



April 2021

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*Brody School of Medicine*  
**DISTINCTION DAY**  
Abstract Book

# *Acknowledgments*

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## **Improving Pediatric Asthma Management by Utilizing a Scoring System and Care Pathway**

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**Background:** Asthma is a prevalent condition that contributes to significant morbidity and mortality in pediatric populations. Although the management of acute asthma exacerbations involves widely understood core interventions, variation in provider practices is prevalent and can limit the quality of care. Clinical care pathways have been previously demonstrated to improve care efficiency by offering a more streamlined triage method and standardized management strategies. We incorporated a quantitative Pediatric Asthma Severity (PAS) score into a standardized care pathway to improve the management of asthma's exacerbation in our Children's Emergency Department (ED).

**AIM Statement:** To improve the efficiency of asthma exacerbation care in the Children's ED by decreasing the length of stay for patients presenting with acute asthma exacerbation by 10% in an initial 1-year period and 5% in subsequent years.

**Methods:** A PAS scoring system was used to risk-stratify patients aged 2-18 years with a documented or reported history of asthma or albuterol use presenting with an acute asthma exacerbation. Patients presenting with foreign body aspiration, a history of chronic lung disease, congenital heart disease, anatomic airway abnormalities, or immunosuppression were not included. Patients were then categorized into an appropriate care pathway based on initial severity scoring. Project interventions, including PAS implementation, education sessions, care pathway implementation, and transitioning the care pathway into an electronic format, were implemented in sequential PDSA cycles that were followed by retrospective chart auditing and data review. The primary outcome measure for this study was average Length of Stay (LOS) in the ED, which was assessed in 2-month increments as four study periods from October 2017 to November 2020.

**Results:** 1962 patients met the inclusion criteria during the study periods. Over the course of the project period, the average LOS in the ED was maintained for both patients discharged from the ED and patients admitted to the hospital. In the initial year following the implementation of the PAS scoring system, the LOS for admitted patients decreased by 8% (316 minutes to 291 minutes); however, we observed a reciprocal increase in LOS for discharged patients during the same study period (160 to 189 minutes, an 18% increase). Following the formal incorporation of the asthma care pathway into the electronic record system, overall LOS decreased for both admitted (331 minutes to 316 minutes, a 4.5% decrease) and discharged patients (184 minutes to 175 minutes, a 4.9% decrease) from the previous study period.

**Conclusion:** The implementation of an electronically integrated clinical care pathway that utilizes a standardized severity scoring system can decrease length of stay in the ED for pediatric patients presenting with acute asthma exacerbation. Although this study demonstrates the utility of an integrated severity assessment and care management algorithm in improving care for a specific patient demographic, it also suggests that standardized care pathways may be useful in caring patients of any age presenting with an acute illness associated with a severity-driven course of management.

## **Improving Diabetic Retinopathy Screening in the Outpatient Primary Care Setting**

Chris Chase

Diabetic patients at an outpatient primary care practice (OPCP) of a rural academic tertiary care center (RATCC) were not receiving annual eye screening according to organizational standards, hindering identification of diabetic retinopathy. We aimed to increase the percentage of diabetic patient annual eye screening to 30% from 3/2018 to 12/2019.

After clinical flow mapping, the following 7 Plan-Do-Study-Act (PDSA) cycles were introduced. 1) Organizational standards discussion. 2) Onsite automated retinopathy scanning and telemedicine. 3) Same day screenings. 4) Optimized scan room ergonomics. 5) Retinopathy scanner maintenance contract. 6) Dedicated scanner operators. 7) Exam room signage.

The percentage of diabetic patients receiving annual retinopathy screening increased from 8% to 37%. The catchment of retinopathy per 100 diabetic patients at the OPCR increased from 0.96 to 4.44.

These interventions increased the number of diabetic patients screened annually and better characterized a community's level of diabetic retinopathy.

## **Access to Long Acting Reversible Contraceptives in Eastern North Carolina**

A Gautam, MPH<sup>1</sup>, A Powelson, MD<sup>1</sup>, J deVente, MD,PhD<sup>1</sup>

Affiliation: East Carolina University

**Background:** More than half of mothers in eastern North Carolina present with unintended pregnancy. Unintended pregnancies are a major contributor to infant mortality rate in eastern North Carolina. Long acting reversible contraceptives (LARCs) have been shown to be the most effective form of reversible contraception, furthermore the American College of Obstetricians and Gynecologists recommends immediate postpartum (IPP) LARC as a safe, effective option for unintended pregnancy. However, access to LARCs has been and continues to be a challenge for many patients in eastern North Carolina. Two forms of IPP LARC became available at an academic labor and delivery department in 2018, the Nexplanon hormonal implant and Mirena intrauterine device. This process relied on numerous institutional- and state-level policy changes and interventions. This study aims to quantify the rate of receipt of LARC among patients who expressed a desire for LARC before and after IPP LARC was made available.

**Methods:** Over 1150 women who delivered at Vidant Medical Center with East Carolina University Obstetrics and Gynecology were included in this quality improvement study. Two groups of patients were identified retrospectively from the obstetrics patient lists, one group who delivered at Vidant prior to IPP LARC becoming available and the second group who delivered after IPP LARC was an option. Retrospective chart review was performed documenting the desired contraception the patient stated at discharge, whether or not the patient received it inpatient, attendance of postpartum visit, and contraceptive method received. The primary outcome measure was receipt of LARC among those who desired LARC, which was also further stratified by form of LARC. A 2-tailed Fisher's exact test was performed to compare measures for the pre and post groups. Balancing measures included expulsion rates for IUD.

