INNOVATIVE RESEARCH SYMPOSIUM

A Celebration of Student and Faculty Scholarship, Collaboration, and Innovation

Thursday, April 25, 2019

Fairfield University

Innovative Research Symposium

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THURSDAY, APRIL 25, 2019
Barone Campus Center

Sigma Xi
12:00 - 3:00 p.m., Oak Room

Graduate Research and Independent Projects
12:00 - 3:00 p.m., Dogwood Foyer

Egan School of Nursing and Health Studies Projects
2:00 - 4:30 p.m., Dogwood Room

Undergraduate Research and Independent Projects
2:00 - 4:30 p.m., Oak Room Foyer

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Welcome and Appreciation

Dear Colleagues, Students, and University Guests:

Welcome to the 2019 Innovative Research Symposium at Fairfield University! Innovation is a spark of imagination igniting the pursuit of answers to questions that drive our intellectual curiosity. Fairfield students collaborate with faculty mentors to develop creative research projects that extend from the classroom to the world. Whether examining cells under a microscope or learning about folklore in The Gambia, our student research contributes to the understanding necessary to address today's pressing societal issues.

The Innovative Research Symposium showcases the rich diversity of student research from across academic disciplines. Capstone Nursing and Health Studies projects, research by our Sigma Xi students in the natural sciences, mathematics, and psychology, and undergraduate, graduate, and independent projects are featured. We invite you to engage with the exciting scholarly endeavors of nearly 300 undergraduate and graduate students that spotlight the wide range of student-faculty research at the core of Fairfield's academic mission. Exploring these innovative projects joins us together in reaching for the *magis*, the more, to advance the common good through the pursuit of knowledge.

We are grateful for the generous support of so many from our Fairfield community who contributed to making this event such a success. We offer our appreciation to the many donors whose gifts enable Fairfield University students to pursue their academic goals and take advantage of the opportunities arising from collaboration with our outstanding faculty. A special note of appreciation is extended to each faculty mentor who devoted his/her time and energy to our students. Special recognition also goes to Kimberly Baer, Tasha Mehne, Jay Rozgonyi, Allison Wade, Curtis Ebdon, Casey Timmeny, Margaret McClure, Jill Smith-Carpenter, Kathy Saracino, Matt Dinnan, Dayna Cavanaugh, and Geri Derbyshire, and all those who assisted in making this event possible. Most especially, we thank the students who inspire us every day with their joy for learning.

Congratulations to our student presenters and faculty mentors! Thank you for

joining us on this day of academic celebration.

Jocelyn M. Boryczka, PhD
Associate Vice Provost for Scholarly, Creative, and Community Engagement

Sigma Xi


SIGMA XI
THE SCIENTIFIC RESEARCH SOCIETY
Fairfield University

MEL-28-mediated Regulation of Microtubule Motors Affects Fertility in the Nematode Worm Caenorhabditis elegans

Booth #1

Giulia Crosio '20

Faculty Mentor: Anita Fernandez

Abstract:
A gene is a sequence of DNA that serves as a set of instructions for the cell to manufacture a particular component. We have been using the genetic model animal C. elegans to study the roles of different genes and how they collaborate to promote fertility. We have discovered that the regulation of microtubule motors, which are essential transporters of cargoes within cells, is important for fertility. In addition, we have discovered that mel-28, a nuclear envelope protein not previously associated with intracellular transport, plays important roles in microtubule motor function. Specifically, simultaneous disruption of mel-28 and the microtubule motor dynein negatively impacts fertility in C. elegans. This suggests that dynein and mel-28 coordinately contribute to processes essential for fertility. To identify other genes involved in dhc-1;mel-28 infertility, we disrupted multiple candidate genes and assayed their effects on fertility in dhc-1;mel-28 double mutant animals. We discovered that when klc-2 is disrupted, the fertility issues in the mel-28; dhc-1 mutant are rescued. This indicates that mel-28 and dhc-1 are involved in a process that is opposed by Klc-2. Klc-2 encodes a regulator of the microtubule motor kinesin. We are now testing candidate cargoes to establish which ones are directly involved in the rescue of the mel-28; dhc-1 fertility defects.

Technical Abstract:
Microtubule motors are multi-molecular machines that ferry cargoes from one location to the other within a cell. We have been studying mel-28, a conserved and essential protein important for chromosome segregation and the post-mitotic rebuilding of the nuclear pore. Previous work showed that mel-28 and the minus-end directed microtubule motor dynein work in parallel to support fertility in C. elegans. Simultaneous disruption of mel-28 and dhc-1 (which encodes the large subunit of dynein) causes low brood size and

disorganization of the oogenic germline. Our main goal has been to understand why dhc-1;mel-28 double mutants have reduced fertility. Using markers that identify oocyte stage, we have observed that dhc-1;mel-28 double mutants have oocyte maturity defects. To find cellular components that regulate mel-28 and dynein-related cellular processes, we did a candidate RNAi screen searching for genes that when disrupted rescue the brood size of dhc-1;mel-28 double mutants. We found that disrupting klc-2, which encodes the light chain of the plus–end directed microtubule motor kinesin, drastically improves the brood size of dhc-1;mel-28 double mutants. This suggests that mel-28 and dynein work together to promote a cellular process that is opposed by Klc-2-mediated kinesin activity. We are currently using RNAi to test known cargoes regulated by Klc-2 in order to determine if these are implicated in the rescue of dhc-1;mel-28 fertility defects. All of the genes we are studying are conserved and essential in all animals. What we learn by studying genetic networks regulating fertility in C. elegans could be valuable for understanding regulation of intracellular trafficking in other animals, including humans.

Mating Behavior of Red Pandas (Ailurus fulgens)

Booth #2

Sean Coleman '21, David Denaro '20

Faculty Mentor: Ashley Byun

Abstract:
Red pandas are a species of mammal that lives in Central Asia. There are fewer than 10,000 in the wild and as a result they are endangered and a Species Survival Plan animal. This means organizations are actively trying to breed them and protect them. At The Connecticut's Beardsley Zoo there is a potential mating pair of red pandas, Rochan and Meri. In order to help with this effort, we spent the spring 2019 semester gathering new information about their everyday behavior. Three hours a week were spent at the zoo observing the red pandas. This was also supplemented with watching cameras placed in their habitat when we were not at the zoo. The observations were focusing on their individual, social, and mating behaviors. From this data it suggests that their activity levels increased as they approached their mating season. Social interactions and mating behaviors, such as grooming one another and scent marking became more frequent. However, even though these behaviors increased, they were not always consistent. Despite this, these patterns suggest that copulation is a possibility at some point during this breeding season.

Technical Abstract:
Red pandas (Ailurus fulgens) reside in Central Asia, particularly around Burma, Nepal, India, Tibet, and the Sichuan and Yunnan Provinces of China, and are currently classified as endangered by the International Union for Conservation of Nature (IUCN). With fewer than 10,000 individuals left in the wild and a decreasing population size, the red panda is a Species Survival Plan (SSP) animal. The Species Survival Plan helps promote the preservation of endangered species and also provides all of the animals with the best possible living enclosures. The Connecticut’s Beardsley Zoo has a potential mating pair of red pandas, Rochan and Meri. To help the zoo’s red panda breeding program, we spent the spring 2019 semester gathering new information about their everyday behavior through focal sampling. An ethogram was constructed to document specific individual, social, and mating

behaviors through both direct observation and observations made through live feed camera videos. An average of three observations hours were conducted weekly. Preliminary observations indicate that the red pandas' activity levels slowly increased as their mating season approached. Social interactions and mating behaviors, such as grooming one another and scent marking, became more frequent. While these behaviors increased, they were not always consistent. However, their behavioral patterns do suggest that copulation is a possibility at some point during the current breeding season.

The Acoustic Testing of Myrmecophaga Tridactyla to Explore Stress and Anxiety Patterns

Booth #3

Denise Esposito '19, Ryan Remeika '19, Daniel Ramsaran '19

Faculty Mentor: Ashley Byun

Abstract:
Giant Anteaters (Myrmecophaga tridactyla) are a large insectivore found in Central and South America. The Connecticut's Beardsley Zoo is home to three giant anteaters, a male (Eo), a female (Pana), and their male offspring (Tupi) who was born last year. Animal keepers at The Connecticut's Beardsley Zoo have reported that the anteaters, particularly Pana, demonstrated high sensitivity to specific sounds. Lawn maintenance and construction equipment in particular appear to evoke a level of anxiety unmatched by other stimuli. Based on our past work, we have generated the following hypothesis: Sounds generated by lawn maintenance equipment induce anxiety because they are acoustically similar to the cry of a baby anteater. To test this hypothesis, we exposed anteaters to a variety of sounds, some of which resembled a baby anteater cry and some of which were notably different. To minimize stress and accustomation to sounds, only eight sounds of less than 30 seconds each were tested over a period of three hours, once a week. Anteater's anxiety responses were ranked between 0 and 4. Spectrograms of each sound were generated using Raven Pro 1.5 to visually observe and compare sounds. Preliminary data confirm the initial hypothesis: Sounds that induced anxiety were acoustically similar to the baby anteater cry.

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Analysis of Maternal Behaviors from Labor to Cub Removal in Captive Amur Leopards (Panthera pardus orientalis)

Booth #4

Alanna Goldy '20, Teresa Sauer '20, Morgan Hansen '21

Faculty Mentor: Ashley Byun

Abstract:
Amur Leopards (Panthera pardus orientalis) are a critically endangered species with an estimated 57 individuals remaining in the wild and under 200 individuals living in zoos around the world. Threatened by deforestation, poaching, and reduced prey populations in the wild, efforts to maintain genetic diversity and replenish the Amur Leopard population are dependent on the success of captive breeding programs in zoos known as the Species Survival Program or SSP. As part of the SSP, The Connecticut's Beardsley Zoo currently has a mating pair of Amur Leopards. After an unsuccessful mating last winter, the pair mated successfully this year, producing three cubs. Using a live camera feed in the female's enclosure, we observed the births of these cubs. Shortly after the birth of the third club, we noticed significant injuries to two of the three cubs and alerted the zoo staff who promptly removed them from the enclosure for veterinary care. Injuries presumed to be from hypergrooming by the female resulted in the death of one cub. To better understand the female leopard's behavior, the critical period from labor to the point at which the three cubs were removed by staff was analyzed. This analysis has the potential to inform zoos and the Amur Leopard SSP about the early maternal behaviors of female Amur Leopards as well as the behaviors which may indicate inflicted injury on cubs.

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Beardsley Zoo currently has a mating pair of Amur Leopards. After an unsuccessful mating last winter, the pair mated successfully this year, producing three cubs. Using a live camera feed established within the female's enclosure, we observed the births of these cubs. Shortly after the birth of the third club, we noticed significant injuries to two of the three cubs and alerted the zoo staff who promptly removed them from the enclosure for veterinary care. Extensive injuries presumed to be from hypergrooming by the female resulted in the death of one cub. To better understand the female leopard's behavior, the critical period from labor to the point at which the three cubs were removed by staff was analyzed. This analysis has the potential to inform zoos and the Amur Leopard SSP about the early maternal behaviors of female Amur Leopards as well as the behaviors which may indicate inflicted injury on cubs. Preliminary analysis of grooming behavior indicates that the female groomed the uninjured cub significantly less than one of the two injured cubs ($p=0.014$), though not the other ($p=0.37$). Further analysis of of the critical period is necessary to determine other significant behaviors.

An Analysis of Pack Dynamics in a Newly Formed Pack of Captive Mexican Wolves (Canis lupus baileyi)

Booth #5

Alanna Goldy '20, Teresa Sauer '20, Morgan Hansen '21

Faculty Mentor: Ashley Byun

Abstract:
Canis lupus baileyi, or Mexican wolves, are a highly endangered species native to Mexico and the Southwestern United States. The careful regulation of captive Mexican wolf populations at zoos is critical to the success of efforts to reestablish this species in their native range. Connecticut's Beardsley Zoo recently introduced two related male wolves to their female wolf. Although there is no possibility of breeding between the males and the female due to her advanced age, the displacement of the two males from their original pack and into an enclosure with an unrelated female presents an interesting dynamic which has the potential to reveal information about the establishment of dominant and submissive roles within Mexican wolf packs. Behavioral observations have been conducted for three to six hours a week since the time of the males' introduction in the enclosure, tracking the aggressive and familial behaviors of each individual to better understand how the pack's social dynamic is changing and stabilizing. While directly after the introduction frequent aggressive behaviors between the two males were observed, there has since been an increase in the submissiveness of the smaller male and a complete reduction in aggressive interactions, indicating the establishment of a hierarchy within the pack.

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interesting dynamic which has the potential to reveal information about the establishment of dominant and submissive roles within Mexican wolf packs. Behavioral observations have been conducted for three to six hours a week since the time of the males' introduction in the enclosure, tracking the aggressive and familial behaviors of each individual to better understand how the pack's social dynamic is changing and stabilizing. Data is collected primarily through direct observation of the pack. Behaviors are recorded on an ethogram which defines behaviors to ensure the efficacy of data analyses. These direct observations are supplemented with observations from zoo staff as well as video and photos collected by camera traps in the wolf enclosure. While directly after the introduction frequent aggressive behaviors between the two males were observed, there has since been an increase in the submissiveness of the smaller male and a complete reduction in aggressive interactions, indicating the establishment of a hierarchy within the pack.

Black-tailed Prairie Dog (Cynomys ludovicianus) Aggression Above and Below Ground Studied via Observation and Underground Burrow Mapping

Booth #6

Izabela Horzempa '19

Faculty Mentor: Ashley Byun

Abstract:
Based on observations of the prairie dog colony at the Connecticut's Beardsley Zoo, we constructed a description of the captive prairie dog behavior. Based on camera trap observations, the aggression seen between the prairie dogs occurs in specific areas in the enclosure, the primary tension zone. Aggression is seen by fighting and chasing between the individuals. Keeping the prairie dogs in a confined space leads to obstacles preventing prairie dogs' instinctual dispersal tendencies, which could potentially motivate the aggression seen within the enclosure. Underground burrow mapping was initially done by synthetic fogging and then confirmed by the ground penetrating radar (GPR). The GPR images confirmed our suspicions that there is a larger coterie in the northern part of the exhibit, as shown by the extensive network of tunnels. In addition, there is a smaller coterie in the southern part of the exhibit. The GPR images do not show any burrows or chambers in the middle area of the exhibit, proving that there is no connection between the northern and southern regions of the exhibit. We conclude that the prairie dog colony at Connecticut's Beardsley Zoo has two separate coteries, in which the aggression arises from consequences of intercoterie conflict for food.

Technical Abstract:
Beginning in 2015, the Connecticut's Beardsley Zoo reported seeing high levels of aggression within their exhibit prairie dog colony. As part of the service learning program RIZE (Research, Internships and Zoo Education), we sought to understand the reasons behind the aggression. We began documenting the colony's behavior and determined that most aggression occurred in a specific area rather than equally throughout the enclosure. In

2016, using a synthetic fogging machine to elucidate underground burrow connections, we discovered the possible existence of two separate burrow networks, suggesting that the original colony had fractured into at least two separate groups or coteries. To confirm our suspicions, in 2017, we surveyed the burrow networks using ground penetrating radar (GPR) to produce non-invasive, high resolution subsurface images. GPR results confirmed the existence of two separate burrow networks. Our observations and underground burrow maps suggest that this colony consists of two distinct coteries and that territorial food aggression between individuals of these different coteries was the principal cause of hostility. To test this hypothesis, we requested that zoo staff distribute the food within the enclosure so each of the two coteries had equal access to food. The redistribution of food according to coterie boundaries resulted in a sudden and dramatic decrease in aggression and fighting within the captive prairie dog colony.

Studying Behavioral Compatibility Between the Golden Lion Tamarin and Goeldi's Monkey at Connecticut's Beardsley Zoo

Booth #7

Rebecca Lyons '20, Kenneth Fernandez '21, John Cahill '19

Faculty Mentor: Ashley Byun

Abstract:
This experiment examined behavioral compatibility between the male Goeldi's Marmoset, Monty, and the female Golden Lion Tamarin, Zag, at Connecticut's Beardsley Zoo in Bridgeport, CT. According to the International Union for Conservation of Nature (IUCN), the Golden Lion Tamarin is endangered and the Goeldi's Marmoset is vulnerable to being endangered. Zag had a partner that had died, and Monty initially had his mother and his sister with him, and as a result they started to exhibit behaviors such as overgrooming of their bodies, specifically seen in their tails. Their behavioral compatibility was monitored after an introduction within the enclosure at the zoo. In order to determine behavioral compatibility, we separated monkey behaviors into 17 distinct categories, especially those that denoted aggression or positive sociality. We monitored and recorded behavior every day for one hour, either in person at the zoo or via two live-stream webcams set up within the enclosure. We found that as time went on, aggressive behaviors were far less prevalent than social ones, with positive grooming each other becoming more and more frequent and aggressive behavior becoming less so. In conclusion, we believe that these two monkey species are fit for cohabitation on a larger scale within Association of Zoos and Aquariums (AZA) facilities.

Technical Abstract:
This experiment examined behavioral compatibility between the male Goeldi's Marmoset, Monty, and the female Golden Lion Tamarin, Zag, at Connecticut's Beardsley Zoo in Bridgeport, CT. Interactions between these two species of monkeys, and studies of the Goeldi's Marmoset in particular, have very rarely been published by the Association of Zoos and Aquariums and an introduction of these two species is of great interest to the New World Primate Taxon Advisory Group, as according to the IUCN, the Golden Lion

Tamarin is endangered and the Goeldi's Marmoset is vulnerable to being endangered. Zag had a partner that had died, and Monty initially had his mother and his sister with him, and as a result they started to exhibit behaviors such as overgrooming of their bodies, specifically seen in their tails. Their behavioral compatibility was monitored after an introduction within the enclosure at the zoo. If the determination of the interactions of both species is found to be beneficial to both monkeys, then this introduction can serve as a guide for other introductions of possibly different species to increase the population of threatened species. In order to determine behavioral compatibility, we separated monkey behaviors into 17 distinct categories, especially those that denoted aggression, such as hunched walking and screaming, or positive sociality, such as mixed grooming and eating. We monitored and recorded behavior every day for one hour, either in person at the zoo or via two live-stream webcams set up within the enclosure. Using this method, we found that as time went on, aggressive behaviors were far less prevalent than social ones, with grooming each other becoming more and more frequent and whining, screaming, and other aggressive behaviors becoming less so. In conclusion, we believe that these two monkey species are fit for cohabitation on a larger scale within AZA facilities.

Aggression in Captive Maned Wolves

Booth #8

Noelle Prisco '21, Bexhet Donolvani '21, Christopher Beninati '20

Faculty Mentor: Ashley Byun

Abstract:
Maned wolves are a species protected by the species survival plan. At The Connecticut's Beardsley Zoo, the captive maned wolves have begun to show aggression towards one another. This project explores the possible causes for the aggression between the wolves.

Analyzing Stress Levels in Biology Students at Fairfield University

Booth #9

Ryan Brennan '20

Faculty Mentor: Brian Walker

Abstract:
We wanted to test out how a therapy dog, impacted college students by having them spend time with the Fairfield University therapy dog Dakota. There was a dog group and a non-dog group of students. What we did was take a sample of their saliva prior to seeing Dakota and after seeing Dakota, testing for the presence of a stress hormone called cortisol. We wanted to determine if therapy dogs could exert positive effects on the baseline college student by lowering his/her stress levels, and if the results proved to be significant, to potentially implement a therapy animal program at our campus.

Technical Abstract:
The purpose of the study was to see how the presence of a therapy dog impacts stress levels of college students prior to taking an exam. A random sample of college students was taken from a freshman biology class and was split into groups, one that spent time with the dog and one that did not spend time with the dog. An initial baseline cortisol reading was taken at the beginning of the study and a questionnaire was given to students, and then the two groups completed their time either with the dog or without the dog. A final reading was taken at the end of the allotted time. Samples were taken and analyzed, specifically taking note of the delta between initial and final stress readings. Further analysis testing how class time, preparation time, and reported stress could be run to see if there was any correlation between those factors and salivary cortisol.

Erythrocyte and Lipoprotein Profiles Fluctuate According to Changes in Serum Lipids Present in Different Egg-based Diets.

Booth #10

Julia Greco '21, Allison Sloan '19

Faculty Mentor: Catherine Andersen

Abstract:
Chicken egg yolks and egg whites contain a wide variety of compounds that impact human health. Egg compounds have previously been shown to impact inflammatory markers and cholesterol levels. Currently, we are investigating the effects that a whole egg vs. egg white vs. egg-free diet has on clinical red and white blood cell profiles. It was hypothesized that different egg-based diets may modestly alter serum lipid levels (i.e. total cholesterol, HDL cholesterol, LDL cholesterol and triglycerides), and that this will cause a fluctuation in red and white blood cell counts. Therefore, we are conducting an ongoing dietary intervention trial in which healthy women and men participate in four-week dietary periods absent of eggs, consisting of three whole eggs per day, and consisting of three egg whites per day. After analyzing fasted serum lipids, blood cell counts, and dietary records, we deduced that variation in serum lipid levels following different egg-based diets are associated with shifts in red and white blood cell counts. These findings may be implemented in future studies concerning immune function and anemia as the results support the idea that there is a connection between diet, cholesterol, and blood cell counts.

Technical Abstract:
Chicken egg yolks and egg whites contain a wide variety of bioactive compounds that impact human health, including readily-absorbed phospholipids, antioxidant carotenoids, and immune-modulating proteins. Consumption of whole eggs and egg whites has previously been shown to cause differential shifts in serum inflammatory markers and indices of lipoprotein and cholesterol metabolism, whereas the relationship between egg intake and anemia status remains controversial. Therefore, we are currently investigating the effects that a whole egg vs. egg white vs. egg-free diet has on clinical erythrocyte and immune cell profiles. It was hypothesized that

different egg-based diets may modestly alter serum lipid indices (i.e. total cholesterol, HDL cholesterol, LDL cholesterol and triglycerides), which will cause a fluctuation in clinical erythrocyte and immune cell counts due to interactions between lipoproteins (e.g. HDL, LDL) and blood cells that alter erythrocyte lifespan and immune cell activity. An ongoing, randomized cross-over dietary intervention study is being conducted in which healthy women and men (18-35y, BMI < 30kg/m2) start the trial off with a fpur-week dietary period absent of eggs, and then a four-week diet consisting of three whole eggs or three egg whites per day. Participants then complete a second four-week “washout” egg-free diet, before consuming the alternate egg diet for another 4 weeks. After analyzing preliminary data on fasted serum lipids, clinical erythrocyte and differential immune cell counts, and dietary records at the end of each dietary treatment, we deduced that shifts in serum lipids levels during different egg-based diets are associated with shifts in erythrocyte and immune cell counts. These findings may be implemented in future studies concerning immune function and anemia as the results support the idea that there is a connection between diet, cholesterol metabolism, and hematologic profiles.

Investigating the Relationship Between Daily Stress, Dietary Intake and Metabolic Health

Booth #11

Allison Sloan '19

Faculty Mentor: Catherine Andersen

Abstract:
Different levels of stress can affect a person's metabolic age (the age they seem to be based off of measurements such as height, weight, and body mass index) relative to his/her actual age due to their food intake. Nutrition is extremely important to a person's metabolic health and their risk for developing certain diseases such as cancer, heart disease, or diabetes. There are many factors that can influence an individual's dietary choices, which can ultimately affect their health and risk for diseases. Stress can affect a person's cravings, and can also vary daily depending on work or personal demands. We decided to determine if stress affects metabolic health based on an individual's dietary intake from day to day. We thought that stress would affect people's nutritional intake. We conducted a study with 19 participants who were employed full-time either in emergency (first responders) or non-emergency professions. The participants completed a fasted baseline health assessment, in which we measured body composition and blood, followed by daily surveys related to stress, cravings, and dietary intake over the course of five days. Data analysis consists of categorizing the dietary intake as either workday or non-workday, in order to better understand the relationship between daily stress and food intake in relation to metabolic health.

Technical Abstract:
Nutrition has a major role in determining an individual's metabolic health and risk for developing chronic diseases, such as cardiovascular disease, type 2 diabetes, and cancer. Modifiable lifestyle factors and behaviors that influence dietary choices may represent a promising target to improve health and lower disease risk. Importantly, psychological and physiological stress may impact an individual's satiety levels and nutritional cravings. Stress can vary daily, depending on occupational demands and personal factors. Therefore, we set out to determine whether stress affects relative metabolic health due to an individual's daily dietary intake, as compared to workdays and non-workdays. We hypothesized that stress factors may negatively impact one's dietary

intake, nutritional status, and metabolic health. We further evaluated the relationship between stress and diet on relative metabolic age--an emerging marker for metabolic health that is adjusted for an individual's chronological age. We recruited 19 participants who were employed full-time in emergency/first responder or non-emergency professions to complete a fasted baseline health assessment, where we measured height, weight, body composition, blood pressure, and metabolic age. Participants then entered a five-day period in which they completed daily surveys related to stress, waking satiety and food cravings, and complete dietary intake. Preliminary data demonstrated that plant-based dietary patterns were associated with lower blood pressure and relative metabolic age, but that average stress was not associated with nutritional status. Therefore the need to observe the dietary intake and stress responses on individual days, and throughout the day, warrants investigation. Ongoing work involves analyzing dietary intake for each individual day, categorized as a workday or non-work day, in order to better understand the dynamic relationship between daily stress and dietary intake in relation to metabolic health.

Analysis of Long Term Water Quality Trends in Lake Lillinonah

Booth #12

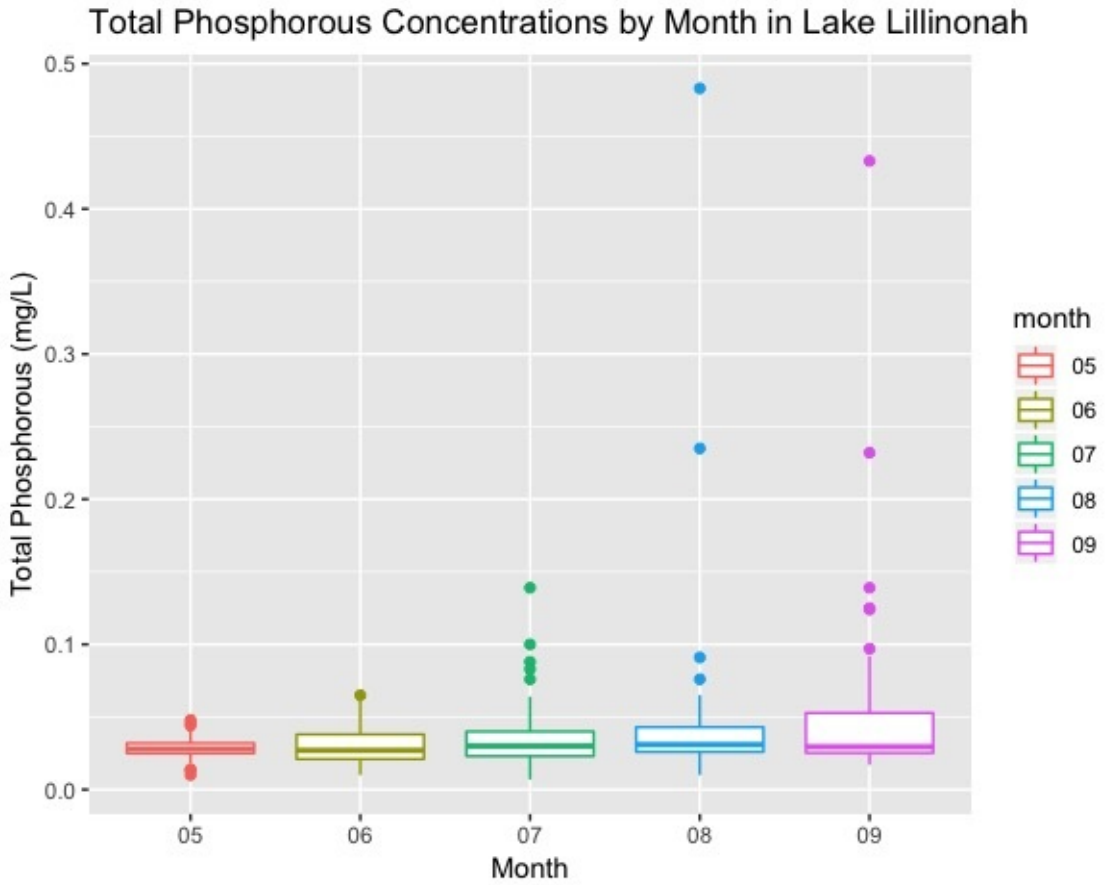
Katherine Biardi '19

Faculty Mentor: Jennifer Klug

Abstract:
Have you ever wondered what turns a lake green? For Lake Lillinonah, located in Western Central Connecticut, the color is caused by high amounts of nutrients, especially nitrogen and phosphorous. The high levels of nutrients can lead to algal blooms, which can have high concentrations of algal toxins that may be harmful to humans. Because Lake Lillinonah is widely used for recreational activities, proper monitoring of water quality in the lake is essential for its management. My research is focused on an analysis of water quality data collected from 2010 to 2018, in order to determine if there are any long-term water quality trends at Lake Lillinonah. I found that for all years, temperature peaked in July and August, and water clarity was lowest at those times as well. Analysis of nutrients over the monitoring season showed an increasing trend throughout the summer months, with the highest concentrations of nutrients in August and September. The increases in nutrients in late summer coincide with the large algal blooms and high toxin levels that are found on Lake Lillinonah in August and September, which are the months in which recreation on the lake is highest. These results highlight the importance of monitoring Lake Lillinonah in the future, especially in the light of climate change and increasingly high temperatures in the summer.

Technical Abstract:
Water quality monitoring is important to ensure that lakes continue to provide important ecosytsem services to humans. Lake Lillinonah is located in Western Central Connecticut and has been classified as a eutrophic system since its formation; with high amounts of nutrients, especially nitrogen and phosphorous, that support plant and algae growth. Cyanobacteria in particular have been a continuous problem because they form blooms in the late summer and can produce the algal toxin microcystin. Because recreation is a large part of the ecosystem services Lake Lillinonah provides, proper monitoring of water quality in the lake is essential for its management. The Citizen-Led Environmental Observatory (CLEO) was founded to monitor

water quality in Lake Lillinonah. My research is focused on an analysis of all the data collected from 2010 to 2018, in order to determine if there are any long-term water quality trends at Lake Lillinonah. I found that for all years temperature peaked in July and August, and water clarity (measured as Secchi depth) was lowest at those times as well. Analysis of total phosphorous (TP) over the monitoring season showed an increasing trend throughout the summer, with September having significantly higher concentrations than May and June. TP concentrations varied between years, but there were no observable trends over time. The increases in TP in late summer coincide with the large algal blooms and high toxin levels that are found on Lake Lillinonah in August and September. These results highlight the importance of monitoring Lake Lillinonah in the future, especially in the light of climate change and increasingly high temperatures in the summer. Understanding trends in lake temperature, Secchi depth, and nutrients, can lead to improved and more accurate predictions of algal blooms and high toxin levels.



An Analysis of the Effect of Discharge on Indicators of Water Quality in Lake Lillinonah

Booth #13

Teresa Sauer '20

Faculty Mentor: Jennifer Klug

Abstract:
Climate change is predicted to increase the number of severe storms in Northeastern North America. Heavy precipitation has a complex impact on lakes. Greater amounts of water come into the lake from the rivers, mixing the layers of the water column. This reduces surface temperature and brings oxygen to the lake floor. These effects tend to improve water quality by reducing harmful algae blooms and low oxygen conditions on the lake floor, both of which greatly reduce the recreation potential of the lake. However, increased river inflow may also increase nutrient concentrations in the lake, which promotes the growth of algae blooms and reduces water quality. The purpose of this research project is to analyze how high inflow affects indicators of water quality in Lake Lillinonah to better understand how the health and recreation potential of the lake are influenced by severe precipitation events. By examining the relationship between river discharge and algae concentrations and dissolved oxygen levels--variables which represent relative water quality--in periods during which the water column was significantly mixed, I hope to track the full effect of significant precipitation events on Lake Lillinonah. The project has the potential to inform organizations which monitor Lake Lillnonah on future predicted water quality as the frequency of severe storms increases.

Technical Abstract:
Climate change is predicted to increase the frequency of severe precipitation events in the Northeastern region of North America. This would subsequently increase the frequency of high inflow events into lakes. Fluctuations in river inflow are closely linked to changes in ecosystem processes and overall water quality. Increased inflow can reduce the prevalence of algal blooms and hypoxic conditions by destabilizing the water column; however, high inflow also results in higher nutrient loading which may lead to eutrophic conditions. The purpose of this research project is to analyze how high inflow events affect indicators of water quality in Lake Lillinonah in Connecticut to better

understand how the health and recreation potential of the lake are influenced by severe precipitation events. Lake Lillinonah is an impoundment of the Housatonic River. I define high inflow events by identifying significant daily changes in the predictor variables of stability and temperature. This method accounts for the lagged impact of inflow changes on the lake system. I then look for changes in the response variables of dissolved oxygen and phycocyanin, both of which are highly indicative of overall water quality. I predict Phycocyanin will decrease and dissolved oxygen will increase immediately after high inflow events due to reduced water column stability. However, I expect that increased nutrient loading as a result of the inflow event will raise phycocyanin within a certain time frame of the discharge event. Understanding the complex impact of high inflow events on Lake Lillnonah will allow us to anticipate changes in water quality and track yearly conditions as the predicted effects of climate change worsen.

Effects of Thermal Acclimation on the Muscle Physiology of Tautog

Booth #14

Kamryn Jebb '20

Faculty Mentor: Shannon Gerry

Supported by Mancini Fund

Abstract:
Understanding the effect of temperature on muscle performance is important in understanding how temperature affects whole organism performance. Prior research on muscle function at varying temperatures has not addressed the duration of acclimation. Therefore, we compared thermally acclimated fish to fish taken from the wild. We used tautog, a commercially important fish from Long Island Sound that uses its pectoral fins to swim. The speed at which this muscle contracts and relaxes and the power produced by the abductor superficialis, the muscle which tautog use to swim, was quantified. Water temperatures in the Long Island Sound range from 5°C to 20°C, therefore, muscles were tested in 5°C, 10°C and 20°C. We found that the longer fish were exposed to warm temperatures, the better their muscles performed in colder temperatures. This is shown by the increased power produced by fish acclimated at 20°C when compared to fish obtained from the wild when tested at warmer temperatures. Any exposure to cold temperatures, regardless of the duration, caused a decrease in muscle performance. This was shown by the slow contraction and relaxation times of acclimated fish and natural fish when tested at lower temperatures. As water temperatures increase due to global warming, it is important that we understand how these temperature disparities will affect this organism's performance.

Technical Abstract:
Understanding the impacts of temperature on ectotherm muscle is important to appreciate the thermal effects on whole organism performance. Much of the work to this point has been predicated on thermal acclimation of muscle via myosin isoform regulation. The duration of acclimation, however, has varied greatly in the literature. As a result, we aimed to address the effects of acclimation on fish locomotor muscle. By comparing thermally acclimated fish to fish taken and tested immediately from the wild we can address the

effects of acclimating fish to a specific thermal environment in the lab. Our study species was the tautog (Tautoga onitis) which is a labrid and can be found along the eastern coast of North America in waters that range from 5°C to 20°C. Locomotor muscle fiber kinetics and power output of the abductor superficialis muscle was measured in a group of tautog acclimated at 20°C and a group of tautog collected once water temperatures reached 20°C. Muscles were tested at 5°C, 10°C and 20°C. 20°C acclimated tautog locomotor musculature produced more power when tested at 5°C than the power produced by natural 20°C tautog when tested at 5°C. This finding suggests that increased exposure time to warmer waters allows tautog abductor superficialis muscles to perform better at colder temperatures. At lower temperatures, both 20°C acclimated and natural 20°C tautog showed a long time to max twitch and time to relax when compared to that of warmer temperatures. This demonstrates that any exposure to cold temperatures, despite the duration, causes a decrease in tautog muscle function.

Inducing Morphology in a Population of Bluegill Sunfish

Booth #15

Emily Patchell '19

Faculty Mentor: Shannon Gerry

Abstract:
Bluegill sunfish are a species of freshwater fish native to North America. Adult bluegills show a difference in their physical characteristics based on habitat. Bluegills living in shallow, weedy habitats (littoral zone) usually have a deeper body with larger fins, which is useful for maneuvering through thick vegetation. Bluegills living in open water habitats (pelagic zone) typically have streamlined bodies that are useful for steady swimming. The goal of this study was to put bluegills into simulated littoral and pelagic habitats and examine how their bodies changed over a period of eight months. Ninety young-of-the-year bluegills were collected from Lake Waban, Wellesley, MA, and randomly separated into simulated littoral and pelagic tanks. At month four of the study, littoral bluegills were combined into one tank and pelagic bluegills were combined into one tank due to low survival rates. Each fish was weighed and photographed biweekly and the following physical characteristics were measured: mass (g), standard length (cm), width (cm), spiny dorsal fin area (cm2), anal fin area (cm2), and caudal fin area (cm2). There was no difference in any variables between habitats ($p>0.05$). Therefore, we are unable to determine if habitat differences have an effect on body form in bluegills. Future experiments will explore how swimming performance affects body form.

Technical Abstract:
The bluegill sunfish (Lepomis macrochirus) is a species of freshwater fish native to North America. Adult bluegills demonstrate a change in their physical characteristics as a result of different environmental cues, leading to divergence among individuals in a single population. This phenomenon is known as polyphenism, which is when two or more distinct body types are produced by the same genotype. Littoral bluegills typically have a deeper body with larger fins, which are useful for maneuvering through a shallow, weedy habitat. Pelagic bluegills typically have streamlined bodies, which allow for sustained steady swimming in the open water. It is unknown when

juvenile bluegills start to diverge into these two body types during development. Thus, the objective of this study was to place juvenile bluegills into simulated littoral and pelagic habitats and examine the induced morphologies over a period of eight months. Ninety young-of-the-year bluegills were collected from Lake Waban, Wellesley, MA, and randomly separated into three littoral tanks and three pelagic tanks in the lab. Due to a low survival rate, at month four all pelagic bluegills (n = 14) were combined into one tank and all littoral bluegills (n = 8) were combined into one tank. Individual fish were weighed and photographed biweekly. The following morphological characteristics were quantified using Image J: mass (g), standard length (cm), body width (cm), spiny dorsal fin area (cm2), anal fin area (cm2), and caudal fin area (cm2). There was no difference in any morphometric variables between habitats ($p>0.05$). Therefore, we are unable to determine if environmental cues have any effect on body form in bluegill sunfish. Future experiments aim to explore how variation in swimming performance may induce morphological change.

