOOP software. The expected concentrations achieved via the simulations were compared to the actual drug concentrations that were obtained at predefined time points throughout the sedation. Statistical analysis including accuracy based on performance error (PE) {(predicted - actual)/predicted concentration} were measured by Median Absolute PE (MdAPE).

Results: Ten adult patients with a median age of 39 years (IQR 27.8-44.5 years) were included with 65 total blood samples collected during the sedations. Median sedation length was 22.1 minutes (IQR 16.8-25.9 minutes). Patients were administered ketamine only (n=3), propofol only (n=2), or both agents (n=5). The median total ketamine dose was 1.1 mg/kg (IQR 0.9-1.3 mg/kg), and the median total propofol dose was 1.7 mg/kg (IQR 1.2-2.3 mg/kg). Median actual versus MBI simulated ketamine plasma concentrations were 0.61 mcg/mL (IQR 0.4-0.94 mcg/mL) and 0.36 mcg/mL (0.23-0.5 mcg/mL), respectively, and were significantly correlated (p < 0.001). Median actual versus simulated propofol plasma concentrations were 0.88 mcg/mL (IQR 0.44-1.7 mcg/mL) and 0.79 mcg/ml (IQR 0.36-1.5 mcg/mL), respectively, and were not correlated. The MdAPE revealed the extent of variability within the small sample size, as resultant ketamine MdAPE of 109.9% (IQR 67.6%-155%) and propofol MdAPE of 100% (IQR 70.6%-185.6%) were shown.

Conclusion: Actual ketamine concentrations were correlated to simulated values at the same timepoints; however, correlation with propofol was not detected. The inconsistency could be resultant of physiologic and provider variability, which requires a larger sample size to resolve. There was large variability in MdAPE within the small sample size. Larger studies are needed to assess the quantitative accuracy of this model, and thus utility, for TCI in procedural sedations in the emergency setting.

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103 Impact of Stay-at-Home Orders on Reported Pediatric Poisonings during the COVID-19 Pandemic

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Study Objectives: Systemic Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2), the virus responsible for the illness "COVID-19," was announced by China in December 2019. Soon after, a pandemic was declared by the World Health Organization (WHO) in March 2020. Cases of COVID-19 in Pennsylvania (PA) were first announced on March 6, 2020. Subsequently, there were limitations of gatherings and travel, closure of schools and non-essential businesses and physical distancing. With limitations, children were at home for longer periods of time and subsequently had increased access to potentially poisonous substances, such as over the counter medications, prescriptions, medications that are only delivered in a clinic but were given for home use due to closures, and increased amounts of cleaning supplies. The inherent isolation that comes with physical distancing was feared to surge depression and suicidal gestures particularly among adolescents. We know from previous natural disasters that an increase in reported exposures to poison control centers follow a major incident. We anticipated an increase in reported pediatric exposures to the Poison Control Center at Children's Hospital of Philadelphia (CHOP PCC) and nationally during the COVID-19 pandemic.

Methods: We analyzed all reported pediatric cases (less than 18 years old) in the American Association of Poison Control Centers' National Poison Data System (NPDS) and the CHOP PCC of eastern Pennsylvania and Delaware. Timeframes analyzed included January 1, 2020 to May 31, 2020, which were compared to the same timeframes in 2018 and 2019. The data was then characterized by total reported cases per month, and subsequently by age groups of zero to five years, six to twelve years, and thirteen to eighteen years. Out of the separated groups, we evaluated sex, site of reported case, unintentional or intentional ingestion, and reported outcomes.

Results: The number of reported pediatric poisonings did not vary significantly when comparing each month of 2020 to the previous two years. Sex, intent, and medical outcomes did not vary significantly from year to year or following the implementation of the stay-at-home order. The greatest increase observed was among the age group six to twelve years with site listed as "own residence," or the percentage of reports coming from a home, when comparing the months of March through May in the year 2019 to 2020 on both the local level (OR 2.2; 95% CI 1.8-2.6, P<0.0001) and the national level (OR 2.15; 95% CI 2.08-2.23, P<0.0001). This reflects a statistically significant increase in poisonings occurring in the home during a pandemic when compared to the same time in the year previous.

Conclusions: Following the implementation of stay-at-home orders during the COVID-19 pandemic, total volume of pediatric poisonings reported to both the CHOP

PCC and nationally did not increase when compared to previous years. However, the number of exposures listed as occurring in "own residence" increased significantly from March through May 2020 when compared to the year prior, particularly in the age group six to twelve years. This is important for emergency physicians to be aware of as many predictions call for "a second wave," as with the usual course of other coronaviruses. Additional stay-at-home orders to help mitigate spread of the virus may occur, along with an increase in school-aged children with reported poisonings.

104 Associations between Neighborhood Disadvantage Measures and COVID-19 Case Clusters

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Study Objectives: The spatial distribution of COVID-19 remains to be described, though there is growing evidence of an increased burden among already disadvantaged populations and neighborhoods. Understanding the pattern of population risk is critically important for health systems and policy makers responding to the pandemic. Our aims were: 1) to describe the association between neighborhood factors and incident cases of COVID-19; and 2) to examine the changes in cases over time. We hypothesized that there would be an association between disadvantaged neighborhoods and case clusters.