**Results:** Prior to having IPP LARC available (pre-IPP), 59% received LARC amongst those who desired it. After immediate postpartum LARC (post-IPP) was made available in the labor and delivery formulary, 66% received LARC amongst those who desired it. When stratified by form of contraception, a different pattern emerged. In the pre-IPP group 64% of patients received a Nexplanon among those who desired it, and in the post-IPP group 91% patients received a Nexplanon among those who desired it. In contrast, 52% received Mirena in the pre-IPP group, compared to the post-IPP group where 44% received Mirena among those who desired it.

**Conclusions:** There is a marked discrepancy in the number of women who express interest in receiving LARCs and those who actually end up receiving them. A significant portion of this discrepancy is due to the amount of women who are lost to follow up and do not attend their postpartum visits. By offering inpatient placement in the immediate postpartum period, there was an overall increase in utilization of LARC among those who desired this form of contraception. There was a slight decrease seen in the rate of receipt for Mirena, which may be attributed to a variation in patient preference. This study identifies opportunities for improvement in contraception counseling and management. Thorough education about efficacy and risks of IPP LARC and standardization of documentation regarding contraception throughout labor and delivery settings may improve point of care decision-making for patients.



## **Targeting Hemoglobin A1c Levels, Retinopathy, and Neuropathy to Improve the Health of Adult Patients with Diabetes**

Juhi A Gor<sup>1</sup>, Dr. Tim Powell, MD, FAACP<sup>1</sup>

**Introduction:** Among the chronic illnesses affecting our nation, uncontrolled diabetes is highly prevalent. Complications include neuropathy and retinopathy. Increasing hemoglobin A1c (HbA1c) levels increase the risk of complications, and the goal for the diabetic population is a HbA1c level below 9. Along with targeting HbA1c levels, our project aims to reduce retinopathy and neuropathy. Patients face cost barriers when it comes to receiving eye exams, whereas other patients receive eye exams, but outside of the ECU healthcare system, making it difficult to obtain documentation. Screening for neuropathy has become a challenge due to time constraints placed on the provider.

**Global Aim:** Improve the health of diabetic patients by lowering HbA1c levels and increasing screenings for eye and foot exams.

**Specific Aim:** Improve the health of diabetic patients between 18-74 years of age in the ECU APHC Clinic by lowering percent of patients with HbA1c greater than or equal to 9 from 16% to 15%, increasing referrals for eye exams from 17% to 35%, and increasing foot examinations from 62% to 80% between June 2018 to December 2019.

**Methods:** To achieve our goal for HbA1c levels, education was provided through a nurse educator on making lifestyle changes. To reduce the risk of retinopathy, providers are reminded to discuss eye exams through the placement of eye shaped cutouts on patient doors. Screening for neuropathy began by placing monofilaments in patient rooms. Foot shaped cutouts are placed on the door as an additional reminder, along with directing patients to remove their shoes. To target all three areas, diabetes management cards were designed for patients to track their disease progression.

**Results:** Patients with HbA1c levels  $\geq 9$  has decreased from 16% in June 2018 to 14% in December 2019. Eye exams have increased from 16% to 31%, and foot exams have increased from 64% to 77%. These changes are the result of our four PDSA cycles.

**Discussion/Conclusion:** Patients that received education had an improvement in HbA1c levels. The control of HbA1c was not impacted by the diabetes management cards. Having reminders in place and ease of access had an impact on the annual eye and foot exams. The improvement can be attributed to the initial two PDSA cycles. The diabetes management cards did impact the eye and foot exams performed, but greater data collection is needed. Our interventions are progressing toward improving the management of complications in the adult diabetic population in Eastern NC.

## **Improving Monthly Completion Rates for Patients Requiring Diabetic Foot Exams**

Kyle Luke, BS, BA East Carolina University, Shiv Patil M.D, East Carolina University.

**Background:** Diabetic foot ulcers are a complication of neuropathy and peripheral arterial disease that often result in lower extremity amputations. Early recognition of patients with diabetes at risk for these conditions can prevent adverse outcomes. The American Diabetes Association recommends a foot examination annually to identify risk factors for these conditions. However, many clinics have difficulty implementing routine foot exams into daily practice. The objective of this project was to utilize quality improvement interventions to improve our monthly percentage of completed foot exams to  $\geq 70.00\%$ .

**Methods.** Our project occurred at an academic family medicine center from December 2019 to December 2020. The Plan-Do-Study-Act format was used and data was retrospectively gathered through the electronic health record. Our team consisted of attending physicians, residents, nurses, and medical office assistants. Three quality interventions were used including the use of an exam room visual cue consisting of 2 red feet, a list of patients with diabetes due for foot exams was given daily to medical assistants, and a paper template of the diabetic foot exam for easier documentation. Quality meetings were held to discuss project results and assess each intervention. The mean monthly completion rate was calculated using Microsoft Excel software.

**Results:** All patients due for a foot exam during the months of our interventions were included in calculating monthly completion rates. The mean rate prior to our first intervention was 65.85% (135/205). The exam room visual cue yielded an average monthly rate of 68.28% (198/290). A direct 2.42% improvement from baseline. The generated lists of patients given to medical assistants resulted in a completion percentage of 59.18% (29/49). The addition of the exam room template resulted in a completion percentage of 70.37% (57/81). A 4.57% increase from baseline.

**Conclusion:** The exam room visual cue led to a direct increase of 2.42%, but failed to increase our monthly percentage to  $\geq 70.00\%$ . Despite not reaching our goal the intervention demonstrates the effectiveness of visual cues to act as inexpensive solutions that can be easily adapted into outpatient practice. Our second intervention did not improve our monthly completion percentage and was severely impacted by the coronavirus pandemic. Our final cycle using the exam template resulted in a 4.57% increase from baseline and reached our goal of 70.00%. The combination of visual cues and templates for documentation appear to be promising solutions aimed at increasing diabetic foot examination rates.