Aggressive Conditioning of Siamese Fighting Fish, Betta splendens

Booth #16

Courtney Scrivanich '19, Emily Patchell '19, Kamryn Jebb '20

Faculty Mentor: Shannon Gerry

Abstract:
Many have speculated whether Betta fish have the capability to recognize humans. Fish do not have a specialized part of the brain for recognizing human faces; however, research has shown that vertebrates, and some fish species, may have the ability to do so. Additionally, Bettas are ideal for behavioral experiments because of their predictable aggression. Therefore, the objective of our research was to train Bettas to show aggression toward a specific pattern to determine whether they are capable of recognizing different stimuli. To conduct testing, 10 male Bettas were housed individually, six of which were used for experimental testing and four control. The experimental fish were trained using a tank with mirrors. When the Bettas exhibited aggressive behavior with an “X” pattern submerged in the tank, they were rewarded with food pellets. The trials were conducted three times a week for four weeks. Current research is ongoing. Future trials will be conducted with the mirrors removed and the Bettas will be rewarded for showing aggression toward the X stimulus. After the conclusion of the experimental trials, the brains of the experimental and control fish will be dissected to compare the size of the brain regions between the two groups. Eventually, the findings of this experiment have the potential to demonstrate whether Bettas can be conditioned to recognize human faces.

Technical Abstract:
Many have speculated whether Betta splendens, or Siamese fighting fish, have the capability to distinguish human faces. Unlike humans and other complex-brained species, the primitive brains of fish lack a neocortex; however, previous research has indicated that other vertebrates, and some fish species, have the capacity to perform facial recognition of human faces. Additionally, Bettas are ideal for ethological experiments because of their predictable aggressive behavior. The classical conditioned behavior of Bettas occurs in the cerebellum. Therefore, the objective of our research was to train Bettas to show aggression toward a conditioned stimulus in order to

determine whether they are capable of recognizing different stimuli. To conduct testing, 10 male Bettas were housed individually, six of which were used for experimental testing and four control. When conditioning the experimental fish, individuals were placed a tank where three of the sides were covered with mirrors. After acclimating to the environment and being exposed to mirror images for five minutes, a laminated piece of paper with an "X" pattern was placed in the tank. When the Bettas exhibited aggressive behavior with the X present, they were rewarded with food pellets to form habituation. Aggressive behavior included biting, tail beating, operculum raising, and flaring of the fins. The trials were conducted three times a week for four weeks. Current research is ongoing. Future trials will be conducted with the mirrors removed and the Bettas will be rewarded for showing aggression toward the X stimulus. After the conclusion of the experimental trials, the brains of the experimental and control fish will be dissected to compare the size of the brain regions between the two groups. It is expected that the experimental fish will have larger cerebellums. Eventually, the findings of this experiment have the potential to demonstrate whether Bettas can be conditioned to recognize human faces.

Oleuropein Reduces Prdx1 Expression, Cell Proliferation and Viability in K562 Human Leukemia Cells

Booth #17

Sophia Fagan '19, Natalie Fulco '19

Faculty Mentor: Shelley Phelan

Supported by Femia Science Endowment, Mancini Fund

Abstract:
Oleuropein is one of the two main phenolic compounds derived from olive leaves. The purpose of our study was to examine the effects of oleuropein extract on cell growth and viability of the K562 human leukemia cell line, and to investigate possible molecular mechanisms of action. Oleuropein of 98% purity was used for our studies. K562 cells treated with 200 and 400 µg/ml oleuropein exhibited a significant reduction in cell growth and viability after four days compared to ethanol-treated controls. Cells treated with 200 µg/ml oleuropein showed decreased cell proliferation and viability after two days, and approximately 90% reduction in cell density and viability after four days of treatment. A concentration of 400 µg/ml oleuropein resulted in 100% toxicity by day four. We found a two-fold elevation in LDH release within 24 hours of treatment with 200 µg/mL oleuropein. To begin to explore a mechanisms of action, we used western blotting to examine known antioxidant and signaling pathways for possible regulation by oleuropein in these cells. We examined expression of the Peroxiredoxin (Prdx) family of proteins. We found that 200 ug/ml oleuropein reduced Prdx1 expression by about 50% after eight and 24 hours. We are currently investigating the mechanism of cell death induced by oleuropein and the role of Prdx1 in oleuropein-induced toxicity.

Technical Abstract:
Oleuropein is one of the two main phenolic compounds derived from olive leaves. Studies have found that the polyphenols in olive leaves possess antioxidant properties, and increase apoptosis in cancer cells, suggesting its possible efficacy as an anti-cancer treatment. The purpose of our study was to examine the effects of oleuropein extract on cell growth and viability of the

K562 human leukemia cell line, and to investigate possible molecular mechanisms of action. Oleuropein of 98% purity was used for our studies. K562 cells treated with 200 and 400 µg/ml oleuropein exhibited a significant reduction in cell growth and viability after four days as compared to ethanol-treated controls. Cells treated with 200µg/ml oleuropein showed decreased cell proliferation and viability after two days, and exhibited a 90% reduction in cell density and viability after four days of treatment. A concentration of 400 µg/ml oleuropein resulted in 100% toxicity by day four. We also examined the effects of oleuropein on cellular cytotoxicity using an LDH release assay and found a two-fold elevation in LDH release within 24 hours of treatment with 200 µg/mL oleuropein. To begin to explore a mechanisms of action, we used western blotting to examine known antioxidant and signaling pathways for possible regulation by oleuropein in these cells. We examined expression of the Peroxiredoxin (Prdx) family of proteins, a group of thiol-specific antioxidants found to be elevated in many types of cancer. We found that 200 ug/ml oleuropein reduced Prdx1 expression by about 50% after eight and twenty-four hours, while having no significant effect on expression levels of Prdx-2, -3, -4, and -6. We are currently investigating the mechanism of cell death induced by oleuropein, as well as the role of Prdx1 in oleuropein-induced toxicity. Together with previously reported cancer-cell specific effects, this research provides a promising new avenue for the use of natural products as anti-cancer agents.

The Effect of Doxorubicin on Levels of Peroxiredoxins in MCF7 Breast Cancer Cells

Booth #18

Allison Peeney '19

Faculty Mentor: Shelley Phelan

Supported by Femia Science Endowment

Abstract:
Doxorubicin is a chemotherapy drug used to treat cancer by targeting and killing cancer cells. My research focuses on the effect of this drug in a breast cancer cell line (MCF7). Specifically, we are interested in studying the effect of doxorubicin on levels of antioxidant proteins called peroxiredoxins, which are a family of proteins that have been previously linked to drug resistance in this cell line. First, the growth and death of cells treated with different concentrations of doxorubicin were measured. Using this data, cells were grown and treated with doxorubicin. Using a technique called western blot analysis, protein levels of the peroxiredoxins were measured in cells that were treated with doxorubicin or untreated. We are currently testing different concentrations and durations of treatment. This project will contribute to the field of cancer research and potentially help in the optimization of cancer treatment.

Technical Abstract:
Doxorubicin is a chemotherapy drug used to induce the growth, arrest, and death of cancer cells. Peroxiredoxins (Prdxs) are a family of antioxidant proteins that are known to be related to drug resistance against doxorubicin. Previously, our lab demonstrated that doxorubicin resistance and peroxiredoxin levels are both elevated in MCF7 breast cancer cells in comparison to MCF10A non-cancerous breast epithelial cells. Additionally, suppression of specific Prdx proteins decreased MCF7 resistance to doxorubicin. This project sought to measure the effects of doxorubicin on Prdx levels in MCF7 breast cancer cells. First, cell growth and death were measured in cells treated with different doxorubicin concentrations using the MTS and LDH assays, respectively. We found that doxorubicin reduced cell proliferation by about 70% and increased cell death by about 40% in the 2.5 uM treated cells at 72 hours after treatment. Then, cells were cultured and

treated with 2.5 uM doxorubicin for various durations between zero and 72 hours, and western blots were generated and analyzed to examine the effect on Prdx protein expression. Future directions include measuring Prdx mRNA levels using RT-PCR as well as an investigation of possible upstream signal transduction pathways that mediate Prdx regulation. This project will contribute to the field of cancer research and potentially help in the optimization of cancer treatment.

Determining a Quantitative Relationship Between Cell Growth Rate, Cellular Metabolism and Nuclear Structure in MCF-10A Cells to Predict Cancer Aggressiveness

Booth #19

Isabelle Seppa '20

Faculty Mentor: Shelley Phelan

Abstract:
Cancer, especially aggressive forms of cancer, can ravage the human body. Cancerous cells have the ability to bypass checkpoints in the cell cycle which control normal growth in regular cells. The ability to bypass these checkpoints allows cancerous cells to grow and replicate uncontrollably. The rate of cancer aggressiveness at the time of diagnosis has been shown in studies to remain relatively constant over duration of disease, and that it is in the early stages of cancer formation that aggressiveness is determined. The purpose of this study is to use cell and molecular biology approaches to measure cancer aggressiveness, so that we can develop a quantitative growth model to predict cancer aggressiveness with a non-invasive microscopy-based method. This study specifically hopes to find a relationship between cellular growth rate, cellular metabolism and the nuclear structure in various breast cancer lines. To do this, we are growing the cells in culture under different conditions, and measuring glucose uptake, oxygen consumption, and nuclear changes as indicators of cancer aggressiveness. Eventually, we will run parallel microscopic imaging studies to compare these results to non-invasive measures, with the hope of developing a model to predict cancer aggressiveness in patient samples.

Technical Abstract:
Aggressive cancer grows at faster rates than normal cancer. Studies have shown that the aggressiveness level at diagnosis remains stable over time. The MCF-10A cell line is a widely used, normal, human breast epithelial line. The MCF-10AT sub-line is an oncogenically transformed line that has characteristics of breast cancer cells. The purpose of this NSF-funded study is to develop and establish a quantitative relation between cell growth rate,

cellular metabolism, and nuclear structure in these cell lines to further evaluate the possible application of this model in determination of cancer aggressiveness. We first measured glucose uptake in the MCF-10A cells. In this glucose uptake assay, 2-deoxyglucose (2-DG) was used for quantifying glucose uptake in MCF-10A cells. In the reaction, 2-DG was taken up by glucose transporters and metabolized into 2-deoxyglucose-6-phosphate (2-DG6P), which was then oxidized to produce NADPH. The amount of NADPH quantified by emittance at 412 nm was directly proportional to the amount of glucose uptake in the MCF-10A cells. Our experiments confirmed the optimal cell number, concentration of 2-DG6P, and time frame for our experiments. We also examined the oxygen consumption rate (OCR) in the MCF-10A line using a phosphorescent oxygen probe (POP). The standards of the POP, glucose oxidase and Antimycin A inhibitor were all tested for their functionality in the assay with the line. Antimycin A was tested with the MCF-10A cells to observe inhibition of the mitochondrial electron transport chain. Using this assay, we were also able to determine the optimal cell number and time frame for this experiment. Further testing is currently being conducted using this oxygen consumption assay to determine the difference between quiescent cells and growing cells. Future experiments will proceed with the MCF-10AT line and parallel analysis will occur between the assays and microscopic imaging through differential interference contrast microscopy.

Molecular Fingerprinting of Human K562 Leukemia Cells and PBMCs via MALDI-TOF Mass Spectrometry

Booth #20

Tyler Lyons '19, Eunsun Hong '19, Justin Gilbertson '19, Justin Mercado '20, Catherine Andersen '19

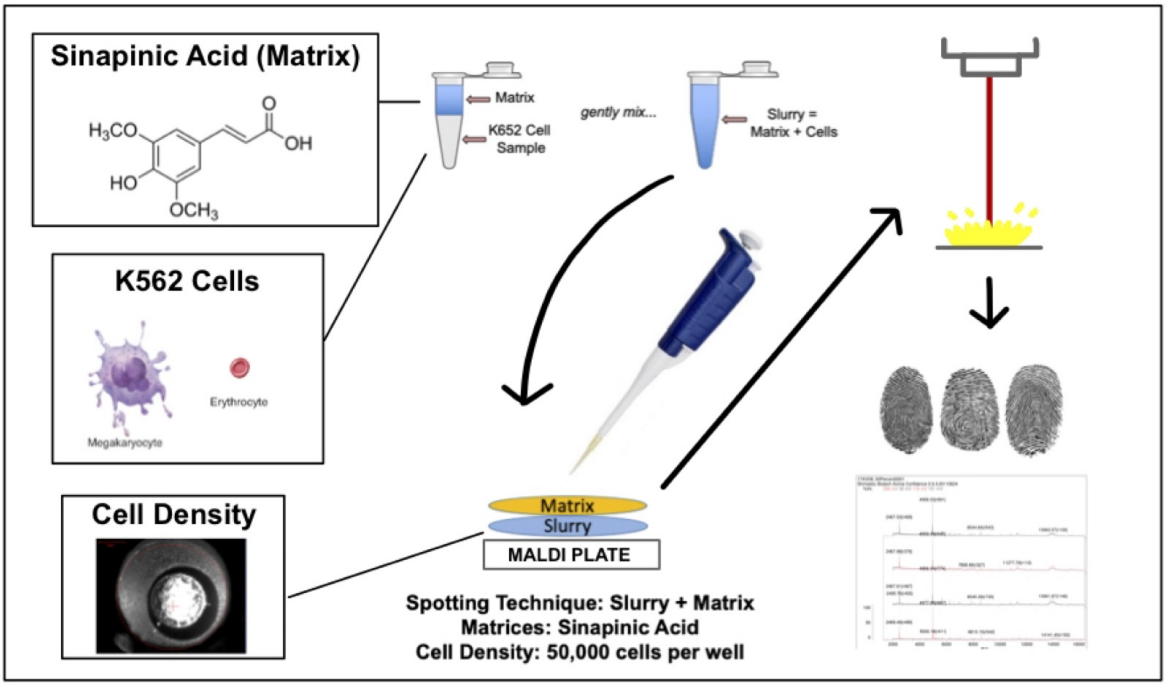
Faculty Mentor: Aaron VanDyke

Supported by Hardiman Scholars

Abstract:
Mass spectrometry is a chemical technique that fragments molecules into small pieces, so its original chemical structure can be identified. One could picture the laser as the Death Star, and the molecule as the planet, where the multiple fragments of the explosion are detected to give us the original mass of the molecule. Matrix Assisted Laser Desorption/Ionization Time-Of-Flight (MALDI-TOF) is a specific type of mass spectrometry often used for characterizing biomolecules. While routinely used to study bacteria, it has rarely been used to analyze human cells. Just as human fingerprints are unique to each individual, our goal is to use use the MALDI-TOF to acquire a spectral “fingerprint” of K562 cells, a human chronic myelogenous leukemia cell line. Importantly, optimizing the preparation method of the samples for MALDI will be useful for characterizing when cells change or grow after experimental treatments. We've identified the optimal preparation method for this analysis to obtain a high-quality fingerprint. A key discovery in our research this year was the use of a weak acid to break apart the membrane of our cells and boost the signal of the molecules inside, which is what we have seen. We're excited to apply these discoveries to the study of samples from a dietary intervention study, examining the link between egg consumption and inflammation.

Technical Abstract:
Matrix Assisted Laser Desorption Ionization-Time Of Flight (MALDI-TOF) mass spectrometry is a powerful method for characterizing biomolecules. While routinely used for the identification of microbial species, it has more recently been extended to the analysis of mammalian cells. We describe the

use of MALDI-TOF for acquiring a spectral fingerprint of K562 cells, a human chronic myelogenous leukemia cell line. Importantly, the number of cells, MALDI matrix, and spotting technique are useful for characterizing phenotypic shifts and differentiation patterns of K562 cells following experimental treatments. Optimal results have been obtained using a matrix of sinapinic acid, preparing a slurry of matrix with sample followed by additional matrix and spotting 50,000 cells per well. Cell washing and lysis methods were also tested. Most notably, formic acid was discovered to significantly improve the signal obtained from K562 samples but had a mixed effect on peripheral blood mononuclear cells (PBMCs). PBMCs were obtained from a dietary intervention study, examining the link between egg consumption and inflammation.


Sinapinic Acid (Matrix)
H_3CO
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OH
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K562 Cells
Megakaryocyte
Erythrocyte
Cell Density
Matrix
K652 Cell Sample
gently mix...
Slurry = Matrix + Cells
Matrix
Slurry
MALDI PLATE
Spotting Technique: Slurry + Matrix
Matrices: Sinapinic Acid
Cell Density: 50,000 cells per well

Investigating the Potential of Self-assembling Peptide Systems for Uric Acid Electrochemical Sensing Applications

Booth #21

Jonathan Myers '19, Samantha Brown '19, Oreoluwa Cherebin '19, Mikaylin Nogler '21

Faculty Mentor: Amanda Harper-Leatherman, Jillian Smith-Carpenter

Supported by Lawrence Program

Abstract:
Uric acid is a clinically relevant biomolecule and its detection is important due to its links to a myriad of diseases and medical concerns, including, but not limited to, gout and diabetes. Certain soluble, biocompatible self-assembling peptides have conductive properties that make them useful in electrochemical sensing schemes. We are studying the incorporation of synthesized self-assembling peptide structures in a layered electrochemical sensing scheme for uric acid. Along with being biocompatible, peptides are highly modifiable biomolecules that can create self-assembling nanostructures from short sequences. Self-assembling peptides were synthesized in order to investigate the most effective short peptide sequence that can be used in a uric acid electrochemical sensor. The resulting structures and electronic properties associated with these modified peptide systems have promise as components in uric acid sensors.

Technical Abstract:
Uric acid is a clinically relevant biomolecule and its detection is important due to its links to a myriad of diseases and medical concerns, including, but not limited to, gout and diabetes. Certain soluble, biocompatible self-assembling peptides have conductive properties that make them useful in electrochemical sensing schemes. We are studying the incorporation of synthesized self-assembling peptide structures in a layered electrochemical sensing scheme for uric acid. The scheme employs drop casting layers of self-assembling peptide nanostructures, -cyclodextrin, and Nafion onto the surface of glassy carbon electrodes. Along with being biocompatible, peptides are highly modifiable biomolecules that can create self-assembling

nanostructures from short sequences. Research in the field has focused on sequences that demonstrate -bond stacking such as the diphenylalanine motif present in the A-42 amyloid-beta sequence, as well as sequences that form α-helical superstructures. With this in mind, peptides were synthesized using the nucleating core of the A-42 amyloid beta sequence in order to investigate the most effective short peptide sequence that can be used in a uric acid electrochemical sensor. The resulting structures and electronic properties associated with these modified peptide systems have promise as components in uric acid sensors.

Gold Aerogels Incorporating Carbon Nanotubes for Biosensing Applications

Booth #22

Caitlyn Zarra '19

Faculty Mentor: Amanda Harper-Leatherman

Supported by Lawrence Program

Abstract:
Metal aerogels have found use in many applications due to their conductivity, high surface areas, and low densities. Carbon nanotubes are conductive nanomaterials that can enhance sensitivity of some sensors including biosensors. Indirect glucose detecting electrochemical biosensors using the enzyme glucose oxidase and the electrochemical detection of hydrogen peroxide have been highly studied because glucose levels must be monitored in the treatment of diabetes. Gold aerogels have shown promise for non-enzymatic glucose detection. In this research, we are investigating the use of commercially available citrate stabilized gold colloids of various diameters as well as synthesized gold colloids to form aerogels in the presence of encapsulated carbon nanotubes. We are exploring the potential of these aerogels for glucose biosensing using voltammetry. Carbon nanotubes are an addition that are expected to increase the conductivity of gold aerogels and the sensitivity of glucose detection.

Technical Abstract:
Metal aerogels have found use in many applications due to their conductivity, high surface areas, and low densities. Carbon nanotubes are conductive nanomaterials that can enhance sensitivity of some sensors including biosensors. Indirect glucose detecting electrochemical biosensors using the enzyme glucose oxidase and the electrochemical detection of hydrogen peroxide have been highly studied because glucose levels must be monitored in the treatment of diabetes. Gold aerogels have shown promise for non-enzymatic glucose detection. In this research, we are investigating the use of commercially available citrate stabilized gold colloids of various diameters as well as synthesized gold colloids to form aerogels in the presence of encapsulated carbon nanotubes. We are exploring the potential of these aerogels for glucose biosensing using voltammetry. Carbon nanotubes are an

addition that are expected to increase the conductivity of gold aerogels and the sensitivity of glucose detection.

Investigating the Catalytic Activity of Self-Assembling Nucleopeptides

Booth #23

Jovelt Dorsainvil '19

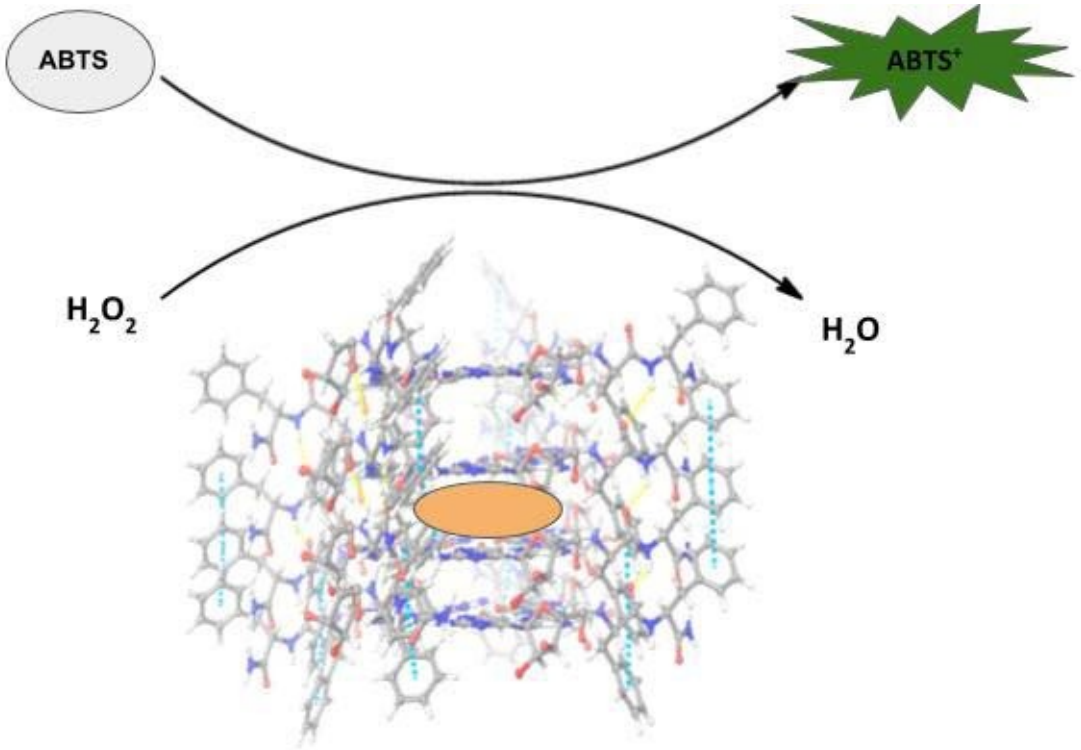
Faculty Mentor: Jillian Smith-Carpenter

Supported by Lawrence Program

Abstract:
G-quadruplexes are structures that can be achieved using nucleic acid sequences rich in guanosine and have been shown to accelerate to the rate of numerous reactions, including peroxidase reactions. We have previously shown that nucleopeptides, short peptides modified with a guanosine can self-assemble into higher order nanostructures. In this project, we designed a co-assembly system using a known self-assembling nucleopeptide, gs-GKLVWWAE with a hemin cofactor. We hypothesize that the nucleopeptides will self-assemble into nanofibers and the hemin will position itself within the formed G-quadruplex structures within the nanostructures. We report the ability of the hemin/nucleopeptide complex to catalyze peroxidase reactions.

Technical Abstract:
The non-canonical G-quadruplex secondary structures have been shown to catalyze numerous reactions, including peroxidase oxidation reactions. The use of G-quartets in catalysis has been linked to their ability to bind hemin, that becomes catalytically competent once nestled in the protein-like binding cavity atop the G-quadruplex. In this report, we designed a supramolecular co-assembly system that strategically places hemin between stacked G-tetrads by taking advantage of the highly ordered architecture of peptides that self-assemble. Our target system was achieved by modifying the N-terminus of self-assembling peptides, GKLVWWAE and GKWW, with a guanosine nucleoside to yield the nucleopeptides gsGKLVWWAE and gsGKWW. We hypothesize that these modified peptides will self-assemble into nanofibers, driven by the propensity of the peptide to self-assemble, and will position the guanosines such that they stack into G-tetrads within the supramolecular nanofiber with hemin interspersed between the G-tetrads. We report the characterization of the hemin-nucleopeptide supramolecular structures and the

ability of the complex to catalyze peroxidase reactions through the use of a chromogenic ABTS assay.



Exploring Dynamic Disulfide Chemistry on Supramolecular Fibers

Booth #24

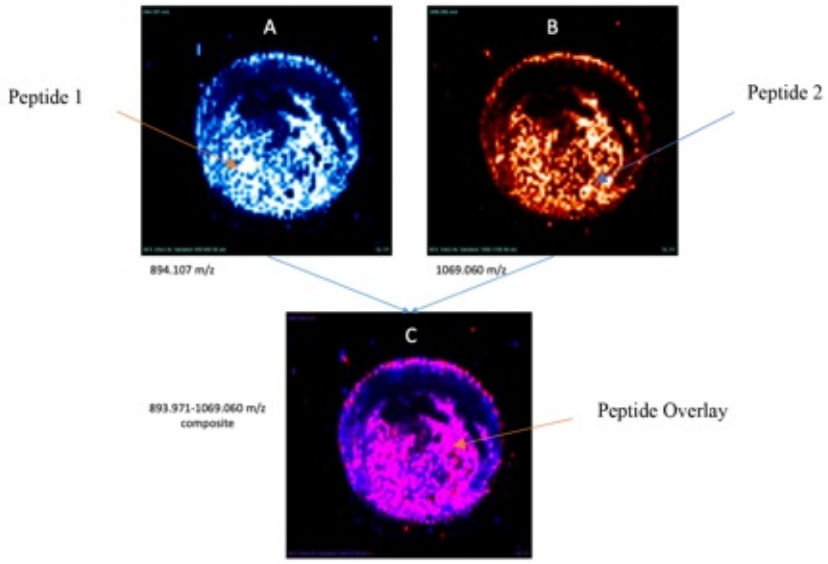
Ramiz Haddad '20, Elizabeth Ferraro '20, Ashley Halmans '20

Faculty Mentor: Jillian Smith-Carpenter

Abstract:
Several peptides associated with neurodegenerative diseases have been shown to self-assemble into supramolecular structures. While the design rules to assemble these structure are well-documented, very little research to date has focused on the surface reactivity of these peptide-based structures. We report on the characterization of a thiol-thioester exchange reaction occurring on the supramolecular surface as a function of pH and thiol concentration. Additionally, the use of a novel method of MALDI mass spectrometry imaging (MSI) to observe peptide interactions in the complex assembly mixture is also reported. These techniques serve as a model system for the development of post-assembly modifications for a wide variety of potential applications.

Technical Abstract:
An N-terminal dithioester modified peptide, that is derived from the nucleating core of the Aβ peptide associated with Alzheimer's disease, was synthetically prepared through solid phase peptide synthesis and purified by high-performance liquid chromatography (HPLC). The resulting cross-β amyloid fiber structures were confirmed by Fourier-transform infrared spectroscopy (FT-IR), matrix assisted laser desorption ionization-time of flight mass spectrometry (MALDI-TOF MS) and transmission electron microscopy (TEM) imaging. The surface reactivity of the supramolecular structure was characterized through a transthioesterification reaction between the dithioester modified peptide in an assembled nanofiber and exogenous thiol containing small molecules. Multiple experiments of varying pH and thiol concentrations were conducted to characterize the thiol-thioester exchange reaction on the amyloid fibers. MALDI mass spectrometry was used to characterize reaction kinetics by following the change in m/z peak intensity ratios of thioester to thiol masses. HPLC analysis was also utilized to validate the data observed with mass spectrometry. The results of these experiments show that the accessible dithioester groups completely react in

less than one hour at pH 8 with 50 eq. of the exogenous thiol. Additionally, the use of a novel method of MALDI mass spectrometry imaging (MSI) to observe peptide interactions in the complex assembly mixture is also reported. A 2D spatial representation of the assemblies was rendered using BioMap and ImageJ software. These techniques serve as a model system for the development of post-assembly modifications for a wide variety of potential applications and will allow for further exploration of dynamic disulfide chemistry on the supramolecular peptide fibers.



Metalloproteinase Cleavage of Amyloid Peptides

Booth #25

Kierstin Jones '21, Jonathan Bell '19

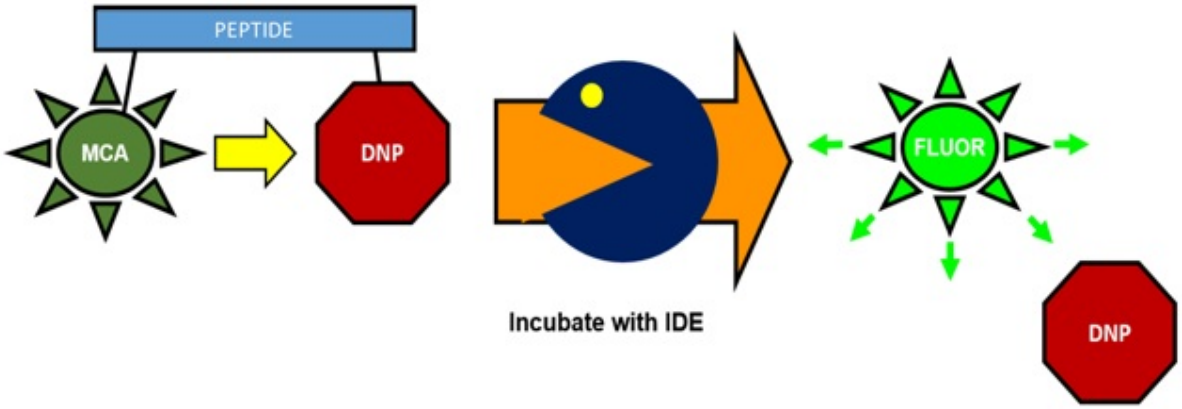
Faculty Mentor: Jillian Smith-Carpenter

Supported by Lawrence Program

Abstract:
Plaque-forming self-assembling peptides are an important component in the study of neurodegenerative diseases, such as Alzheimer's disease and Parkinson's disease. Once the plaques are formed, it can be difficult to disassemble these structures chemically or enzymatically. It is of great interest to researchers to better understand how enzymes, including the metalloprotease MMP-9, cleave short self-assembling peptides based on the Aβ amyloid sequence. Kinetic assays and proteolytic cleavage site mapping using MALDI-TOF mass spectrometry were performed to analyze proteolysis of several peptide substrates. The information gained about how MMP-9 and other metalloproteases cleave beta-strand forming peptides can be beneficial for potential applications towards other large peptide structures that cannot easily be cleaved through traditional chemical means.

Technical Abstract:
Peptides that are known to form β strand structures are substrates for many metalloproteinase enzymes. Insulin-degrading enzyme (IDE) is a Zn2+-metalloproteinase that degrades proteins such as insulin and amyloid beta. Our lab has previously reported on the functional requirements of the IDE active site residues that affect substrate binding, specificity and proteolysis using a mutational analysis of bacterially expressed human IDE and kinetic studies using fluorogenic resonance energy transfer (FRET) derivatives of human insulin and Aβ peptides. MMP-9, a matrix metalloproteinase, is an enzyme produced in humans that is typically responsible for the cleavage of extracellular matrix, playing a role in developmental growth characteristics. Interestingly, it has been previously shown that MMP-9 can cleave self-assembling peptide substrates, including peptides in higher order oligomer structures, unlike IDE. In this report, we provide preliminary results on MMP-9's potential to cleave supramolecular structures composed of self-assembling peptides. An Aβ amyloid derived peptide substrate, KLVFFAQ,

and a control MMP-9 peptide substrate were used in these initial studies on the enzymatic activity and mapping of the proteolytic cleavage products.



Syntheses and Characterization of Cobalt(II) Model Complexes for Liver Alcohol Dehydrogenase

Booth #26

Emilse Almanza '19, Kendra Landy '19, Rami Kharbouch '19, Samantha Zygmont '20

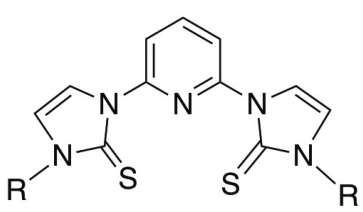
Faculty Mentor: John Miecznikowski

Supported by Hardiman Scholars, Lawrence Program

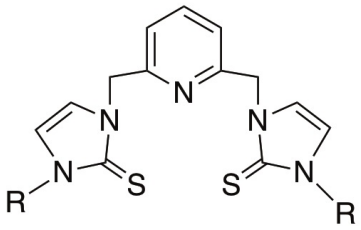
Abstract:
In the Miecznikowski laboratory, we have worked to synthesize several chemical model complexes for the active site of the enzyme, liver alcohol dehydrogenase. Liver alcohol dehydrogenase, which is found in many organisms, facilitate the breakdown of alcohol in the body. These chemical model complexes have cobalt(II) as their metal center and were developed from two unique ligand types. A ligand can be described as the backbone coordinated to the metal. In addition, the cobalt(II) metal center is coordinated to one nitrogen and two sulfurs, just as in the enzyme. Several experimental methods were used to characterize our model complexes. The synthetic route that was followed to prepare the complexes will be presented. Results from the characterization of the complexes will be presented as well.

Technical Abstract:
Recently, we have developed and synthesized a series of tridentate pincer ligands, each possessing two sulfur- and one nitrogen-donor functionalities (SNS), based on bis-imidazole or bis-triazole precursors. The tridentate SNS ligands incorporate thione-substituted imidazole or triazole functionalities. We have prepared somewhat rigid ligand systems (1a-c) through the use of 2,6-dibromopyridine as a ligand precursor. In addition, we have prepared more flexible ligand systems by employing the starting material 2,6-(dibromomethyl)pyridine to introduce a methylene linker into the pincer ligand (2a-c, 3a-c). We have metallated these ligand precursors to form zinc(II) complexes containing these tridentate ligands. Recently, we have prepared cobalt(II) complexes that contain these ligand precursors. The cobalt(II) complexes are cobalt model complexes for liver alcohol

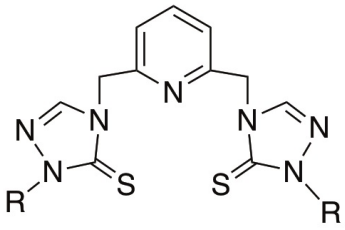
dehydrogenase. A detailed description of the syntheses, and characterization (ESI-Mass Spectrometry, EPR Spectroscopy, UV-Visible, and single crystal structures) of the SNS cobalt(II) model complexes and ligand precursors will be presented.



1a-c



2a-c



3a-c

R = **a** = *i*Pr; **b** = neopentyl; **c** = *N*-butyl

Analysis of Commercial CBD Products

Booth #27

Sally-Ann DeLucia '19, Justin Gilbertson '19

Faculty Mentor: Matthew Kubasik

Abstract:
Cannabidiol, also known as CBD, is a component found in cannabis that is widely used as treatment for pain and anxiety. Unlike the cannabis plant and other cannabis components, CBD is completely legal in the United State and has grown in popularity due to its wide variety of medicinal uses. With the growing popularity of these products has come a growing curiosity into their composition. We are pursuing investigations into medicinal CBD products to determine the amount of CBD which can be compared to the reported amounts on the packaging. We will also determine if any other components of cannabis can be found in the products. CBD drops, capsules, and soft gels will be analyzed. We are using Gas Chromatography- Mass Spectrometry to identify the components and to quantify them.

Technical Abstract:
Cannabidiol, also known as CBD, is a component found in cannabis that is widely used as treatment for pain and anxiety. Unlike the cannabis plant and other cannabinoids, CBD is completely legal in the United States and has grown in popularity due to its wide variety of medicinal uses. With the growing popularity of these products has come a growing curiosity into their composition. We are pursuing investigations into medicinal CBD products to quantify the amounts of CBD to compare to the reported amounts, as well as to determine whether or not any other cannabinoids are present in the products. CBD drops, capsules, and soft gels will be analyzed. We are using Gas Chromatography- Mass Spectrometry to identify the components and to quantify them.

Chiral Biasing of Enantiomeric Helical Peptides Composed of Alpha-Aminoisobutryic Acid Residues

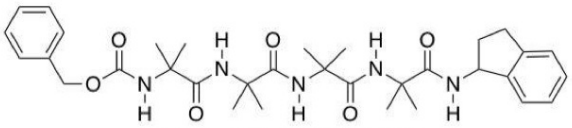
Booth #28

Sally-Ann DeLucia '19, Mark Korst '21, Karim Alveranga '22, Etienne Chollet '21

Faculty Mentor: Matthew Kubasik

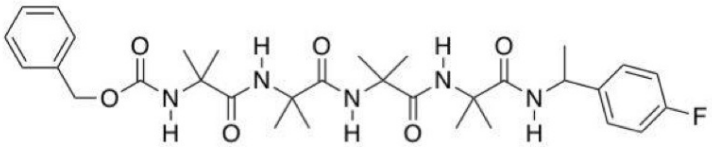
Abstract:
Oligomers of the achiral amino acid α-aminoisobutyric acid are known to form 3-10 helical secondary structures in solution and the solid state. Oligomers composed of only this achiral amino acid form an equal mixture of left- and right-handed helixes. We are pursuing investigations of chirally-biasing end groups. The addition of a racemic (equal mixture) C-end group allows for the possibility of two diastereomeric configurations, along with their mirror images. We are using 1H NMR and X-ray diffraction to identify the preferred configurations.

Technical Abstract:
Oligomers of the achiral amino acid α-aminoisobutyric acid are known to form 3-10 helical secondary structures in solution and the solid state. Homooligomers of this achiral amino acid form racemic mixtures of left- and right-handed helixes. We are pursuing investigations of chirally-biasing terminal groups. The addition of a racemic C-terminal group allows for the possibility of two diastereomeric configurations, along with their mirror images. We are using 1H NMR and X-ray diffraction to identify the preferred configurations.



