when rapid progression of edema and/or severe systemic/neurological symptoms appear [1].

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177. Implementation of a protocol driven Crotalinae Envenomation Unit

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Objective: From April 2016 to September 2017, 20 patients were treated for crotalinae envenomation at our tertiary care hospital. Historical data from chart reviews reported the median length of stay (LOS) at 36 hours and the median number of crotalidae polyvalent immune FAB used in treatment to be 12 vials per patient. In April 2018, a protocol was implemented for mild to moderate crotalinae envenomation. The protocol included nursing education and standardization of extremity measurements, aggressive pain control, early physical therapy consultation, timing of laboratory testing, and automatic activation of medical toxicology consultation. All patients were followed up one week post-discharge. We present a quality improvement initiative on use of the protocolized therapy that is suggestive of decreased LOS and total antivenin use.
Methods: All patients with mild to moderate envenomation as determined by medical toxicology consultation from April 2018 to September 2018 were admitted to the protocoled envenomation unit. Age, gender, number of vials of antivenin, and length of stay were recorded. Mild envenomation was defined as swelling crossing less than 2 major joints and moderate envenomation as swelling crossing two major joints.
Results: Nine patients (8 males) were admitted to the unit. Median age was 47 years [25-75% IQR 36-52]. The median number of antivenin vials given was 8 [25-75% IQR 4-11]. Median LOS in hospital was 25.8 hours [25-75% IQR 13-51]. Two of the nine patients had moderate envenomation. One patient developed swelling of her entire upper extremity requiring a re-bolus of antivenin. The other patient developed severe upper extremity swelling and digital ischemia after use of tourniquet and ice therapy prior to presentation, resulting in wound management consultation. The two moderate envenomation patients had LOS of 63 and 60 hours. No other patients had LOS greater than 45 hours.
Conclusion: The median number of antivenin vials in this prospective observation was less than recommended by the manufacturer (12-18) with good outcomes in all patients. The median length of stay was also improved from the two years prior. While not explicitly recorded in this project, nursing leadership also reported increased comfort with treating envenomation. There were several limitations. Historical data was not prospectively recorded and was estimated from patients' charts making direct comparison from our prospective data unreliable and the number of patients treated remained low. A protocoled approach, directed by medical toxicologists, for treating crotalinae envenomation may decrease length of stay and the amount of antivenin given.

178. Pharmacokinetic evaluation of *Vipera ammodytes* snakebites treated with currently available antivenoms

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Objective: Due to shortage of Zagreb antivenom availability, *Vipera ammodytes* bites in Slovenia have been treated with French and UK antivenoms in recent years. In Croatia, for therapeutic purposes the remaining doses of Zagreb antivenom have been used. Composition differences between these three antivenoms exist. First, they differ in specificity. Zagreb antivenom (Croatia) is raised against *V. ammodytes* venom, but is clinically effective and used against all European venomous snakes. Viperfav (France) is raised against *V. aspis*, *V. berus* and *V. ammodytes* venoms, but was mostly used against *V. aspis* and *V. berus*. ViperaTAb (UK) is raised against *V. berus* venom solely, and used only to treat envenomations caused by *V. berus* until recently. Second, they differ in the type of active component, since Zagreb antivenom and Viperfav are $F(ab')_2$-based, while ViperaTAb is a Fab-based preparation. And third, investigated antivenoms have differently prescribed administration routes, intravenous for ViperaTAb and Viperfav and intramuscular for Zagreb antivenom. The aim was to reveal pharmacokinetic profiles of currently available antivenoms in *V. ammodytes* envenomation and their influence on venom level decrement.
Methods: A prospective case series of consecutive patients envenomed by *V. ammodytes* and treated with Zagreb antivenom or ViperaTAb at the University Hospitals of Split or Ljubljana since 2015. In serum samples concentrations of $F(ab')_2$ or Fab fragments, venom and neurotoxic ammodytoxins were determined. Pharmacokinetic parameters of antivenoms were evaluated whenever possible.
Results: Nine patients were treated with Zagreb antivenom and seven with ViperaTAb, one of which also received Viperfav. Pharmacokinetic profile differences were revealed. Systemic clearance of ViperaTAb was between 4.3 and 23.2 mL/h/kg. Its distribution and elimination half-lives were in the range 0.4-3.2 h and 12.9-55.9 h, respectively. In the case of Zagreb antivenom, due to prolonged residence time, even the sampling period of 96 hours post-treatment was not sufficient for estimation of pharmacokinetic parameters. The exception was a patient hospitalized for 8 days, revealing systemic clearance of 0.42 mL/h/kg and a half-life of 317.2 h. Venom was detected in the serum of all patients, in contrary to ammodytoxins. Measured concentrations correlated with the $F(ab')_2$/Fab concentration, revealing an inverse trend in venom-antivenom circulation behavior.
Conclusion: The antivenom concentration was highly dependent on the fabotherapics type and administration route, significantly affecting reappearance and systemic clearance of *V. ammodytes* venom and its neurotoxic component.