## **Improving Hepatitis B Vaccination Timeliness for Very Low Birth Weight Infants in the NICU**

Arjun Patel<sup>1</sup>, Ryan Moore, MD<sup>1</sup>

<sup>1</sup>Brody School of Medicine at East Carolina University, Greenville, NC

**Background:** The American Academy of Pediatrics recommends infants <2000g receive their first Hepatitis B dose at 1 month of age or at hospital discharge due to increased immunologic response; however, very low birth weight (VLBW, <1500 g) infants have delayed or lack of immunization despite demonstrated vaccination effectiveness and relative safety in this population. Our project aim was to improve timeliness (delivery by <33 days) of 1-month Hepatitis B vaccinations to VLBW infants in the NICU to 80% by 12/2020.

**Methods:** This longitudinal project was conducted in a level IV NICU at a tertiary care referral center. Our primary outcome measure was the monthly percent of VLBW infants admitted to the NICU that received timely Hepatitis B vaccination. Baseline vaccination rates were measured over an 8-month period. The Plan-Do-Study-Act (PDSA) model was utilized for change implementation with cycles including a survey to NICU staff to identify vaccination knowledge limits and perceptions (PDSA 1), education sessions on vaccine administration, survey results, and changes to workflow (PDSA 2), and Hepatitis B consent process alterations to allow consent to be obtained at Labor and Delivery admission (PDSA 3).

**Results:** Baseline Hepatitis B vaccination rates demonstrated 82 infants received timely vaccination out of 130 NICU admissions (63.08%) with exclusion criteria as infant mortality at <33 days of life. Survey results (n=55) (PDSA 1) found 81.8% correctly identified vaccination timing. 58.2% correctly indicated no reason to defer while 34.6% indicated that antibiotics and apnea were both contraindications. 56.1% of respondents believe that >90% of VLBW infants receive vaccination. Over 11 months following PDSA 1, 110 VLBW infants were vaccinated out of 151 VLBW NICU admissions (72.85%). Over 7 months following PDSA cycles 2 and 3, infant vaccination rates were found to be 81.40% (70/86 infants).

**Discussion:** An initial deficiency in timely delivery of Hepatitis B vaccinations (63.08%) was identified. While our first PDSA identified that the majority of respondents understand vaccination timeline and safety in VLBW patients, there was a knowledge deficiency regarding contraindications (nursing/resident/fellow) and actual NICU performance (attendings). Following PDSA 1, there was a slight improvement in vaccination rates to 72.85%. Following PDSA 2 and 3, an improvement in vaccination rates above aim was noted with a new baseline of 81.40%

**Conclusion:** Hepatitis B vaccination delivery to VLBW infants in the NICU has continued to improve with interventions including surveys, education, and consent process alterations. Further work could include interventions to improve the 2-month vaccination process.

## **Implementing Education, Instruction, and Data Collection Improvements to Reduce Blood Culture Contamination Rates in the Emergency Department**

Meera Patel

**Background:** Blood draw contamination rates are a hospital-reported quality metric since false positive blood culture results can provoke adverse effects on patient care and system resource stewardship. At Vidant Medical Center (VMC), the hospital-wide mean blood draw contamination rate remains continually elevated above the acceptable 2.5% threshold. Of all hospital units, the Emergency Department (ED) consistently shows the highest average rate of 6.0% and brings down the hospital-wide average. Potential contributing factors include skin flora contamination, inadequate volume collection, miseducation, and protocol breakdowns. To improve this quality metric, changes were systematically implemented to aim for an absolute reduction of 1.5% (relative reduction of 25%) in ED blood draw contamination rates from the monthly mean of 6.0% from October 2017 to August 2019, with the long-term goal of achieving rates at or below the 2.5% threshold.

**Methods:** From April 2017 to August 2019, the Model for Improvement and Plan-Do-Study-Act (PDSA) methods of quality improvement were utilized to implement holistic changes targeting nurse re-education, real-time instruction, accountability, data reporting frequency, and role specialization. Designed as a focused audit study, the primary outcome measures of percent blood draw contamination from the ED and other adult units were analyzed against the 2.5% threshold. Correlations between fill volume and number of contamination events made by employees flagged for repeated blood draw contamination were also analyzed.

**Results:** Assessments showed that PDSA cycles 1 and 2, both education initiatives, resulted in an immediate sharp decline in rates (decreased by 2.7% and 1.6% respectively), followed by a slight rise in subsequent months. Later, PDSA cycle 3, involving individualized instruction, information availability, encouragement of accountability, and more frequent data reporting, resulted in an absolute drop (1.7%; 26% relative drop) in contamination rates over one month followed by a fluctuating but improved downtrend through April 2018. No significant runs were noted to hold sustained change below the mean, with the longest run consisting of four points from August to November 2017. Fill volumes did not significantly correlate with contamination events.

**Conclusion:** The specific aim of this study to reduce ED blood draw contamination rates by 1.5% over the study period was not met. Still, the outcomes provide valuable lessons for overcoming barriers during future project endeavors and for approaches to quality improvement in general. Further exploration into causative factors may result in heightened and sustained improvements in ED blood draw contamination and quality of care at VMC.

## **Improving ED Sepsis Identification and Time to Treatment Initiation**

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<sup>1</sup>Medical Student, Brody School of Medicine at East Carolina University

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<sup>3</sup>Senior Medical Director for Quality, Vidant Medical Center and Clinical Assistant Professor, Department of Pediatrics, Brody School of Medicine at East Carolina University

**Introduction:** In 2015, the Centers for Medicare & Medicaid Services implemented the Severe Sepsis and Septic Shock Early Management Bundle, a new core measure (SEP-1) to assess quality of care for septic patients. In FY 2019, there were 47 total bundle failures at our hospital with an overall SEP-1 performance of 44%. A quarter of these failures resulted from missing the 3-hour window for antibiotic administration, indicating that there is room for improvement in identifying these patients sooner, so that care can be initiated promptly.

