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### 3. Prospective Cohort Study of Intravenous Lipid Emulsion for Resuscitating Critically Ill Poisoned Patients

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**Background:** Intravenous lipid emulsion (ILE) therapy is increasingly used in the management of life-threatening drug overdoses. However, current literature is primarily limited to animal studies and human case reports/series, which are subject to publication bias. The clinical effectiveness of ILE has not been systematically evaluated. In May 2012, the Toxicology Investigators Consortium (Toxic) developed a prospective sub-registry to better evaluate the use of ILE in drug overdose.

**Objectives:** This study aims to describe the use and outcomes of ILE during the resuscitation of acutely poisoned patients.

**Methods:** A prospective cohort study of individuals treated with ILE in the Toxic lipid sub-registry between May 2012 and October 2015 was conducted.

**Results:** Sixty-eight cases (54 % female; median [IQR] age 47 [29–56] years) were reported. The majority involved suicide attempts (83 %). Thirty-eight unique xenobiotics were identified, with calcium channel blockers being most frequently implicated (20 %). Common clinical findings included CNS depression (65 %), heart rate (HR) 140 bpm (22 %), and ventricular dysrhythmias (37 %). Fifty-two subjects (76 %) survived to hospital discharge. Cardiac arrest during acute management occurred in 28 (41 %) patients, with the arrest occurring before (n = 15) or after (n = 10) ILE administration (timing unknown in 3 cases). In the 10 cases in which the arrest occurred after ILE administration, 30 % survived to hospital discharge. In the 15 cases in which ILE was given after arrest, 47 % survived to hospital discharge (p = 0.6). The percent survival by log of the partition coefficient (log P), stratified by quartiles (<2.29; <3.00; <3.79; <5.43), was: 72.2, 68.8, 81.3, and 86.7 %, respectively (r = 0.89; p = 0.11).

Following ILE administration, 10 % of patients had an increase in their oxygen requirement, 17 % developed acute lung injury/ARDS during hospitalization, 4 % developed pancreatitis, and 9 % demonstrated laboratory result interference.

**Discussion:** In ToxIC, the majority of metformin exposures were acute, intentional overdoses. Approximately 40 % of the patients with metformin overdoses in ToxIC had metabolic acidosis (pH < 7.35). Our analysis of lactate was limited as it was not specifically included in ToxIC until 2015. Renal insufficiency occurred in 13.8 % of patients.

**Conclusion:** ILE use is primarily reserved for critically ill patients. Poisoned patients who received ILE in this series demonstrated high survival, despite critical illness. Because multiple interventions often occur simultaneously, it is challenging to determine the exact contribution of ILE on survival of individual patients. Nonetheless, the mortality in this study population was lower than might otherwise be expected.