Chemical Formula: $C_{33}H_{45}N_5O_6$
Exact Mass: 607.34
Molecular Weight: 607.75
m/z: 607.34 (100.0%), 608.34 (35.7%), 609.34 (3.5%), 609.34 (2.7%), 608.33 (1.8%), 609.34 (1.2%)
Elemental Analysis: C, 65.22; H, 7.46; N, 11.52; O, 15.79

Z-Aib$_4$-Inanamide



Chemical Formula: $C_{32}H_{44}FN_5O_6$
Exact Mass: 613.33
Molecular Weight: 613.73
m/z: 613.33 (100.0%), 614.33 (34.6%), 615.33 (5.8%), 614.32 (1.8%), 615.33 (1.2%)
Elemental Analysis: C, 62.63; H, 7.23; F, 3.10; N, 11.41; O, 15.64

Z-Aib$_4$-AMBA-F

Assessing JUUL vs Generic Vape Products to Determine Concentrations of Potential Toxins Present

Booth #29

Catherine Montalto '19, Justin Mercado '20, Oreoluwa Cherebin '19

Faculty Mentor: Matthew Kubasik

Abstract:
Currently in the media, there is much talk and controversy regarding vape and e-cigarette products as well as what exactly is present within the liquid they contain. In order to gain concrete evidence into this matter, three flavors of JUUL brand vape pods containing vape juice were tested as well as the same three flavors of a generic brand, Switch. The three flavors include both mango and mint, JUUL's bestsellers, as well as tobacco, which is sold to mirror the taste of cigarettes for those looking for a real alternative to conventional cigarettes. Both the JUUL vape juice and the generic pods were tested for concentrations of nicotine, benzene, benzoic acid, and formaldehyde to determine how much of each was present, if at all. It is known that the vape liquid does contain nicotine; however, there is minimal evidence regarding the presence of the other hazardous substances.

Technical Abstract:
We used a gas chromatography-mass spectrometer (GC-MS) to determine the concentrations of potentially harmful toxins such as nicotine, benzene, benzoic acid, and formaldehyde within e-cigarettes. Multiple methods of analysis will be used to determine the composition of liquid contained in the pods. Standard solutions of each analyte were used to make a calibration curve for the quantification of the analytes in the unknown samples. The liquid inside the JUUL pod will be sampled by opening it and diluting it in methanol. Testing will also be carried out using a simulated puff of the JUUL; this allows for testing of the aerosol that is inhaled by users of this product. The aerosol will be analyzed using solid phase microextraction (SPME) that will be collected into a 60 mL plastic syringe. This allows for the determination of the potentially hazardous materials contained within JUUL pods and similar products. The result of this experiment will show the potentially hazardous compounds of the JUUL pods and the generic brands.

Analysis of Urban Community Gardens in Bridgeport, Connecticut

Booth #30

Julia Nojeim '19

Faculty Mentor: Dina Franceschi

Supported by Vincent Rosivach Collaborative Research Fund

Abstract:
Urban Agriculture (UA) is a method of sustainable farming in a metropolitan area that supplies crops to area residents. It encourages city inhabitants to utilize local resources to grow their own produce and supplement their diets with foods they may not otherwise have access to. Urban Agriculture provides many benefits to gardeners who take advantage of it. For this project, Fairfield University, in collaboration with the Center for Faith and Public Life's research commitment, is partnering with the Green Village Initiative (www.gogvi.org) of Bridgeport to realize the benefits of metropolitan experiences. The Green Village Initiative (GVI) strives to improve Bridgeport's economy, environment, and community through urban gardening. The organization provides opportunities for Bridgeport residents to expand their education of nutrition and pursuit of healthy eating. This study explores the benefits urban community gardeners get from growing crops in Bridgeport. Its timeframe spanned summer to fall of 2018. Benefits we studied include increased exercise levels, increased produce consumption, increased money saved, and decreased disease rates. This project was made possible by funding from the Faculty Student Collaborative Research Fund and benefactor Robert Lynch and support from the Fairfield University Center for Faith and Public Life.

Technical Abstract:
From the 1900s on, Urban Agriculture (UA) has granted city inhabitants the opportunity to utilize local resources to grow their own produce and supplement their diets with foods they may not otherwise have access to. Bridgeport, Connecticut, has recently begun embracing urban community gardening. The Green Village Initiative (GVI) is a nonprofit organization that has established 13 community gardens throughout Bridgeport. Fairfield University, in collaboration with the Center for Faith and Public Life's

research commitment, partnered with GVI to realize and promote the benefits of metropolitan experiences from its investment in UA. Urban Agriculture provides many economic, social, and health benefits to gardeners who take advantage of it. Urban gardens supply both use value and non-use value to the neighborhoods they are in. Community gardens generate income for gardeners, produce fresh harvests at a lower cost to consumers, and lower transportation costs to markets. Gardeners experience reduced risk of disease due to increased produce intake and increased exercise levels. Gardens are lauded as safe spaces of relaxation, empowerment, and gathering. In addition to community and individual benefits, UA also improves environmental health. Climate changes are stabilized locally as urban green space controls humidity, rainfall, temperature, and soil erosion. Over the summer and fall of 2018, photographic data of crop growth was taken in nine separate gardens to assess plant progress. In September, eight individual gardeners volunteered to track their weekly harvest and labor data to determine money saved and disease rates reduced via gardening. Qualitative benefit analysis was gained through interviews with the volunteers. The study is relaunched to collect more data throughout the spring and summer of 2019. Even before its necessary continuation, the study's findings of community garden benefits corresponded with and expanded upon those outlined here.

The Isolated Journey of Germain

Booth #31

Haley Blasi '19

Faculty Mentor: Janet Striuli

Supported by Corrigan Scholars Fund

Abstract:
While *les femmes savants* of the 18th century were objects of ridicule, some women were able to build a successful platform for scientific work. This was not the case for Germain, whom we compare with Agnesi in terms of mathematical production and professional career, using the figures of Ardinghelli and Du Chatelet as connecting points. We found that the literature has not academically addressed Germain's career and that in fact few historical sources are available. Through this research project we hope to formulate an historical publication which addresses both the mathematical and social reasons for Germain's lack of success compared to other female scientists of the same time period, while raising questions for the community of researchers.

Technical Abstract:
In hopes of encompassing both mathematics and women's history, our research examines the efforts of Sophie Germain to establish herself as a female mathematician in the eighteenth century. In order to do so, her life and achievement will be compared to that of other, more successful, female scientists and mathematicians during the same time period. Closely comparing Sophie Germain to Maria Agnesi, an eighteenth century Italian mathematician, we will analyze the different ways the two female scientists navigated social conventions, historical events, and personal situations to pursue their careers. Germain has been remembered for her work in applied mathematics and number theory, in this last field for her effort to prove the Last Fermat's Theorem. Her more modern approach to finding a solution to Fermat's problem set her apart from other mathematicians of her time even though she did not receive the recognition. Because of Germain's inability to find an appropriate outlet for her work, her career was seemingly less successful than her female counterparts.

Design and Fabrication of a Band-pass Filter

Booth #32

Clarensky Benoit '19

Faculty Mentor: Uma Balaji

Supported by Corrigan Scholars Fund

Abstract:
This project focuses on the design of a band-pass filter. A bandpass filter is used to filter out unwanted frequencies from a signal within a certain bandwidth depending on the application. Different steps were taken for the completion of this project. A literature review was conducted and the information gathered was then used to simulate the circuit models found during the research. After simulating the research, a physical prototype was done. After confirming the physical circuit's response to closely follow the simulated circuit, a printed circuit board was made and the electrical components were soldered onto it.

Technical Abstract:
A band-pass filter is an electrical circuit that filters out unwanted frequencies from a certain signal within a specific bandwidth depending on the application. Band-pass filters are used in many electronics and widely utilized in telecommunications because of the finite frequencies required by communication for voice and videos. A literature survey was conducted on the design of filters for a specific bandwidth and insertion loss. A suitable design option was chosen for the given bandwidth of 1KHz and the center frequency of 10KHz. Appropriate equations for the design of a second order filter with Multiple feedback in operational amplifiers was used. A MATLAB code was written to determine the values of parts such as resistances and capacitance. The IC 741 op-amp has been used in the filter. Multisim simulation tool was to simulate the designed circuit. Upon finding acceptable response from our simulation, we proceeded to use a general-purpose breadboard to physically test the circuit. Finally, we directed our focus to the design of a printed circuit board (PCB). Our simulated results: we obtained a center frequency of 8.845 kHz. We realized that a tuning of part values was required to obtain the desired specifications. However, we built our physical circuit on a breadboard, we obtained a center frequency of 8 kHz with a 1

kHz bandwidth. We worked on designing the printed circuit board (PCB) using Eagle software. A finished PCB was ordered and the parts have been soldered on the board. The process of design to manufacturing has been understood through this project. We conclude that tuning of filter is essential to achieve the desired specifications.

Distributed JavaCat

Booth #33

Davis Doherty '19, Peter Coffman '19, John Wiley '19, Benicat Benoit '19

Faculty Mentor: Amalia Rusu

Abstract:
The Federal Aviation Administration (FAA) develops systems to support air traffic controllers. Effective testing of these systems requires data containing conflicts between flights, which is rarely found in real flight data. To generate usable data, the FAA uses an algorithm inspired by evolution to create acceptable solutions. Our system is based on a multi-computer architecture where one is responsible for controlling the algorithm, while all others are responsible for the actual computations. All the computers' data is regularly shared and allows for even work distribution. In the previous system, all computers were responsible for only their solutions. Our system coordinates solutions on the controlling computer which evenly distributes tasks to others; this makes it possible to select the optimal number of solution-generators and computers independently, without one affecting the other. We also worked to improve the performance of the system on a single computer, which resulted in large runtime improvements. Our system was tested with serious failures, including a 50% loss of computers, and stayed operational. Initial results show it can operate on more computers than needed, improving performance whereas before adding computers did not improve performance. Our system configured with few computers uses similar computational resources with improved performance.

Technical Abstract:
An important area of research for the Federal Aviation Administration (FAA) is the development of automated systems to support air traffic controllers. Effective testing of these systems requires test data containing conflicts between flights, which are rarely found in actual flight data. The FAA previously developed a system that time-shifts recorded air traffic scenarios using an island model genetic algorithm (GA) to introduce the conflicts, which was brittle and inflexible. Our new system is based on a controller/processor parallel GA. One controller node is responsible for generating candidate solutions by distributing them to a pool of processor nodes for evaluation through the use of an island model. Using this model, the

individuals will, at regular intervals, “migrate” from one island to another, allowing the sharing of information. In the previous system, each island resided on a dedicated node where only their individuals could be evaluated. Our system moves all islands to one central node, which distributes evaluation tasks evenly; this makes it possible to select the optimal number of islands and processor nodes independently, without infrastructure limitations restricting the GA’s metaparameters. We also compared the distributed solution to a highly-optimized single-node solution, which uses memorization to improve the performance of the GA’s evaluation. Our system was tested in scenarios with serious failures, including the loss of 50% of the processor nodes, and remained operational. Preliminary results show our system scales to clusters substantially larger than needed, improving on initial performance where the requirement that each node have its own island led to less benefit in reducing runtime. Similarly, when our system is configured on a small cluster with many workers, the runtime is dramatically improved using similar computational resources.

Reticle Handler Barcode Scanning Camera Simulation Package

Booth #34

Brendan Dunne '19, Benjamin Nelligan '19, Evan Gorman '19, Matthew Williges '19, Brendan Dunne '19

Faculty Mentor: Amalia Rusu

Abstract:
The semiconductor lithography process is critical to the production of semiconductor chips. Identification of parts is achieved using two dimensional barcodes and barcode scanning cameras. The precision required means the software drivers embedded in this equipment must be robust and thoroughly tested. There is potential for improvement in driver test simulation, and the development of drivers allowed by decoupling software testing from hardware decreases development time, reduces errors, and ultimately saves money. We will create a simulator framework with automated testing capabilities. The system will be written in Python and designed to be flexible and easily extendable to simulate other hardware, and initially the system will support simulation of TCP/IP-based scanner cameras only. Drivers will run their “default” mode, agnostic of test status, and the test parameters will be configured externally. Built-in software tests will be included to verify the software, and each simulator module will be verified by comparing results to the actual hardware. Our team of computer and software engineering undergraduates is in the process of developing the system using agile software development methods. We are working closely with stakeholders at ASML Holding to iteratively develop the software to their specifications.

Precision Surface Metrology Applicator

Booth #35

Sarah Dignam '19, Muhammad Bangi '19, John Norton '19, Christopher Connors '19

Faculty Mentor: Andrew Judge

Abstract:
The goal of this project is to design a device that will apply a Particle Measurement Card (PMC) to a surface in order to measure surface cleanliness in cleanrooms. These PMC's are currently applied by hand, making the measurement subject to variations in operator force, angle, and other factors. This device will apply a consistent and precise force to the PMC in order to improve the particle measurement process. Our device aims to eliminate the inconsistencies in operator use by applying the PMC at a precise force and angle. With this data, ASML will apply its surface cleaning process until the surface particle count is at their desired level. By improving the particle measurement process, the entire lithography process will improve.

Technical Abstract:
The goal of this project is to design a device that will apply a Particle Measurement Card (PMC) to a surface in order to measure surface cleanliness in cleanrooms. When the PMC is applied it will collect the particles on the surface that it makes contact with. The purpose of the device is to apply an accurate force onto the PMC consistently. Any particles that are on the surface may interfere with the lithography process or get on the reticle which would then be copied onto each wafer printed, potentially ruining an entire batch. The most common method of detecting particles is applying a PMC by hand to surface. It is then run through a machine that detects the particles by measuring the reflection of light beams. The current method of applying PMC's relies on employees to follow procedure which is not a reliable method. Having a device that can apply the PMC will make results more accurate and consistent. The critical purpose of our project is assisting in resulting in component cleanliness in lithography processes. Improvement in the lithographic process is so important because as lithography improves, so does the speed and capability of the microchips that are created from the process. A simplified lithography process includes a wafer, a reticle and a optical system. Lithography processes and devices have become so precise

that a particle can create malfunctions or errors in the process. This project will produce a device that will measure particles on a surface more efficiently. As of today, we have a working prototype that can successfully apply the PMC to a surface. Our main research is to focus on developing an accurate force from our device onto the PMC.

Manual Reticle Handler

Booth #36

Tyler Moragas '19, Mckenzie Armington '19, Kaitlyn Nelson '19, Joshua Dougherty '19, Tyler Moragas '19

Faculty Mentor: Andrew Judge

Abstract:
Reticles contain the master patterns of microchips made of glass-like material roughly the size of a CD case. Though the manual movement of these pieces are limited there are still instances when reticles must be moved by hand. Although a device currently exists to aid in the manually handled processes, it is not ideal and can be awkward to use. It is vital that the new device allow for the safe movement of the reticle as each one can cost upwards of six figures due to the alignment grid lines being patterned with a highly expensive electron beam process. Advances in this technology are important because with that improvement comes advances in the microchips the process produces, including shrinking feature sizes. This project has been in process since the beginning of the Fall 2018 semester and has included analyzing multiple design ideas for each component of the device. This included material and mathematical tests and calculations. The final design combines two tools that were used previously, combining picking up the reticle and rotating it in one simple device. The final goal of this project is to create a working prototype of the handling device that works within the machine environment without damaging or scarring the reticle itself. By doing this, the process of manual reticle movement at ASML can be simplified and made more secure.

Technical Abstract:
Reticles are key components of photolithography and therefore the semiconductor industry. Reticles are used to project an image from the reticle itself onto wafers, which are then used to make microchips in electronics. Reticles are extremely fragile and though the movement of these pieces are as automated as possible, there are still instances when reticles must be moved manually. Although a device currently exists to aid in the manually handled processes, it is not ideal and can be awkward to use. It is vital that the new device allow for the safe movement of the reticle as each one can cost upwards of six figures due to the alignment grid lines being patterned with a

highly expensive electron beam process. Advances in lithography technology are important because with that improvement comes advances in the microchips the process produces, including shrinking feature sizes. This project has been in process since the beginning of the Fall 2018 semester and has included analyzing multiple design ideas for each component of the device. This included Finite Element Analysis, coefficient of friction tests, and free body diagrams of different designs. The final design was chosen based on feasibility of the design as well as security of the reticle. The overall goal of this project is to design and produce a working prototype of a manual reticle handling device that works within the machine environment without damaging or scarring the reticle itself. The redesigned device combines the two devices that are currently used to manually move the reticle, combining the pick up and rotation mechanisms. The design involves a flexure loaded grippers and a limited rotation mechanism installed in the ergonomic handle. With this design the process of manual reticle movement at ASML can be simplified and made much less intensive.

Pixel-level Image Fusion Algorithms for IR/EO MultiSensor System

Booth #37

Michael Foster '19, Russel Moore '19, Clarensky Benoit '19, Robert Munoz '19

Faculty Mentor: Djedjiga Belfadel

Abstract:
This project explores the capabilities of target tracking algorithms and how efficiently they are able to track a ballistic missile in flight.

Technical Abstract:
Target tracking through the use of satellite sensors allows for reconnaissance of ballistic missiles in real time in order to determine the flight path and the potential destination of a target. This task is performed through the utilization of multiple sensors along with a tracking algorithm that performs iteratively, updating the output with new data gained from the sensors. The Maximum Likelihood Estimate (MLE) method has been proven to be efficient and effective in estimating parameters in a system. Our team has been researching the state-of-the-art hardware and algorithms that are currently being used for this purpose to be added to a comprehensive paper. Hardware includes anything from sensors, target systems, lens, Integrated Circuit (IC) boards, military based cameras, and even regular name brand cameras. By researching the hardware, the team is familiarizing itself with what will work best for algorithm development. It is important to recognize technology used for similar purposes that exist today. We currently have an MLE algorithm being written in MATLAB that will be used to test input data. The input data will be generated from the Systems Tool Kit (STK) program which allows the user to generate a scenario that includes the missile's launch and flight path as well as the number of satellites, their orbital path, and the satellite positions. Currently the algorithm in MATLAB is nearing completion, STK scenarios have been generated in order to test the algorithm's capabilities, and a comprehensive paper has been created. The outcome of the algorithm is to track a simulated target using data from multiple sensor platforms in 3D. The results, whether successful or unsuccessful, will go towards a global effort to expand this field of research.

Optical Speed Gun

Booth #38

Ryan Dunkin '19, Nick Delfico '19, Mike Amoroso '19, Muhammad Mumbasit '19, Chris Quinn '19

Faculty Mentor: Jeffrey Denenberg

Abstract:
There are multiple devices out there that are used by the police to check the speed of a vehicle to ensure people are following the speed limit and not driving over the speed limit. However, there are side effects to each of the methods used by the police to determine the speed of a vehicle. For example, using a radar gun does not only harm the policeman health because an immense amount of radiation is passed through the microwaves, but also becomes inaccurate in many conditions, making it harder for police to determine the correct speed of the moving vehicle. However, we are working on creating an optical speed gun that will use stereoscopic vision to determine the speed of the moving vehicle, which we believe will make it easier for police enforcement to detect accurate speed of the moving vehicle and will eliminate the risk of health problems. As of now, we have built the prototype and put it under certain tests to determine how the prototype responds in certain conditions such as how the sensors of the camera respond in bright sunlight or in rain, etc., and we are working on a code that will be used to determine the speed of the moving vehicle by taking two images at 45 degree angles; the first when the vehicle becomes visible and the second when the vehicle passes the camera. Then, the code will do the calculations and present us with the results.

Automated Inventory Robot for Small Companies

Booth #39

Michael Lynders '19, Daryl Vinluan '19, Matthew Pauwels '19, Bryan Sepkowski '19

Faculty Mentor: Jeffrey Denenberg

Supported by Hardiman Scholars

Abstract:
Many online retail warehouses, such as Amazon, employ an automated inventory system which keeps track of the location of every item in inventory. When an order is placed, a mobile robotics platform moves among the shelves, retrieving entire shelves of inventory and transport them to human pickers who remove the needed item and add it to an order. While this system works extremely well on a large scale of almost 100,000 robots in service around the world, this does not work well for smaller companies with limited resources and space. Our project goal is to develop an automated inventory system that is easily adaptable to an existing inventory system. Our approach is to create a rail-bound carriage that can be adapted to common modular shelving. The carriage would be able to move horizontally down an aisle, and move vertically up the shelving. A grasping mechanism would be able to manipulate boxes of product from the shelves so that they could be moved to a receiving station when ready for shipping. Currently, we have developed a Python script for keeping track of the boxes in inventory. We created a small-scale model of the horizontal actuator and developed motion control code to move it in a controlled manner. Trapezoidal motion profiling was implemented first, and then s-curve trajectory planning was developed to control the derivative of acceleration which could induce vibration. A full-scale model of the manipulator and horizontal rail cart are currently being developed.

Rate Dependent Materials Testing

Booth #40

Jeremy Morton '19, Claire Ismerlian '19, Raphael Longobardi '19, Liam Jago '19

Faculty Mentor: Joseph McFadden

Abstract:
When testing the strength of a given material, the rate at which forces are applied changes the behavior of the test specimen. The Instron tensile testing machine is used to either stretch or crush samples until they break, and record data about how much they deform when force is applied. However, this machine is not capable of applying load quickly, which is important for testing the behavior of materials undergoing sudden loads like impacts. Our project is to design an add-on for the machine which will allow it to apply forces much more quickly, while also being removable to allow the machine to be operated normally.

Technical Abstract:
As a group, we are working with Fairfield University's Instron tensile testing machine to assemble an auxiliary apparatus that will operate at a desired rate anywhere between 80mm/s to 500mm/s, depending on the application, in both tension and compression. Presently, an Instron is only capable of operating at 8.3 mm/s. The increase in loading rate is important for determining the behavior of materials undergoing impact loading. Our idea is to use custom designed hydraulic piston to accomplish our goal. We are currently using samples of a commonly used material for electronics casings for experiments and testing. Approach: We have constructed a three-dimensional model of a hydraulic piston which will be able to handle loading in both tension and compression. This would allow for the least amount of modification made to the Instron, so that the Instron can still be used under its normal loading conditions. Results as of today: Assuming a successful completion, along with full functionality of our apparatus, we will be able to achieve a desired rate of loading in both tension and compression. This rate is to be anywhere between 80 mm/s to 500 mm/s, depending on its application. The accomplishment of this task will allow materials to be tested under more realistic scenarios, which allows companies to produce and provide accurate information about their products.

Redesign of a Charm Extractor for an Automated Jewelry Unpacking System

Booth #41

Raymond Sanchez '19, Bradley Kimball '19, Madison Roberts '19, Lillian Vincens '19

Faculty Mentor: Michael Zabinski

Supported by Hardiman Scholars

Abstract:
The objective of this project is to create an automated system that will fully unpack small, individually packed objects. This system will be able to work on its own without the need for supervision in order to free up labor resources for other duties. The approach taken to complete this task is based on three steps connected by a conveyor belt to keep the system flowing. The first part is a feeding system that controls the feed rate into the rest of the system and the orientation of the packaged object. The second part uses a CO2 laser to safely and efficiently open the packaging. Finally, the opened package will enter a tumbling system to separate the object from the packaging. With tuning for efficiency, this system will be able to fully unpack the charms at a speed that will match or exceed the existing method. The only interaction that this system will need is an employee to load the system with up to 100 bags and collect the objects after everything has been processed. Due to the lack of needed human assistance with this system, the resources previously used on this task can now be reallocated for other tasks. Therefor this system saves the company time and money.

Lend a Hand: Light Weight, Low Noise Prosthetic Hand

Booth #42

Katherine Unfried '19, Nicholas Herringshaw '19, Robert O'Donovan '19, Moses Olimpio '19

Faculty Mentor: Ruvinda Gunawardana

Supported by Hardiman Scholars

Abstract:
Prosthetics have existed for many thousands of years and serve to improve the users' quality of living by replacing a missing appendage. Prosthetic capabilities have advanced right along with modern medical technology; unfortunately, more advanced movement capability and user-feedback capability yields a prosthetic that is heavier, louder, and more expensive. This project aims to develop a lightweight, low-noise hand controlled with the same nerve impulses that control human hands. To complete this task, the project was broken down into different segments: mechanical hand design, electrical design, software, artificial muscle design, and biocompatibility. Each section was directed by an engineering student studying mechanical engineering, electrical engineering, software engineering, and bio engineering, respectively. The end result of the project is an artificial hand that is small, light, quiet, and low cost enough to not be cumbersome, and can improve the user's quality of life. This project looks hopefully into the future to a world where engineering changes the lives of amputees by providing them with what they need to be entirely self-sufficient.

Technical Abstract:
In recent years, prosthetics have become increasingly advanced. Unfortunately, the more advanced movement capabilities and user-feedback a prosthetic possesses, the more cumbersome it becomes. Myoelectric prosthetic hands with a natural range of motion are heavy, loud, hot, and expensive. This project challenged the team to overcome these issues to design a lightweight, low noise, myoelectric-controlled prosthetic hand. The team approached this project by dividing the problem, a functioning prosthetic hand, into different components that aligned with each individual's skill sets, and sharing the responsibility of project leadership while working

together to produce a single product. It was of paramount importance that the electrical circuit work in conjunction with the microprocessor to take in myoelectric signals and output instruction to the actuators. Similarly, it was necessary that the actuators selected be compatible with the microprocessor, and also with the physical hand interface. This project involved significant research as well as trial and error. The final design for this semester is a mechanical hand made up of a two-part silicone hand, with an internal bone structure fabricated from 0.125” ID copper tubing. The socket is a heat-molded polypropylene. This allows the socket to be fit to an individual user’s arm. Motion is controlled by linear actuators operating at less than 45 dB. An Arduino UNO running Python will serve as the microcontroller. From the beginning, this project aimed to develop a lightweight, low noise hand, controlled via myoelectric signals that could improve an individual’s quality of life. The team will deliver a prototype to this end in April. It should be recognized that this project is not complete, but there are, and will continue to be, significant opportunities for adjustment and improvement.

Pill Identification and Dose Verification

Booth #43

Leighton Waters '19, Danny Hage '19, Sam Harris '19, Joan Ruiz '19

Faculty Mentor: Ryan Munden

Abstract:
The purpose of the pill dispenser is to hold one's daily supply of pills, verify them, and dispense them. Once the user has entered the pills and selected when they are to be dispensed his/her job is done. The job of the pill dispenser is to then verify that the pill the user inserted in the machine is in fact the pill he/she is going to receive at a given time. The machine does this by taking a picture of the current pill that is ready for dispensing and comparing it to pictures of the pill the user has selected for dispensing. Once the pill is either verified or denied it is either dispensed or stored away as an incorrect pill.

Technical Abstract:
Once the user inserts pills into individual sections of the machine they will be held until it is time to dispense. Dispensing will be monitored and completed by a single Arduino controlling multiple motors. Once dispensed individually into the photo tray, a picture will be taken and sent to an Arduino where a machine learning neural network will compare the image with a database of pill images to determine if the pill is the correct pill for dispensing. If the pill is verified it will then trigger a motor to dump the pill toward the exit to be consumed by the user. If the pill is not verified it will be dumped into a reject box to be accessed later by the user and prompt the system to dispense another pill.

Computational and Experimental Development of an Inlet/Exhaust Manifold for a Cylindrical Chemical Reactor

Booth #44

Alyssa Martinez '19, Conor Goetz '19, Taylor Poosikian '19, Daniel Hagis '19

Faculty Mentor: Shahrok Etemad

Supported by Hardiman Scholars

Abstract:
The goal of this project was the development of an inlet and exhaust manifold geometry for a cylindrical chemical reactor that will reduce, either entirely or significantly, the carbon dioxide released into the atmosphere from flue emissions. Overall success is achieved from generating an appropriate design for the inlet and outlet areas of a cylindrical chemical reactor that will create uniform velocity and minimal pressure drop. In regards to health and emissions, reducing greenhouse gases in the environment will reduce the rate of global warming. The inlet / exhaust manifold receives the exhaust gas from the chemical reactor which is released into the atmosphere. There is a mesh within the cylindrical reactor that is coated with a nanosorbent that absorbs and captures carbon dioxide. It is imperative to have uniformity across the reactor to decrease waste and cost in the final design. An iterative approach using ANSYS Fluent simulation software is our analytical process to predict how an intake manifold will react under real conditions.

LogOX 3- in-1 Forestry Mulitool

Booth #45

Gabriella Borea '19, Gabriella D'Angleo '19, Jonathan Canniff '19, Gunnar Brewen '19

Faculty Mentor: Sriharsha Sundarram

Supported by Hardiman Scholars

Abstract:
LogOX is a 3-in-1 forestry multi-tool that encompasses three main tools that a logger/arborist may need when handling logs. The first is a cant hook which is used to rotate downed logs in order to facilitate safe cutting through of logs. The second is a log hauler which is used to quickly and efficiently pick up logs to transport from one place to another, such as up on a log splitter. And the third is a timberjack which is used to prop up the logs off the ground for easier cutting with a chain saw. The purpose of our project can be broken down into four main goals: Redesign product for improved efficiency and reduced weight (material change). Design new quick disconnect pin. Quantify the amount of energy saved using tool vs. not using tool. Cost analysis for savings based on efficiency of tool. From completing all of these goals, we will be able to present LogOX with some information and updates for their product to increase the efficiency and performance of the product.

Technical Abstract:
Log handlers center their work around their ability to effectively haul logs to their desired location. Completing these tasks manually can become tiresome, thus slowing down production and potentially causing back injury. The LogOX 3-in-1 forestry multi-tool combines a log hauler, cant hook and a timberjack, in order to make the job of the logger easier. Working in collaboration with LogOx, the goal of this project was to quantify the product ergonomics, as well as modify the design to reduce the weight and production cost. The product ergonomics study was performed by obtaining EKG data using BioPac instrumentation and the results have shown that utilizing the tool decreases the stress put on the loggers' backs by up to 50%. Additionally, engineering design and analysis tools SolidWorks and ANSYS were used to quantify the load carrying capability of the tool. Current work is focused on modifying the wall thickness of the tool, as well as to finding a lightweight

material alternative so as to reduce overall weight and cost. Lastly, a prototype for a more efficient and manageable disconnect pin has been created to minimize the time needed to switch between the different tools.

Stent for Less Invasive Circulatory Assist Device

Booth #46

Mahammad Camara '19, Andrew Altamirano '19, Christopher Costabile '19, Christine Cunniff '19

Faculty Mentor: Susan Freudzon

Abstract:
Heart failure affects nearly 5.7 million adults in the United States and has many treatments, most notably a heart transplant. Due to a shortage of donor hearts available for transplantation, the need for mechanical circulatory assist devices is significant. Traditionally, circulatory assist devices are large and require a connection to an external battery pack via a wire that passes through the skin. Our task is to design a mechanism to support the miniaturized pump that also provides connections to the heart and aorta. Our approach features a housing device that the pump screws into. This attachment will secure the pump inside the support and allow for future removal of the pump in case it needs repair or replacement. The inlet of the housing device will be twice the diameter of the outlet to allow for proper fluid flow through the pump. Medical grade biocompatible flexible tubing will be attached to either end of the housing device. This flexible tubing will have metal mesh surrounding the tubing to allow for flexibility and to provide structural support. This tubing and pump will serve as a conduit for blood flow from the left atrium to the aorta. This device will support the heart by assisting the flow of oxygen-rich blood through the aorta and to the rest of the body. Our project will enable a new approach to the implementation of circulatory assist devices.

Technical Abstract:
Heart failure affects nearly 5.7 million adults in the United States and has many treatments, most notably a heart transplant. Due to a shortage of donor hearts available for transplantation, the need for mechanical circulatory assist devices is significant. Traditionally, circulatory assist devices are large and require a connection to an external battery pack via a wire that passes through the skin. Bonde Innovations, our sponsor, has developed a smaller and less invasive ventricular assist device. Our task is to design a mechanism to support the miniaturized pump that also provides connections to the heart and aorta. Our approach features a housing device that the pump screws into. This attachment will secure the pump inside the support and allow for future

removal of the pump in case it needs repair or replacement. The inlet of the housing device will be twice the diameter of the outlet to allow for proper fluid flow through the pump. Medical grade biocompatible flexible tubing (either Dacron or Velour) will be attached to either end of the housing device. This flexible tubing will have metal mesh surrounding the tubing to allow for flexibility and to provide structural support. This tubing and pump will serve as a conduit for blood flow from the left atrium to the aorta. This device will support the heart by assisting the flow of oxygen-rich blood through the aorta and to the rest of the body. We plan to use ANSYS for testing to ensure that the tubing and mesh combination will remain open and not collapse under the suction of the pump and pressure from surrounding organs within the body. Our project will enable a new approach to the implementation of circulatory assist devices.

Multipurpose Solar Charging Station

Booth #47

Patrick Evans '19, Maxwell Malcy '19, Maverick Ruiz '19, Ryan Avery '19

Faculty Mentor: Uma Balaji

Supported by Hardiman Scholars

Abstract:
This project's goal is to use solar power, a renewable, free resource accessible worldwide, to recharge mobile devices leaving little to no carbon footprint. The chosen solar panel will be capable of charging two mobile devices, such as a cell phone or tablet. The project will be focused on efficiency in multiple aspects of the system design, such as solar tracking. Data from a research study on consumer habits of mobile devices will be consulted to better design the charger for practical consumer use. The end result will be a low cost charger, independent of the electrical grid, in a fixed location, built with the consumer's needs in mind.

Technical Abstract:
This project's goal is to use solar power, a renewable, free resource accessible worldwide, to recharge mobile devices leaving little to no carbon footprint. The chosen solar panel will be capable of charging two mobile devices that operate with 5V batteries. The charger will be able to provide varying amperage to charge mobile devices. This project will use Maximum Power Point Tracking (MPPT) algorithm as well as solar tracking technology to operate the solar panel at the highest achievable efficiency. We will be using a DC-DC converter to boost or lower the voltage output from the solar panel as required by the mobile devices. A microcontroller will be programmed to operate a stepper motor for solar tracking. A photoresistor will provide the required sensor feedback of the solar luminance to the microcontroller that will generate the signals to turn the panel to face in the direction of maximum efficiency. The microcontroller will also generate PWM (pulse width modulation) pulses for the DC-DC conversion. The MPPT algorithm running on the microcontroller will improve the DC-DC conversion efficiency. Data from a research study on consumer habits of mobile devices will be consulted to better design the charger for practical consumer use. The end result will be a low cost charger, independent of the electrical grid, in a fixed location, built

with the consumer’s needs in mind.

Proper Diameter of Edge-Colored Graphs

Booth #48

Jill Stifano '19

Faculty Mentor: Mark Demers

Supported by Hardiman Scholars

Abstract:
Graph theory is the mathematical study of relationships. In general, a mathematical graph consists of vertices (distinct points) and edges (segments connecting those points). Vertices can represent any discrete group, from cell towers to distribution warehouses. Edges represent relationships between the vertices; for example, communication signals or transportation networks. Mathematicians use colors as an arbitrary method of labeling vertices, edges, or both, in a graph. This research focuses on edge-colored graphs. The diameter of a graph is a measure of the minimum number of edges needed to travel on a path from one vertex to another, for any pair of vertices in a graph. We extend this notion by considering proper diameter, which allows only paths in which no two consecutive edges have the same color. The biggest result of this research is a full characterization of the structure of a graph that has the maximum proper diameter attainable, based on a certain number of connections between vertices. This work was supported by the National Science Foundation under Grant No. 1560222.

Lucas on the Loose: A Game in Haskell with a Graphical Interface

Booth #49

Lauren Kearney '19

Faculty Mentor: Chris Staecker

Abstract:
This project is a game called Lucas on the Loose with a graphical interface written in Haskell. The final version of the game is a continuation of a final project we completed for a functional programming class last semester. In that class, we learned to code using the language Haskell, which is a purely functional programming language. Because all computations in Haskell are modeled by evaluations of mathematical functions, user interactions must be implemented using a special functional design pattern called a monad. In an earlier text-based version of the game, we used the IO monad to handle these interactions, but to make graphical interfaces is more difficult. In order to make the game, we used Gtk2Hs, a Haskell library that creates graphical applications that use the Gtk widget set. With widgets like layout boxes, buttons, images, and more, we were able to create the game with a graphical interface. We used sequencing in the IO monad to build the interface when the game is started as well as to refresh the screen after each move. Key presses and mouse movements are handled using a special Events monad. By using these new functions and the Gtk2Hs library, we were able to create a more advanced version of our original game.

Technical Abstract:
This project is a game called Lucas on the Loose with a graphical interface written in Haskell. The final version of the game is a continuation of a final project we completed for a functional programming class last semester. In that class, we learned to code using the language Haskell, which is a purely functional programming language. Because all computations in Haskell are modeled by evaluations of mathematical functions, user interactions must be implemented using a special functional design pattern called a monad. In an earlier text-based version of the game, we used the IO monad to handle these interactions, but to make graphical interfaces is more difficult. In order to make the game, we used Gtk2Hs, a Haskell library that creates graphical applications that use the Gtk widget set. With widgets like layout boxes,

buttons, images, and more, we were able to create the game with a graphical interface. We used sequencing in the IO monad to build the interface when the game is started as well as to refresh the screen after each move. Key presses and mouse movements are handled using a special Events monad. By using these new functions and the Gtk2Hs library, we were able to create a more advanced version of our original game.

Detector Simulation and Data Quality at Jefferson Laboratory

Booth #50

Richard Capobianco '19

Faculty Mentor: Angela Biselli

Abstract: & Technical Abstract:
The internal structure of nucleons, which are protons and neutrons, is still vastly unknown. Many laboratories dedicated to the field of nuclear physics are still trying to get a better understanding of these particles with Jefferson Laboratory in Newport News, Virginia being one such laboratory. Their unique particle accelerator makes Jefferson Laboratory one of the leading facilities in the world studying how quarks, the fundamental components of most particles, are distributed within the nucleons. In my research, I undertook two preliminary tasks to help further the efforts of those working at Jefferson Laboratory towards reaching such a goal. First, I studied the optimal configuration for the upcoming experiment at Jefferson Laboratory to reduce the background noise coming from nuclear electrons which would inhibit the detector's ability to produce legible results. Secondly, I began examining the new data that was being generated by the most recent runs. I was tasked with aiding the other researchers by performing data quality tests for each run of the detector. Towards this ends, I have compiled relevant data tables displaying significant results from each run into a centralized location, making the results more accessible as well as providing an easier method of seeing how the results of the experiment vary between runs of the detector.