**Aim:** To increase SEP-1 compliance by 25% by the end of FY 2020

**Methods:** The project was conducted at a 58-bed emergency department in Greenville, North Carolina with a team comprised of a quality nurse specialist, medical student, and several ED nurses/physicians. The project began in January 2020, but was interrupted due to the COVID-19 pandemic. The primary outcome measure chosen was SEP-1 core measure performance. Before measuring our endpoint, several PDSA cycles were implemented in an effort to increase bundle compliance. PDSA cycles #1-3 involved nursing-focused interventions. These interventions included the implementation of a triage screening tool, an interactive EHR documentation tool that prompts time-based interventions, and an educational game for staff. PDSA cycle #4 shifted towards provider-focused interventions and the development a sepsis-focused order set including labs, fluid, and antibiotic suggestions based on suspected source.

**Results:** For the initial nursing-focused interventions, the team received feedback that the paper triage tool and EHR-based documentation tool were unnecessarily cumbersome and difficult to remember, as they did not integrate into the existing workflow. Based on this feedback, these interventions were not carried forward. Both the educational game and sepsis order set were well-received by stakeholders and continued. In FY 2020, SEP-1 performance improved by 5%, which fell short of our aim. The first quarter of FY 2021 is promising, however, as we are on track for a 24% improvement.

**Discussion/Lessons Learned:** After receiving feedback on the initial PDSA cycles, it became clear that interventions that are integrated into preexisting workflow are perceived well by staff. At this point the team shifted priorities to developing interventions that complemented current practices. While the results fell short of fulfilling our specific aim, this may be due in part to competing interests during the COVID-19 pandemic. It is encouraging that we have continued success in the early part of FY 2021, which may indicate that our chosen time frame for analyzing project performance was too narrow.

**Conclusion:** While the results were more modest than our specific aim, our project successfully led to an improvement in SEP-1 performance throughout our institution. This is an important step toward improving the quality of care for patients presenting with severe sepsis or septic shock. We hope to continue to improve upon this trend in FY 2021.

## **Improving Communication of Lab Results to Patients at an Outpatient Pediatric Obesity Clinic**

Sanjana Prabhu, MS4, Brody School of Medicine at ECU  
Suzanne Lazorick, MD, MPH, FAAP, ECU Pediatrics  
David N. Collier, MD, PhD, FAAP, ECU Pediatrics  
Gloria Randolph, CMA  
Natalie Taft, MSN, LDN

**Background:** Patient notification is a standard of patient care; 90% of patients want to be informed of all test results. At our clinic, patient notification of lab results was provider-dependent, variable, and often delayed until follow-up. The purpose of this project was to create and evaluate a standardized process of patient notification at our clinic. Our specific aim was to increase the percentage of eligible new patients having lab letters sent to them from 0% to 90% by August 31, 2020.

**Methods:** This project was conducted at the ECU Pediatric Healthy Weight Clinic with the two clinic providers, A and B. After initial chart review, process map analysis, and collection of staff feedback, we initiated a letter process with four PDSA cycles. The intervention population consisted of new clinic patients who had lab work done with two or more test results. From October 2019 to August 2020, we collected a monthly outcome measure of the percentage of patients with lab results “communicated”, defined as the letter being created by the provider and documented in the patient chart. A phone survey was conducted to elicit feedback from patients in February 2020 who were sent letters. All data was captured via manual chart review, de-identified, and stored in a spreadsheet. Data was analyzed using Microsoft Excel and a run chart was created using R.

**Results:** During the 11-month project, 155 new patient charts were reviewed (average, 13 per month; range, 0-25). 127 patients were eligible, and letters were completed for 110 of them (87%). The average letter completion rate was 92% for Provider A and 73% for Provider B. The survey had a 40% response rate (6 out of 15). 50% of respondents reported having received a letter, with an average satisfaction rate of 4 out of 5. 83% of respondents endorsed wanting to receive all lab results and 100% said they prefer a letter format.

**Conclusion:** We aim to improve patient care at our pediatric obesity clinic by increasing the percentage of patients notified about lab results from 0% to 90% via letters mailed to patients. The average letter completion rate was 92% for Provider A and 73% for Provider B. Our project results, combined with positive patient feedback, suggest mail notification could be useful for our outpatient population. Future PDSAs to help achieve sustainability include standardizing the provider process and increasing documentation of letters being sent out.



## Standardized Resident Physician Transitions of Care in the Emergency Department

Greyson Vann<sup>1</sup> and Jennifer Bennett, MD<sup>2</sup>

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**Background:** Transition of care (TOC) represents one of the most common and dangerous occurrences in an emergency department (ED). Miscommunication is the cause of 70% of sentinel events and 84% of treatment delays, and occurs in nearly 80% of medicolegal cases. 24% of ED malpractice claims specifically implicate TOC. Highlighting the importance of sign-out, the Accreditation Council for Graduate Medical Education requires that “[Residency] Programs, in partnership with their Sponsoring Institutions, must ensure and monitor effective, structured hand-over processes to facilitate both continuity of care and patient safety.” Presently at East Carolina University (ECU), emergency medicine (EM) and emergency medicine/internal medicine (EM/IM) resident physicians (residents) receive training on TOC, but a system is not uniformly used. The aim statement for this quality improvement project is “resident physicians in the emergency department will use a standardized patient TOC format 50% of the time in 8 months.”