Methods: We analyzed data from patients presenting to a large health care system in Boston, MA from 2/5/20 to 5/4/20. Patient mailing addresses were geocoded to census tracts within a 20-mile radius of Boston. COVID-19 incidence per census tract was calculated using Empirical Bayes smoothed rates to adjust for small area estimation. Clustering of cases at the census tract level were assessed using local Moran's I, accounting for multiple comparisons. Quantile local spatial autocorrelation was used to determine the spatial association between neighborhood demographic and disadvantage measures (from the American Community Survey) and census tracts with high incidence of COVID-19. Poisson regression models were used to assess the independent associations between neighborhood factors and COVID-19. Finally, we mapped the distribution of cases in the study area over time.

Results: As of May 4, 2020, there were 9,898 patients in the study area who had been treated in the health care system for COVID-19. The overall crude incidence was 31.8 cases per 10,000 population; adjusted incidence per census tract ranged from 2.3 to 405.1 per 10,000 population. Two case clusters were identified in the Chelsea/Everett and Lynn areas (p=0.007). We found statistically significant co-location of the top quintile of cases with several neighborhood factors (all p<0.05): % of population Hispanic (n=72 census tracts), black (n=36), uninsured (n=33), receiving Supplemental Nutrition Assistance Program (SNAP) benefits (n=39), and living in poverty (n=23). In the adjusted model, factors associated with increased incidence of COVID-19 were a higher proportion of Hispanic population (aIRR 1.24, 95% CI 1.21-1.28) and households receiving SNAP benefits (aIRR 1.08, 95% CI 1.02-1.13). The distribution of cases varied over time, but with persistently high incidence in communities north of Boston.
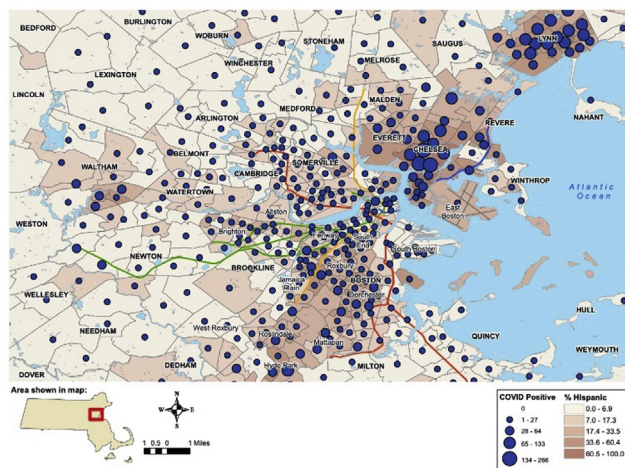

Figure 2. Hispanic population and COVID-19 cases in the study area, from 2/5/20 to 5/4/20.

Conclusion: We found a significant association between neighborhood disadvantage measures and high incidence rates of COVID-19. Limitations include case ascertainment challenges due to access to testing and possible selection bias from use of a single health care system. These results suggest that policy makers should consider health inequities as they respond to the ongoing pandemic and plan for future health needs.

105 Studying the Impacts of To-Go Medications for Vulnerable Populations Discharged from the Emergency Department during the COVID-19 Pandemic

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Study Objectives: Emergency departments (EDs) function as a safety net for vulnerable populations who lack reliable access to health care, including those who face housing insecurity and who lack or possess limited insurance. These groups commonly utilize emergency care for low acuity conditions including asthma, pneumonia, cellulitis, and urinary tract infections, which can be treated with short courses of steroids or antibiotics, respectively. However, vulnerable patients face multiple barriers to filling prescriptions including cost, transportation and wait times at the pharmacy. Providing these patients with full courses of pre-packaged medications has the potential to improve medication compliance and health outcomes. The COVID-19 pandemic has created unique challenges for discharging patients with low acuity conditions from the ED. Not only have vulnerable and disadvantaged populations been affected disproportionately by COVID-19, but also, barriers to filling prescriptions are now compounded by pharmacy closures and social distancing. In the face of increased demand for medications used to treat respiratory disease and infection, the goal of this work was to examine a potential solution to enhancing patients' access to medications during the COVID-19 pandemic.

Methods: In a large urban academic hospital in Boston, a "to-go" medication program was used for patients discharged from the ED during the local surge of the COVID-19 pandemic (March 2020 - April 2020). Patients diagnosed with asthma, cellulitis, COPD, pneumonia, or urinary tract infection who did not require hospitalization received pre-packaged to-go medications free of charge prior to discharge. A monthly report was generated for each to-go medication through the electronic medical record. Retrospective chart review was conducted to obtain de-identified demographic information for those patients. Microsoft Excel was used to generate descriptive statistics. This study was approved by the Institutional Review Board of Partners Healthcare, Boston.

Results: A total of 50 patients from March 13 - April 30, 2020 were discharged with to-go medications. Demographics are listed in Table 1. During the surge of the COVID-19 pandemic at our institution, 66% of patients who received to-go medications were diagnosed with a respiratory illness. Of the patients in the to-go medications program, 56% did not have private insurance, 26% did not speak English as their primary language, and 30% were undomiciled.

Conclusion: The "to-go" medications program has the potential to improve medication adherence while also reducing infection transmission by promoting social distancing through avoiding pharmacy visits. In future research, we aim to continue to analyze the effects of this program on vulnerable populations in order to improve equitable access to health care for all as well as to study how this program affects ED return visits and by extension overall hospital costs.

Table 1. Demographics of Patients who Received To-Go Medications

	March - April 2020	% (n)
Sex		
Female		46% (23)
Male		54% (27)
Age		
19-49		52% (26)
50-64		26% (13)
65 - 99		22% (11)