Direct Administration of Isopropyl Alcohol

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Problem

- There is no established standard for the minimum requirement of alcohol or phenol to cause neurolysis (Poddar et al., 2016).
- The gap in literature also does not define the effects of IPA on nerves in the epidural space. This lack of evidence creates significant questions for certified registered nurse anesthetists (CRNA).
- First, is there any residual IPA going through the epidural catheter following a bolus of medication that will reach the epidural space?
- Second, if it reaches the epidural space, is it enough to cause neurolysis? Careful attention must be given to aseptic precautions because it is equally important to consider the risks of nerve cell injury (Campbell et al., 2014).

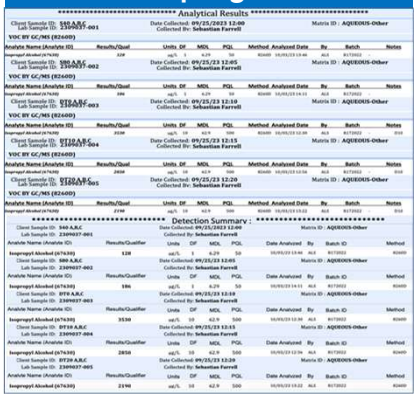
Literature Review

- Current practice of scrubbing the hub of central venous and peripheral intravascular catheters is to use a 70% IPA prep pad or apply an IPA–impregnated protective cap which guards against external contamination for every line entry to reduce the risk of central line-associated bloodstream infections (CLABSIs) (Boyce, 2018; CDC, 2016; TJC, 2013).
- For anesthesia, this same aseptic technique is controversial when applied to epidural catheter ports.
- The literature selectively references ethyl alcohol (absolute alcohol, dehydrated alcohol, or ethanol) as being a well-established agent used in purposefully induced neurolysis (Campbell et al., 2014; Koyyalagunta et al., 2016; Rangel Jaimes et al., 2022).
- Varying ranges of concentrations are used for neurolysis (Miller, 2013; Poddar et al., 2016).
- Determining if IPA is safe for use as a disinfectant on epidural catheters without causing neurolysis could reduce infection rates. Guidelines and policies can be created in light of new research.

Methods

- This scholarly project used a quantitative research design method
- The setting for the innovation was at the AHU Biochemistry Science Lab, located in Orlando, Florida, in addition to a third-party laboratory in Altamonte Springs, Florida.
- Three samples were created for each of the three different dry times. Those solutions were then tested under GC to detect any identifiable concentrations across the varying dry times.
- 40 ml vials were used to store the sample of 18 ohms water flushed through the epidural catheter after scrubbing the hub of the epidural catheter for 30 seconds and waiting at dry times of 0, 10, and 20 seconds.
- Ten ml of 18-ohm water was used in the syringe and flushed through the catheter. An additional 30ml of 18-ohm water was used to fill the vile and eliminate any head space. In between each sample, the syringe and the epidural catheter were rinsed with water to remove any possible residual alcohol. The vials were then sealed and delivered to the third-party lab for testing.

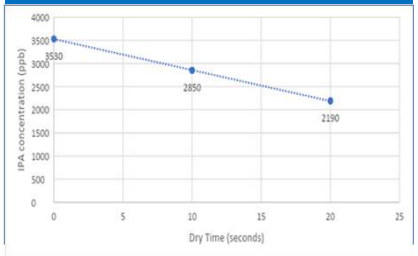
Lab Sampling Results



Analytical Results

Detection Summary :

Data points



More Results

For the sake of interpretation of the data, 1mcg/L= 1 parts per billion (ppb). The results for the samples are as follows: DT0A,B,C 3530 mcg/L, DT10A,B,C 2850mcg/L, and DT20A,B,C 2190mcg/L

Data prediction Forecast

Discussion & Implications

- Although the detected amount of IPA was not applied to the rat astrocytes directly, the data collected is still significant because of the relationship between dry times, and the amount of alcohol, suggesting that waiting the full 53 seconds eliminates the risk of neurolysis for the patient.
- The impact of this newfound knowledge can assist providers in discerning safe methods for their own anesthesia practice. Should institutions adapt this new information, policies can now be created to address the cleansing of epidural catheter ports when disconnecting and administering medication.

Conclusions

- The initial goal of identifying the amount of alcohol that passes through the epidural catheter after scrubbing the hub was achieved and can be used to make the recommendation that it is safe after waiting at least 53 seconds between scrubbing with IPA and administration of medication.
- The alcohol was not tested on rat astrocytes, as time did not permit further investigation. If this scholarly project were to continue, the detected amounts of IPA would have been directly applied to rat astrocyte cells to study the effect and determine potential cell death.
- References listed in QR code

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