Determining the Energy Resolution of BGO Scintillator Crystals as a Detector for ProRad

Booth #51

Justin Dickovick '20

Faculty Mentor: Angela Biselli

Supported by Lawrence Program

Abstract:
At IPN Orsay, I worked under a physicist and a physics post-doc and tested inorganic Bismuth Germanate Oxide (BGO) crystals from two different manufacturers. The goal of the project was to determine how accurately these crystals can measure energy signatures from well-known energy spectra. With these results, the ProRad project decided on which manufacturer to order the crystals from. These crystals will be used in the detector for a low-energy particle accelerator that they are constructing.

Technical Abstract:
In an attempt to further understand the Proton Radius Puzzle, the ProRad experiment at IPN Orsay seeks to measure the electric form factor of the proton with a much higher precision than before. To do this, they must construct a detector capable of taking precise enough measurements. The purpose of this project was to test Bismuth Germanate Oxide (BGO) crystals from two different manufacturers to use as a scintillator detector. Additionally, two different light insulations for the crystals were tested. Using a 137Cs radioactive source, the energy deposit spectrum of the crystal was measured and used to determine the energy resolution of the crystals. Using this method, the energy resolution was measured at different points along the crystal to make sure that the resolution was independent of where the radiation hit the crystal, an important trait for them to have. The findings will provide ProRad with insight on the optimal crystal to build their detector with and will also provide an experimental setup to quality test the crystals that they order for the detector.

Contact Microscopy and Edge Processing/Anodization/Applications

Booth #52

Edward Wenzel '20

Faculty Mentor: David Winn

Abstract:
For the project I worked on last summer, I researched two different applications of physics. I did a lot of article reading and proposal writing for Dr. Winn here at Fairfield University. One part of our project was looking into lensless microscopy. The purpose of this was to write a design proposal for a microscope that could look into the human body with a wider field of view. This would allow for us to better determine and diagnose diseases within the human body. One great example would be various forms of cancer. Another project I had worked on was edge processing with aluminum. The purpose of this project was to research slowly dropping pieces of aluminum into an acid bath to change its index of refraction to much more favorable value. This would allow us to see through the aluminum and use it as a replacement for glass in certain settings. Examples include car windshields, sunglasses, and phone screens.

Technical Abstract:
One part of the research project includes a design for a lensless microscope. The purpose of the microscope is to be able to look into the human body and better diagnose diseases. For Field-of-View (FOV), Time, and Opacity, we proposed a contact microscope with an array of individual “pinhole camera pixels,” similar to the eye of a fly or a lobster, that would be in contact with a back-illuminated clear surface or one immersed in a clear, soft material/liquid, as on a microscope slide. Each pinhole pixel has a micro-Field-of-View (μFOV) that is collimated so as to just touch but not overlap the adjacent pixels – i.e. ~1 micron μFOV or even finer for each pixel, depending on the imaging detector pixel sizes. This leads to a contact microscope for clear media with 1-2 μm resolution and with a 1x1 cm FOV. To image opaque materials or objects in contact with the microscope, an alternative design uses half the pixel collimator's to illuminate the adjacent pixels on the object. For the edge anodization of the aluminum, the piece of aluminum is to be lowered into an acid bath by a motor with an attached

power supply. The acid bath would result in the aluminum obtaining a porous surface. These pours would be sizable around 50 nm. This would make the aluminum transparent yet still a rigid material. The plan would be to use these transparent sheets of aluminum as a replacement for glass in certain scenarios.

Impacts of Mixing in Submarine Canyons

Booth #53

Christian Burns '20

Faculty Mentor: Robert Nazarian

Abstract:
See Sigma Xi technical Abstract: below.

Technical Abstract:
The large-scale ocean circulation is a major component of Earth's climate system and is supported by turbulent mixing. One of the most significant drivers of ocean mixing is the breaking of internal waves (i.e. energetic waves that propagate below the sea surface). One of the regions in which there is intense ocean mixing is submarine canyons (Carter & Gregg, 2002; Nazarian & Legg, 2017a,b). Previous studies which incorporate many assumptions and suggest that up to 25% of the internal wave energy budget may be lost in these regions (Nazarian et al., in prep). Despite the efficiency with which submarine canyons lead to the breaking of internal waves and subsequent mixing, a robust calculation of the magnitude and spatial distribution of internal wave driven mixing has not yet been conducted. In addition to this mixing being important for the large-scale ocean circulation and climate system, this mixing is also important in distributing nutrients in the ocean and supporting biodiversity (McPhee-Shaw, 2006). The goal of this project is to calculate the magnitude of mixing in each submarine canyon and compare it to the global internal wave energy budget to determine the percentage of internal wave driven mixing that occurs in ocean canyons. A computational algorithm was created, incorporating high-resolution maps of canyon topography and internal wave energy flux in the ocean. Based on the geometry of these canyons as well as the magnitude of internal wave energy incident upon each canyon, we have conducted a preliminary calculation of the energy loss based on existing theory (Nazarian & Legg 2017a,b) and show that a large fraction of the incoming internal wave energy is dissipated to mixing in canyons. In future work, we will calculate the percentage of internal wave energy in submarine canyons and use a global climate model to analyze the ramifications of this mixing on the large-scale ocean circulation and climate system.

Perceived Stress Mediates Adverse Childhood Experiences and Suicide Ideation in Young Adults

Booth #54

Amanda Franco '20

Faculty Mentor: David Hollingsworth

Abstract:
Negative childhood events and experiencing stress are suicide risk factors; however, there is little research examining these factors in a mediation model. The current study examined the relationship between adverse childhood experiences, perceived stress, and suicide ideation in a mediation model in a sample of college students. It was hypothesized that perceived stress would significantly mediate the relationship between adverse childhood experiences and suicide ideation. Participants in the current study included 328 college students who were recruited from a large Midwestern university. In this study, there were more female participants than male participants (261 women, 67 men). Participants completed a battery of self-report measures to assess for the variables of interest. Results supported the hypothesis, as perceived stress significantly mediated the relationship between adverse childhood experiences and suicide ideation. The present findings demonstrated that encountering adverse childhood experiences, was associated with higher levels of perceived stress, which in turn was associated with increased suicide ideation. A clinical implication of the study is the importance of clinicians assessing for negative childhood experiences and related stress during suicide risk assessments.

Technical Abstract:
According to the Suicide Prevention Resource Center (2014), about 7% of college students reported having thoughts of suicide. Studies have also found that suicide is the second leading cause of death in young adults (CDC, 2018). Research has shown that encountering adverse childhood experiences (e.g., physical abuse, psychological abuse, neglect) are risk factors for suicidal outcomes (Brockie et al., 2015). In addition, Hager and Runtz (2012) found that aspects of negative childhood experiences were positively correlated to current perceived stress. A possible negative outcome of experiencing

perceived stress is suicide ideation, which are positively associated with each other (Cole et al., 2015). Thus, the aim of the current study was to examine perceived stress as a mediator of the relationship between adverse childhood experiences and suicide ideation in a sample of college students. It was hypothesized that perceived stress would significantly mediate the relationship between adverse childhood experiences and suicide ideation. Participants in the current study included 328 college students that were recruited from a large Midwestern university. Participants completed a battery of self-report measures to assess the variables of interest. A mediation analysis with 5,000 bootstrapping samples was conducted using the PROCESS macro for SPSS. Results indicated that perceived stress significantly mediated the relationship between adverse childhood experiences and suicide ideation (= .03, 95% CI= .01 to .06), supporting the hypothesis. The present findings demonstrated that encountering adverse childhood experiences was associated with higher levels of perceived stress, which in turn was associated with increased suicide ideation. A clinical implication of the study is important for clinicians assessing for negative childhood experiences and related stress during suicide risk assessments.

Depressive Symptoms Mediate the Relationship between Self-Defeating Humor and Suicide Ideation in College Students

Booth #55

Andriana Goodchild '19

Faculty Mentor: David Hollingsworth

Abstract:
Suicide is currently the second leading cause of death among college students (ACHA, 2018). A factor that may put a college student at risk of suicide is the use of self-defeating humor (Tucker et al., 2013). Self-defeating humor is a humor style where a person highlights their personal flaws in an attempt to make others laugh in social settings (Martin et al., 2003). One possible factor that may explain the relationship between self-defeating humor and suicide is depression. Past research has shown that using self-defeating humor and depressive symptoms are positively correlated (Martin et al., 2003). Furthermore, experiencing depressive symptoms is a prominent risk factor for suicide ideation (Frewen, Brinker, Martin, & Dozois, 2008). People who use self-defeating humor may unintentionally lower their mood, making them more susceptible to developing suicide ideation. The purpose of this study was to examine whether depressive symptoms could explain the relationship between self-defeating humor and suicide ideation in a sample of 357 students. Results found that depressive symptoms significantly mediated the relationship between self-defeating humor and suicide ideation, supporting the hypothesis. These findings demonstrated that using self-defeating humor was associated with an increase in depressive symptoms, which in turn was related to an increase in suicide ideation.

Technical Abstract:
Suicide is currently the second leading cause of death among college students (ACHA, 2018). A factor that may put a college student at risk of suicide is the use of self-defeating humor (Tucker et al., 2013). Self-defeating humor is a humor style where a person highlights their personal flaws in an attempt to make others laugh (Martin et al., 2003). One possible factor that may explain the relationship between self-defeating humor and suicide is depression. Past research has demonstrated that using self-defeating humor and depressive

symptoms are positively correlated (Martin et al., 2003). Furthermore, experiencing depressive symptoms is a prominent risk factor for suicide ideation (Frewen et al., 2008). People who use self-defeating humor, may unintentionally lower their mood, making them more susceptible for developing suicide ideation. The purpose of this study was to examine the mediating effects of depressive symptoms on the relationship between self-defeating humor and suicide ideation. It was hypothesized that depressive symptoms would significantly mediate the relationship between self-defeating humor and suicide ideation. Participants included 357 college students from a large Midwestern university. Participants completed a set of questionnaires to assess the variables of interest. A mediation analysis with 5,000 bootstrapping samples was used to conduct the statistical analysis. Results of the mediation analysis found that depressive symptoms significantly mediated the relationship between self-defeating humor and suicide ideation (β= .008, 95% CI = .004 to .014), supporting the hypothesis. The results of the study demonstrated that depressive symptoms significantly mediated the relationship between self-defeating humor and suicide ideation. Societal implications of this study include the fact that people should be more mindful of the use of self-defeating humor because of the impact it may have on their mental health.

Ethnic Identity as a Moderator of Defeat and Suicide Ideation Among African Americans

Booth #56

Chelsea Salvatore '19

Faculty Mentor: David Hollingsworth

Supported by Vincent Rosivach Collaborative Research Fund

Abstract:
Suicide is currently the third leading cause of death among African American young adults (CDC, 2018). Previous research has established defeat (the feeling of failure following a struggle; Gilbert & Allan, 1998) as a predictor of suicide ideation (Lester, 2012). However, ethnic identity, which is made up of aspects such as language, religious affiliation, and cultural traditions (Phinney, 1992), may serve as a protective factor against feelings of defeat and suicide ideation. Past research has found ethnic identity moderates the relationship between depression and suicide ideation among African Americans (Walker et al., 2008). The current study examined ethnic identity as a moderator of the relationship between defeat and suicide ideation in African Americans. Participants included 106 African American college students. Results found that ethnic identity significantly moderated the relationship between defeat and suicide ideation, supporting the hypothesis. For participants with high levels of ethnic identity, the relationship between defeat and suicide ideation was no longer significant. However, for participants with low levels of ethnic identity, as feelings of defeat increased, so did their thoughts of suicide. The results of this study imply that African Americans who have high levels of ethnic identity may be protected from the effect defeat has on suicide ideation.

Technical Abstract:
Suicide is currently the third leading cause of death among African American young adults (CDC, 2018). Previous research has established defeat (the feeling of failure following a struggle; Gilbert & Allan, 1998) as a predictor of suicide ideation (Lester, 2012). However, ethnic identity, which is a main component of one’s self-concept and is made up of aspects such as language, religious affiliation, and cultural traditions (Phinney, 1992), may serve as a protective factor against feelings of defeat and suicide ideation. Past research

has found ethnic identity moderates the relationship between depression and suicide ideation among African Americans (Walker et al., 2008). Thus, the aim of this study was to examine ethnic identity as a moderator of the relationship between defeat and suicide ideation in African Americans. It was hypothesized that ethnic identity would moderate the relationship between defeat and suicide ideation. Participants included 106 African American college students. Participants completed self-report measures that assessed the variables of interest. A moderation analysis with 5,000 bootstrapping samples using PROCESS (Hayes, 2013) for SPSS was used to analyze the data. Results of the moderation analysis found that ethnic identity significantly moderated the relationship between defeat and suicide ideation, supporting the hypothesis (= -.05, Confidence Intervals [CI] of -.03 to -.07). Simple slope analyses demonstrated that at low levels of ethnic identity, defeat had a significant effect on suicide ideation (= .06, CI of .03 to .08). However, the relationship between defeat and suicide ideation was no longer significant at high levels of ethnic identity (= .001, CI of -.01 to .02). The results of this study imply that African Americans who have high levels of ethnic identity may be protected from the effect defeat has on suicide ideation.

Understanding the Initial Psychological Differences in Gender Within a Substance Use Population

Booth #57

Kaitlyn Larkin '19, Emma Smith '19

Faculty Mentor: Frank D. Buono

Abstract:
Substance use disorder (SUD) is a psychological disorder that affects 20.2 million individuals in the United States and is two to three times more likely to affect men than women. There are psychological, biological and social differences across gender for using illicit substances (e.g. risk of addiction, sex hormones, age). One motivating factor for individuals to use substances is to alleviate emotional distress caused by co-occurring disorders (e.g. anxiety and depression). In the current study, we examine the influence of gender on Appeal of Substance Use (ASU) scores and evaluate the interaction between the scores on this assessment and the PHQ-9 and GAD-7. Data was utilized from 83 men and 63 women entering residential substance abuse treatment programs at a private psychiatric hospital in Connecticut. The ASU measures the perceived positive aspects of substance use (e.g. reducing negative emotions). Results indicate that scores on ASU significantly differed by gender. Initial conclusions suggest gender differences in motivation for using substances. Future research should further investigate specific motivators for substance use across gender.

Technical Abstract:
Substance use disorder (SUD) is a psychological disorder that affects 20.2 million individuals in the United States and is two to three times more likely to affect men than women. There are psychological, biological and social differences across gender for using illicit substances (e.g. risk of addiction, sex hormones, age). One motivating factor for individuals to use substances is to alleviate emotional distress caused by co-occurring disorders (e.g. anxiety and depression). In the current study, we examine the influence of gender on Appeal of Substance Use (ASU) scores and evaluate the interaction between the scores on this assessment and the PHQ-9 and GAD-7. Data was utilized from 83 men and 63 women entering residential substance abuse treatment

programs at a private psychiatric hospital in Connecticut. The ASU measures the perceived positive aspects of substance use (e.g. reducing negative emotions). Results indicate that scores on ASU significantly differed by gender, $F(1, 126)=4.922$, $p<.05$. Initial conclusions suggest gender differences in motivation for using substances. Future research should further investigate specific motivators for substance use across gender.

When Eyewitnesses Change Their Reports Across Multiple Interviews: The Role of Accuracy and Confidence

Booth #58

Nicole Palas '20, Jennifer Finelli '20, Samantha Pizzichillo '19, Jessica Degore '19, Jessica Ferrante '20

Faculty Mentor: Linda Henkel

Abstract:
Sometimes answering challenging questions can undermine a person's confidence in what they remember. Three studies examined whether question difficulty influences witnesses' consistency when they are questioned repeatedly about a videotaped crime they witnessed. This is an important issue because jurors typically discount the testimony of inconsistent witness, even though some of what they report may be accurate. In three experiments, witnesses answered either easy questions about clearly observable details or challenging questions about minute details before answering questions about the crime itself. The interview was repeated 20 minutes, two days, or one week later. The results showed that with increased delay, accuracy and confidence declined and response change rates increased. Witnesses were less accurate, less confident, and more inconsistent for hard than for easy pre-crime questions. However, doubt induced by hard questions didn't "spillover" and cause more inconsistent responses for crime details. Thus, witnesses can selectively maintain consistency across repeated interviews for details they remember more accurately and confidently.

Technical Abstract:
Witnesses sometimes change their memory reports when re-questioned, which taints jurors' views of their testimony. Drawing from recent findings that confidence and self-assessed accuracy are inflated by answering easy questions, we examined whether witnesses are more likely to change their responses after answering a series of initial questions that were either easy or were challenging, and whether response change rates were related to actual or perceived accuracy. In three experiments, subjects were interviewed about what they saw in a videotaped crime. Half answered easy questions about clearly observable details, and half answered challenging questions about

more minute details. Then they were questioned about the crime itself. After a delay (20 mins, two days, one week), they answered the questions again. In all three studies, subjects were less accurate for the hard than for the easy pre-crime questions, but regardless of whether they answered hard or easy questions first, overall accuracy for crime-related details did not differ. Confidence and perceived accuracy aligned with their performance, with higher confidence and perceived accuracy for easy than for hard pre-crime questions. As predicted, they changed significantly more responses from the first to the second interview for the hard questions. Thus response change was greater on the items they were less accurate on to begin with. However, self-induced doubt instilled by answering the initial hard questions did not "spillover" and cause more inconsistent responses for crime details: They had similar rates of response change for crime-related details regardless of whether they initially answered hard or easy questions. Response change rates increased as the delay increased, suggesting that witnesses can selectively maintain consistency across repeated interviews for aspects of their recollections that they are more accurate on and subjectively more certain of.

Attention in College Students

Booth #59

Lauren Hart '19

Faculty Mentor: Margaret McClure

Supported by Hardiman Scholars

Abstract:
This study examined the effectiveness of BouncyBands® as an intervention for people with attention deficits. The use of these bands on chair legs is supported with anecdotal evidence from teachers for use in the classroom for students with ADHD; they notice that students tend to stay on task when fidgeting with the bands on the chair, but this is something that has not yet been shown to be effective empirically. For this empirical research, typical college-aged participants completed various tests of selective and sustained attention with and without a bouncy band chair. Participants performed significantly better on the sustained attention task when they sat in the bouncy band chair than when they sat in the regular chair. There were no significant differences in overall performance when sitting in the bouncy band or regular chair on the selective attention tasks. The use of BouncyBands® helped typical college students improve their attentional functioning on a sustained attention task.

The Relationship Between Social Cognitive Errors Within Intimate Partner Violence in College Dating Relationships and Borderline Personality Disorder

Booth #60

Michelle Sidhom '19, Katherine Armstrong '20, Chloe Lazar '19, Alessandra Montesanto '19, Michelle Miller '19, Emma Tuzzoli '19

Faculty Mentor: Margaret McClure

Abstract:
Recent research suggests that intimate partner violence (IPV) in adolescent dating relationships may be related to borderline personality disorder (BPD) pathology. Social cognitive errors have been found in samples of individuals with both experiences. We examined social cognitive (SC) errors in two samples: BPD and high IPV. Although individuals in both groups demonstrated SC errors, the types of errors differed, as those with high IPV made more hypermentalizing errors, (overthinking social interactions), while those with BPD made more hypomentalizing errors (impulsive responses).

Technical Abstract:
Background: Intimate partner violence (IPV) in college students is alarmingly high (Dardis et al., 2015) and may be related to borderline personality disorder (BPD) (Vanwoerden et al., 2019). Individuals who experience both IPV and BPD exhibit social cognition (SC) errors. This study examined SC errors in two samples: individuals who reported high IPV and BPD. Method: As part of two ongoing studies, 20 individuals (10 females) ages 19-60 (M=35.7, SD=11.1) with DSM5 BPD, and 15 college students who reported high IPV victimization (13 females) ages 18-21 (M=19.2,SD=1.1) completed the MASC (48 multiple choice questions about video clips) and the RMET (36 images of eyes expressing various emotions are named). Results: Although there was no difference in accuracy scores for either the RMET or the MASC (all ps>.05), individuals with BPD made more hypomentalizing errors on the MASC (t(33)=2.1, p=.04) than those with high IPV, while the opposite was true for hypermentalizing errors (t(33)=2.0, p=.05). Discussion: Although both BPD and high IPV individuals demonstrated social cognitive

errors, the types of errors made differed. This suggests that development of specialized interventions for both high IPV and BPD are necessary, due to the reported difference in social cognition errors.

Can We Encourage Helping Without Also Increasing Caregiver Burnout?: Understanding Associations Between Emotional Focus, Willingness to Help Others, and Caregiver Burnout

Booth #61

Courtney Hankins '19, Katherine Mackenzie '21

Faculty Mentor: Michael Andreychik

Abstract:
In helping professions like teaching, nursing, and counseling there is a greater level of burnout, meaning that people in these professions face chronic job-related stressors and emotional exhaustion. Past research has shown that the more people connect with others' negative emotions, the more empathetic and willing to help they are. However, doing so also leads to greater distress and takes a greater toll, resulting in burnout. This study measures the levels of distress, reflecting burnout, college students have when watching an interview of a peer describing the good and the bad parts of her adjustment to college in her first semester. Participants were given one of four possible instructions: to be objective, to focus on all emotions both positive and negative, focus on just the negative emotions, or focus on just the positive emotions when watching and listening to the interview. We then measured participants' levels of distress and asked them if they would be willing to help the student in the interview by providing her with anonymous advice. We predicted that those who were instructed to focus on all or some emotions would show greater willingness to help compared to those who took an objective view and that those who were told to focus on the interviewee's negative emotions would show greater levels of distress than those who were instructed to focus on positive emotions.

Technical Abstract:
Those who work in "helping professions,"such as first responders, teachers, nurses, and mental health professionals, have an increased level and risk of burnout in comparison to other occupations. As such, it is critical to understand how to reduce the risk of burnout among these professionals. This

study suggests that one way of reducing the risk of burnout is to encourage helpers to empathize with the positive emotions (e.g., joy, pride, hopefulness) of those with whom they work. To examine the potential burnout-reducing effects of empathizing with others' positive emotions, we presented college students with a video of a fellow student describing both the good and the bad parts of the adjustment to college in her first semester. Before watching the video, participants were randomly assigned to adopt one of four perspectives as they watched the video: remain objective, focus on the student's negative emotions, focus on the student's positive emotions, or focus on all of the student's emotions. Participants then indicated how much distress they experienced while watching the video (a stand-in for burnout) and also whether or not they would be willing to help the struggling student by giving or providing her with advice. Our key prediction was that whereas all participants who connected with the struggling student's emotions would report a greater willingness to help her (compared to the objective control condition), participants who connected with the student's negative emotions would report greater burnout-related emotions than those who connected with the student's positive emotions.

Does an Actor's Group Membership Influence How Knowledgeable Here is Seen to Be?

Booth #62

Kaitlyn Larkin '19

Faculty Mentor: Michael Andreychik

Supported by Vincent Rosivach Collaborative Research Fund

Abstract:
Philosophers have struggled for years to answer the question, "How do we decide whether an individual truly 'knows' something?" Gettier (1963) observed that it is possible for an individual to appear knowledgeable without actually possessing "true" knowledge (situations now referred to as Gettier cases). But, initial empirical tests of Gettier's argument have shown that ordinary people often see agents as possessing knowledge even when those agents are correct about something purely because they are lucky (rather than knowledgeable). The current project sought to contribute to the limited empirical evidence on knowledge attribution by replicating a study by Turri et al., (2015), the most influential study on the topic to date. Further, in addition to examining the robustness of existing findings on knowledge attribution, I also examined whether factors not directly relevant to the "facts of the case," such as whether an actor is seen as an expert or non-expert, affect how knowledgeable the actor is seen to be. The results of two experiments replicated the findings of Turri et al. (2015). And, I also found some evidence that expert agents were more likely to be seen as possessing "true" knowledge than non-experts, even when the experts and non-experts had the same beliefs for the same reasons.

You Know I Feel Negatively About Them, But Can You Tell Me Why?

Booth #63

Julia Pisani '19, Perry McCarthy '19, Rebecca Ahmed '21

Faculty Mentor: Michael Andreychik

Abstract:
People sometimes have attitudes of which they are unaware or which they cannot control. These implicit attitudes have important implications for how one thinks about and acts towards other people, and are especially relevant for understanding societal phenomena such as prejudice and discrimination. But how do we measure such implicit attitudes? One popular measure is the Implicit Association Test (IAT). But, past research has shown that the IAT may not be able to distinguish between different types of implicit attitudes. In this study, we measured people's implicit attitudes toward a variety of social outgroups using the IAT. We also measured people's explicit emotional responses towards these same outgroups. We expect that the IAT will reveal similar levels of implicit negativity toward each of these groups, but that people will also report qualitatively different types of explicit negative emotions toward the groups. These results would support the idea that the IAT cannot distinguish between different types of negative implicit attitudes that people have.

Testing the Effects of Environmental Enrichment on Behaviors in the Male VPA Rat Model for Autism Spectrum Disorder

Booth #64

Christina D'Agata '19, Lea Lecaj '19, Katie Trykowski '20

Faculty Mentor: Shannon Harding

Abstract:
This project is looking into the effects of environmental enrichment on behavior in rodents that are expressing symptoms of autism. A valid autism animal model was utilized. Will environmental enrichment improve these autism spectrum disorder symptoms? Will environmental enrichment improve animal development, anxiety, or social behaviors? This study examined the effects of environmental enrichment during development on a variety of behaviors in the autism spectrum disorder (ASD) model. Pregnant Long Evans rats were administered valproic acid (VPA - treatment) or saline (control) on pregnancy day 12.5. After the rodents developed further, male rats were assigned to the following groups: saline-standard, VPA-standard, saline-enriched, and VPA-enriched. Enriched housing included toys, social partners, and new bedding. Standard housing consisted of a Plexiglas cage with cob bedding. Enrichment continued for 2 weeks before behavioral tests were conducted. It is hypothesized that enrichment will reduce the autism symptoms seen in the male rats, specifically reducing anxiety and improving social behaviors.

Technical Abstract:
In the United States, autism spectrum disorder (ASD) affects one in 68 children and is characterized by deficits in social behaviors and communication. Previous research in rodents has shown that exposure to VPA (valproic acid, an antiepileptic compound) during development produces a reliable animal model for ASD. This study examined the effects of environmental enrichment during development on a variety of behaviors in the ASD model. Pregnant Long Evans rats were administered saline (n=2) or VPA (n=4, 600mg/kg body weight, s.c.) on gestational day 12.5. After weaning, male rats were assigned to saline-standard, VPA-standard, saline-enriched, and VPA-enriched groups (n=6 animals per group). Enriched

housing included an assortment of toys, social partners, and shredded bedding (n=6 animals per cage). Standard housing consisted of a Plexiglas cage with corncob bedding (n=3 animals per cage). Enrichment continued for two weeks before behavioral tests were conducted, including surface righting, elevated plus maze, emergence, and tests for social behaviors. It is hypothesized that enrichment may reduce anxiety and improve social behaviors in the VPA-exposed animals. These findings will have important implications for the therapeutic treatment of ASD in humans.

Athlete Academy

Booth #65

Alexandru Rusu-Sprincenatu '20, Spencer Letizia '20, Matthew Flores '20, Prathna Pel '20, Alexander Freedman '20, John Moriarty '20

Faculty Mentor: Amalia Rusu

Abstract:
With the increasing popularity of youth sports, it can be difficult for coaches to manage drills and exercises for players in an individual context. As a result, many training exercises are team-oriented. In this environment, team growth can still occur, but individual player growth can stagnate. In such instances, an individualized approach can be more beneficial to the players' growth and performance by allowing each player to improve in necessary categories. A system that can target individual areas for growth will allow for greater training efficiency on both an individual and team level. Athlete Academy is founded on the idea of assisting youth players in improving their athletic skills. Our web services include but are not restricted to player training. The system also provides a service for coaches to evaluate individual player performances. Utilizing performance rating metrics, our system can generate drills that are optimized for each individual player. With an integrated user account, parents can also contribute to their child's growth by generating drills based on their rating of the child's performance. In order to alleviate stress and wasted time, our system allows players and coaches flexibility with regards to their direction of growth, improving the overall quality of the team game.

Technical Abstract:
With the increasing popularity of youth sports, it can be difficult for coaches to manage drills and exercises for players in an individual context. As a result, many training exercises are team-oriented. In this environment, team growth can still occur, but individual player growth can stagnate. In such instances, an individualized approach can be more beneficial to the players' growth and performance by allowing each player to improve in necessary categories. A system that can target individual areas for growth will allow for greater training efficiency on both an individual and team level. Athlete Academy is a software application where coaches, players, and parents can monitor and record the progress of individual players throughout their training and

competitive games. The system is also able to organize the data of individual players within their team or organization. With the application's player comparison functionality, coaches can compare their players based on skill level. Players' strengths and weaknesses are recorded, and their progress tracked. The data will be used to generate drills on an individual basis. With the focus on individual improvement, each player can grow in skill and physique. In this way, the system can give a sport team a competitive edge against opposing teams. By targeting each individual player, the whole team can benefit, and coaches can spend more time creating strategies aimed at victory. Our future plans include the accommodation of different sports, a reward system, and metrics refinement. We will be giving players various utilities to improve and reach the top of their game.

Structural Determination of 19F Labeled KIX via Disulfide Tethering

Booth #66

Raquel Reilly '20

Faculty Mentor: William Pomerantz

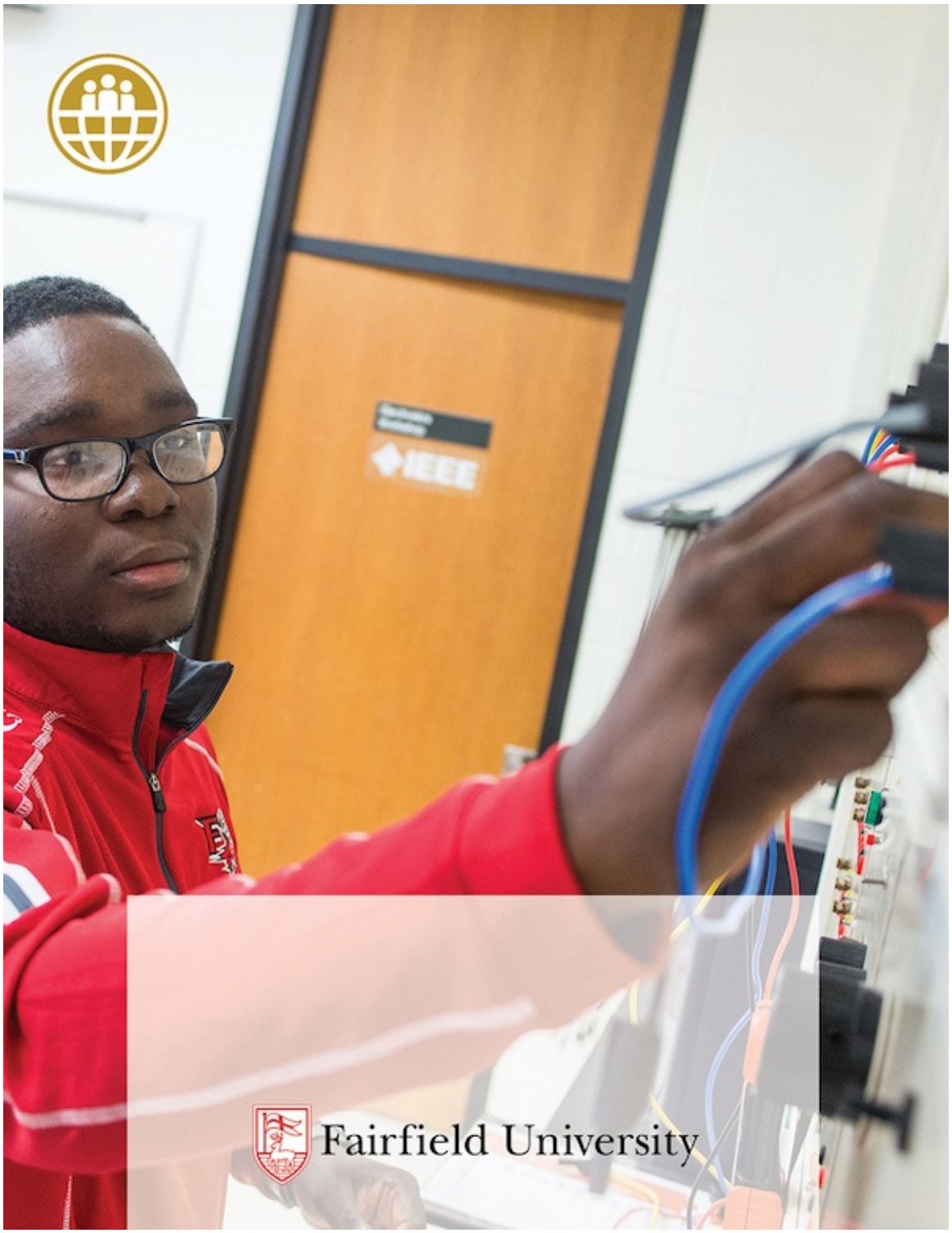
Supported by Hardiman Scholars

Abstract:
The KIX domain, also referred to as the CREB binding domain, is a protein domain of the coactivator CBP and p300. The KIX domain has two sites that can bind to several different transcription factors, which regulate how and when specific genes are turned on or turned off. The KIX domain regulates genes that are important for memory formation, hematopoiesis and inflammation. Transcriptional activators that do not function properly can be an onset for different types of cancer, and therefore there is great interest in understanding how proteins such as KIX are involved in gene expression. Despite its critical biological role, only one high-resolution 3D image of the KIX domain has been reported. The absence of such images are in part due to the intermediate stability of the protein. Previous research demonstrated that the KIX domain can be chemically modified to increase its stability. Here, the KIX domain was modified through the incorporation of fluorinated amino acids, and the tethering of a small molecule. We expect this stabilized form of the fluorinated KIX domain will allow for a greater understanding of the structure of the protein and will provide further insight as to how the KIX domain functions in regulating transcription.

Technical Abstract:
The KIX domain of the coactivator CBP/p300 is involved in the regulation of hundreds of genes, some of which have applications in memory formation, hematopoiesis and the inflammatory response. Despite its wide array of applications, only one crystal structure of the KIX domain has been reported using a tethered small molecule, and none in its unliganded state. The absence of such structures are in part due to the intermediate stability of the protein. Previous research findings from the Pomerantz lab show that incorporating fluorinated amino acids stabilizes the protein, but the reason for this remains unknown. The focus of this project is to tether a small molecule to a mutated

cysteine on KIX, and incorporate fluorinated tyrosine residues into the protein. Here, we demonstrate that a 2-fluorotyrosine and 3-fluorotyrosine-containing-KIX mutant (L664C) can be expressed, is well founded, and can be tethered with a synthetic small molecule 1-10. Fluorine NMR was utilized to verify the incorporation of the unnatural amino acids. After tethering molecule 1-10 to 3FY KIX L664C, the resonance corresponding to Y631 was perturbed. This result, as well as mass spectrometry, has verified that the molecule was successfully tethered. Stability and crystallography studies are underway. Additionally, in future work, we plan to co-crystallize the molecule tethered to KIX with other reported small molecules to potentially identify a new ligand binding site. Our study will ultimately allow for a greater understanding of the structure and stability of the KIX domain.

Graduate Research & Independent Projects



Job Analytics Project

Booth #165

Rajashekar Reddy Nandyala '19

Faculty Mentor: Amalia Rusu

Abstract:
The main purpose of the Job Analytics Project is the study to give an overview about the current job market trends in various streams. This provides the analysis of the job market across three major job posting sites: Indeed, Dice, Monster. This helps the job seekers irrespective of their career level to get an overview of the jobs posted across the sites across various streams and job trends in each stream and main skills required to fulfill the job. The earlier analytic study on the jobs is based on individual job posting site data. For this study, I considered the job postings data across three major job sites. All the job trends and job market details available across job posting sites are based on the data available on their site. This system helps the people to get the analytic picture of jobs across three major job posting sites. To complete this study the collection of data from all the three is needed. To collect the data certain frameworks were used. To present this data to users the Tableau Data Visualization tool is used. This study revealed that most of the employers are likely to prefer to post on Indeed job site. The job trends show that there is an expected slight growth in IT jobs.

Fairfield Voters Keeping the Line Moving?

Booth #166

Will Korzennik '19, Tommy Iezin '20

Faculty Mentor: Gayle Alberda

Abstract:
Fairfield University’s Election Day Research Project was a joint effort between Fairfield University's College of Arts and Sciences and Center for Faith & Public Life. Since the 2000 election, the way elections are administered has grown in importance and become part of the national political discourse. There is a growing need for data to adequately assess the voting process. This project begins to gather data from around the country, assess it, and use it to find viable solutions so the voting experience is enhanced. Student researchers went to polling places in Fairfield, Connecticut to collect data. The data collection was done via observations and surveys. One group of student researchers was tasked with observing the voting process. These student researchers collected information on each polling location, line length inside the polling locations, and wait times of voters. Another group of student researchers was tasked with asking voters to fill out a survey of their voting experience. This project helps identify administrative issues that occur when implementing Election Day.

Fairfield Senior Advocates - A Voice for Seniors in Fairfield

Booth #167

Jonathan Raj '19

Faculty Mentor: Jonathan Delgado, Kurt Schlichting

Abstract:
Our goal: keeping seniors at all income/asset levels in Fairfield and CT; this is so important to everyone's finances. This requires addressing tax and cost of living burdens affecting our senior community.