**Methods:** The project targeted EM and EM/IM residents. A QI and TOC presentation was given at resident conference in May 2019, with small groups creating fishbone diagrams of factors affecting TOC. A PDSA cycle was performed for two weeks during July 2019, during which residents were encouraged to use the I-PASS handoff system. A Qualtrics survey assessing resident perception of TOC was distributed in December 2019. A presentation on TOC was given during the 2020 EM intern orientation. A planned February 2021 survey assessing resident TOC practices and perceptions was not completed. Descriptive statistics were performed on the Qualtrics survey results using SPSS (IBM, Version 26).

**Results:** The most identified factors affecting TOC were resident experience level, attending influence, workroom size, number of computers, interruptions, and patient complexity. Perceived benefits of I-PASS were focused on the thoroughness of sign-out. Perceived drawbacks were length of time required for sign-out, redundancy, and difficulty remembering each part of I-PASS. Statistically significant negative correlations were found between the perception that a standardized sign-out would improve patient safety and would unnecessarily lengthen sign-out ( $r=-0.372$ ,  $p=0.043$ ), and between the perception that a standardized sign-out would improve the transfer of information and would unnecessarily lengthen sign-out ( $r=-0.389$ ,  $p=0.034$ ).

**Conclusion:** TOC represents one of the most dangerous moments during patient care in the ED. Attempts to standardize this at ECU have been unsuccessful due to inadequate buy-in and the perception that a standardized TOC method would unnecessarily lengthen TOC. Residents believe that a standardized TOC method would improve information transfer and patient safety.

## **Reducing Blood Wastage in a Large Level I Trauma Center**

Amber Whitley<sup>1</sup>, Susan Weiss<sup>1,2</sup>, Michael Passwater<sup>2</sup>, Brittany Stewart<sup>2</sup> and Keosha Joyner<sup>2</sup>

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**Background:** Recent decline in blood product collections and the demand for life saving transfusions highlights the need for effective blood management. Between 2011 and 2013, AABB facilities reported a 12.1% decline in collections of whole and red blood cells (RBC). Lean Sigma methodology demonstrated that reducing the number of RBC units wasted by 4,300 per year saved \$800,000 over a four year period. This study analyzed the placement of cryoprecipitate in massive transfusion protocols (MTPs), the use of pooled plasma in therapeutic plasma exchange (TPE) and the emergent transport of RBCs. Our AIM was to reduce cryoprecipitate and plasma wastage to 15% and 5%, respectively.

**Methods:** At Vidant Medical Center, a level I trauma center, cryoprecipitate was issued during the second round of the MTP causing the transfusion service to thaw cryoprecipitate when the MTP was activated. If a second round was not needed, the thawed cryoprecipitate was discarded. TPE protocols required thawed plasma to be pooled, preventing transfusion to a different patient if the original procedure was cancelled. Collaboration with multi-disciplinary teams including the transfusion services, apheresis service and trauma service identified opportunities to maximize blood management efficiency. The MTP was revised to issue cryoprecipitate in the third round. Pooled plasma was replaced with individual plasma units for TPE procedures allowing thawed plasma to be transfused to a different patient. Point of service emergency blood refrigerators were installed in the trauma bay to minimize blood wastage related to “cold chain” disruptions during transport.

**Results:** During the study period 76, 241 blood units of plasma, cryoprecipitate, RBC's and plasma were discarded. Cryoprecipitate and plasma demonstrated a statistically significant decrease in waste rates from 27.47% ± 9.57% to 18.2% ± 5.13% (p = 0.00163) and 10.77% ± 4.55% to 6.0% ± 2.71% (p = 0.01319), respectively. The percentage of RBC's units delivered to the emergency room, not transfused and returned to the blood bank decreased from 51.57% ± 4.22% to 28.57% ± 14.01% (p=0.0000422). Hospital savings following the introduction of three interventions amounted to \$80,083 over a two year period.

**Conclusions:** This study indicated that the introduction of three interventions decreased cryoprecipitate and plasma wastage and produced copious hospital savings. In addition, the decline in RBC return rate demonstrates that the blood stored in the refrigerators is adequately being used to resuscitate patients. Future efforts aim to identify additional sources of blood waste and services other than trauma with high wastage.

