Thesis Portfolio

Optimization of the Production of Lofexidine
(Technical Report)

Implementation of Tactics Employed by the European Union to Reduce Rates of Antibiotic Consumption and Resistance
(STS Research Paper)

An Undergraduate Thesis Portfolio

Presented to the Faculty of the School of Engineering and Applied Sciences
University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree
Bachelor of Science in Chemical Engineering

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10 May 2020

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Sociotechnical Synthesis

Overconsumption and mistreatment of pharmaceuticals have induced a number of crises, one of which is the opioid addiction crisis in the United States. Withdrawal symptoms are among the most influential reasons for continued abuse of opioid products. Typical regimens for withdrawal treatments often introduce other addictive drugs, seemingly defeating their purpose. To address this concern, the capstone team developed a basic layout for a lofexidine production facility; lofexidine is an effective, nonaddictive drug for treating opioid withdrawal symptoms.

The production process described in the technical report could be developed further for possible quality validation and USP certification (allowing for legitimate production) after more substantial property data on the compounds involved in the process are obtained. One reason why many opioid addicts do not seek medical assistance is excessive treatment prices. The process investigated by the capstone team has much higher theoretical yield than present lofexidine manufacturing practices; actualizing this process could facilitate substantial price reduction of lofexidine-based treatment regimens and allow more opioid addicts to successfully overcome barriers to quitting.

While the capstone research addresses the opioid addiction crisis, the STS paper addresses a different potential crisis of drug overconsumption: many antibiotic drugs are currently losing effectiveness. There is a growing risk of drug-resistant bacteria which could kill unabated by conventional treatments. Ulrich Beck's risk society framework was employed to investigate the European Union's response to this hazard. Document analyses were performed to study the interventions taken by EU member nations for mitigating the risks of drug-resistant bacteria. Intervention inquiries focused on two metrics: alignment with Beck's risk society principles and effectiveness for reducing intended target rates (consumption, resistance, or both).

The accumulated information was compiled into an outline of the measures that were most common for lowering rates of antibiotic consumption and resistance in the European Union and potential ways to compare their effectiveness. The paper also contains evaluations on the accuracy of Beck's risk society framework for describing the rationale and impact of the most prevalent measures. Both the capstone and STS research involve problems resulting from pharmaceutical abuse. Optimizing production of lofexidine may help alleviate the ongoing crisis of opioid addiction, while investigating EU tactics for reducing antibiotic consumption and resistance rates may help alleviate the future crisis of implacable bacterial outbreaks.