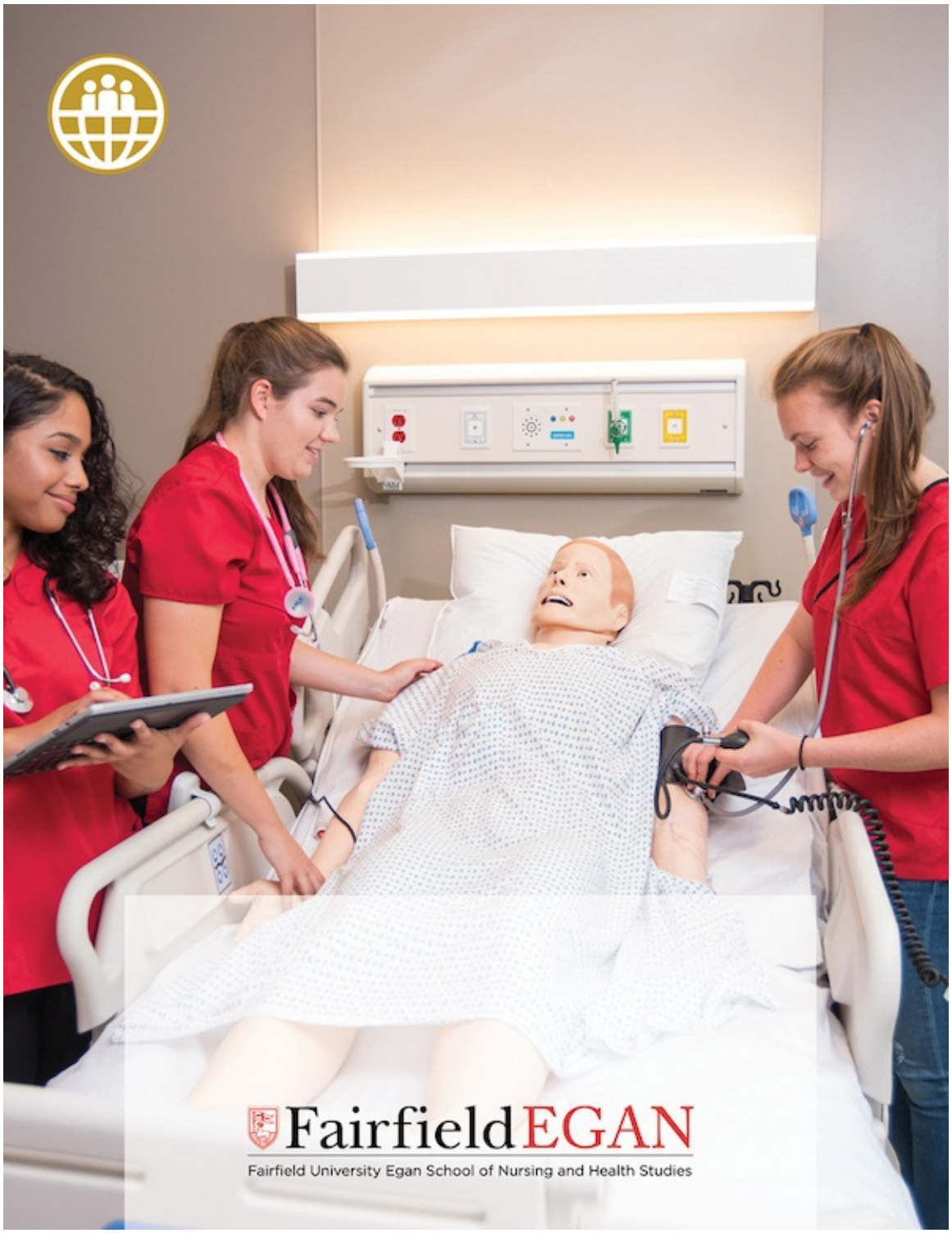
- Finding senior-friendly housing solutions.
- Evaluating state, federal and town programs that affect seniors
- Advocating for change through our legislative reps and state leaders
- Networking with senior/taxpayer groups in other towns
- Delivering a series of small victories – a signal that things will get better

- Mobilizing seniors, listening to their concerns, informing them of progress

Our mission: Make Fairfield an attractive town for older adults: an affordable, desirable, vibrant, engaged community. This makes our community--and our finances--better.

Our Core Values: Seniors are important to our town: to its economy, diversity, sense of community. FSA is non-partisan and represents all Fairfielders. FSA is inclusive: No age restrictions, all points of view considered.

Egan School of Nursing & Health Studies Projects



Will an Educational Intervention for Nurses Reduce Complications of Central Line Catheters and the Need for Reinsertion?

Booth #67

Ann Ballas '19

Faculty Mentor: Carole Pomarico

Abstract:
Vascular access is fundamental and invaluable in the treatment of hospitalized patients. There are multiple venous access devices which are used to administer fluids, medications, blood products, nutrition, chemotherapy, and blood sampling. Other devices can be used for dialysis. It is estimated that five million central venous access devices are inserted annually in the USA. When skin integrity is disrupted there is a risk for a blood stream infection. Strict adherence to the proper care of these devices is paramount. Replacing catheters due to infection is not only costly, but it extends a person's length of hospital stay and may limit the blood vessels that can be used for catheter placement. By providing an in-service and reference booklet on venous access devices, what they are, what they are used for and how to improve catheter maintenance, I aim to reduce complications that result in the reinsertion of catheters and subsequent loss of vascular access sites.

Enhancing Quietness on Surgical Units in Local Hospitals

Booth #68

Karen Caldwell '20

Faculty Mentor: Carole Pomarico

Abstract:
My project was to identify what noises are on surgical floors and how we can improve and implement interventions to decrease the noise to improve our Press Ganey Scores.

Will a Patient Hand-off Report Checklist Decrease the Transit Time for Admitted Patients from Emergency Department to Inpatient

Booth #69

Lori Cleary '21

Faculty Mentor: Carole Pomarico

Abstract:
This project consisted of creating a checklist to trial between two departments to increase the efficiency of the report process from the Emergency Department to the inpatient hospital floor.

Documentation of Pneumococcal Vaccine and Increased Compliance of Administration

Booth #70

Martha Matto '20

Faculty Mentor: Carole Pomarico

Abstract:
The project is focused on improving pneumonia vaccination rates among adult veterans at West Haven Veterans Hospital. Through collaboration with a multidisciplinary team and an intensive literature review, chart audits, a goal of increased compliance with pneumococcal vaccination will be observed with a more structured and formalized documentation process.

Will a Discharge Education Program for Patients with Clostridium difficile Infection Reduce Reinfection at Home?

Booth #71

Linda Tom '19

Faculty Mentor: Carole Pomarico

Abstract:
Clostridium difficile is a bacterium that causes a gastrointestinal infection which may be severe. I have developed a discharge education program for patients with this condition to reduce the chance of them becoming reinfected with this bacterial infection at home. The program has three components. First, there is a newly designed patient education brochure to be given to patients and their caregivers upon discharge. Second is direct patient and caregiver communication by nurses to ensure patients understand infection control precautions after discharge. Third is follow-up with the patient's primary care provider after discharge to ensure understanding and compliance with the program.

Administration of Epinephrine by School Bus Drivers: A Training Model

Booth #72

Lila Tullock '19

Faculty Mentor: Carole Pomarico

Abstract:
Schools in Connecticut provide emergency allergy preparedness in the form of a registered nurse on premise, individual emergency care plans and orders for epinephrine and diphenhydramine administration. School nurses delegate administration of epinephrine to school employees in the form of anaphylaxis identification, reaction, and epinephrine administration when students are in school and on field trips. Medical emergency practice drills are performed to familiarize the staff in the event of such a situation. But there is a gap in this preparedness. In the time that a student leaves his/her home and travels to school by bus, no such preparedness is in place. The protocol for any medical emergencies during transportation to and from school is limited to bus drivers pulling over and calling 911. Education for transportation employees is limited to first aid and basic CPR. When a bus driver has to call 911, it is often relayed through dispatch, delaying initiation of EMS and losing precious minutes. Students have died waiting for emergency services or due to the delayed administration of epinephrine. Rapid administration of epinephrine in allergy emergencies is the front line of preventing anaphylaxis deaths.

Is It Possible to Implement an Animal Assisted Therapy Program for the Inpatient Psychiatric Unit at Bridgeport Hospital?

Booth #73

Kimberly Vankeuren '19

Faculty Mentor: Carole Pomarico

Abstract:
I have researched the benefits of animal-assisted therapy in the inpatient mental health setting. Canines in particular have been shown to decrease levels of anxiety and stress among patients and staff. After visiting with a dog, people report feeling happier. Animal-assisted therapy is used extensively in the medical field and is a low cost option to benefit hospital patients.

Will the Addition of a Tip Sheet Improve Compliance for Proper Use of TABS Bed Alarm System?

Booth #74

Catarina Ventura-Pfalzgraf '21

Faculty Mentor: Carole Pomarico

Abstract:
This project entails the use of an information sheet for enhanced use of a Bed Alarm System.

Prevalence and Incidence of Pressure Injuries in Adult Cardiac Patients in Intensive Care: A Systematic Review.

Booth #75

Toni Prato '19

Faculty Mentor: Eileen O'Shea

Supported by Corrigan Scholars Fund

Abstract:
Due to the wide range of values and sparse empirical evidence regarding prevalence and incidence of pressure injuries specific to cardiac patients in intensive care, the purpose of this study is to systematically review the literature to explore the following research questions: 1. What is the prevalence of pressure injuries in adult cardiac patients admitted to intensive care? 2. What is the incidence of pressure injuries in adult cardiac patients admitted to intensive care?

Understanding the Goals of Palliative Ventilation in the Stepdown ICU

Booth #76

Aisling Coffey '19

Faculty Mentor: Jenna LoGiudice

Abstract:
Palliative ventilation aims to manage severe respiratory distress in patients. When a patient is in severe respiratory distress, he/she experience dyspnea and labored breathing which can be painful and uncomfortable for the patient. Health providers utilize non-invasive positive pressure ventilation (NPPV) to decrease the patient's work of breathing and provide respiratory muscle rest during inspiration. A literature review was conducted to collect information on NPPV in critical care settings. The literature review discussed articles that addressed the concept of palliative ventilation, clinical studies of palliative ventilation, clinical application of palliative ventilation, and goals of NPPV therapy. Interviews were also conducted with palliative care specialists to better understand the goals of palliative ventilation. The results of this study will support the importance of palliative ventilation in patients experiencing respiratory distress. It will address the need for healthcare providers in critical care settings to counsel patients and their families on the goals and shortcomings of NPPV.

Community Resiliency Model in Schools: Impact on Teacher Well-Being and Confidence Responding to Student Needs

Booth #77

Patricia Baginski '19

Faculty Mentor: Joyce Shea

Supported by Lawrence Program

Abstract:
The purpose of this study was to determine how Community Resiliency Model (CRM) (Miller-Karas, 2015) would impact teacher well-being and confidence in addressing student distress in the classroom. Resiliency is how a person or community is able to bounce back from stress. CRM is a skills-based resiliency program that has been used to help people in many parts of the world following traumatic events. A deficiency in the number of mental health providers responding to disaster events, combined with the availability of local leaders motivated to help, leads to the development of a resilience-building skill set that could be shared within the community by non-therapists. As described by the founder, Elaine Miller-Karas, “The Community Resiliency Model trains community members to not only help themselves but to help others within their wider social network (Miller-Karas, 2014).” Based on recent developments in neuroscience, training in the six skills empowers participants to modulate their responses to stress and build resiliency.

Patient Identification and Specimen Labeling: The Dangers of Mislabeling Patient Vials in the Emergency Department

Booth #78

Casey Collins '19

Faculty Mentor: Katherine Saracino

Abstract:
Making errors when labeling patient specimens in the Emergency Department (ED) has the potential to occur in all stages of diagnosis and treatment, and therefore it is imperative for patient identification to match the service or treatment being provided. Accurate patient identification is imperative for the provision of safe patient care. All hospital employees are responsible for the accuracy of patient identification. A policy was put into place to ensure that specimens match the patient they were collected for, and that each nurse's ID number is also placed on the vials collected to maintain responsibility for said collected vials. The hope is that in implementing this policy in the Emergency Department they will also see a decrease in labeling errors. The research study demonstrated that reducing specimen labeling errors is possible through careful specimen labeling and focused intervention. I will be presenting these findings to the RNs at the ED where I currently have clinical to reinforce that the process of patient identification and tube labelling is an essential safety barrier to prevent patient identity mix-up.

Cardiac Cath Report Sheets

Booth #79

Nicole Fay '19

Faculty Mentor: Katherine Saracino

Abstract:
Cardiac catheterizations are a common procedure performed at Waterbury Hospital. The Waterbury Telemetry unit was identified to have number of clients who will undergo a cardiac catheterization. The communication between staff members regarding these clients is essential to safe patient care. A review of various literature confirmed the importance of check-off sheets and post-procedure report sheets for nurses caring for this client population. Proper nursing care is essential for patient safety and recovery. Evidenced-based practice supports that one central location for all three required documents: a check off pre-procedure sheet, a report from Cath lab to the floor, and post-procedure care for these patients greatly improves patient outcomes. A formalized document can increase the likelihood that nurses get all the necessary information needed to provide comprehensive and complete care for cardiac catheterization patients. At this time, there currently is no formal document or policy in place at Waterbury Hospital. This learning need was addressed by creating a standard complete form and process to be used by the staff. An in-service was held to provide this resource to the nursing staff of the telemetry unit at Waterbury Hospital.

Identifying and Preventing Burnout in ICU Nurses

Booth #80

Caroline Gallo '19

Faculty Mentor: Katherine Saracino

Abstract:
Background: Burnout occurs from excessive work- related stress and is a rapidly growing problem for Intensive Care Unit (ICU) nurses. ICU nurses are exposed to extremely critical patients who require intense care. Nurses who work in these critical settings are also exposed to an increased number of poor patient outcomes and death. There is a need for education for nurses and staff who are regularly employed in ICUs on how to best manage the everyday stressors of their workplace in order to prevent burnout and uphold quality patient care. Objective: The objective of this project is to examine and to evaluate factors that lead to burnout and nurse fatigue, as well as to identify and to evaluate the effectiveness of interventions, such as a sacred pause following patient death and mindfulness-based stress reduction, on burnout in ICU nurses. Methods: A literature review was preformed in order to gather information and data regarding burnout in the nursing profession and among ICU nurses. Results: Improved coping strategies are proved to be important in decreasing the cases of nurse burnout and factors leading to burnout such as moral distress or excessive stress in the workplace. There were links between work environment and the likelihood of developing burnout. Additionally, interventions such as taking time after a patient death to reflect or taking time to be mindful proved to help reduce work related stressors and decrease incidence of burnout in nurses. Conclusion: It is important to educate all nurses about the factors that can lead to nursing burnout, causing dissatisfaction in the nurse's life and lesser quality patient care, and to find ways to cope and combat burnout. It is especially important for this education to take place in ICU and critical care settings due to the intensiveness of the patients these nurses are treating and the high rate of poor patient outcomes or patient death in this population.

Recognizing the Signs of a Stroke in the Community

Booth #81

Taylor Leclair '19

Faculty Mentor: Katherine Saracino

Abstract:
Strokes are one of the leading causes of death and disability in America but most people do not understand the warning signs that happen before or during a stroke. This project focuses on the key symptoms and why it is important to call 911 immediately. On a basic level, which this project will go deeper into, a stroke occurs when the blood supply of the brain is disrupted and a blood vessel either clots or bursts. If someone having a stroke gets the help they need immediately then the medical team can attempt to restore the blood supply before it is too late and the person cannot survive. This study was conducted due to the deficit knowledge identified on the Medical/Telemetry Observation unit at Waterbury Hospital of patients being observed and tested to rule out stroke when they did not understand what having a stroke meant or looked like. A poster of this project will be presented to staff on the floor to help them recognize that members of the community may not have the same knowledge about strokes that medical staff have. Staff will then be able to take the key points from the presentation and teach patients how to identify what having a stroke means and looks like in the community.

Spike into Advanced Directive

Booth #82

Christina Ni '19

Faculty Mentor: Katherine Saracino

Abstract:
When discussing code status, limitations have been identified between members of the healthcare team and patients and their families. I have observed instances when a patient considered hospice care but also wanted to maintain Full Code status. The potential exists for a patient transitioning towards end-of-life to receive CPR. A goals of care conversation that results in a completed advanced directive may eliminate the need for CPR. Objective: Develop an educational resource using the SPIKES Model to increase nurse rates for scheduling the advanced directive appointment for patients. Methods: The findings of a randomized controlled trial were reviewed for this project. Authors investigated the impact of advanced care planning on end-of-life care in older adults. Findings from the randomized controlled trial may enhance nurse interest on the topic of the SPIKES Model as a guide to deliver distressing health status news to the patient and family. Results: 154 of the 309 participants were randomized to complete an advanced directive. Among the 125 (81%) that completed the document, only 108 (84%) actually expressed wishes or appointed a surrogate, or both. Of the 56 participants who died within six months, end-of-life wishes were much more likely to be known and followed in the intervention group (25/29, 86%) compared with the control group (8/27, 30%; $P<0.001$). In the advanced directive group, family members of participants who died had significantly less stress ($P<0.001$), anxiety ($P=0.02$), and depression ($P=0.002$), than those of the control participants. Participant and family satisfaction was higher in the completed advanced directive group.

Reinforcing Discharge Education

Booth #83

Joyce Ramirez '19

Faculty Mentor: Katherine Saracino

Abstract:
When a patient is discharged from the hospital, they have undergone various procedures and received tons of information. This causes distress for both the patient and family, as they need to keep track of everything done in the hospital and understand new diagnoses and prescribed medications. In Waterbury Hospital, patients are confident that they are receiving everything they need to know once they leave the hospital. They express any questions they have and wait for the nurses or doctors to give them that information. Patients often admit that they have so much on their mind that they often forget important information. They state that they have stayed at other hospitals where they are often not told about their follow-up appointments until after they have passed. This causes more stress to their lives and they often feel overwhelmed. In order to facilitate more comprehensive education before discharge, there will be a check-off sheet of various evidenced-based research for the RNs to better educate their patients. This education relieves stress for the patient and family members involved, as they will be better informed depending on what works for them.

Newborn Delayed Bathing: Patient Education

Booth #84

Emily Thomas '19

Faculty Mentor: Katherine Saracino

Abstract:
When a newborn baby is born, he/she is covered in blood, vernix, and amniotic fluid. Historically, babies were bathed immediately following birth, but recently the Family Birthing Center at Waterbury Hospital has implemented a 24 hour delayed bathing policy. The vernix, which is made of water, lipids, and protein, is a thin layer protecting a newborn baby from heat loss and risk of hypothermia in addition to infection. Because this layer keeps babies warm, it also helps regulate their blood sugar and decreases risk of hypoglycemia. By waiting 24 hours to bath a newborn, this layer of vernix is able to naturally soak into the skin. In addition, delayed bathing is found to improve maternal bonding and breastfeeding success. Because babies appear to be ‘dirty’ directly following birth, many parents choose not to wait this 24-hour protocol to wash their child. With an evident knowledge deficit at the bedside, various staff members agreed that this was an issue that should be addressed on the unit. In order to facilitate more comprehensive education at the bedside, a brochure containing evidence-based research has been created to serve as a tool for the RN to better educate about the benefits of delayed bathing in newborns. This education allows new parents to better understand hospital policy and make informed decisions regarding their newborn’s care.

A Balancing Act: The Importance of Accurate Fluid Balance Monitoring in Cardiac Patients

Booth #85

Erica White '19

Faculty Mentor: Katherine Saracino

Abstract:
The patient population of the Heart and Vascular Center (5-7 HVC) of Yale New Haven Hospital is largely affected by cardiovascular conditions such as congestive heart failure, coronary artery disease, and myocardial infarction, among other disorders and comorbidities. The RN's role in cardiac disease management is to continually assess and monitor these patients' fluid balance and lab values, in order to evaluate the efficacy of treatment methods. Current evidence-based research shows that effective fluid management is an ongoing concern for patient safety due to lack of consistency and accuracy in charting methods, physical assessments, and weight measurements. Unit 5-7 HVC expressed the need for staff members to be educated on and reminded of the importance of fluid balance monitoring in cardiac patients. In order to to reinforce the need for accurate I&O and consistency in charting, an educational in-service was provided to members of the healthcare team. This information will be left on the unit as a poster. Additionally, an adjunct poster was created using data from YNHH regarding the amount of milliliters in common items ordered by patients on the floor, and will be left on the unit as a resource for staff members for documentation purposes. This research project ultimately served to enhance the HVC healthcare team's knowledge regarding fluid balance monitoring and to promote safer, more diligent nursing care for better patient outcomes.

Self-Care for Critical Care Nurses

Booth #86

Zaid Aparicio '19

Faculty Mentor: Kathleen Lovanio

Abstract:
Critical care nurses across the nation have some of the highest rates of burnout syndrome, and that can negatively affect overall patient and health outcomes. Critical care nurses are especially vulnerable and are constantly exposed to both physical and mental stress. Chronic occupational stressors, such as taking care of patients who are of high acuity, high levels of responsibility during shifts, high levels of expectations and job requirements, caring for families in crisis, working technologically advanced medical equipment, dealing with moral and ethical dilemmas, and patient morbidity and mortality impacts nurses. Critical care nurses are constantly challenged to act quickly and think critically, quickly causing stress in the work environment because of daily challenge in work routines, and constant encounters with traumatic events or ethical dilemmas arise each day at work. Critical care nurses suffer from a worldwide phenomenon called Burnout Syndrome or "BOS". Burnout syndrome is defined as the state of emotional, mental, and physical exhaustion resulting from excessive and prolonged stress in the workplace or environment. This exhaustion is commonly associated with the expectation and job requirements of critical care nurses. The Critical Care Societies Collaborative (CCSC) and American Association of Critical-Care Nurses (AACN), report that about 25% to 33% of critical care nurses show obvious symptoms of severe BOS, and at least 86% have at least one of the three classic symptoms of BOS. The Critical Care Societies Collaborative (CCSC) has taken the initiative to research and find solutions addressing the Burnout Syndrome phenomenon. This in effort to prevent post-traumatic stress disorder, alcohol abuse and even suicidal thoughts that can result from untreated or unaddressed Burnout Syndrome. Burnout Syndrome leads to a decrease in quality care for patients, and an increase in medical errors. This research will focus on prevention and treatment options for critical care nurses in the Surgical Intensive Care Unit at the West Haven Veterans Hospital who experience Burnout Syndrome. This article will also focus on programs already available at the VA for nurses. The main idea of this research is to help critical care nurses prevent burnout syndrome by

incorporating self-care strategies into their professional lives.

Suicide Prevention with Veterans

Booth #87

Kelly Cordes '19

Faculty Mentor: Kathleen Lovanio

Abstract:
Mental health is as important as physical health and it is crucial to assess all types of health in patients. Suicide is a major cause of death for individuals in the United States. Specifically, veterans make up 20% of daily suicide deaths. Evidence-based literature shows that the most affected group of veterans are young and transitioning from military life to civilian life. By using controlled trials and comparative cohort studies, quantitative research can conclude suicide risk prediction in newly released soldiers. Interventions are implemented in order to prevent self-harm in veterans. Oftentimes, veteran patients will not be asked if they have suicidal ideations and will be discharged while still having suicidal thoughts. The Veteran Affairs hospital in West Haven uses a suicide guide upon admission and provides resources for those at risk. Using the most well-established treatments such as psychotherapy-focused interventions and cognitive behavioral therapy, suicide prevention can be affective in veterans.

Better to be Safe than Sorry! Maintaining the Safety of Nurses in the Emergency Room

Booth #88

Hannah Dingley '19

Faculty Mentor: Kathleen Lovanio

Abstract:
Patients in the emergency room can become angry, agitated, or upset for many different reasons. This behavior can result in violence which could create a sub-therapeutic environment. Studies have shown that some nurses want to leave the profession because of the violence that they encounter during their shifts. A safe work environment is imperative to allow nurses to perform their best and most effective care. Because of this, it is necessary for healthcare professionals to be able to identify warning signs of patient escalation and potential violence. Identifying these warning signs and triggers will allow providers to better de-escalate these patients before violence occurs. This will improve the environment and safety of the emergency department for both staff and patients.

Improving Patient's Quality of Care through Bedside Report

Booth #89

Laryssa Dumont '19

Faculty Mentor: Kathleen Lovanio

Abstract:
A nurse's day at the hospital begins with change-of-shift report from the nurse who has worked the prior shift. Although nurses have many responsibilities and tasks to complete, it is beneficial to provide sufficient time for a thorough report by bedside on the patient. Nurses are often conducting report in the hallway or away from the patient’s bedroom, and includes little to no patient involvement. Many critical components of the patient's care are exchanged during report; miscommunication and errors can occur due to insufficient report between nurses. Therefore, it is essential to incorporate a standardized handoff at the patient’s bedside. A standardized handoff at bedside allows nurses to share significant information and engage in dialogue about the patient, as well as allowing patients to be aware, ask questions, and take an active role in their care. Studies have shown that implementation of bedside report has improved patient-centered care, satisfaction, and safety. A handoff was created for nurses to use as a checklist when conducting report to ensure patient safety, enhance care, decrease errors, and provide quality patient care.

Nurse, I Can't Sleep!

Booth #90

Katelyn Fleury '19

Faculty Mentor: Kathleen Lovanio

Abstract:
This research project focuses on eliminating sleep disturbances during the night shift and provides nurses with non-pharmacalogical interventions for improving sleep patterns. Inadequate sleep can affect people of all ages and can impact many aspects of their lives. The identified population includes veterans on a medical-surgical floor that aren't getting adequate sleep, but also applies to any patient in a hospital setting. The purpose is to assess physiological and holistic interventions to allow patients to get the proper amount of sleep during the night. Literature states that inadequate sleep at night can interfere with an individual's physical, psychological, social, and even spiritual well being that can later cause life-long consequences if not resolved. Furthermore, lack of sleep can interrupt a person's ability to make decisions or perform regular activities of daily living. It is important for nurses to be educated and aware of the importance of sleep, especially in a veteran based population. Veterans are highly susceptible due to the fact that they are exposed to several health issues including sexual trauma, TBI's, PTSD, substance use, and chronic pain, all of which contribute to lack of sleep. By using evidence-based interventions, nurses can prevent sleep disturbances during the night which will ultimately improve an individual's quality of life.

Bridging the Communication Gap between RNs and NAs

Booth #91

Emily Mason '19

Faculty Mentor: Kathleen Lovanio

Abstract:
On a busy medical-surgical telemetry unit, nursing assistants are essential in directly providing quality care. Nursing assistants (NA) may take on an assignment with several patients and are often among the first to respond to bed alarms and call bells. As well as meeting patient needs and performing delegated tasks, nursing assistants need to be aware of a patient's code status, precautions, and physical limitations prior to entering a room. However, keeping track of several patients can be overwhelming. For instance, patient safety is at risk if a nursing assistant is unaware of fall precautions or takes a blood pressure on an arm with a fistula due to missed communication. This research project focuses on effective communication between registered nurses and nursing assistants at change of shift. Proper communication guarantees that nursing assistants receive critical information, increases patient satisfaction, and promotes teamwork. In addition to an educational in-service for nursing staff, a flowsheet tool was created as a reference for nursing assistants. This tool serves the purpose of keeping specific information regarding patients' code status, diagnoses, and needs organized. Implementation of this tool will improve patient outcomes and ensure safety through more efficient care.

Telemetry Monitoring: Medical Surgical Floors Need a Little More Heart

Booth #92

Meghan O'Shea '19

Faculty Mentor: Kathleen Lovanio

Abstract:
While telemetry is an essential part of any hospital setting, in many cases, hospitals are aiming to implement single telemetry monitors onto medical-surgical floors. On these floors, such as 6 East at the West Haven Veterans Hospital, the nurses are not adequately trained to monitor these machines. Research suggests that the use of telemetry monitoring in hospitals medical-surgical units may not be truly effective or the safest measure for the patients on the unit. The use of single telemetry monitoring will decrease the ability of early recognition in vital signs for higher risk cardiac patients. It shows that there is a possibility of the unintended consequences of improper treatment due to a lower level of education among staff. There are also possibilities for alarm fatigue, overuse of the alarms due to false positive alarms based on the inability for alarms to be read and set correctly, which in turn will compromise patient safety. Overall, telemetry is a costly system, and while hospitals may believe that single telemetry may save money, telemetry monitoring requires a specialized skill set that many nurses on Medical Surgical floors, like 6 East, do not have. This system then, in turn, will put a burden on the veterans and the VA staff and in turn requires further education for the nursing staff to benefit clinical workflow.

The Importance of Including

Booth #93

Kaylee Bergen '19

Faculty Mentor: Linda Roney

Abstract:
When a patient's disease is incurable and the patient is being kept alive with life-saving measures, this becomes a difficult situation for all involved, whether they are family members, doctors, or nurses. Family members often do not want to end treatment because they believe they are giving up on their loved one, while nurses and doctors often know they are unable to utilize further curative treatments to help the patient. Palliative care is an option that focuses on providing support and comfort measures to the terminally ill patient, rather than exhausting all remaining curative treatments. On the Pulmonary Unit at Northwest 9 at Bridgeport Hospital, palliative care is a greatly needed resource that would benefit many patients. However, with an evident knowledge deficit at the bedside on palliative care and how to communicate the need and benefit of it, various staff members are in agreement that this is an issue of importance that needs to be addressed. The evidence-based literature utilized in this capstone project supports the need for an in-service nurse education plan on palliative care, both what it is and how to suggest it in an effective and positive manner. Furthermore, the evidence-based research shows that palliative care education improves nurse's knowledge, confidence and communication skills, as well as decreases stress; all improvements that will ultimately allow nurses to deliver better quality care to patients. In addition to this research presentation, a flyer was created for the Bridgeport Hospital Pulmonary Unit healthcare staff that includes information regarding palliative care, and how to communicate the benefit of it to both patients and family members.

Surgical Site Infection Prevention

Booth #94

Shannon Heiser '19

Faculty Mentor: Linda Roney

Abstract:
After patients undergo surgery, they are admitted to a post-anesthesia recovery unit and then a post-surgical floor. Once admitted on the post-surgical floor, patients are still drowsy from anesthesia, and their main desire is pain medication. These patients usually do not want to be educated at this moment because they wish to sleep. Northeast 7 in Bridgeport Hospital is a post-surgical floor for orthopedic, neurology, and urology surgeries. These patients have catheters, drains, and surgical incisions, all of which are entry points for infection. Because of this post-surgical infection was identified as a risk factor for patients on this floor. After conducting research, patient education regarding surgical site incisions was selected as the area of interest. On Northeast 7 the staff follow evidence-based protocol and guidelines to prevent surgical site infections from occurring. Research shows that patient education in preventing surgical site infections is crucial for risk management. When the nurse leaves the room, the patient's hygiene is not monitored at the surgical site incision. That being said, most patients after surgery do not wash their hands, which is the most important requirement in preventing surgical site infections. It is important to educate patients about surgical site incisions and the ways in which they can be prevented. Obstacles to effective education include health literacy of patients. In order to address education on surgical site infection prevention, a bilingual brochure has been created at an elementary reading level. This will be placed at the nursing station as a reference point for the nursing staff in educating patients on prevention. In addition to this, a sticker will be created on the patients' mirrors in order to remind them of the importance of hand hygiene after surgery.

Educating Parents to Prevent SIDS

Booth #95

Laura Josephson '19

Faculty Mentor: Linda Roney

Supported by Hardiman Scholars

Abstract:
SIDS stands for Sudden Infant Death Syndrome and is defined as the unexplained death of an infant younger than one year, whose death remains unknown despite a thorough autopsy. SIDS remains one of the leading causes of infant death in the USA. On the pediatric floor at Bridgeport Hospital, there are a variety of patients ranging from infants to adolescents. There are a large number of infants admitted to the floor with various diagnoses, however many parents aren't aware of ways to prevent SIDS. Parents on the floor expressed a lack of understanding about the prevention measures for SIDS, but they want to create the safest environment for their child. Many parents received education about prevention of SIDS during their postpartum and initial pediatric visits, however as time goes by many parents forgot the major key points. The role of the pediatric RN is to promote safety for the patient and to provide proper education to family members. On the pediatric floor parents expressed knowledge deficit about SIDS. Therefore, educational information should be provided to all parents with a child less than 12 months of age. In order to facilitate more comprehensive education to parents of infants, the RNs on the floor can initiate verbal communication on prevention of SIDS by using evidence-based research. In an education session on the unit, RNs will be educated on ways to prevent SIDS such as initiating supine sleeping, letting infants sleep alone, keeping infants' faces free, avoiding overheating, and avoiding smoking/nicotine in the vicinity. This education allows parents to partake in proper actions to ensure safety to their infant and decrease the incidence of SIDS.

Clostridium Difficile Prevention in the Acute Care Setting

Booth #96

Julia Mazzotta '19

Faculty Mentor: Linda Roney

Abstract:
This research project focuses on the topic of Clostridium difficile prevention on medical surgical floors within the acute care setting. The Clostridium difficile infection has become more prevalent and severe in recent years. Due to the severity of Clostridium difficile and the impact the infection has on the hospitalized patient population, this research project aims to find a more successful protocol to prevent Clostridium difficile and provide effective treatment when a patient is positive for clostridium difficile. In connection to this research presentation an educational in-service was conducted in order to educate nursing staff on how to prevent Clostridium difficile and identify at-risk patients on the medical-surgical unit North West 9 at Bridgeport Hospital. In addition to an educational in-service a handout was created for nurses to use regarding hand hygiene and contact precautions in order to prevent the spreading of Clostridium difficile. This research project aimed to decrease the prevalence of Clostridium difficile, identify those at risk, and to provide efficient treatment options to those who acquired the infection.

Alarm Fatigue in the Critical Care Setting

Booth #97

Eilish Newcomb '19

Faculty Mentor: Linda Roney

Abstract:
Alarm fatigue is defined as an excessive number of alarms resulting in desensitization to alarms, missed alarms, and an increase in noise level. In the progressive care unit at Bridgeport Hospital, an average of 37,000 telemetry alarms sound per week. Nurses have expressed that the number of alarms that sound each shift is concerning, causing distractions for nurses and preventing patients from proper rest. Every alarm that sounds should be "actionable," meaning it requires timely intervention by a nurse. According to the evidence-based literature, frequent alarms, false alarms, and non-actionable alarms are a danger to patient safety, and in some cases may result in patient death. By setting and adjusting parameters so that every alarm is actionable and true, this will result in a decrease in the number of alarms that sound. Furthermore, a decrease in noise level will lead to an increase in patient safety, satisfaction, and rest. In conjunction with this research project, a badge card with pertinent information about reducing alarm fatigue was created for the nurses in the progressive care unit at Bridgeport Hospital.

Formalization of a Post-Trauma Code Debriefing Process

Booth #98

Danielle Oleck '19

Faculty Mentor: Linda Roney

Abstract:
A trauma code can often appear as organized chaos from the outside while each team member works to perform his or her designated tasks within the same limited time frame. Each code is a unique situation to which each staff member must quickly adapt. Each code is also an emotionally taxing yet educational experience for the future. The Bridgeport Hospital Emergency Department trauma team sees intense cases on a near daily basis; however it only implements a limited debriefing session for tragic codes or pediatric deaths. This creates a need for a formalized, time-sensitive post-trauma code debrief. Evidence-based research shows that debriefing sessions improve the quality of patient care and safety. In addition, studies report staff members' increased sense of support, the ability to pay respect to patients, and having time to regroup before returning to their assignments. Along with the in-service session provided on the unit, a structured and standardized handout was created for the Bridgeport Hospital trauma team (attending physicians, residents, nurses, patient care technicians, ED code narrators, and any additional needed multidisciplinary resources specific to the case) to complete after each code to ensure adequate evaluation, processing, and identification of areas for improvement presented by the occurrence.

The Importance of Accurate Nursing Assessments and the Rothman Index

Booth #99

Amy Polewaczyk '19

Faculty Mentor: Linda Roney, Susan Bartos

Abstract:
The Rothman Index (RI) is a patient acuity score, used to aid in identifying trends in a patient's level of acuity. When information regarding the patient is inputted into the Electronic Medical Record (EMR), the RI is updated, which ultimately elucidates how that specific patient's overall health is progressing. This enables the healthcare providers to make more informed patient care decisions. The RI is based upon vital signs, laboratory test results, the Braden scale, cardiac rhythm, and nursing assessments, totaling 26 classifications that impact the patient's comprehensive score. This makes it exceptionally consequential that data and observations concerning the patient are reported in an accurate and timely manner. The documentation of this objective data is also crucial to patient prospective rounding, allowing for healthcare providers to be proactive and methodical in their care, and further tend to the patient's needs. At Bridgeport Hospital, the RI is underutilized. Healthcare providers have received education on the RI and understand it to be a tool accessible through the EMR, yet there is an evident knowledge deficit regarding the benefits it possesses and how the opportune documentation of information is extraordinarily critical to the care the patient receives. Moreover, it was addressed that education about the RI is needed, specifically on West Tower 10, one of the medical-surgical units at Bridgeport Hospital. The ultimate goal of this capstone project is to educate healthcare providers about the advantages and necessity of reporting nursing assessments, laboratory results, and vital signs in an accurate and timely manner. Using the RI, along with patient prospective rounding, healthcare providers can continue to be dynamic and systematic with the care of acutely ill patients and strive to improve overall outcomes.

Proactive Management of Delirium

Booth #100

Caitlin Villano '19

Faculty Mentor: Linda Roney

Abstract:
This research project focuses on the different approaches nursing staff can take to care for a delirious or acutely confused patient, specifically in the medical-surgical unit setting. Delirium at its most basic definition is an acute change in mental status. A person can be hyperactive, hypoactive or mixed, and this can occur at any age. Hyperactive delirium includes agitation and hallucinating which often causes the condition to be more easily identified and diagnosed. Conversely, hypoactive delirium includes lethargy, drowsiness, and inattention and as a result this type of delirium often goes undiagnosed for an extended period of time. The typical patient population of a medical-surgical floor consists of mature adults admitted for high severity illnesses. These patients may be on multiple medications and have a medical history of dementia. As a result, these clients are at an increased risk for developing delirium throughout their stay in the hospital. Delirium is an increasingly overlooked disorder that can result in long term cognitive impairment or in some instances, death. The evidenced-based practice included in this project addresses the importance of comprehending delirium as a disorder and the negative outcomes it has for patients. These include prolonged hospital stays, long-term cognitive impairment, and increased mortality. The evidence also reinforces the most effective interventions healthcare professionals should be implementing for patients in the hospital setting. Continual education for healthcare professionals of the importance of proper assessment and early interventions to prevent delirium is crucial in improving patient outcomes as well as increasing nurses' confidence in caring for delirious patients. In connection with the research presentation, a handout was created for the nursing staff on the unit Northwest 7 at Bridgeport Hospital including information on the most beneficial interventions to ensure prevention of delirium and confusion among patients.