**Table 1. Annual Units Wasted, by Product Type at Vidant Medical Center**

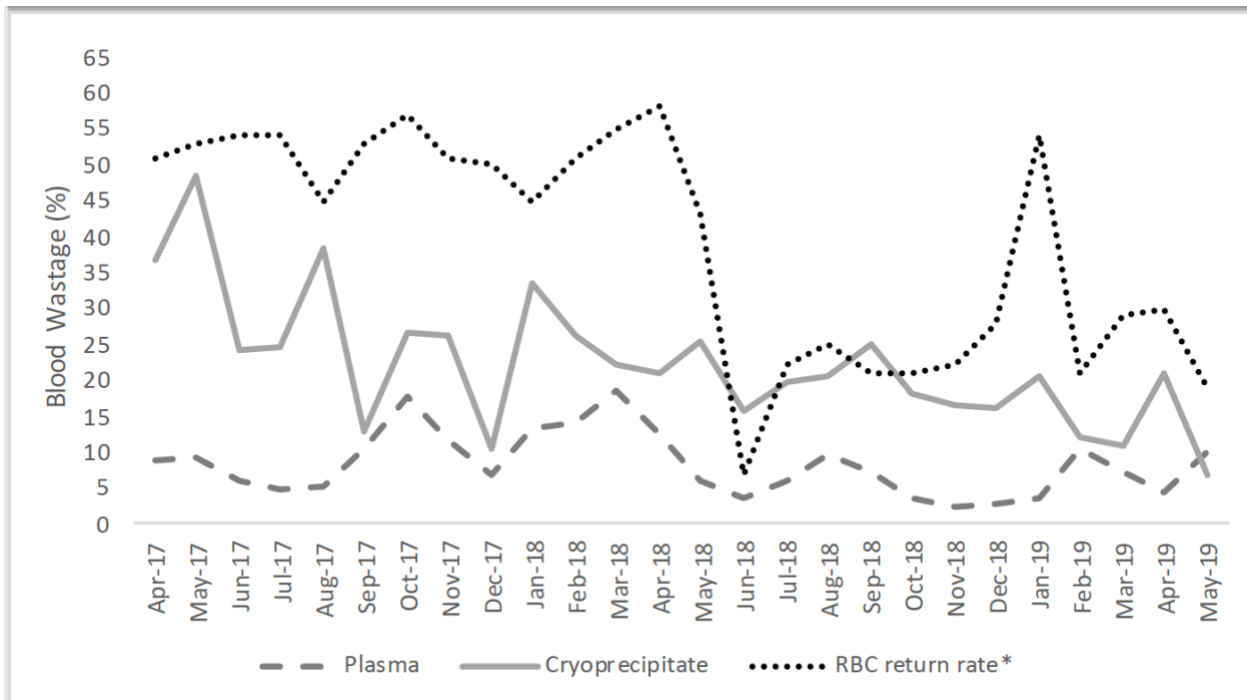
| Discarded Product | 2019     | 2018    | 2017    |
|-------------------|----------|---------|---------|
| Sample Size       | 28,479*  | 29,105  | 29,865  |
| RBC (%)           | 0.8*     | 0.9     | 1.1     |
| Platelets (%)     | 0.5*     | 0.6     | 0.7     |
| Plasma (%)        | 5.8*     | 10.6    | 8.2     |
| Cryo (%)†         | 16.2*    | 22.7    | 25.6    |
| Blood Waste (\$)  | 87,616** | 105,577 | 136,998 |

\*Numbers and percentages are based on data from January to July of 2019. Data from August to December of 2019 has not yet been reported.

\*\*Projected total blood waste (\$) for 2019 is based on data trends from January to July of 2019.

†Cryoprecipitate

**Figure 1. Wastage by Blood Products from April 2017 to May 2019**



*Medical Education & Teaching Distinction Track*

## **The Use of a Pre-Laboratory Preparation Video in the M1 Neuroscience Course**

Andrew Brown

**Introduction:** The Brody School of Medicine has condensed its preclinical years from 2 years to 1.5 years to allow for more time gaining clinical experience. Therefore, course instructors have had to implement new strategies to adequately cover the same amount of material in less time. Many courses at the Brody School of Medicine, including the first-year Neuroscience course, have increased the use of out-of-class instructional videos for students to view on their own to help combat the loss of lecture hours. The purpose of this study was to determine the effects of adding a pre-laboratory preparatory video as a learning resource on student satisfaction and examination performance in this condensed curriculum.

**Methods:** A pre-laboratory video was created to cover laboratory-specific material from a general overview lecture given in previous cohorts that students would see during their first laboratory session and on their first exam. Students enrolled in the 2019-2020 first year Neuroscience course completed surveys regarding confidence in covered material and perceived usefulness of the resource. The cohorts were administered the same examination. Student written, laboratory, and combined exam performance was compared to the performance of students from the previous cohort who did not have access to the video but did receive a general overview lecture.

**Results:** 36/82 students (43.9%) completed the survey. Survey responses indicated increased comfort level with the covered material after viewing the video, improved content-related confidence upon entering the first laboratory session, and perception that the video to be a useful study resource for exam preparation. Students viewed the videos an average of 4.67 times prior to their first exam. There was no significant difference in combined examination performance between the two cohorts.

**Conclusion:** This study suggests that the use of a pre-laboratory preparatory video is an effective resource to improve student knowledge and confidence in covered content and is a useful study resource for exams. Despite a decrease in written performance, no significant decrease in laboratory or overall performance suggest effectiveness of video as a learning resource in the context of reduced lecture hours. Videos for subsequent laboratory sessions may be similarly beneficial moving forward.

## **Conflict Resolution: A Standardized Professional Case for Fourth-Year Medical Students**

Caitrin Curtis

**Introduction:** Conflicts in the medical workplace are associated with medical errors and higher ratings of personal stress. However, interpersonal conflict can have a positive impact on a team when they are managed effectively, by generating an innovative solution from different perspectives. Objective structured clinical exams (OSCE) have been utilized to assess students' interpersonal skills utilizing the standardized patient (SP) model. However, utilization of a standardized professional (S-Pro) model to assess medical students' conflict management skills in the context of an interprofessional team has not been previously reported.

**Methods:** Fourth-year medical students attended a didactic lecture regarding evidence-based conflict resolution techniques from Team STEPPS®. Subsequently, they were presented with a conflict scenario to resolve with a S-Pro in ten minutes. Students completed a survey before and after the intervention regarding their perceived ability to manage a conflict.

**Results:** After completing the OSCE, students reported a significant increase in their confidence in conflict management with another medical student, resident, attending physician, or patient.

**Discussion:** Applying evidence-based conflict resolution techniques with a S-Pro can increase medical students' confidence in managing a conflict in the medical workplace. The OSCE script facilitates the teaching of professionalism and communication skills between medical students and other simulated professionals.



## **Problem-Based Learning: Approach to a Patient with a Generalized Rash**

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**Background:** In order to address the apparent curriculum gaps in both dermatologic and multi-organ system diseases across medical school curricula, a new problem-based learning (PBL) case was developed with the goal of improving students' knowledge and ability to evaluate the presentations of common (and uncommon) dermatological rash presentations. This active learning case has been integrated into second year medical students' Foundations of Medicine course – a class with a primary focus on PBL curriculum.