Emergency Department Nurse Burnout

Booth #101

Chaffee Crowley '19

Faculty Mentor: Marian Villaflor

Abstract:
This research project focuses on burnout among Emergency Department registered nurses. The Emergency Department is evidenced to be a highly stressful workplace, which can lead to low job satisfaction and poor health outcomes among nurses. This research project analyzes evidenced-based literature to understand the prevalence, situational risk factors and negative outcomes associated with nurse burnout in the Emergency Department. Emergency Department nurses have one of the highest rates of burnout among healthcare professions due to the situational risk factors specific to the environment of an Emergency Department, such as high rates of workplace violence and secondary traumatic stress. In turn, burnout can have a negative impact on nurses, including decreased job satisfaction, hypertension, anxiety, and depression. Furthermore, this research project identifies and supports the use of active interventions to prevent nurse burnout, such as debriefing and yoga. Educating nurses on interventions to decrease burnout can increase job satisfaction and decrease the rates of poor health outcomes among nurses. Along with this research project, handouts were made for the Yale New Haven Hospital Emergency Department staff that included information on the prevalence, risk factors, negative outcomes, and interventions associated with burnout specific to Emergency Department nurses.

Improving Adherence to Quietness Initiatives

Booth #102

Kristen Gibney '19

Faculty Mentor: Marian Villaflor

Abstract:
The importance of receiving a sufficient amount of quality sleep time is a vital component of promoting a healthy lifestyle. When patients are admitted to a unit, getting enough quality sleep becomes a challenge that can impede their recovery and overall mental well-being. The disruptions to a patient's sleep can come from anxiety, scheduled medications, and mainly, a lack of quietness on the unit. It is a nurse's job to help implement ways that patients can get an adequate amount of sleep to improve the quality of their care. By setting up initiatives to make the floor a quieter place, both patient outcomes and the stress level of nurses can be improved. At St. Raphael's Campus of Yale New Haven Hospital, there are interventions in place to help achieve increased levels of quietness, but their patient satisfaction numbers in this area are still falling short. These initiatives include giving each patient a "Quiet Kit" which comes with earplugs, an eye mask, and headphones, keeping patient room doors shut, and dimming hallway lights at night. This research project will focus on ways to enforce the practices that are already in place and develop new ideas that will improve patient satisfaction with quiet levels on the unit.

Integrating Rothman Index into Novice Nurse Practice

Booth #103

Abbey Lawlor '19

Faculty Mentor: Marian Villaflor

Abstract:
The Rothman index is a tool used to monitor patients' well-being in the hospital. The Rothman Index is accessible from each patient's chart and uses vital signs, lab values, cardiac rhythm, and nursing assessments to present the result of either a pass or fail health status. By using the Rothman Index, new nurses can identify patients who are declining and activate the rapid response treatment if necessary.

Interdependency on Pain Management Improvements in Surgical Care Units

Booth #104

Tai Nguyen '19

Faculty Mentor: Marian Villaflor

Abstract:
On the bariatric floor of Main 6 at Yale New Haven Hospital St. Raphael Campus, patients are coming in after surgery with distress and anxiety while reporting moderate to severe pain. Nurses are granted the opportunity to assess and evaluate or determine the pain. Many postoperative strategies are available to manage and reduce postoperative pain. Yet the nurses' and patients' lack of knowledge regarding pain management, ineffective team communication, and the lack of use of alternative interventions all contribute to pain, thus impacting the patients' quality of life, length of recovery, and increase the risk of post-surgical complications. In the past and still today, pain management on floors relied profoundly on opioid and non-opioid as a way to eliminate pain. Patients who come to these floors only know about pain medications and are not taught to be aware of the other alternatives to better their health. This research serves as an educational tool for all nurses to implement and patients to seek to decrease pain. This evidence-based research being conducted relies on interdependency from everyone, not just the nurses and doctors. It encourages all patients to be more responsible and accountable for their pain, while allowing nurses to advocate for better pain therapy to improve health as a whole.

Prevention of Hospital-Acquired Delirium

Booth #105

Erin O'Brien '19

Faculty Mentor: Marian Villaflor

Abstract:
Hospital-acquired delirium is a very serious and common condition in older adults. Although it has become a frequent issue for older adults admitted to the hospital, it is often overlooked and undiagnosed. There are many risk factors that contribute to an older adults' likelihood of developing hospital-acquired delirium. Older age and a history of dementia are two non-modifiable traits that increase one's chance of acquiring delirium, but many risk factors can be prevented during a patient's inpatient experience. Medications, such as painkillers and sedatives, disturbed sleep/wake cycles, and/or poor nutrition and hydration are a few of the most common modifiable causes of hospital-acquired delirium. Nurses have a crucial role in preventing and recognizing the early signs and symptoms of hospital-acquired delirium. In doing so, nurses are able to improve the cognition and quality of life of their older adult patients. This research project will focus on reinforcing modifiable delirium prevention strategies at St. Raphael's Campus of Yale New Haven Hospital.

In-Patient Fall Risk Reference Guide

Booth #106

Erin O'Gallagher '19

Faculty Mentor: Marian Villaflor

Abstract:
Every in-patient at the Center for Musculoskeletal Care at Yale New Haven Hospital is categorized as high, moderate, or low risk for falls. Nurses are required to assess, document, and assign fall risk scores to each patient on a shift-by-shift basis using an evidenced-based fall risk algorithm called the Hester Davis Fall Risk Assessment. Based upon the score assigned by the algorithm, certain protocols are to be followed to ensure that the patient does not fall during his/her hospital stay. Because nurses take on multiple assignments and are tasked with many different duties, stress and fatigue lead to inaccurate fall risk scores and poor execution of precautionary protocols. This lack of focus increases the chance of having an in-patient fall. A handout, which outlines how to assign accurate fall risk scores using the Hester Davis Fall Risk Assessment and how to execute proper protocols, was created for nurses to reference throughout their shifts. This handout provides information on what to assess when assigning scores, how often these assessments are to be completed, and a detailed guide on what precautionary actions are to be taken for high, moderate, and low fall risk scores. This reference handout is aimed at reducing the incidence of in-patient falls and maintaining a safe hospital environment.

Alarm Fatigue Prevention

Booth #107

Maggie Sullivan '19

Faculty Mentor: Marian Villaflor

Abstract:
The Intensive Care Unit (ICU) is an environment in which patients need to be closely monitored, and where nurses must be prepared for any situation that may arise. ECG monitoring allows nurses to do this. However, alarm fatigue creates desensitization to alarms, and increases the number of deaths that occur in this setting, because nurses innately adapt to these noises. On Saint Raphael's Medical Intensive Care Unit (MICU) floor, nurses have expressed how alarm fatigue definitely impacts their daily roles as nurses. There are 16 beds on this unit, thus, 16 patients with ECG monitoring. Each nurse in the MICU cares for two patients, and knows what their patient's baseline is. Therefore, a nurse is subject to react quickly, or less emergent to a sounding alarm, based on knowledge of his/her patient. The alarm's purpose is to alert the nurses if his/her patient's condition is changing. However, "false alarms" occur regularly. ECG monitors are equipped to have up to 40 different alarms, to make each patient's care more individualized to a patient's condition. To prevent alarm fatigue, this research plans to educate the floor about the different parameters that can be set using a standard poster to help implement the individualization of each patient's alarm. The goal is to make nurses more aware of the ECG monitors' ability to detect what is most important for each patient to reduce alarm fatigue in a critical care setting.

BE FAST To Recognize The Signs and Symptoms of Stroke

Booth #108

Abigail Collins '19

Faculty Mentor: Michele Lecardo

Abstract:
Stroke is one of the leading causes of death and disability in the United States. Two types of strokes that will be looked at in this project are ischemic and hemorrhagic strokes. Ischemic strokes occur when a blood clot blocks blood flow to the brain while a hemorrhagic strokes occurs when a weakened blood vessel bursts and bleeds out into the brain. Both are medical emergencies and need to be treated rapidly. As the time between onset of stroke and treatment increases, millions of neurons in the brain are starved of oxygen and die. These dying neurons can lead to deficits in physical and cognitive ability, making completing normal activities of daily life difficult. Poor public knowledge of the signs and symptoms of stroke increase time between onset and treatment which leads to poorer patient outcomes and greater range of disabilities. This research project will focus on education for both patient and medical staff on the old FAST scale and the newer BE FAST stroke scale for prehospital recognition of stroke symptoms. The mnemonic FAST (face drooping, arm weakness, slurred speech, and time) is widely used to catch the early signs of a stroke and increase the likelihood of immediate treatment. FAST focuses on the anterior circulation of the brain and detects as much as 90% of strokes. However a portion of patients with ischemic strokes are not captured by the FAST mnemonic. By adding "balance" and "eyes" to the mnemonic, a higher rate of strokes can be captured in a timely manner. BE FAST leads to a decrease in the amount of strokes that are missed by just looking at FAST symptoms. Revision by both patients and medical staff is needed to include the teaching of balance and eye symptoms to catch more strokes in time for treatment.

DVT Prophylaxis

Booth #109

Kelsey Downey '19

Faculty Mentor: Michele Lecardo

Abstract:
This research project focuses on different approaches nurses can use to better educate patients on the pathophysiology of deep vein thrombosis and preventable actions. On the surgical floor of 7 East at Norwalk Hospital, the patient population consists of patients post surgery. Many of those patients have a decrease in mobility, making it more difficult for them to get up and move. As a result, those patients are at risk for DVT. Deep vein thrombosis occurs when blood is not properly circulating the body, causing a clot to form in the deep veins, many times in the lower legs. Evidence-based practice has showed that prophylaxis methods such as anticoagulants, compression pumps, and walking can reduce the risk of DVT. In the hospital, patients and family members have expressed little understanding of DVT and its prevention methods. A common question presented by patients is: “Are these heparin injections truly needed for my health? I do not understand why I am getting them so frequently.” In connection to the research presentation, a handout was created to educate patients and family members on the seriousness of DVT and the benefits of prevention methods.

The Importance of Nursing Education on the Differences Between Palliative Care and Hospice Care

Booth #110

Brittany Fasanelli '19

Faculty Mentor: Michele Lecardo

Abstract:
It has been observed at Norwalk Hospital on the medical oncology unit that there are several misconceptions regarding the differences between palliative care and hospice care between healthcare professionals. Many nurses believe that the terms “palliative care” and “hospice” are interchangeable and are synonymous with end-of-life care. Although palliative care is undoubtedly part of hospice, it is an independent service that provides symptom management and focuses on the goals of the patient throughout their entire disease process. Hospice is considered to be end-of-life care for terminally ill individuals who have a prognosis of six months or less to live. This common misconception among nurses and other healthcare professionals severely affects the chronically ill individuals who are being cared for. Nurses with a lack of knowledge about palliative care and hospice care services prevent their patients from receiving the best patient-centered care they deserve. If nurses were better educated on the differences between palliative care and hospice care, they would be able to identify the patients who would be considered candidates for palliative care services early on in their disease process; this would allow these patients to receive the full benefit of the services. This research project focuses on the importance of nursing education in terms of the major differences between palliative care and hospice care. The evidence-based literature included in this project will explain the differences between palliative care and hospice care, the importance of educating nurses on these two different services, and the benefits the education has on both the nurses and the chronically ill patients that are being cared for. In addition to this research project, a handout was created for the nurses to help them review the major differences between palliative and hospice care.

On-Q Pain Relief System and Patient Education

Booth #111

Maria Frisoni '19

Faculty Mentor: Michele Lecardo

Abstract:
Joint replacement surgeries and their post-operative phase can be very difficult for the patient due to the large amounts of pain they might have. Analgesics and narcotics are frequently prescribed to these patients to help alleviate and reduce the amount of pain experienced during the course of recovery. Many patients express concern in taking the narcotics prescribed to them because they are afraid of the risk of addiction and other side effects such as constipation and drowsiness. In order to reduce the use of narcotics for post-operative joint replacement patients, Norwalk Hospital has implemented the On-Q Pain Relief System. This system is intended to reduce the pain experienced by the joint replacement patients. The On-Q is a catheter that is inserted into the area of replacement during the surgery and is attached to a balloon filled with a local anesthetic. The On-Q stays in for three days after the surgery and releases the medication at a steady rate in order to block the nerves around the site of surgery. Patients are able to be discharged with the On-Q system and discontinue it in the comfort of their own home when the course of anesthetic is finished. Unlike narcotics that target and affect the entire body, the On-Q only targets the surgical site, which results in better pain relief, a faster return to normal activities, greater mobility, and a more comfortable recovery all around. Patient education for this type of system is imperative. Patients have to be ready and able to understand discharge instructions and be confident in discontinuing the system by themselves. Since these are elective surgeries, patients are able to be more prepared and receptive to the system due to scheduling and pre-op education.

How Implementing Proper Screening and Monitoring Can Better The Outcomes of Patients Diagnosed With Postpartum Depression

Booth #112

Brooke Harney '19

Faculty Mentor: Michele Lecardo

Abstract:
Postpartum depression is a major issue in maternal health and it is largely underreported. It is puzzling that such a major issue would remain so underreported. One of the reasons contributing to this paradoxical situation is that pre-screening is not implemented in all patients. On the postpartum maternity unit at Norwalk Hospital, the patients are women primarily in their late twenties and early thirties ranging in socioeconomic backgrounds who have given birth within the last five days. A nurse on the unit told me a story of a previous patient who had committed suicide following a silent battle with postpartum depression. This patient's story is why pre-screening is so important for both nurses and doctors to complete with mothers both antepartum and postpartum. While on the unit, I looked through many patient charts and found copies of the Edinburgh Postnatal Depression Scale in the charts of only a few patients, all of whom were patients of midwives versus OB-GYNs. This scale as well as other screening tools such as the Pregnancy Risk Assessment Monitoring System, which is a surveillance project headed by the CDC, should be utilized in the care of every postpartum patient. If these screening tools were properly utilized then there would be better outcomes for patients who suffer from postpartum depression. This research project focuses on the importance of nurses and doctors properly utilizing postpartum depression screening tools to better the outcomes of patients who suffer from this silent battle. The evidence-based research included in this project will explore the diagnostic criteria, screening tools, best time to screen, and cut-points for positive screening. In addition to this research project, a flyer on the importance of screening for postpartum depression and screening tools were created and provided for the nurses, doctors, and midwives on the maternity unit at Norwalk Hospital to implement better screening and therefore better outcomes for patients suffering from postpartum depression.

Patient Interpreter Services

Booth #113

Susana Miranda '19

Faculty Mentor: Michele Lecardo

Abstract:
Communication between healthcare providers and foreign language speaking patients can be ameliorated by utilizing patient interpreter services, such as the MARTTI. Patients with limited English proficiency (LEP) often cannot make appropriate decisions regarding their treatment and health because they are unable to understand what it is healthcare providers are communicating to them. Language barriers reduce the quality of care provided to patients, produce poor rates of medication adherence, and increase rates of hospitalizations. The disparity between LEP patients and those who speak English is worsened as medical interpreters continue to be underutilized by healthcare professionals. Without patient interpreter services, communication is ineffective between patients and caregivers. Furthermore, “ad hoc interpreters,” or family members, friends or other unqualified staff members, are readily available to translate for patients. As a result, facilities frequently overlook the need and importance for interpreter services. Studies have shown that when anyone other than a qualified interpreter is used, more mistakes, such as omitted information regarding allergies or prescriptions, are made. Evidence-based research proves that better care is provided and patients benefit when utilizing patient interpreter services. Therefore, it is vital to further educate healthcare professionals on how to use an interpreter and other interpreter services to overcome language barriers and continuous miscommunication. In order to ensure learning was accomplished, a presentation was held at Norwalk Hospital to clarify the importance of interpreter services and how to use them appropriately.

Educating PCU Nurses on Implementation of Intravenous Insulin Infusion

Booth #114

Megan Morgan '19

Faculty Mentor: Michele Lecardo

Abstract:
Many patients admitted to the Progressive Care Unit at Norwalk Hospital present with uncontrolled blood glucose levels as a result of poorly managed diabetes, or infection of new diagnosis, or result of stress. A diabetic patient in the hospital cannot manage his/her blood glucose personally; the nurse is required to perform routine blood glucose checks and administer insulin based on those levels. However, nurses are unable to use a sliding scale to administer insulin based on their patients' levels and are required to inform the doctor of the blood glucose levels. Once the doctor is informed, they then have to put an order in for the amount of insulin to be given to the patient. There are many concerns with this method of treatment since it causes delays, patient dissatisfaction and possible extended length of stay in the hospital. Evidenced based research demonstrates that implementation of intravenous insulin therapy with titration by nurses helps create a more fluid plan of care for this population of patients. The main purpose of this project is to create an understandable, straightforward education plan to teach nurses how to titrate insulin. There is a specific hospital protocol with how to titrate intravenous insulin that nurses will have to become familiar with in order to care for these patients. As a result of this, nurses on the unit will have increased confidence in providing safe, effective care while also increasing their independence and autonomy.

Endovascular Stroke Process of Norwalk Hospital

Booth #115

Amy Neenan '19

Faculty Mentor: Michele Lecardo

Abstract:
Norwalk Hospital is home to one of the nation’s first primary stroke centers. When a patient comes into the Emergency Department with a suspected ischemic stroke, there is a current stroke alert system in place that signals whether a patient is within the 0-6 hour stroke window (Level 1 Stroke Alert) or 6-24 hour window (Level 2 Stroke Alert). This policy, based off the DAWN trial (2018), decides whether a patient qualifies for endovascular treatment. When a patient comes to the ED, the time elapsed since the stroke may not be known to the patient or the health care providers. Level 1 Stroke patients differ from Level 2 Stroke patients in terms of clinical presentation. This project will educate nurses in the Norwalk Hospital Emergency Department on the clinical manifestations for the 0-6 hour patient versus the 6-24 hour patient to ensure the correct stroke alert is activated so that the staff and stroke team members are able to provide the best care possible.

Patient-Controlled Analgesia for Management of Postoperative Pain

Booth #116

Chelsey Arling '19

Faculty Mentor: Patricia Lamb

Abstract:
Oftentimes when patients receive a diagnosis that involves undergoing surgery, one of their main concerns is the management of post-operative pain during the healing process that follows. This project focuses on patient education involving the use of one of the most common forms of pain management, patient controlled analgesia (PCA). After observing the orthopedic post surgical population at Stamford Hospital, it was apparent that many patients needed further education involving patient controlled analgesia. The main focus preoperatively is to ensure patients are provided proper education about what it is, the benefits and importance of using PCAs compared to other modes of pain relief, how it works, possible side effects, and safety measures and concerns. PCAs are a patient controlled on-demand delivery system of titrated intermittent opioid medication given intravenously, which allows for the optimal state of analgesia to be achieved when in severe pain. This analysis will further touch upon how findings have shown to improve pain management with the use of PCAs. As a result, there has been a noticeable decrease in patients' risks such as infection, trouble breathing, muscle spasms, and heart attack. This showed increased patient satisfaction along with improvement in the use of nursing resources. Aside from the efficacy and benefits of using PCAs, many are uneducated about the possible side effects of opioids such as respiratory depression, constipation, and nausea. Additionally, there is a continuous concern about safety and what interventions are in place to help prevent overdose or misuse of the device. This analysis will delve into each of the topics mentioned above involving patient controlled analgesia, and will also address in full detail what patients and families need to know before using this form of pain management.

Importance of Proper Body Mechanics and Prevention of Injury for Healthcare Personnel Working with Heavy Patient Populations

Booth #117

Katherine Barber '19

Faculty Mentor: Patricia Lamb

Abstract:
Despite the study and practice of body mechanics in undergraduate and graduate nursing programs, incorrect body mechanics while moving, transferring, and assisting patients on a floor with heavy patient population can still cause great injury to registered nurses, nursing assistants, and other unit staff. Although staff injury due to use of improper body mechanics is entirely preventable, the nature of nursing and hands on patient care produces valid reasons for its occurrence. A common reason why healthcare personnel use improper body mechanics is to save time in such a fast paced and even hectic type of work. Another common reason is that body mechanics may not be emphasized for nurses and other unit staff who do not commonly deal with a heavy patient population. Through mixed methods of secondary data analysis and observation of the Van Munching Rehab Unit of Stamford Hospital, the importance of proper body mechanics for the safety of staff has become apparent. The skill of proper body mechanics can be overlooked in regular everyday practice. Evidence shows that short reviews for Certified Nursing Assistants (CNAs) increased patient handling confidence and led to prevention of injury. For units that utilize float nurses and other float staff such as nursing assistants who do not commonly work with heavy patient population, it may be beneficial to have a visible reminder of the proper methods of transferring and assisting patients and its importance to prevent injury. The evidence supports that improper body mechanics still cause preventable staff injury and that a visible reminder could be used to decrease this number and keep staff safe.

Patient Fall Prevention on Med-Surg Units

Booth #118

Autumn Boyce-Sarlo '19

Faculty Mentor: Patricia Lamb

Abstract:
This capstone project focuses on preventing patient falls and fall-related injuries that occur on med-surg units throughout hospitals. Patient falls and fall-related injuries have been a persistent hospital acquired condition and have been identified as a national patient safety goal by the Joint Commission. The participants in this study are postoperative patients who have undergone a variety of surgeries such has spinal, hip, knee, and shoulder replacements. The evidence based literature included in this project identifies both internal and external factors that increase the risk of patient falls on med-surg floors. Internal factors included in the literature are advanced age and certain medical conditions such as cognitive impairments, impaired mobility and hypertension. External factors include how the hospital unit is structured and organized and the nursing process implemented by the staff. The literature also provides a valid instrument known as the Banner Mobility Assessment Tool that has been proven to reduce falls and increase the utilization of safe patient handling equipment. In addition, the evidence-based literature outlined effective fall prevention programs and interventions such as; risk assessments, purposeful hourly rounding, video surveillance, patient education, staff education and training. Educating the staff about factors contributing to patient falls and effective nursing interventions is crucial to successfully preventing this hospital acquired condition. In order to reach this goal, a educational poster was created for the nursing staff on Greenwich Hospital’s med-surg floor. The poster identified key evidence based nursing interventions that enable safe patient handling.

Improving Patient Acuity Assignment in the Emergency Department

Booth #119

Mary Carolan '19

Faculty Mentor: Patricia Lamb

Abstract:
In the Emergency Department, triage is a vital step in the admission process, where the nurse determines the acuity of patient illness. Prior to 2002, many Emergency Departments nation wide used an acuity scale such as 1) emergency 2) urgent and 3) non-urgent. Now, however, many institutions, such as Greenwich Hospital, have offered educational classes on a more comprehensive scale known as the Emergency Severity Index (ESI) model, which includes five levels of patient acuity. In the Emergency Department at Greenwich Hospital, multiple staff nurses supported the idea that acuity levels are assigned to patients without careful consideration of the severity of presenting conditions and the amount of resources that will be required to stabilize the patient in the emergency setting. In order to promote an accurate acuity assignment to each patient, a badge buddy card with ESI components has been created to serve as a convenient tool for the nurses to determine patient acuity based on the ESI guidelines. The badge states the five levels of the acuity scale with an explanation of each acuity level. The badge buddy provides a convenient, time saving tool to be used by nurses to properly prioritize each patient situation.

A Review for NICU Nurses: Treating Infants with Neonatal Abstinence Syndrome

Booth #120

Jenna Castro '19

Faculty Mentor: Patricia Lamb

Abstract:
In the Neonatal Intensive Care Unit (NICU) at Greenwich Hospital, there is a need to review Neonatal Abstinence Syndrome (NAS) and the protocol for treatment. This need exists due to the low incidence of this patient population at Greenwich. NAS is a term used for neonates who are born to a mother who used substances such as opioids, benzodiazepines, or selective serotonin reuptake inhibitors throughout her pregnancy. When the baby is born he or she is at risk for drug withdrawal. According to research, treatment is based on the infant's signs and symptoms of withdrawal. The first line of treatment is generally nonpharmacological actions such as tight swaddles, gentle rocking, and frequent feedings. If the baby is not tolerating these actions the healthcare team may then discuss the need for pharmacological actions such as morphine or methadone. A reduced familiarity with this population or the hospital's protocol for treatment of these patients may lead to inadequate or improper care for the infant. Therefore, the design of the project is to review evidenced-based research to increase awareness of the protocol as well as when to use non-pharmacological versus pharmacological actions when treating an NAS patient. As a result of the research, a review of NAS and its treatment protocol has been presented and reinforced to the staff in the NICU at Greenwich Hospital.

The Benefits of Non-Pharmacological Interventions for Patients with Heart Failure

Booth #121

Shadea Foster '19

Faculty Mentor: Patricia Lamb

Abstract:
Heart failure today is a significant health problem, as prevalence continues to rise. It has the ability to affect the patient and can become a strain for loved ones as well. Over time, quality of life and performing ADLs can pose a challenge. Non-compliance with medication continues to be an issue within this population, often leading to readmission. With a poor prognosis, pharmacological treatments alone do not necessarily help to improve a person's quality of life with this diagnosis. Pharmacological treatments, in conjunction with non-pharmacological interventions, can have a positive impact on one's functional capacity, as well as morbidity and mortality rates. Non-pharmacological interventions include diet and nutrition, exercise, smoking cessation, and immunizations. Salt and fluid restriction work wonders in patients who are already severely fluid overloaded. Patient education on moderate alcohol consumption should be advised, unless it's suspected that the patient also has alcohol related cardiomyopathy. Patients need education in regards to smoking considering the fact that it tends to reduce cardiac output. In more stable clients, physical activity should be encouraged, as long as it does not induce symptoms. Consider influenza and pneumococcal vaccinations also for patients because their condition can easily be exacerbated by pulmonary infections.

Median Arcuate Ligament Syndrome (MALS) Education

Booth #122

Sarah Kohaut '19

Faculty Mentor: Patricia Lamb

Abstract:
Median Arcuate Ligament Syndrome (MALS) is a rare and difficult condition to diagnose due to its non-specific symptoms. Patients with MALS experience extreme abdominal pain, weight loss, and abdominal bruit because the celiac artery is being compressed by the median arcuate ligament. Normally, the ligament crosses superior to the celiac artery. With MALS, the compression of the artery causes stenosis leading to the abdominal pain. Dr. Hsu at Stamford hospital is a surgeon who preforms the corrective surgery for MALS. The post-operative patients are sent to the tenth floor for recovery. The staff there is faced with the challenge of remembering information on these rare patients in order to care for them. It is important for nurses and other staff to be aware of what their patient's diagnosis entails and the treatment they have received. A flyer was created to be placed in the staff common areas as a reminder of the key components of MALS. With continuous exposure to these facts the staff will be able to recall details more easily, allowing them to save time by eliminating the need to review MALS. Furthermore, it will enable them to give higher quality care to MALS patients.

Preventing Hospital-Acquired Delirium in Oncology Patients

Booth #123

Julia Kolano '19

Faculty Mentor: Patricia Lamb

Abstract:
Hospital-acquired delirium is a problem that seems to affect many patients in the Intensive Care Unit setting, but this sort of delirium also seems to affect many patients who are in the hospital for long periods of time. These patients that are in the hospital for long stretches of time tend to include oncology patients. These patients can be in the hospital for months at a time, constantly receiving treatment or being treated for other issues associated with the cancer. Hospital-acquired delirium can occur due to many factors; medications, dehydration, and poor nutrition. Oncology patients are receiving high doses of chemotherapy at one time that is knocking down their immune system, putting them at a high risk for infections, which is a main risk-factor for developing hospital-acquired delirium as well. On the medical-oncology unit at Greenwich Hospital, many patients are not informed that this sort of delirium can occur, and it is almost too late for the nurses to correct the delirium once it has already occurred. Educating both the patients and nurses about both pharmacology and non-pharmacology methods to reduce the risk for hospital-acquired delirium will greatly benefit the patients and families who are dealing with a difficult disease already. Education was provided to the nurses regarding signs and symptoms of hospital-acquired delirium and ways to lessen the occurrences on oncology units.

Signs and Symptoms of Domestic Violence and Available Outreach Programs

Booth #124

Brianna Napoli '19

Faculty Mentor: Patricia Lamb

Abstract:
Domestic violence has a destructive influence on society, affecting women, children, and families across the globe. In the healthcare field, nurses and primary care physicians are often the first to encounter the signs and symptoms of abuse. Signs and symptoms including frequent bruising, injuries that have an inconsistent explanation or that are attributed to a multitude of excuses, patients withdrawn and reserved, fearful and quiet around abuser, apprehensive, have a loss of interest in daily activities, and discuss or attempt suicide are often overlooked and misdiagnosed. It is crucial for healthcare providers to acknowledge these symptoms to assist in providing available outreach programs. Focusing primarily on Stamford's Immediate Care Center, expanding the number of programs readily available is crucial in the safety of those mistreated. Besides Safety Planner, a crisis line that develops a safety plan to aid the victim in anonymous transportation and shelter, Immediate Care has limited resources for supporting those experiencing domestic violence. With a multitude of programs obtainable and readily accessable, places similar to the Immediate Care Center can be the first-line of halting domestic violence and the beginning of healing.

Educating Families on End-of-Life Care: Importance of Early Patient and Family Education

Booth #125

Grace O'Hara '19

Faculty Mentor: Patricia Lamb

Abstract:
The end of life is a critical period that is highly emotional and a source of extreme stress for both the patients and their families. Families are forced to make swift decisions about their critically ill loved ones, while simultaneously trying to cope with the intimidating setting of the ICU. This strain felt by the families can be exacerbated, particularly in the critical care setting, when the patient's wishes are not clear, the patient is unable to verbalize his or her preferences in regards to care, or there are misconceptions about the concept of palliative care. The uncertainty surrounding goals of care can often cause a delay in the transition from curative care to comfort care, leaving the patient in pain and subject to unnecessary procedures. This issue is one that has been noted on the unit in Greenwich Hospital, as many of families are unsure of their loved one's medical preferences or have a negative connotation of the introduction of palliative care. Evidence-based practice shows that through early patient and family education, many of the emotions surrounding ambiguity can be alleviated and patients can gain a sense of control. It is when patients are informed about topics such as advanced directives and palliative care that the burden felt by the family can be eased and the patient can have a clear outline of the type of care they wish to receive. But, there are still many barriers to these types of early interventions such as, reluctance to discuss the issue, difficulty discussing own mortality, and concern that pain management may not be important if they have an advanced directive. It is through evidence-based literature that an in-service educational session will be provided to patients and their families about the importance of discussing end-of-life care prior to entering the critical care setting.

The use of Pharmacological Pain Interventions versus the Use of both Non-Pharmacological and Pharmacological Interventions in Cancer Patients

Booth #126

Olivia Peifer '19

Faculty Mentor: Patricia Lamb

Abstract:
Many cancer patients experience excruciating amounts of pain, not just physically, but emotionally as well. On the oncology floor at Greenwich Hospital, many of the patients are receiving around-the-clock pain medications. Many of these patients are terminally ill, some being treated with palliative or hospice care. In addition, non-pharmacological interventions, such as heal-touch therapy, can be very useful as well with relaxing patients to help with their anxiety over their diagnosis, which helps improve their physical and mental health. Thus, the overall purpose of this research study is to compare the use of pharmacological pain interventions with the use of both non-pharmacological and pharmacological interventions in cancer patients. The study will determine if one intervention is more or less effective than the use of both interventions. At the end of the study, the evidence-based research will determine which intervention is more successful with relieving each patient's pain. Once it is established which intervention is more effective, there will be education to the patients and staff members about what intervention should be used when caring for the cancer patients.

Effectively Reporting Handoff When Transferring Patients from a Labor & Delivery to Postpartum

Booth #127

Toni Prato '19

Faculty Mentor: Patricia Lamb

Abstract:
The Joint Commission defines patient handoff as “a transfer and acceptance of patient care responsibility achieved through effective communication” (The Joint Commission, 2018). Handoff communication between nurses is a critical part of patient care when transferring patients from a labor and delivery unit to a postpartum unit. Safety and effectiveness of patient care are two factors that are considered when transferring patients between these units (Shahid & Sumesh, 2018). In 2015, the Joint Commission assessed 936 sentinel events and found that 70% of these events were caused by faulty communication between healthcare professionals (Shahid & Sumesh, 2018). Due to the wide variety of handoff techniques and styles of communication nurses use, errors during handoff report often occur (Shahid & Sumesh, 2018). Important information specific to labor and delivery to postpartum nurse handoff includes the transferring of patient’s current running fluids, pain medications administered, anesthetic use during delivery, and intake and output. Most of the time, nurses conduct handoff on their patients solely from what they remember. However, handoff given through this technique is affected by the healthcare professional’s fatigue, staff interruptions, memory load capacity, multitasking ability, and communication issues (Abraham, Kannampallil, Patel, Almoosa, & Patel, 2012). To help prevent detrimental patient outcomes, handoff tools are helpful. The thoughts of the nursing staff on the labor and delivery and postpartum units at Greenwich Hospital align with the research presented regarding problems during handoff report. Therefore, further research will be conducted to determine what type of specific patient information is needed on a nursing handoff tool when transferring patients from a labor and delivery unit to a postpartum unit. This type of tool will promote a more effective and therefore safer way of conducting handoff between these maternal newborn units at Greenwich Hospital.

Educating the Pediatric Population on Vitamin D Deficiency

Booth #128

Gianna Ricchezza '19

Faculty Mentor: Patricia Lamb

Abstract:
This project focuses on vitamin D deficiency within the pediatric specialty, with a concentrated setting of an outpatient clinic that provides care to an underserved population. Vitamin D deficiency is a global issue, and is particularly a concern among the pediatric population. The pediatric body requires sufficient levels of vitamin D to protect against conditions such as rickets, cardiomyopathy, seizures, and poor bone mineralization. At-risk groups should take vitamin D supplements at a dose recommended by their provider. Some examples of at-risk groups are those with limited sun exposure and pigmented skin, as well as those whose mothers had vitamin D deficiency intrapartum and those with poor diets lacking in vitamin D. The literature confirms that sunlight is the primary source of vitamin D. It can also be found in foods such as red meat, oily fish, egg yolks, and fortified breakfast cereals. Properly educating families using layman's terms on dietary sources of vitamin D and safe sun exposure to promote bodily absorption of vitamin D is imperative to enhance compliance. Sufficient vitamin D levels will promote healthy bone structure and protect against the conditions listed above. To facilitate a comprehensive education process, a reference sheet was created for the Greenwich Pediatric Outpatient Clinic staff to utilize when educating families on vitamin D deficiency.

The Healing Power of Music

Booth #129

Maria Vero '19

Faculty Mentor: Patricia Lamb

Abstract:-
Cancer is a debilitating and depleting disease. Despite the fact that many give their all to try and fight, it is exasperating to remain positive while overcoming such an illness. Patients commonly fall to the depths of despair resulting in mental health disorders such as anxiety and depression. In conjunction with these mental health disorders, many patients may experience an increase in pain as their disease progresses. This research project focuses on music therapy and the advantages it can have for cancer patients. Evidence based research has found that music therapy can reduce pain and enhance the mental health status of a patient by significantly reducing anxiety and depression. This support helps patients as they continue through this difficult chapter in their lives. In the Bendheim Cancer Center, various alternative therapies are offered, however music therapy is not one of them. Therefore, a hand-out was distributed to educate the nurse manager and staff regarding the powerful impact musical therapy exhibits. Additionally, it explained why this form of therapy is essential when caring for this specific patient population. To further demonstrate the positive impact, a violinist was brought into the cancer center to play for the patients receiving chemotherapy. The staff was able to see firsthand how effective this form of therapy is and how it can increase the overall quality of a patient’s life.

What to Expect After Expecting: A Guide to the Postpartum Baby

Booth #130

Danielle Wight '19

Faculty Mentor: Patricia Lamb

Abstract:
Women following birth tend to be dissatisfied with their new body figures as many still look "pregnant" when leaving the hospital. This can be discouraging and upsetting for women who were unaware of this reality and are not educated on a realistic time frame in which this weight is lost following pregnancy.

Know Your Drugs: Patient Education for Medication Adherence

Booth #131

Hannah Anderson '19

Faculty Mentor: Rachel Kinzler

Abstract:
Before a patient is discharged, nurses conduct a review of medications, follow up appointments, and post-care that patients are to follow at home. The current practice in place includes an instruction packet, a medication list, and various education for post-procedure care. After going through this paperwork, the nurse then prompts the patient to sign a form stating the nurse went over all necessary information. While this current practice is not entirely problematic, it is also not perfect. In recent patient- report surveys, patients have highly rated the hospital for its care and nursing capabilities; however, patients have marked unsatisfactory ratings in regards to medication education. Research has shown that patient education and understanding is critical for medication adherence post discharge. Equally as important, educating healthcare professionals on the benefits of patient education and helping build it into their patient care is crucial in enhancing patient health outcomes. In conjunction with an educational in-service, a checklist was created to aid the nurses in ensuring their patient understands all the care and medicine they are receiving.

Save the Trach! Maintaining Safety in Tracheostomy Management

Booth #132

Kate Brown '19

Faculty Mentor: Rachel Kinzler

Abstract:
Background: Annually, more than 100,000 people undergo a tracheostomy procedure in the United States. Tracheostomies are needed to facilitate secretion management of a traumatized airway, to bypass an obstruction of the airway, or to deliver more oxygen to the lungs. While under general anesthesia, a surgical tracheostomy is performed between the second and third tracheal rings. Post-operatively, the nurse is responsible for providing tracheostomy care to ensure airway patency and for maintaining the ability to respond swiftly in the event the patient experiences airway loss. Objective: To identify potential risks for airway compromise among patients hospitalized with a tracheostomy. I am learning, practicing, and discussing best management of trach care with patients that have a tracheostomy. On a local trauma surgical unit where I am completing my nursing capstone training and project, I am acutely aware of the increased vulnerability of clients' breathing through the medical device of a trach. I would feel more reassured about patient safety if a tracheostomy insertion tray and an extra tracheostomy kit were placed at the bedside of each patient identified with a tracheostomy. Methods: A preliminary literature review was conducted using the search term "tracheostomy death" to identify the evidence on the ultimate airway risk associated with tracheostomy. A systematic review by Klemm & Nowak (2017) included articles published from 1990 to 2015 and is based on the largest number of deaths and the largest number of tracheotomies performed evaluated in one document. Results: In the past two decades, the majority of the identified 352 tracheostomy-related deaths were associated with surgical procedures. However, 12% of tracheostomy-related deaths were associated with post-operative airway loss. Expected Outcomes: There is the potential for the patient with a tracheostomy to experience airway loss. The project highlights the importance of maintaining appropriate trach replacement equipment and functional airway suction at the patient’s bedside to adequately provide a layer of preparatory protection in the event of emergent

airway loss. Having specific nurse training regarding monitoring and management of patients with tracheostomies is essential to avoid life-threatening complications, promote patient safety, and minimize risk of airway loss.