**Methods:** Students worked through the PBL case in two sessions over two weeks. In the first session, students established a differential diagnosis and formulated learning objectives as they were presented with a patient's history and physical exam. In the second session, students presented their findings based on their objectives and the case was resolved. After the second session, students were asked to evaluate the efficacy of the case and their confidence in the topics covered – evaluating laboratory values, establishing a differential diagnosis for a drug reaction, evaluating the presentations of a rash, and understanding the presentation and pathophysiology of Drug Reaction with Eosinophilia and Systemic Symptoms (DRESS) – using a 5-point Likert scale (1= very uncomfortable, 5= very comfortable). A pilot group was conducted for proof of concept in the winter of 2020. The case was then implemented into M2 curriculum for the class of 2023.

**Results:** 27 students responded to the poll for a response rate of 32.1%. Across all subjective domains, students demonstrated an increase in level of comfort. Prior to the case, average level of comfort in establishing a differential diagnosis for a drug reaction was 2.33 (sd=1.07), whereas after the case, this improved to 3.85 (sd=0.53); comfort in evaluating the presentation of a rash improved from 2.41 (sd=1.18) to 3.93 (sd=0.55); level of understanding the presentation and pathophysiology of DRESS improved from 2.19 (sd=0.92) to 4.04 (sd=0.52).

**Discussion:** Students reported improved confidence and understanding in all of the domains inquired. Overall this course accomplishes its goal of diversifying the PBL curriculum at the Brody School of Medicine. Next steps would be to proceed with the implementation across multiple years and continuing to collect data while also looking at students' performance on standardized testing in both systemic and dermatologic diseases processes.

## **Recognizing Heart Murmurs: Using Simulation-Based, Self-Directed Learning for USMLE Step One Preparation**

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**Background:** USMLE Step One examination format includes integration of auditory stimuli as a part of clinical basic sciences questions. Self-Directed Learning (SDL) refers to the collection of learning activities that are truly learner-focused in that learners determine their own individual needs and participate on their own time. The integration of clinical simulation modalities into the basic science curriculum has been shown to improve retention of material and medical student satisfaction with their educational experience (Dyrbye et al., 2011). It has been shown that self-directed simulation has produced learning outcomes that are equal to faculty-directed simulations and actually take less time for the students to complete and are less burden on faculty (Brydges et al., 2013). The purpose of this project is to provide a self-directed, simulation-based auscultation learning experience to assist medical students in the recognition of heart murmurs. The goal is to develop an educational format that will improve the student's ability to recognize heart murmurs using SDL with an auscultation simulator. The effectiveness of the SDL program using an auscultation simulator as a review modality for board examination preparation will be studied.

**Methods:** Self-directed study auscultation topics were selected based on First Aid for the USMLE Step One reference information pertaining to the mitral valve, aortic valve, ventral septal defect and patent ductus arteriosus murmurs. The SAM II Student Auscultation Manikin (Cardionics) containing a sound library was used for learning heart sounds. 113 (2019: 65; 2020 48; 2021: COVID) second-year medical students voluntarily enrolled in the study and participated prior to their dedicated Step One study period. Students completed a pre-test consisting of auditory auscultation-based questions. Following the pretest, students studied murmur characteristics using the auscultation simulator. The time needed to spend on the program was determined by each individual student. Students completed a post-test once the auscultation modules were completed. Test scores were compared using a paired t-test. Students also completed a Likert scale survey to assess attitudes toward this self-directed learning experience.

**Results:** When comparing second-year medical students' (N=113) pretest scores versus their post-test scores, a significant ( $p<0.05$ ) increase in student performance from 51.8% to 89.9% was found. Prior to completion of the modules, students were only able to effectively recognize normal heart sounds, with (2019: 95%; 2020: 97%) of the students correctly identifying them. The percent of students that were able to correctly identify each murmur in the (pretest/posttest): aortic stenosis (2019: 54%/86%; 2020: 65%/90%); aortic regurgitation (2019: 38%/89%; 2020: 40%/92%); mitral stenosis (2019: 34%/85%; 2020: 39%/82%); mitral regurgitation (2019: 34%/82%; 2020: 31%/79%); mitral valve prolapse (2019: 35%/83%; 2020: 38%/85%); patent ductus arteriosus (2019: 68%/98%; 2020: 67%/98%); ventricular septal defect (2019: 46%/94%; 2020: 51%/96%). Each of the murmurs had a significant ( $p<0.05$ ) increase in performance. Likert scale data showcased that students strongly agreed (5.0) that practicing at their own pace improved their experience, the modules helped them better recognize murmurs, and that they were interested in other Self-directed simulation modules. The participants agreed (4.0) the system was easy to use, improved their confidence in recognition of murmurs, and the Self-directed Simulation helped them prepare for USMLE Step One.

**Conclusion:** Completion of the SDL Heart Murmur auscultation modules significantly increased the students' ability to recognize pathological heart murmurs. Completion of the modules increased the students' confidence in their abilities to recognize heart murmurs and answer USMLE Step One examination questions. SDL simulation-based auscultation modules should be incorporated into the first two didactic years of medical school to provide clinical correlations and to assist preparation for USMLE Board Examinations. **Future Directions:** Integrate simulation-based SDL into the medical school curriculum.

## **Supplementing Gross Anatomy Pelvis and Perineum Content with Online Videos: Effects on Student Learning**

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**Introduction:** As medical schools across the United States move toward utilizing a condensed curriculum, course directors are left with less time available in the laboratory. In 2018, we added online video modules to supplement a prosection presentation and Flipped Classroom session after removing a dissection from the Gross Anatomy and Embryology course at the Brody School of Medicine.