Neonatal Hypoglycemia

Booth #133

Michaela Cottam '19

Faculty Mentor: Rachel Kinzler

Abstract:
Neonatal hypoglycemia is common in newborns born to diabetic mothers. Yale Maternal Fetal Medicine treats women with high risk pregnancies, many of which are complicated by gestational diabetes. There is often a lack of knowledge, due to a recent diagnosis of diabetes and complexity of the disease. While working with the diabetes nurse educator and the manager on the unit, it is evident that there is a need for further patient education on how maternal diabetes affects the newborn after birth. Information was collected from nurses on the unit about previous experiences with diabetic mothers. The mothers were often surprised when their children were born hypoglycemic and had to receive heel sticks and close monitoring, sometimes resulting in a transfer to the NICU. The evidence-based research included in this project addresses the effects and treatment of hypoglycemia in neonates, the benefits of bonding and feeding babies at risk for hypoglycemia promptly after birth, and the importance of diabetes education for mothers. In connection to the research presentation, a first draft of a pamphlet was made in close collaboration with the diabetes nurse educator, that contains a brief explanation of hypoglycemia, what mothers should expect at birth, and ways that mothers can regulate their blood sugars to be in a safe range for their babies. The goal of this pamphlet is to educate mothers and prepare them for possible complications in relation to neonatal hypoglycemia, as well as motivate them to monitor their blood sugars closely throughout the last months of pregnancy in order to promote the best outcomes possible.

The Use of Verbal De-escalation to Decrease Incidences of Physical Aggression on a Psychiatric Unit

Booth #134

Mary Eliseo '19

Faculty Mentor: Rachel Kinzler

Abstract:
In the inpatient psychiatric setting, verbal aggression can easily escalate into physical violence when a patient is distressed. This is particularly true on an adolescent unit, where aggressive behavior is a main reason for hospitalization. The role of the psychiatric nurse is primarily to maintain the safety of all patients on the unit while ensuring the milieu remains therapeutic. Verbal de-escalation by means of therapeutic communication is an effective way to prevent violence when a patient is emotionally distressed. When a nurse's response to an upset or angry patient is not therapeutic, it can further escalate the situation by triggering the patient. This leads to an increase in violence on the unit, which in turn leads to emotional burnout and frustration for the nursing staff. Nurses on the adolescent unit at Yale Psychiatric Hospital report an increasingly aggressive patient population in recent months that has been frequently unresponsive to verbal de-escalation attempts. A need for further education regarding the most effective and therapeutic verbal de-escalation techniques was addressed in an in-service learning session on the unit. This education allows nurses to ultimately prevent emotional burnout and frustration by reducing the number of physically aggressive outbursts on the unit.

Pressure Ulcers in the Intensive Care Unit

Booth #135

Katherine Kearins '19

Faculty Mentor: Rachel Kinzler

Abstract:
This research paper focuses on pressure ulcer prevention and treatment in the intensive care unit setting. Patients in intensive care units are at high risk for pressure ulcers due to complex diagnoses, decreased mobility, and circulatory impairment. Evidence-based literature focuses on interventions that can be implemented to prevent the development of a pressure ulcer. Prevention methods include risk assessments, turning schedules, adequate nutrition, proper linen use, and education. Education of nurses and the interdisciplinary team is necessary for implementation of prevention strategies. Furthermore, evaluation of the effectiveness of implementation strategies and compliance on the floors are needed to see if education was adequate. Evidence-based research emphasizes the effectiveness of silicone foam dressings for the prevention of pressure ulcers. If a patient develops a pressure ulcer, nutrition and hydration are vital components to promote wound healing. Evidence-based literature explains the importance of moist wound dressing for the care of a pressure ulcer. Education of healthcare professionals on current evidence-based prevention methods and treatment is essential to decrease rates of pressure ulcers in intensive care units.

Ways to Promote Mobility on a Medicine Unit

Booth #136

Ann McBride '19

Faculty Mentor: Rachel Kinzler

Abstract:
This research project focuses on patients' mobility throughout their stay at the hospital, specifically on a medicine unit. Many medicine units are scored on whether or not their patients had been ambulating. The scoring comes from what has been charted. In every hospital, "if it wasn’t charted it wasn’t done," so this can affect the final scores. When nurses have their patient assignments they try to have the patient set a goal or something achievable for the shift, such as ambulating the hallway or moving from the bed to the chair. In certain situations patients may need referrals to physical therapy and/or occupational therapy to work to get stronger and achieve optimal outcomes. Furthermore, in the evidence-based practice having patients ambulating throughout their stay at the hospital shows it can lead to effective referrals, better health and increased mobility scores. Educating healthcare professionals on the benefits of ambulating patients is crucial during the stay and discharge of a patient. This research will be presented to one of the medicine units at Yale New Haven Hospital in order for the floor nurses to hopefully improve their scores as well as the patients' health.

Know the Signs: Identification and Management of Hypertensive Disorders in Pregnancy

Booth #137

Emma Stringer '19

Faculty Mentor: Rachel Kinzler

Abstract:
Hypertensive disorders during pregnancy are on the rise. This research project focuses on the management of gestational hypertension and how to properly identify the warning signs of preeclampsia, which can occur during pregnancy or in the postpartum period. Gestational hypertension and preeclampsia are leading causes of maternal and fetal morbidity and mortality. In multiple countries around the world including the U.S., there has been an increase in the rates of maternal deaths due to hypertensive disorders. At Maternal Fetal Medicine, part of Yale New Haven Hospital, a large number of patients experience chronic hypertension during pregnancy or gestational hypertension and are at risk for developing preeclampsia. Therefore, it is imperative for patient safety for nurses to understand the up-to-date identification and management guidelines of hypertensive disorders. By also understanding all of the warning signs of preeclampsia, nurses will be able to prevent eclampsia from occurring. Furthermore, it is imperative for nurses to know the updated management practices as well as the emergent treatment therapies for eclampsia. The evidence-based literature in this research project shows up-to-date guidelines for identifying the warning signs and management of gestational hypertension and preeclampsia. Additionally, the evidence identifies the ideal management practices for hypertensive disorders and eclampsia. In order to educate the staff about the conducted research, a nursing staff in-service was performed and a handout with a summary of the findings was provided.

Palliative and Hospice Care In Pediatric Critical Care Patients

Booth #138

Brooke Matthews '19

Faculty Mentor: Rachel Smith

Abstract:
The use of palliative and hospice care in pediatric patients is far less prevalent when compared to adult populations. The lack of knowledge regarding differences between these two types of care serves as a barrier to the initiation of these services. Palliative care benefits the patient most when introduced at diagnosis; improving quality of life and integrated with curative treatment. Hospice care is introduced when the prognosis is six months or less and does not include curative treatment. In the Pediatric Intensive Care Unit (PICU) at Yale New Haven Children's Hospital, many patients are diagnosed with either life-limiting or life-threatening illnesses who can benefit from either palliative or hospice care. Early introduction of palliative care not only provides physical and psychosocial comfort but can also alter the trajectory of the patient or family's decisions. The Registered Nurse (RN) is often the individual having informative conversations with the patients and families. A nursing in-service meeting was held to educate and provide information on both services. In addition, a comparison chart was created to serve as a resource to the nursing staff. This session was held informally as nurses were free to ask for information. As a result, the RN will be able to provide consults and education for the patient to improve quality of life.

Presentation and Prevention of Myocardial Infarction

Booth #139

Kelly Kristiansen '19

Faculty Mentor: Rose Iannino-Renz

Abstract:
Many patients are unaware of the presentation of a myocardial infarction (MI), especially as they can have atypical presentations. Due to patients being unaware of the signs and symptoms of a MI, they could ignore their symptoms as being insignificant. This can delay transport to the hospital or a call to 911. On the telemetry floor at Saint Vincent's Medical Center, there has been an observed gap in patient knowledge with respect to the signs and symptoms of an MI. This research project will focus on patient education for the presentation of an MI in males versus females as well as further prevention once admitted to the hospital for a subsequent MI. By educating patients on presentation and prevention of MI, it will increase the likelihood of patients seeking assistance earlier as well as decrease the likelihood of re-admission. The evidence-based practice supports that even if patients have heart disease, they can still improve their heart health and reduce their risk for another heart attack. Some interventions such as quitting smoking, eating healthier, controlling one's blood sugar and blood pressure, and increasing exercise will improves one's heart health. A handout will be provided to nurses to increase thoroughness of patient education prior to discharge. The handout will be specific to presentation and prevention of MI.

Postpartum SBAR Tool

Booth #140

Elizabeth Marrero '19

Faculty Mentor: Rose Iannino-Renz

Abstract:
Communication during the change-of-shift report is key to giving efficient patient-centered care. In this project, change-of-shift report given by the postpartum nurses at Saint Vincent's Medical Center at the Family Birthing Center was examined. At this facility, giving and receiving report was a concern among the postpartum nurses. This facility's standard was to give oral change-of-shift report at the nurse's station with no adopted format. Due to the current way of giving and receiving report, there were frequent incidents observed, which included miscommunication, unnecessary details, and not enough information. These occurrences led to important details being missed. The evidence-based literature has shown that the use of SBAR reporting improves communication, increases patient safety, encourages teamwork, and keeps change-of-shift report organized and efficient. SBAR assists nurses to identify the situation, provide clear and relevant background information, show the assessment of the situation, and include what patient recommendations the nurse has for the oncoming nurse. Therefore, a SBAR report tool was created to help the postpartum nurses communicate and care for patients more effectively.

Learn What's on the CAM Menu

Booth #141

Brianna McCleary '19

Faculty Mentor: Rose Iannino-Renz

Abstract:
Background: Studies have shown that the CAM measures of aromatherapy, massage, and music are successful for impacting cancer pain. The literature shows that CAM therapies are viable therapeutic options for pain management, insomnia, anxiety, and depression. Ultimately, nurses can create an environment of relaxation and healing touch. Objective: To develop a suggested CAM menu that lists existing hospital and community resources. The use of this nurse tool detailing alternative therapies for managing discomforts has the potential to increase use of CAM. Methods: The National Center for Complementary and Integrative Health database was searched for access to CAM services, costs, and evidence of patient safety. Results: Those who had been diagnosed with cancer were more likely to use CAM for general wellness, immune enhancement, and pain management. Some complementary health approaches, such as acupuncture, massage therapy, mindfulness-based stress reduction, and yoga helped people manage cancer symptoms or treatment side effects and improve their quality of life. Expected Outcomes: A pilot CAM menu listing available free resources was developed. Posting a suggested CAM menu that lists available hospital and community therapies may increase nurse implementation of CAM when providing care to patients with cancer.

Teaching the Importance of Dialysis Adherence to Prevent Hospital Readmissions

Booth #142

Anjali Pillai '19

Faculty Mentor: Rose Iannino-Renz

Abstract:
Readmissions are a recurrent problem in the hospital. This research project focuses on dialysis readmissions seen in the observation unit at Saint Vincent's Medical Center. There are a growing number of patients who fail to comply with treatment and consequently are readmitted due to complications. As readmission rates increase, patients are less likely to effectively manage care independently and comprehend the responsibilities of their diagnosis. The evidenced-based literature supports the importance of adherence to dialysis treatments in order to prevent complications of chronic kidney disease as well as increasing costs due to re-hospitalization. In addition, research emphasizes understanding the patients' reasons and related psychological factors as to why they are delaying care. This is integral to early intervention and consistency in care. Providing an educational session for nurses is essential as it teaches proper assessments to determine patients' self-efficacy and psychological factors related to non-adherence. Furthermore, the educational service recommends effective interventions the nurses can offer to their patients that include cognitive behavioral therapy, telehealth technology and the importance of open communication and frequent follow up with the patient at home. This educational program will allow nurses to communicate effectively to their patients regarding non-adherence and implement patient-centered interventions.

The Impact of Nutrition and Exercise on Cardiac Disease

Booth #143

Joanna Sokolovic '19

Faculty Mentor: Rose Iannino-Renz

Abstract:
Many times, when a patient is diagnosed with heart disease, he/she lack the knowledge of the importance of a healthy lifestyle. If every cardiac patient was thoroughly educated on the significance of leading a healthy lifestyle through diet and exercise, this could decrease the number of medications patients are on as well as improving patient care. On the cardiac floor at Saint Vincent's Medical Center, the inpatient rooms often fill with knowledge-deficient patients who assume that taking medications or "having the surgery" will completely heal them of their heart disease. The patients at times admit that they feel uneducated and do not seem to understand the benefits of living a healthier lifestyle. The role of the registered nurse is to promote a healthier lifestyle for patients by educating the patient on the importance of nutrition and active lifestyles. Many of the staff members on the unit agreed that the patient's lack of knowledge is a common issue on the unit. In order to foster widespread education for the patients, an in-depth research poster will provide education for the nursing staff so that they can relay this information to their patients and their families. Evidence-based research supports that education regarding diet, exercise, and lifestyle promotes a healthier lifestyle, rather than treating cardiovascular disease with medications and surgical interventions.

Long Term Effects of Propofol and General Anesthesia on the Developing Minds of Infants and Toddlers

Booth #144

Jessica Flamio '19

Faculty Mentor: Ryan Keenan

Abstract:
The Department of Sedation Services at Connecticut Children's Medical Center (CCMC) delivers exceptional care to a variety of medically complex pediatric patients. This specialty area provides procedural sedation and anesthesia for a multitude of procedures on children. Many of these children often undergo recurrent procedures for their special needs. These intricate procedures can often cause discomfort, anxiety, and resistance from both the patient and caregivers. However, healthcare providers and many caregivers have expressed their general concern about these sedation techniques currently being used. They have expressed that, although comfort and diminishing anxiety levels are important components, an overarching question remains for overall patient safety in regards to the effect of these medications on brain development. The evidence-based literature addresses the negative components of multiple exposures to general anesthesia along with other sedative medication use. A series of randomized trials has been conducted to test the efficacy of procedural sedation and general anesthesia on the developing minds of infants and toddlers under the age of three. The studies have shown that when increasing the length of time under anesthesia to greater than one hour and the number of total exposures is directly correlated to a significant increase in the development of a learning disability, attention deficit hyperactivity disorder, and many other neurocognitive impairments. In conjunction with the research project, an in-service was held in both the Sedation and Radiology departments at CCMC to highlight the current findings on excessive procedural sedation and general anesthesia use effect on pediatric cognitive development.

Recognizing Glycogen Storage Disease in the Emergency Department

Booth #145

Meghan Guzewicz '19

Faculty Mentor: Ryan Keenan

Abstract:
Glycogen storage disease, a rare inherited condition causing extreme hypoglycemia and an enlarged liver, plagues approximately 30 million Americans, 50 percent of whom are children. The uncontrolled glycemic index, muscle weakness, distended abdomens and stunted growth that accompany the disease are most often misdiagnosed as diabetes, leading to the implementation of unsuitable treatments and the perpetuation of symptoms. Dr. David Weinstein, the world's top researcher on GSD, recently moved his practice to Connecticut Children's Medical Center (CCMC) where he has committed himself to perfecting the use of extended-release cornstarch and protein for each individual afflicted. The three-bed unit at the center of the eighth floor of CCMC is where Dr. Weinstein and his team of 12 healthcare professionals treat over 500 patients travelling from over 49 different states and 45 different countries. Patients arrive for treatment at CCMC wheelchair bound, diagnosed with less than six months to live and within three days of treatment are doing jumping jacks to celebrate their new found energy. With advancements toward a cure, the next most prominent problem left unaddressed is the lack of awareness about the disease, symptoms and treatments. Only a small number of people have heard of the disease and an even smaller number are trained to care for such patients. Children with undiagnosed GSD frequently present to the Emergency Department for hypoglycemia and within 10 minutes of the order to discontinue their fluids they can begin to seize, go into a coma, and ultimately die. This fatality rate can be easily reduced by targeting education regarding GSD signs, symptoms, and treatment specifically at Emergency Department staff RNs.

Information Sheet on RhoGAM

Booth #146

Emma Collins '19

Faculty Mentor: Sally Gerard

Abstract:
On the mother/baby unit at Stamford Hospital, the nurses expressed confusion regarding the administration of immunoglobulin RhoGAM, its side effects, and how to answer frequently asked questions from the patients regarding this topic. This poster was created as a handout for nurses to reference when they have their own questions about RhoGAM, as well as when answering any questions the patients may have. The evidenced-based literature researched for this handout provides answers to questions nurses and patients may have regarding general information about the immunoglobulin RhoGAM and specific information about the dosage , side effects of both given and missed ones, the duration one lasts, and why one may be given postpartum. Miscommunication about RhoGAM increases confusion among nurses which can lead to poor patient education, increasing concerns such as why more than one dose may be given, risks it may have on the fetus and mother (if any), and what it may mean for her next pregnancy.

Nonverbal Communication in Stroke Patients

Booth #147

Carissa Corraro '19

Faculty Mentor: Sally Gerard

Abstract:
Each year in the United States alone, about three-quarters of a million individuals experience a stroke. When a patient is faced with an unpredictable medical emergency such as a stroke, it is almost impossible to prepare for the lifestyle changes that may be needed in the future. Within the medicine unit, various patients have been admitted for this diagnosis; one of the main challenges of this diagnosis is communication and gauging the proper tools to assess and implement patient understanding and language expression after an event that leaves many individuals aphasic. Although the individual's language ability is altered, their cognitive ability can be almost completely intact. A study by Fucetola, Connor, Strube, and Corbetta concluded that the degree of aphasia severity in patients experiencing stroke measured by the Language Competency Index could be independent of the person's ability to perform cognitive tasks. With this knowledge and information, various tools have been created to improve nonverbal communication with patients experiencing stroke. Tools such as computer synthesized speech, melodic intonation therapy, constraint-induced aphasia therapy, picture boards, and various other tools have proven to increase confidence and expression in stroke patients. The role of the RN is to facilitate education and access to tools such as these in order to aid in nonverbal communication. Through the evidence-based research collected, a pamphlet providing these communication resources was provided to staff and a brief in-service during huddle was implemented in order to aid in education and awareness of these new and innovative resources.

Patient Education on Recommended Newborn Practices After Birth

Booth #148

Rachel Demers '19

Faculty Mentor: Sally Gerard

Abstract:
Skin-to-skin, early breastfeeding and delayed newborn bathing are all evidence-based practices that have been supported as beneficial to the mother and baby. On the Labor and Delivery Unit at Stamford Hospital, the time to educate patients about these very important topics is often limited due to labor pain, immense discomfort, emergencies, and/or quick deliveries. The time spent in Labor and Delivery, both before and after delivery, is crucial for patient education as the education can make a difference in practices going forward. The evidence-based research explains the benefits of all three practices, skin-to-skin, breastfeeding, and delayed newborn bathing, for both the mom and baby. These practices help the mother with preventing postpartum hemorrhage, initiating her breast milk supply and increasing infant bonding, along with many other advantages. The practices help the infant with their immunity, nutrition, bonding, stabilization of blood sugar levels and body temperature, and much more. For this project, I researched the topics and with my preceptor educated mothers and their families about these areas and the current practice recommendations. Along with an in-service presentation to staff on the unit, I also made three posters to be laminated and hung in the patient rooms, one for each of the three topics. The posters will also be approved by the hospital's education committee and placed in a binder in each room to serve as an educational tool for the nurses on the unit to use when teaching. Comprehensive patient education will encourage skin-to-skin, breastfeeding, and delayed newborn bathing and will improve the health status of both the mother and baby.

Sensitive Nursing Care of the Transgender Population

Booth #149

Aliza Fleitz '19

Faculty Mentor: Sally Gerard

Abstract:
Throughout the United States, the healthcare world has been slow to adapt to the growing LGBTQ population. This group specifically is at risk for several infectious diseases, delayed access to healthcare as well as higher levels of anxiety throughout hospitalization. Additionally, sex-specific tests such as pregnancy status, calculating glomerular filtration rate (GFR), and screening guidelines for mammography and other imaging presents unique challenges for this community. In order to serve this population and provide competently sensitive care, it is essential to change the distrust many members of the LGBTQ community have in the healthcare setting. Skepticism remains in this community from past discriminations such as the HIV/AIDS crisis as well as inappropriate actions by healthcare providers, including being denied healthcare on the basis of transgender identification. As nursing has a great influence on hospital perceptions and patient care, it is crucial to educate nurses specifically on sensitive care for this at-risk population in order to address healthcare issues for the LGBTQ community. With this in mind, it is pertinent for nurses to first assess their own biases regarding the population. After identifying personal biases, it is important to verify the importance of understanding specific terminology for this population. With a basic understanding of the terminology of the LGBTQ population, gender and sex conversation becomes a more natural assessment and prevents miscommunication. Should biases on gender and sex not be addressed, a nurse may not assess the patient correctly which can lead to an inaccurate diagnosis. Therefore, the Stamford Emergency Department nursing staff held a brief learning session to explore personal bias and define terminology relevant to the LGBTQ community including the use of gender pronouns ranging from he and she to “ze.”

Preventing the Transmission of Respiratory Syncytial Virus (RSV) Among Pediatric Siblings

Booth #150

Elizabeth Nigro '19

Faculty Mentor: Sally Gerard

Abstract:
Considering respiratory syncytial virus (RSV) is one of the leading causes of hospitalization for children worldwide, it is crucial that parents understand the importance of preventing its transmission. This virus is highly prevalent on the Stamford Pediatrics Unit, and those at the highest risk of contracting RSV include young infants, preterm babies, and those with siblings who attend daycare. This project aims to educate parents on the prevention of recurrence and transmission between siblings. RSV is easily spread among children because droplets can survive on surfaces for hours, and almost half of all pediatric RSV patients receive the virus from their sibling. Parents not only desire emotional support throughout their child's treatment, but also seek education on RSV that is broken down into simple and easy to understand language. After meeting with unit staff and reviewing the literature, a poster with scientific evidence and simple language was created to educate parents on RSV prevention. Perhaps hospitals will restrict sibling visitation if RSV prevention becomes widespread. As parents' awareness of RSV increases, hopefully rates of sibling acquired RSV will subsequently decrease. It is crucial to educate parents on up-to-date health research and information to ease anxiety and improve health outcomes for their children.

Management of Atrial Fibrillation

Booth #151

Samantha Salamon '19

Faculty Mentor: Sally Gerard

Abstract:
A growing problem that has been identified on the Cardiology unit at Stamford Hospital is the frequent admission of patients with atrial fibrillation. I have observed that many patients are unaware of how to measure their pulse and are unsure of what to do when it feels irregular. Studies show that those with atrial fibrillation are at an increased risk of stroke because a rapid heartbeat allows blood to pool in the heart, which can eventually develop into a clot. It is important to reinforce education to patients in order to properly manage their atrial fibrillation. Recently, new technology has developed that can easily detect when a patient is in atrial fibrillation. To conduct this study, a handout from the Preventive Cardiovascular Nurses Association will be given to patients to emphasize techniques on how to manage their atrial fibrillation through medications, symptom monitoring, and pulse monitoring. Nurses will be told to discuss this handout when discharging their patients with atrial fibrillation. As a result, there will be less frequent admissions to the hospital due to atrial fibrillation. Proper education and reinforcement are vital in managing this chronic condition that occurs in a majority of cardiac patients.

Medical Diagnosis of Anemia and the Direct Link to Falls

Booth #152

Victoria Trentini '19

Faculty Mentor: Sally Gerard

Abstract:
This research project focuses on the topic of falls which are heightened due to the diagnosis of anemia. Anemia is a condition in which there is a deficiency of red blood cells or hemoglobin in the human body. Symptoms associated with anemia include low energy, fatigue, general weakness, shortness of breath, pallor, dizziness, physical declines, impaired performance, and muscle weakness. Anemia can occur in all people of various ages, however, is often found in oncology patients due to the diagnosis and treatment prescribed. More than 40% of patients with cancer are diagnosed with anemia, and nine in 10 patients will develop it throughout treatments such as chemotherapy. Based on evidence-based research, symptoms of anemia can vary based on the person or can be nonexistent, but can still significantly contribute to falls and result in injury. Education is crucial for patients so that awareness of their high fall risk is established, protecting the patient from potentially preventable injuries. It is imperative that healthcare providers and all members of the interdisciplinary team ensure that proper fall precautions are implemented in order to prevent falls or further debilitating events due to this diagnosis. Although several studies conclude the significant statistical data that links the connection of anemia and falls, up-to-date studies and further research is needed.

Aromatherapy and Combating the Effects of Post Anesthesia Nausea/Vomiting

Booth #153

Justin Corbitt '19

Faculty Mentor: Sandi Badowski

Abstract:
While working in the post-anesthesia care unit (PACU) at Yale New Haven Hospital, I have noticed that almost every patient who comes out of the OR has some variance of nausea or vomiting. This is a very common and expected side effect of anesthesia, and is a very uncomfortable feeling for the post-op patients. There are some pharmacological interventions that can be used to combat these side effects, such as antiemetics, however many times they do not work to their full potential. My research study focuses on the value of using non-pharmacological interventions to combat nausea and vomiting such as the use of essential oils for patients in the PACU. Studies have shown the incorporating of aromatherapy can significantly decrease the undesirable side effects of anesthesia and can also be a calming intervention that can distress the patient, overall promoting healing in post-operative care. After presenting the idea to several of the nurses on the unit, they all seemed very open to the incorporation of more non-pharmacological interventions for nausea and vomiting since these are some of the most common post-op problems and complaints among their patients.

Preventing Surgical Complications Related to Alcohol Abuse

Booth #154

Madeline Anderson '19

Faculty Mentor: Suzanne Turner

Abstract:
On the orthopedic floor at Yale New Haven Hospital, Verdi 4 North, the rooms often fill up with clients who seek elective hip or spinal surgery. Many of these clients have had a history of alcohol abuse, and some even seek out surgical interventions due to injury while intoxicated. Alcohol abuse is recognized as a common and modifiable risk factor for surgical complications. Alcohol abuse can lead to post-operative infection, poor wound healing, respiratory distress, gastrointestinal malfunction, cardiopulmonary issues, and neurologic impairment. Patients and families express that they have little understanding about the surgical complications related to alcohol abuse. Nurses play an essential role in healthcare, but one of their most important roles is that of a patient educator. When patients come to the hospital, they are often clouded with questions and are eager to return to their everyday lives. Nurses can help ease patient anxieties by providing thorough patient education. An in-service was performed on Verdi 4 North to caution floor nurses on the post-surgical complications that are associated with alcohol abuse. Furthermore, a pamphlet, containing evidence-based research, has been created to serve as a tool for RNs to better educate their patients about the importance of pre-operative alcohol abstinence. Early intervention for patients who abuse alcohol is essential to facilitate better surgical outcomes.

Prevention of Post-Intensive Care Syndrome Using an ICU Diary

Booth #155

Kaitlin Benting '19

Faculty Mentor: Suzanne Turner

Abstract:
Following a stay in the Intensive Care Unit (ICU), many patients and families experience some form of PTSD, anxiety, or depression. These symptoms have been classified as factors of post-intensive care syndrome, and result from trauma that the patient and family may have experienced during an ICU stay. Although there are some programs in place to prevent post-intensive care syndrome, many nurses and physicians recognize the need for additional programs to help reduce these symptoms that are extremely common following ICU discharge. The ICU diary is one of the more recent interventions utilized to reduce delusions, memory gaps, and flashbacks that contribute to confusion, anxiety, and depression among post ICU patients. ICU diaries have been used in European countries for 30 years, yet they are only just being trialed in the USA, and many nurses and units in the USA are not familiar with the concept at all. Thus, an in-service presentation was created to educate nurses on the benefits of the ICU diary and how it may be implemented in practice to reduce PTSD, anxiety, and depression of patients and their families following an ICU stay.

Alternative Opioid Routes Lead to Decrease in Opioid Dependence

Booth #156

Emily Byrne '19

Faculty Mentor: Suzanne Turner

Abstract:
Nationwide, the country is struggling with opioid addiction, opioid shortages, and overall proper pain management amongst patients. The most common route of pain medication to date been intravenous (IV) opioids, however Dr. Adam Ackerman at Yale New Haven Hospital York Campus, is trying to change the way pain management is both utilized and prescribed. Dr. Ackerman's research focuses on the benefits of using alternative routes of opioids such as oral or subcutaneous. It is thought that alternative routes can both decrease the side effects of opioids as well as opioid dependence. By exploring evidence-based literature pertaining to this topic, it has been proven that non-IV opioids have been effective in pain control and have decreased opioid use and dependence in patients overall. On the General Medicine Floor, East Pavilion 4-6, in Yale New Haven Hospital's York Campus, the staff is committed to this mission and are placing a focus on patient-centered care through using alternative opioid routes, as well as non-pharmacological pain management techniques when possible. An educational in-service was performed for the nurses so that they could be adequately prepared to answer any questions their patients might have about this topic.

How to Stay "In The Green" with CHF

Booth #157

Katherine Dolan '19

Faculty Mentor: Suzanne Turner

Abstract:
When a patient is diagnosed with congestive heart failure (CHF), he or she is handed a packet of information and is educated on the diagnosis. However, due to the initial shock of the diagnosis, language barriers, lack of understanding, and other barriers to comprehension, many newly-diagnosed CHF patients do not fully understand what CHF entails or how to manage it properly. As healthcare providers, it is often overlooked that patients were not formally educated with medical jargon that professionals are equipped with and accustomed to using. This causes miseducation, misunderstanding, mismanagement, and frequent hospital readmissions. These newly-diagnosed patients have a lot of management to cover, including but not limited to new medications, closely watching their weight and dietary intake, monitoring vital signs, input and output, and smoking cessation. Often, patients on Northeast 10 at Bridgeport Hospital are readmitted due to poor CHF management. Many newly-diagnosed patients are unsure of when to contact their doctor, how to manage their diet, and how to comprehend the packet of information on congestive heart failure. Educating patients in a simple yet informative and effective way will keep them on track with managing their congestive heart failure, and will give them the tools to know when it is important to contact their healthcare provider. A short packet was put together for Northeast 10 at Bridgeport Hospital containing easy to understand information to educate newly-diagnosed CHF patients about congestive heart failure, tips on proper management, how to know which “zone” the patient is in, and how to stay in the “green zone,” contributing to fewer hospital readmissions.

Performing Bedside Handoff Report and Hourly Safety Checks to Prevent Patient Falls

Booth #158

Emily Etchegary '19

Faculty Mentor: Suzanne Turner

Abstract:
Preventable falls and fall-related injuries are the most frequently reported adverse events among adults in the inpatient setting. Despite the wide variety of fall prevention initiatives put into place by the Joint Commission over the last decade, falls remain an ongoing safety issue for many healthcare organizations including the Smilow Cancer Hospital at Yale New Haven Health. Studies have shown that using a standardized handoff report that utilizes active patient participation significantly decreases the frequency of falls related to communication errors. Similarly, the practice of purposeful rounding has been proven to promote quality patient care and safety, as nurses are able to proactively meet the needs of their patients while continually assessing for possible safety concerns. Despite the overwhelming amount of evidence that suggests that conducting bedside change-of-shift report and hourly safety checks greatly reduces the amount of patient falls, nurses are still reluctant to incorporate these actions into their daily practice. Because the majority of falls are completely preventable, it is imperative that nurses be educated about the current research available in order to ensure patient safety and satisfaction. In addition to an educational in-service, an informational handout regarding the benefits of performing bedside report and hourly rounding was created for the nurses to review so that they can adjust their practice accordingly.

Palliative Care: The Role of the Nurse

Booth #159

Julianne Hulin '19

Faculty Mentor: Suzanne Turner

Abstract:
The nurses' scope of practice does not include ordering a palliative care consult. However, this does not mean that the patient’s comfort is not their problem. The purpose of this project is to promote the nurse to be an advocate for patients in regards to palliative care. Evidence shows that palliative care is an effective intervention in promoting comfort and shortening hospital stays. There are many patients who are eligible for palliative care. In particular, patients with multiple chronic illnesses are ideal candidates to receive palliative care. Yale New Haven 6-7 has such a population, and these patients can greatly benefit from palliative care interventions. After reviewing the evidence and the benefits of palliative care, nurses will be educated on who are ideal candidates and how to obtain a consult. Although the consult order may fall in the hands of an MD, it is the nurse’s responsibility to be attentive to patients’ needs and to advocate for them when they could greatly benefit from palliative care services.

Improving Patient Satisfaction

Booth #160

Alisha Marshall '19

Faculty Mentor: Suzanne Turner

Abstract:
Hospitals create an atmosphere to heal the body, mind, and spirit. However, they are also places of business. As in any other business, hospital administrators are concerned with their clients' satisfaction of care. It influences the likelihood that a client or his/her family will recommend the hospital and its similar organizations to their friends. As a patient's experience is an effective indicator to determine the quality of care, it becomes a top priority within the hospital, especially if it is accredited or of high esteem, such as with Magnet hospitals. In this research presentation, evidence-based methods were examined to identify ways to improve patient satisfaction.

Ventilator-Associated Pneumonia Prevention: The Importance of Oral Care

Booth #161

Sarah Maxwell '19

Faculty Mentor: Suzanne Turner

Abstract:
Ventilator-associated pneumonia (VAP) is one of the most common nosocomial infections. In order to prevent the development of this infection, it is important for nurses to follow evidence-based guidelines for the care of the ventilated patient. Included in these guidelines are specific care instructions such as head-of-bed elevation, prophylactic medication administration, and adequate oral care. In the extensive task load of the busy ICU nurse at St. Raphael's Hospital, performing adequate oral care is one of the guidelines for preventing VAP that falls short in compliance rates. Research has shown that the development of ventilator-associated pneumonia begins in the oropharynx, as bacteria travels from the oral cavity in saliva and secretions, down the endotracheal tube and into the distal airways. The normally functioning respiratory system can clear these secretions with coughing and ciliary action, but the patient receiving mechanical ventilation is sedated and cannot clear their airway. For this reason, performing oral care as laid out in the VAP prevention guidelines is very important. Adequate oral care includes teeth brushing twice a day, oral swabbing every 4 hours, rinsing with chlorhexidine gluconate oral rinse twice a day, and providing oral suctioning as needed. This project includes an educational in-service presentation to the nursing staff at St. Raphael's Surgical ICU about the importance of compliance with oral care guidelines. In addition, a flyer outlining the guidelines was created to be posted in the staff room to serve as a reminder for nurses to perform the necessary oral care for their ventilated patients.

Non-pharmacological Interventions for Sundowning Patients

Booth #162

Christine Miller '19

Faculty Mentor: Suzanne Turner

Abstract:
Sundowning or sundown syndrome is very common among people with Alzheimer’s disease or any other form of dementia. Patients who experience sundowning have worsened symptoms when the sun goes down or towards the end of the day. They experience increased agitation, confusion, and anxiety; they may also be more likely to wander, experience delusions and hallucinations and be combative. Providing care and treating illness in these patients is more challenging and difficult. Care becomes complicated because staff members have to focus more time on these symptoms, rather than treating their admitted diagnosis. It is important for healthcare providers to be aware and reminded of interventions that may manage or even reduce common sundowning symptoms. Pharmacological interventions are available, but there are many non-pharmacological interventions that can also be helpful. Polypharmacy is common among geriatric patients and it is more beneficial to implement the non-pharmacological interventions first. Research shows that activity schedules, light exposure, music therapy, offering distractions, and diet changes are some of the many ways to prevent worsening of the patients’ behavior and make patient care less complicated. Along with a poster presentation, a handout of a list of interventions will be made for nurses and assistant personnel.

Sleep Deprivation Among Night Shift Nurses & How To Improve Daytime Sleep

Booth #163

Mairead Norton '19

Faculty Mentor: Suzanne Turner

Abstract:
This research project focuses on the effect that sleep deprivation can have on the night shift nurse as well as techniques that can be utilized in order to improve daytime sleep. Sleep is vital to the health and wellbeing of all humans, regardless of their career. Night shift workers must combat their normal circadian rhythm in order to sleep during the day in preparation for their shift. The evidence-based literature utilized in this project describes how a lack of sleep in nurses and others in the healthcare field can be detrimental to both the staff and the patients. Sleep deprivation in nurses has been linked to hypertension and heart disease, as well as other health related issues. When discussing the effects that this deprivation can have on patients, it can be seen through mistakes made in medication administration, an oversight in regards to new onset symptoms, and so on. The sleep adjustment that night shift requires can often be difficult for new and experienced employees alike. In order to cope with this new schedule, there are various strategies that can be utilized by nurses. Educating these healthcare professionals on the benefits to improving their daytime sleep can improve patient outcomes as well as the health of the staff themselves. Information related to the effects of sleep deprivation and how to improve daytime sleep was provided to the staff through an education in-service as well as a flyer.

Enhanced Recovery after Surgery (ERAS)

Booth #164

Sofia Pinedo '19

Faculty Mentor: Suzanne Turner

Abstract:
Enhanced recovery after surgery (ERAS) is an evidenced-based protocol designed to standardize care, improve patient outcomes, and lower healthcare costs by reducing physiological stress and postoperative organ dysfunction through optimization of perioperative care and recovery. ERAS requires participation from the entire multidisciplinary team of caregivers including surgeons, anesthesiologists, nurses, physical therapists, etc., as well as the patients themselves and their support systems. Not too long after ERAS was implemented, many surgeries converted from inpatient to outpatient. The data shows that it reduces the length of hospital stay by 30% and decreases postop complications by 50%. The three general components of ERAS include; the preop, intraop, and postop phases. The patients themselves play a crucial role in ERAS. Their level of understanding and willingness to participate in perioperative experience is key to obtaining the best possible outcomes after surgery. The primary goal of ERAS and this research project is to decrease length of stay, decrease postop nausea and vomiting, obtain better pain control at rest without opioids, early return of bowel function, and improved wound healing. At Bridgeport Hospital, ERAS protocols for colorectal, orthopedic total joint, and hysterectomy surgeries are being used. The goal for the future is for the ERAS protocols to be developed within many more surgeries at Bridgeport Hospital as well as other hospitals throughout the world.

Undergraduate Research & Independent Projects

Menstruation Frustration : Making Reusable Feminine Hygiene Kits to Help Girls Graduate School

Booth #168

Eunsun Hong '19

Faculty Mentor: Anita Deeg-Carlin

Supported by Lawrence Program, McGuinness Program

Abstract:
As a continuation of my internship experience in The Gambia in the summer of 2017, I went back to work at Starfish International, an organization that focuses on young girls' education and empowerment, to provide reusable and sustainable feminine hygiene kits. Research in the past has shown that in rural places in many parts of Africa, there is a strong correlation between girls' education and female menstruation patterns. Once a girl hits puberty and begins to menstruate, the school drop out rate increased, because hygiene products are unaffordable and there is a lack of knowledge and support. Girls slowly start missing a week a month then eventually drop out when they are unable to catch up with the work. This leads to gender inequality in not only education but in the work force. To reduce gender inequality in society overall, girls should have a fair chance at finishing school. The DFG organization created reusable feminine hygiene kits that can be easily made, carried, and used. I built the bridge between the two organizations to provide the kits made by DFG to Starfish students. The pre- and post-surveys and interviews were assessed to see the positive outcomes of the project in order to determine if this option can aid in reducing dropout rates for girls in the area.

SheisArt In Africa

Booth #169

Candice Peterkin '20

Faculty Mentor: Antan Mills

Supported by Brennan Fund, Hulseman Fund for Global Experiential Learning, Gisela Gil-Egui Memorial Fund for Student Global Learning

Abstract:
SheIsArt is a fully digital landscape consisting of an Instagram page and a YouTube channel. SheisArt aims to uplift and inspire women of color through various art forms such as visual art, literary art, and more. SheIsArt seeks to show that art can be defined in many ways, which is what describes our process of “targeting women who are not the ordinary Kim Kardashian” and instead sharing the beauty of “women walking down the street who have done something great that no one knows about.” In this way, SheisArt is really about challenging viewers to rethink women of color as art and recognize that they, too, can be anything they set out to be. SheisArt's tagline “Acknowledge, Release, and Teach” (ART) represents the three-step process of first acknowledging the struggles of black women, then releasing the struggle, and finally, teaching young women of color to avoid falling into the cycles and giving them advice on how to live in this community. With this project, we were able to travel to South Africa to understand how women live in their communities, understand their struggles and strengths, and show the dichotomy and similarities among women across the world in hopes of promoting unity.

Composing a Reader's Life: My Reading Journey

Booth #170

Martina Goda '20

Faculty Mentor: Betsy Bowen

Abstract:
I choose to depict my relationship with books as a reader throughout my childhood and young adult years by creating a creative and interactive display. I include some of the most memorable books from each period of my childhood, which provide a wide range of books and novels. I have also displayed illustrations and passages for each book as I believe that both of these elements will give the viewer an overview about what each book is about. I chose the illustrations and quotes carefully, basing them on my own memory and taking into account the passages and illustrations which truly capture the essence of each particular book. In addition, this project is shown as a large book which is composed of smaller books inside that are set up chronologically. Each pop-up book can be opened to look at a passage as well as an illustration, as if the viewer is opening an actual novel. I chose to focus on the idea of "Reading as a Journey" and have explored the benefits and joy that are linked with the reading experience, especially as a child.

Motherhood in Russia: An Artistic Review

Booth #171

Sarah Swanson '20

Faculty Mentor: David McFadden

Supported by Hulseman Fund for Global Experiential Learning

Abstract:
My research analyzes women and motherhood in Russian culture beginning in pagan Russia up through modern day. I utilized statues and paintings from different epochs in Russian history, specifically; pre-Christian Russia, Christian Kievan-Rus (10th century), Muscovite Russia (16th-17th centuries), Peter the Great's Russia in the 18th century, pre-revolutionary Russia of the 19th century, the 20th century of Bolsheviks and Soviet Russia, and finally the 21st century of Putin and the modern Russian Federation. Through these eras I look at the roles of women and the female experience from their confinement into separate quarters in the 16th century to modern feminism in the 21st century. I connect each of these periods back to the central theme of motherhood and maternal identity rooted in both pagan goddesses of Damp Mother Earth, as well as Mary, the Mother of God, and Orthodox iconography. Each time period and image sheds light on the female experience as a whole, explaining why the identity of women as mothers first is much more closely linked to Russia than to the United States. My research culminated in my final Russian Studies major capstone in which I brought together art, history, culture, women's studies, and religion into one unified work. My work attempts to show the long-rooted existence of female, maternal identity creating a modern culture of resistance to feminism.

Palliative Care in Ireland vs. U.S.

Booth #172

Kelsi Farren '20

Faculty Mentor: Eileen O'Shea

Supported by Lawrence Program

Abstract:

Palliative care is a fairly new method of care that is slowly emerging in healthcare facilities around the world. It stands to maximize the quality of one’s life while minimizing pain, suffering, and stress. It is care that takes a holistic approach to patients while understanding their families, religious views, interests, opinions, and hopes. Many people have a misperception of what palliative care is and often associate it with end-of-life or hospice care. Palliative care is implemented shortly after being diagnosed with a chronic or life limiting condition. With palliative care being such a new form of care, it comes with many challenges. My studies looked at how palliative care is conducted in Ireland vs. the United States.

Spiders in a Wreath of Orange and Poppy: How the Subservience of Women in Marriage in the 19th Century Gave Rise to Toxic Perceptions of Love and Possession

Booth #173

Teresa Sauer '20

Faculty Mentor: Emily Orlando

Abstract:
This is a multi-disciplinary project which examines the effects of marriage laws on women through the lens of 19th and early 20th century literature and poetry and the arthropod reproductive strategy of traumatic insemination. Traumatic insemination is a process in which an arthropod male pierces a female's abdomen and ejaculates directly into her ovaries or bloodstream to ensure that it is he who impregnates her. This reproductive strategy takes away female choice and inflicts major bodily damage on her. In the same way, the oppressive institution of marriage in the 19th century subverted womens' agency by forcing them both socially and financially into problematic unions in which they were inclined to cede control to their husbands. This was inherently damaging to their sense of identity. The relationship between traumatic insemination and 19th century marriages is further explored through in-depth literary analysis of works such as *The House of Mirth, Madame Bovary,* and *A Doll's House* as well as an original creative piece entitled "Spiders in a Wreath of Orange and Poppy." The negative consequences of marriage during the period are explored from a perspective which does not romanticize human courtship behavior, but rather demonstrates the pitfalls of a system which required women to diminish themselves in order to obtain or else remain secure in their marriages.

Fairfield Slavery Project: The Vincent J. Rosivach Register for Slaves in Fairfield, CT

Booth #174

Olivia McEvoy '19, Alec Lurie '19

Faculty Mentor: Giovanni Ruffini

Supported by Vincent Rosivach Collaborative Research Fund

Abstract:
Our project is the Vincent J. Rosivach Register of Slaves in Fairfield, Connecticut. It is named in honor of Dr. Rosivach, a professor of Latin at the university for many years, who passed away last April. This was a passion project of Dr. Rosivach, who started the project in the 1990s and had been working on it (in some degree) ever since. This is a searchable database of slaves and slave owners of the town of Fairfield. This database features slave family units (specifically marriage and children) and tracks the movement of these individuals through land-owning households. This is done so that descendants can have a better understanding of their history. What also is coming out of the project is a stronger understanding of northern slavery, specifically the size and scope of slavery in colonial New England, because our totals indicate there were more slaves in Connecticut than has previously been recorded. Following completion of the project, this research will be housed at the Fairfield Museum and History Center and Digital Commons of Fairfield University.

Blockchain Technology’s Ability to Reshape Refugee Camp Data Management

Booth #175

Timothy Salit '19

Faculty Mentor: Janie Leatherman

Abstract:
For those who are familiar with blockchain technology, their knowledge does not expand beyond cryptocurrencies such as Bitcoin; however, this technology can respond to needs far beyond the financial world. There are levers to blockchain technology that have economic and social implications. These levers can solve problems in refugee camps' data management through its core pillars of decentralized, transparent, and secure composition. This paper first explores how refugee camps' data management operates. It then defines and explores what blockchain technology is, and how it works. With a lens on the refugee crisis, it explores the impact that blockchain can have on the data management of refugee camps, showing the relation between current problems and blockchain solutions such as a digital wallet to carry one’s identifications and certifications. To investigate these implications, the paper will review start-ups that are working within this sector including BanQu, AID: Tech and Building Blocks. Through these discoveries, the paper will conclude with the importance of investing in this technology and the potential impact it will have on refugees.

Bodies in the Streets: Precarity and Parkland

Booth #176

Sabina Dirienzo '19

Faculty Mentor: Jocelyn Boryczka

Supported by Hardiman Scholars, Faculty Student Collaborative Fund

Abstract:
In February 2018, the most destructive school shooting since Sandy Hook occurred at Marjory Stoneman Douglas High School in Parkland, Florida. In March 2018, the largest American youth protest since the anti-Vietnam protests was organized by youth advocating for gun control. The March for Our Lives protests went to the streets to demonstrate the increased precarity of multiple populations due to the threat of mass shootings, highlighting the ways in which the social contract in America is failing. This paper use a feminist theoretical analysis of Judith Butler's theory of precarity from "Notes on a Performative Theory of Assembly" (2015) to frame the March for Our Lives and analyze how effectively the marches advocate for the state to use biopower to stop mass shootings. Youth protesting in the streets, from a variety of backgrounds, had all experienced the threat of gun violence – showing that the American social contract is not better preserving children, a population which is typically considered to be protected by the government. However, a commitment to having bodies of all kinds in the streets was an effective performance and a call for action. The March for Our Lives of March 2018 used their position of precarity in the aftermath of a mass shooting to rebel against the state's lack of exercised biopower and to argue for 'living more livable lives.'

Food Access - Norwalk, CT

Booth #177

Mahammad Camara '19

Faculty Mentor: Jonathan Delgado

Abstract:
The purpose of this project is to visually display the population distribution of food, as well as linkages between different variables with the hopes that GIS mapping will legibly illustrate correlations and patterns between specific demographic identifiers. Thus, in doing so, the maps would highlight areas of acute need that are perhaps being unmet.

Bridgeport Demographics as They Relate to Food Access

Booth #178

Jordan Kania '21

Faculty Mentor: Jonathan Delgado

Abstract:
My research is about food availability in the Bridgeport area. I have gathered census data relating to food pantries and food access, using variables such as disability, poverty levels, employment status and SNAP usage. My research provides visual maps of the greater Bridgeport area that show the different variables and how they relate to locations of food pantries. This research was in association with the AACN and was a community based project. Research was done as part of a grant and was presented to the larger community at a keynote conference. Work was done in coordination with the Council of Churches and the Egan School of Nursing and Health Studies.

The Effects of the Government Shutdown on CT Food Pantries

Booth #179

Shannon Riley '21

Faculty Mentor: Jonathan Delgado

Abstract:
I focused my research on the effects of the government shutdown on food pantries in CT. I analyzed order totals from CT Food Bank pantries with assistance from the CT Food Bank and used census information to complement what I saw from raw pounds and percent change of pounds of food ordered by pantries. The purpose of the research was to gain a quantitative outlook at residents' reliance on food assistance programs. Additionally, I wanted to see if the SNAP benefit stoppage had affected food pantry orders.

Polychromy, Parthenon, Procreate

Booth #180

Anna Kamradt '19, Meghan Schauer '19, DeAnna Dickinson '19, Maria Klein '20, Matthew Waldemar '20

Faculty Mentor: Katherine Schwab

Abstract:
The world of art history extends far past memorizing paintings and regurgitating dates. Students in the Art History capstone are engaging in discovery through original research to propose polychromatic schemes for a selection of Parthenon sculptures. The seminar consists of seven upperclassman who, through the use of an iPad application, Procreate, and small-scale plaster casts, are reimaging the Parthenon as it was in the classical world as originally constructed and completed nearly 2,500 years ago. Students in the seminar will be displaying their progress and showing the strategies and techniques used to demonstrate their proposals with their iPads equipped with the application, Procreate, and a selection of the small-scale plaster casts. Students hope to offer the opportunity for attendees of the Symposium to engage in the creative exploration of the seminar with hands-on instruction.

Folklore of Gambian Girls: Don't Marry a Snake

Booth #181

Sean Tomlinson '19

Faculty Mentor: Katherine Schwab

Abstract:
Girls in The Gambia are often marginalized in their communities because of their young age as well as their gender. One response has been to recount and reframe traditional folklore among themselves and their younger siblings. For my preliminary research, I worked with the Starfish International, a NGO that serves youth, ages 13-18, in order to create sustainable gender equity in The Gambia. While in Lamin Village, where the program is based, I worked with 20 girls who creatively expressed their desires for agency, friendship, and wholesome relationships through humorous stories that allow them to momentarily shirk societal expectations. We wrote down these new folktales in English and recorded the girls telling them in their local languages. My forthcoming research will look to analyze these tales in terms of their themes, and chart the ways in which “tradition” is reworked by young women for contemporary purposes.

Redlining in American Cities

Booth #182

Nora Quinn '19

Faculty Mentor: Kathryn Nantz

Abstract:
For my final project for the course, "Economics of Race, Class, and Gender in the American Workforce," I chose to tackle the crime and atrocities of Redlining. Redlining is a term to refer to the limiting or denying financial services to certain neighborhoods based on the racial or ethnic background without regard to the residents' qualifications. This practice was performed by the Federal Housing Administration, local governances, and banks for decades and has shaped the way our American cities appear today in 2019. Much of the segregation that we see in our society today with inequalities of social capital relate to this once lawful practice. This project uses Chicago as a prime example of redlining's lasting effects on its segregated, historic neighborhoods.

Gender Wage Gap

Booth #183

Erica Rodrigues '20

Faculty Mentor: Kathryn Nantz

Abstract:
For my "Economics of Race, Class, and Gender in the American Workplace" class, I examined the gender wage gap for my final research project using UC Berkeley case study as my main source. The main question asked was "why do women earn less than men and what policies can reduce the gender pay gap?" In essence, policy makers should focus on these three approaches: laws that prohibit pay secrecy, laws that ban employers from asking about previous earnings, and laws that require employers to report wage gap data. This would increase pay transparency and minimize the wage gap inequality.

Study Abroad: Travel Writing Course at Florence University of the Arts

Booth #184

Michelle Hernandez '19

Faculty Mentor: Kim Baer

Supported by CAS Endowment, Faculty Student Collaborative Fund

Abstract:
My project will cover my experience studying abroad this past summer at Florence University of the Arts for a travel writing course. I will show pictures of my experiences and also share how the course impacted me as a student and writer.

Translations for a Cause

Booth #185

Michelle Kabel '19

Faculty Mentor: Michelle Farrell

Supported by Corrigan Scholars Fund, Brennan Fund, Hulseman Student Global Learning

Abstract:
I have worked with Dr. Farrell to learn how to translate from English to Spanish and Spanish to English. Throughout the two years, I supported her work with the Bridgeport Hope Dispensary and personally translated medical release, disclosure, and insurance forms through various editions. The Hope Dispensary is a national organization that provides medications to those 50 million Americans who are uninsured, underinsured, or undocumented. It not only provides life-saving solutions to those in need but also eliminates the economically costly procedure of destroying expired medication by collecting medication nearing expiration from various hospitals and clinics and redistributing them to people who would otherwise have no access to it. Due to the large Latino and Hispanic community in Fairfield county, the Hope Dispensary of Bridgeport was in dire need of properly translated documents for their Spanish-speaking patients. I also took a formal translation course in Salamanca, Spain. In Salamanca at Colegio Delibes, I was immersed in the Spanish culture and given the opportunity to sharpen my skills in the Spanish language. These skills helped me improve my writing back at Fairfield and the caliber of my translations.

Institutionalized Gender Bias in the Middle East

Booth #186

Christina Chalastra '19, Jared Depietri '19, Sam Gindhart '19

Faculty Mentor: Mousumi Bhattacharya

Abstract:
As companies continue to expand internationally the global marketplace becomes more accessible, making it necessary for businesses large and small to acknowledge and be aware of foreign cultures and customs. Specifically, we have decided to focus on international business in the Middle East, their culture, the implications of Geert Hofstede's Dimensions, and other aspects needed to excel in today's global business environment. The main International Human Resource Management (IHRM) issue we are focusing on is gender bias toward women. Women's ascension to leadership in the Middle East is negatively associated with patriarchal structures which favor males over females. Middle Eastern women in paid employment have to face innumerable barriers such as lack of mobility, gender stereotypes, gender discrimination in the workplace, limited opportunities for growth/ development, and career advancement. Not to mention the number of sexual misconduct reports annually. Overall, there is a general control over women's fundamental rights and it directly affects human resource management.

The Widening Gender Gap In the African Workplace

Booth #187

James Curry '19, Maggie Vergati '19, Kaitlyn Fisher '19

Faculty Mentor: Mousumi Bhattacharya

Abstract:
For this research project, we analyzed the dynamic cultural aspects of Africa, as well as Geert Hofstede's Dimensions as they affect the overall issue of the widening gender gap in the African workplace. After discovering the issue in an article from SHRM, we were able to gather a plethora of information from research databases online. The cultural aspects examined in this research project include history, politics, religion, education, social systems, legal systems, the economy, and arts and media in Africa. Through our research, we discovered that the cultural aspects of Africa that directly influence this human resource issue include education, social systems, and legal systems. For Hofstede's Dimensions, we analyzed how power distance, individualism, masculinity, uncertainty avoidance, and long term orientation affect the gender gap in the African workplace as well. We discovered that masculinity and power distance have the biggest impact on this issue. As a result of this research, we will be able to better understand the implications for this human resource issue and to create recommendations for innovative solutions to this problem.

Working in China: Here's What You Need To Know

Booth #188

Keith Hall '19, Maggie Wadley '19, Ryan Antell '19

Faculty Mentor: Mousumi Bhattacharya

Abstract:
The main purpose of this paper was to find a deeper understanding of how the business culture in China may affect International Human Resource Management (IHRM) practices for a company trying to establish overseas relations and business in China. Throughout the paper, we look at different cultural and behavioral dimensions of China including that of their history and politics, religion and philosophy, education and social systems, economy, legal system, arts and media and Hofstede's Dimensions (Masculinity vs. Femininity, Power Distance, etc.). These cultural and behavioral aspects gave us extensive knowledge on how different business culture is in China compared with that of the United States. From here, we were able to gain insight on how organizations may need to adjust their IHRM practices and policies to create a productive, efficient, and positive workplace environment for Chinese employees. We have concluded that business deals are largely relationship focused. In addition, when dealing with China in a business setting one must recognize the position and title in the company of one's Chinese colleague. Another conclusion we have made about Chinese business culture is that it is very team oriented due to the collectivist nature of the society as a whole. People in China are very competitive, however they work extremely well in teams.

Disciplinary Procedures in Asia Pacific

Booth #189

Christopher Merrill '19, Katherine Santo '19, Michael Simko '19, Christopher Mackey '19

Faculty Mentor: Mousumi Bhattacharya

Abstract:
In this project we will be discussing how aspects of the Asia Pacific region affect their human resource management. There is a lack of policies in place to protect employees in regards to dismissal, termination, relocation, and reassignment of employees. The aspects we will be focusing on are culture, history, politics, religion, philosophy, education system, social systems, economy, legal systems, arts, and media. The area is going through rapid growth which has enormously affected their business sector. Asia Pacific has a hierarchical system in place with well-defined class structures that everyone recognizes and follows. Managers in the region expect their employees to be loyal and obedient to them. We will be discussing how a surplus of talent leads to managers firing employees at will. The employees are not protected and cannot do anything about being fired for unjust reasons. The hierarchical system gives managers all of the power in the businesses. Employees respect their managers' high status and have to do everything they say. As we can see, the region's history and culture has brought them to this point in regards to business atmosphere and procedures. The Asia Pacific region is rapidly growing and we look forward to seeing them become major factors in the global economy with proper human resources divisions in place.

Sexual Harassment in Latin America

Booth #190

Nicolle Salazar Munoz '19, Adam Riestis '19, Michael Santana '19

Faculty Mentor: Mousumi Bhattacharya

Abstract:
Through our research we found that there are many factors that contribute to sexual harassment and general gender inequality in Latin America. In our research we found that when it comes to why sexual harassment is happening, it is largely due to where women reside in the society as a whole. Many factors come to play when we think about this issue as a whole, from the political/legal system, education, and social systems in which there is really no security for women in the workplace. In addition, because of the education systems in place many women do not have the resources to even attend school, let alone go on to a higher secondary education. Even when women can obtain equality in education many employers will chose the male applicant because there are not protective employment laws that we enjoy here in the United States. Overall our research in Latin America has a relatively high Hofstede rating for power distance. This in combination with poor HRM practices has allowed sexual harassment and inequality to plague some Latin American countries.

Guilford, Connecticut Blue Laws

Booth #191

Lilah Murphy '20

Faculty Mentor: Patricia Behre

Abstract:
Inspired by Sunday Closing Laws that are still in place today, I began researching how religion functioned in the creation and enforcement of laws in the colony of Connecticut. In this project, I have researched theories about how these religious-based laws, the so called "Blue Laws" functioned in Connecticut in the late 1700s and early 1800s. I then applied these theories to Guilford, Connecticut through primary source work where I looked at how these laws functioned in court during the time. I have concluded that the Blue Laws during the late 1700s and early 1800s in Guilford, CT were enforced heavily as an attempt to preserve stability during a time of intense change.

College Federal Reserve Bank Challenge

Booth #192

Julian Falcioni '19, Paulina Baclawska '19, Jack Grygier '19, Nate Macht-Greenberg '19, Alexandra Cordero '19

Faculty Mentor: Philip Lane

Abstract:
The College Fed Challenge is a competition designed to bring real-world economics into the classroom. Teams play the role of monetary policymakers by analyzing economic conditions and recommending a course for monetary policy. Fed Challenge participants develop skills—the ability to think analytically, to make effective presentations, to work as a team, to think on their feet—that are valuable in both their academic and professional careers. To compete, teams of three to five students give a presentation on the economy and participate in a Q&A with the judges. Judges are New York Fed economists and staff who are experts on economics and monetary policy. The College Fed Challenge is designed to meet the following goals: 1) to increase understanding of macroeconomics and the Federal Reserve's role in setting U.S. monetary policy and ensuring financial stability; 2) to promote interest in economics as a subject for study and the basis for a career; and 3) to foster a cooperative relationship among students, teachers, and the New York Fed.

Exploring Gender Roles and Their Influence on Educational Achievement

Booth #193

Genesis Sanchez '20

Faculty Mentor: Rachelle Brunn Bevel

Supported by Vincent Rosivach Collaborative Research Fund

Abstract:
Through this project I will explore the gender roles in a western civilization, The Gambia. I will share how the experiences of both men and women shape their educational goals. I will demonstrate how people living in the same circumstances and who share similar backgrounds can have different viewpoints on education. Although most students have aspirations, oftentimes it is hindered by the reality presented to them and that influences what they ultimately decide to do when they grow older.

A Participant Observation of The Evolution of Virtual Fan Communities Within Broadway Audiences

Booth #194

Theresa Bravo '19

Faculty Mentor: Sallyanne Ryan

Supported by Corrigan Scholars Fund

Abstract:
This project examines the evolution of virtual fan communities within Broadway audiences. As a participant observer in "The Junkyard," a group created around the Broadway revival of CATS, I focus attention on analyzing online communication and the shift in relational identity from authentic mediated fan community to authentic face-to-face friend group.

The Effects of BMI from Dietary Consumption and Economics

Booth #195

Luke D'Agostino '20

Faculty Mentor: Scott Hiller

Abstract:
This paper will look at Body Mass Index (BMI) (dependent variable) from the USA from 1975 to 2013. Since the research is ongoing, it is not concrete yet and most likely will change at the time this description is written. The principle independent variables will be: diet of the average adult (percentages looking at plant, poultry, fat, carbohydrate intake), and GDP and unemployment. The goal of this paper is to identify correlations with diet and the performance of the economy.

The Impact of Socioeconomics on Suicide

Booth #196

Gabriella D'Anna '20

Faculty Mentor: Scott Hiller

Abstract:
This paper will analyze the impact that socioeconomic factors, such as unemployment, real GDP growth, real median household income, and alcohol consumption per capita, have had on the suicide rate in the United States from 1981-2017. Through extensive research, this study will examine whether or not socioeconomic factors play a role in one's analysis of the costs and benefits of choosing to stay alive. The topic of suicide has received heavy attention from the media as it has become more common. Promoting good mental health has become an increasing topic of conversation as well, considering recent developments such as popular meditation, sleep, and weekly screen time iPhone features. Many individuals have evaluated the costs and benefits of staying alive and have chosen to take the route of death. Although increased attention has been brought to this issue, there is more work that needs to be done, whether that be through generating policy or through further measures of awareness. The goal of this analysis is to identify correlations among socioeconomic factors and suicide rates in the United States.

Meet Me Halfway: Disability Accommodation and Advocacy in Higher Education

Booth #197

Margaret Moore '19

Faculty Mentor: Sonya Huber

Supported by CAS Endowment

Abstract:
On March 16, 2019, I will be presenting at the 2019 Conference on College Composition and Communication in Pittsburgh, Pennsylvania. This is one of the largest international writing conferences there is and it is a very competitive conference to be accepted to present at for professors and graduate students, let alone undergraduate students. I will be presenting my research on disability inclusion, accessibility, and accommodation, how they are mandated and implemented in higher education, and what areas need improvement. Along with my own presentation, I will have the opportunity to attend panels and workshops addressing issues in disability studies and writing studies--two fields that I wish to focus on in my career. Having the opportunity to learn more about these fields and to connect with top scholars from all over the world will undoubtedly give me a strong foundation on which to base my career.

Mispricing Factors in FAANG Stocks

Booth #198

Brian Murphy '19

Faculty Mentor: Steven Kozlowski

Abstract:
In this study, I evaluate one of the fundamental assumptions of finance: that stock prices are based on exposure to risk factors and differences in risk. The goal is to discover if there are any sentiment-based factors that are involved in the pricing of large technology stocks. Specifically, I analyze the stocks of Facebook, Apple, Amazon, Netflix, and Google ("FAANG stocks"). I focus on these firms because they are the leading firms within the tech sector, whose valuations depend highly on investor expectations of future growth. Potential sentiment influence is tested by analyzing technology stocks using a sentiment-based pricing model and comparing it to industry accepted risk-based pricing models. The purpose of the project is to examine potential discrepancies between the sentiment-based asset pricing model and traditional risk-based models.

Economic Impact Illegal Immigrants have on U.S. State Economies

Booth #199

Robert George '19

Faculty Mentor: Thomas Murray

Abstract:
Illegal immigration has been a very popular topic of discusion in the current American political climate. One of President Donald Trump's main initiatives as President is to build a wall in order to limit the number of illegal immigrants from Mexico. The goal of this project is to use statistical analysis and economic modeling to determine if illegal immigrants have a positive effect on the U.S. economy.

Historical Female Figures in Fairy Tales

Booth #200

Julia McNicholas '19

Faculty Mentor: Walter Rankin

Abstract:
This project will encompass several different German women, over the course of different generations, and will explore how they are portrayed in fairy tales and will hypothesize the reasoning behind their portrayals. The project will also seek to understand why these particular women were chosen for the morals of the fairy tales, and whether they are portrayed in a positive or negative light that led to a broader societal appreciation or hatred of them. The project will require a more in-depth approach to the original assignment, a stronger sense of German culture and its evolution over time, and will explore more women as case studies compared to the original assignment. This interdisciplinary project will tie together several facets of the student's academic career, fusing the German major, anthropology minor, German history courses, and time abroad in Berlin as the foundation for the research, while relying on the student's curiosity and passion for literature and exploring strong female protagonists both in readings and in culture today.

Paradise at Risk: Willingness to Pay for Improved Water Services of a Galapagos Island

Booth #201

Natalie Intemann '19, Tania Arana '19

Faculty Mentor: William Vasquez Mazariegos

Abstract:
The Galapagos Islands are an archipelago off the coast of Ecuador, known for biodiversity and made famous by Charles Darwin’s studies on the theory of evolution. The increase in tourism and permanent population contributes to issues with water and sanitation services. Due to strains on infrastructure, water and sanitation quality and service are lacking, which threatens biodiversity and Galapagos citizen health. This project provides data to address issues of quality and access to water and sanitation services in the Galapagos Islands. Tourists of Santa Cruz Island were interviewed between March 14 and 22, 2019, with individual permission. The surveys determined tourists’ willingness to finance improved water and sanitation services to enhance Santa Cruz Island's current infrastructure and to prevent its future damage. This data determines the cost of improving water services, the value of improving the Galapagos, and the amount of money tourists are willing to add to their donation upon entrance to the islands given the fact that this money will be used to improve water services. A contingent valuation econometric analysis shows an average willingness to finance a water improvement project of approximately $36 per tourist upon entrance to the islands. This shows a high value for protecting one of the world's most biodiverse sites.

55. Depressive Symptoms Mediate the Relationship between Self-Defeating Humor and Suicide Ideation in College Students
56. Ethnic Identity as a Moderator of Defeat and Suicide Ideation Among African Americans
57. Understanding the Initial Psychological Differences in Gender Within a Substance Use Population
58. When Eyewitnesses Change Their Reports Across Multiple Interviews: The Role of Accuracy and Confidence
59. Attention in College Students
60. The Relationship Between Social Cognitive Errors Within Intimate Partner Violence in College Dating Relationships and Borderline Personality Disorder
61. Can We Encourage Helping Without Also Increasing Caregiver Burnout?: Understanding Associations Between Emotional Focus, Willingness to Help Others, and Caregiver Burnout
62. Does an Actor's Group Membership Influence How Knowledgeable Here is Seen to Be?
63. You Know I Feel Negatively About Them, But Can You Tell Me Why?
64. Testing the Effects of Environmental Enrichment on Behaviors in the Male VPA Rat Model for Autism Spectrum Disorder
65. Athlete Academy
66. Structural Determination of 19F Labeled KIX via Disulfide Tethering

3. Graduate Research & Independent Projects
    1. Job Analytics Project
    2. Fairfield Voters Keeping the Line Moving?
    3. Fairfield Senior Advocates - A Voice for Seniors in Fairfield
4. Egan School of Nursing & Health Studies Projects
    1. Will an Educational Intervention for Nurses Reduce Complications of Central Line Catheters and the Need for Reinsertion?
    2. Enhancing Quietness on Surgical Units in Local Hospitals
    3. Will a Patient Hand-off Report Checklist Decrease the Transit Time for Admitted Patients from Emergency Department to Inpatient
    4. Documentation of Pneumococcal Vaccine and Increased Compliance of Administration
    5. Will a Discharge Education Program for Patients with Clostridium difficile Infection Reduce Reinfection at Home?
    6. Administration of Epinephrine by School Bus Drivers: A Training Model
    7. Is It Possible to Implement an Animal Assisted Therapy Program for the Inpatient Psychiatric Unit at Bridgeport Hospital?

8. Will the Addition of a Tip Sheet Improve Compliance for Proper Use of TABS Bed Alarm System?
9. Prevalence and Incidence of Pressure Injuries in Adult Cardiac Patients in Intensive Care: A Systematic Review.
10. Understanding the Goals of Palliative Ventilation in the Stepdown ICU
11. Community Resiliency Model in Schools: Impact on Teacher Well-Being and Confidence Responding to Student Needs
12. Patient Identification and Specimen Labeling: The Dangers of Mislabeling Patient Vials in the Emergency Department
13. Cardiac Cath Report Sheets
14. Identifying and Preventing Burnout in ICU Nurses
15. Recognizing the Signs of a Stroke in the Community
16. Spike into Advanced Directive
17. Reinforcing Discharge Education
18. Newborn Delayed Bathing: Patient Education
19. A Balancing Act: The Importance of Accurate Fluid Balance Monitoring in Cardiac Patients
20. Self-Care for Critical Care Nurses
21. Suicide Prevention with Veterans
22. Better to be Safe than Sorry! Maintaining the Safety of Nurses in the Emergency Room
23. Improving Patient's Quality of Care through Bedside Report
24. Nurse, I Can't Sleep!
25. Bridging the Communication Gap between RNs and NAs
26. Telemetry Monitoring: Medical Surgical Floors Need a Little More Heart
27. The Importance of Including
28. Surgical Site Infection Prevention
29. Educating Parents to Prevent SIDS
30. Clostridium Difficile Prevention in the Acute Care Setting
31. Alarm Fatigue in the Critical Care Setting
32. Formalization of a Post-Trauma Code Debriefing Process
33. The Importance of Accurate Nursing Assessments and the Rothman Index
34. Proactive Management of Delirium
35. Emergency Department Nurse Burnout
36. Improving Adherence to Quietness Initiatives
37. Integrating Rothman Index into Novice Nurse Practice
38. Interdependency on Pain Management Improvements in Surgical Care Units
39. Prevention of Hospital-Acquired Delirium

40. In-Patient Fall Risk Reference Guide
41. Alarm Fatigue Prevention
42. BE FAST To Recognize The Signs and Symptoms of Stroke
43. DVT Prophylaxis
44. The Importance of Nursing Education on the Differences Between Palliative Care and Hospice Care
45. On-Q Pain Relief System and Patient Education
46. How Implementing Proper Screening and Monitoring Can Better The Outcomes of Patients Diagnosed With Postpartum Depression
47. Patient Interpreter Services
48. Educating PCU Nurses on Implementation of Intravenous Insulin Infusion
49. Endovascular Stroke Process of Norwalk Hospital
50. Patient-Controlled Analgesia for Management of Postoperative Pain
51. Importance of Proper Body Mechanics and Prevention of Injury for Healthcare Personnel Working with Heavy Patient Populations
52. Patient Fall Prevention on Med-Surg Units
53. Improving Patient Acuity Assignment in the Emergency Department
54. A Review for NICU Nurses: Treating Infants with Neonatal Abstinence Syndrome
55. The Benefits of Non-Pharmacological Interventions for Patients with Heart Failure
56. Median Arcuate Ligament Syndrome (MALS) Education
57. Preventing Hospital-Acquired Delirium in Oncology Patients
58. Signs and Symptoms of Domestic Violence and Available Outreach Programs
59. Educating Families on End-of-Life Care: Importance of Early Patient and Family Education
60. The use of Pharmacological Pain Interventions versus the Use of both Non-Pharmacological and Pharmacological Interventions in Cancer Patients
61. Effectively Reporting Handoff When Transferring Patients from a Labor & Delivery to Postpartum
62. Educating the Pediatric Population on Vitamin D Deficiency
63. The Healing Power of Music
64. What to Expect After Expecting: A Guide to the Postpartum Baby
65. Know Your Drugs: Patient Education for Medication Adherence
66. Save the Trach! Maintaining Safety in Tracheostomy Management
67. Neonatal Hypoglycemia
68. The Use of Verbal De-escalation to Decrease Incidences of Physical Aggression on a Psychiatric Unit

69. Pressure Ulcers in the Intensive Care Unit
70. Ways to Promote Mobility on a Medicine Unit
71. Know the Signs: Identification and Management of Hypertensive Disorders in Pregnancy
72. Palliative and Hospice Care In Pediatric Critical Care Patients
73. Presentation and Prevention of Myocardial Infarction
74. Postpartum SBAR Tool
75. Learn What's on the CAM Menu
76. Teaching the Importance of Dialysis Adherence to Prevent Hospital Readmissions
77. The Impact of Nutrition and Exercise on Cardiac Disease
78. Long Term Effects of Propofol and General Anesthesia on the Developing Minds of Infants and Toddlers
79. Recognizing Glycogen Storage Disease in the Emergency Department
80. Information Sheet on RhoGAM
81. Nonverbal Communication in Stroke Patients
82. Patient Education on Recommended Newborn Practices After Birth
83. Sensitive Nursing Care of the Transgender Population
84. Preventing the Transmission of Respiratory Syncytial Virus (RSV) Among Pediatric Siblings
85. Management of Atrial Fibrillation
86. Medical Diagnosis of Anemia and the Direct Link to Falls
87. Aromatherapy and Combating the Effects of Post Anesthesia Nausea/Vomiting
88. Preventing Surgical Complications Related to Alcohol Abuse
89. Prevention of Post-Intensive Care Syndrome Using an ICU Diary
90. Alternative Opioid Routes Lead to Decrease in Opioid Dependence
91. How to Stay "In The Green" with CHF
92. Performing Bedside Handoff Report and Hourly Safety Checks to Prevent Patient Falls
93. Palliative Care: The Role of the Nurse
94. Improving Patient Satisfaction
95. Ventilator-Associated Pneumonia Prevention: The Importance of Oral Care
96. Non-pharmacological Interventions for Sundowning Patients
97. Sleep Deprivation Among Night Shift Nurses & How To Improve Daytime Sleep
98. Enhanced Recovery after Surgery (ERAS)

5. Undergraduate Research & Independent Projects
    1. Menstruation Frustration : Making Reusable Feminine Hygiene Kits to Help Girls Graduate School

2. SheisArt In Africa
3. Composing a Reader's Life: My Reading Journey
4. Motherhood in Russia: An Artistic Review
5. Palliative Care in Ireland vs. U.S.
6. Spiders in a Wreath of Orange and Poppy: How the Subservience of Women in Marriage in the 19th Century Gave Rise to Toxic Perceptions of Love and Possession
7. Fairfield Slavery Project: The Vincent J. Rosivach Register for Slaves in Fairfield, CT
8. Blockchain Technology’s Ability to Reshape Refugee Camp Data Management
9. Bodies in the Streets: Precarity and Parkland
10. Food Access - Norwalk, CT
11. Bridgeport Demographics as They Relate to Food Access
12. The Effects of the Government Shutdown on CT Food Pantries
13. Polychromy, Parthenon, Procreate
14. Folklore of Gambian Girls: Don't Marry a Snake
15. Redlining in American Cities
16. Gender Wage Gap
17. Study Abroad: Travel Writing Course at Florence University of the Arts
18. Translations for a Cause
19. Institutionalized Gender Bias in the Middle East
20. The Widening Gender Gap In the African Workplace
21. Working in China: Here's What You Need To Know
22. Disciplinary Procedures in Asia Pacific
23. Sexual Harassment in Latin America
24. Guilford, Connecticut Blue Laws
25. College Federal Reserve Bank Challenge
26. Exploring Gender Roles and Their Influence on Educational Achievement
27. A Participant Observation of The Evolution of Virtual Fan Communities Within Broadway Audiences
28. The Effects of BMI from Dietary Consumption and Economics
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