**Methods:** We created male and female pelvis and perineum videos using content from the course text. Students watched these then attended a prosection presentation and Flipped Classroom session, completing a survey at the end of the latter. We analyzed the data on student self-perception of learning and themed qualitative short answer data using word cloud analysis to find strengths, weaknesses, and desired features in the videos.

**Results:** Students' perceived comfort level with content increased on average. Common themes noted that visual representations were beneficial, particularly for embryology, along with direct references to the course text. Post-video practice questions, clinical correlations, and a playback speed option were widely desired.

**Discussion:** Our results support the use of online videos to supplement other learning strategies such as prosection presentations and Flipped Classrooms while maintaining effective student learning after removal of a dissection. Further analysis using objective examination data would prove to be useful. Our experience suggests video modules, when used to supplement other learning strategies, may be helpful in reducing course contact hours.

## **Pre-class Video Previews to Enhance Traditional Medical School Lecture in a Condensed Curriculum**

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**Background:** Historically, medical student lectures in the pre-clinical years are delivered in the traditional, monologue style by a senior faculty member but declining attendance, decreased classroom time and the increasingly complexity of medicine are driving teachers and schools to create a more efficient, entertaining and educational lecture format. The data is clear though that the more engaged a student is in his/her learning process the more likely it is that the student will have greater mastery and retention of the material. The traditional lecture when delivered as a monolog usually lacks student engagement and can lead to a passive learning experience.

In the current condensed medical curriculum students learn the same amount of material but in 33% less time. The students must balance learning the material from the current day's lecture, refreshing previously covered material and preparing for the next day's lectures. According to a recent survey completed at the Brody School of Medicine >75% of students do not prepare for any lecture. This means that the students cannot actively participate and may miss the opportunity to clarify details in real time.

In order to encourage active learning in a condensed medical school curriculum our group created short, high-yield lecture preview videos that would serve as the student's pre-reading exercise. This turned the traditional monolog lecture with passive learning into an active one while respecting the student's busy study schedule in a condensed curriculum. There was one 5-minute video for every one hour of lecture during the M1 Cardiac Physiology lecture block. We tracked student's grades on exams and quizzes during exam blocks with and without lecture video previews and combined that data with student's responses to a survey about their opinions about the lecture preview videos and their overall effect on their learning experience.

**Method:** This single center, prospective analysis looked at the impact of pre-class video-based instruction on student perception of the traditional lecture and testing performance. The study utilized a quantitative analysis to evaluate the effectiveness of the intervention on the Medical Physiology Course at the Brody School of Medicine.

Study participants were 1<sup>st</sup> year medical students at the Brody School of Medicine who were enrolled in the Medical Physiology Course. The course runs from for over 4 months, but the study period pertained to the cardiac physiology section which is taught over a 4-week period. The 2017-2018 (n=85) course served as a control group where there was not a pre-class video for each individual lecture. The 2018-2019 (n=48) course served as a proof of concept where students utilized the resources on a voluntary basis, but no data was collected in a prospective manner. The 2019-2020 course served as the primary prospective group which is detailed in this study.

The pre-class videos were designed utilizing the ExplainEverything App on the iPad. The app utilized voiced recording over drawings and figures which were uploaded to YouTube. Students could access the YouTube pages individually with links listed on their course's webpage or from a tallied list that was sent to the email in addition to the courses' webpage.

To analyze the video's effect on student performance, quiz and exam scores were compiled from previous classes. Two quizzes and one exam were given throughout the investigation period each year. All testing was performed on the Examsoft platform at the Brody School of Medicine and was supervised by proctors. Class averages were compiled from this data set.

To address the student's perception of the lectures a Likert scale was used (1=Strongly disagree; 5=Strongly agree). A Google Form was used and participants de-identified their answers using a third party and a self-assigned pin code.

Standard analysis was performed on the control group as there was no intervention to assess. In the proof of concept group and the prospective study group, students were sorted into those who watched the video and those who did not. Their grades were averaged just as the control group. In the two intervention groups, Likert responses were analyzed and compared to each other. Secondary analysis was performed on secondary questions not in the primary study analyzing if the number of videos watched correlated with any significant findings. Statistical significant will be set at  $p < 0.05$  for all statistical measurements

**Results:** At the conclusion of the exam block, students were surveyed to evaluate their thoughts of the pre-lecture video series. Forty-eight medical students assessed the experience using a 5-point Likert Scale.

As a whole, the average response for the 2018-2019 class was as follows: the pre-class videos were helpful 4.3125/5, detailed enough 4.125, good use of my time 4.396, gave me a better understanding of the material 4.104, helped me to enjoy lectures more than those I did not prepare for 3.917, feel confident 3.688, I would watch more pre-lecture videos 4.146, allowed me to devote more time to other courses 3.146, and I feel that I did better on the exam because I came prepared to class 3.123.

Overall, the 2018-2019 class scored 81.39 on their 1<sup>st</sup> quiz in the study period, a 74.35 on the second and 77.25 on the exam. The respondents scored 82.38, 74.81, and 79.05 respectively indicating the respondents were a good representation of the class as a whole. Students watched 56.48% of the 18 pre-lecture videos but in comparison respondents indicated they prepare for between 25-33% of classes. In sub-group analysis those who watched 100% of the videos scores were 90.91, 76.63, 83.33 whereas those who watched less than 75% of the videos scores were 80.60, 77.06, 77.20.

**Conclusions:** Video-based lecture previews were regarded as helpful, detailed, a good use of the student's time and gave them a better understanding of the material. Though not surprising, respondents who watched the most videos scored the best on quizzes and exams. This suggests that video based-lecture previews are not only well regarded by students but are a reasonable means of preparing for lectures in a condensed medical school curriculum. By redesigning lecture format and empowering students as adult learners, medical schools can hope to transition learners from information gathers to information synthesizers. This concept was applied to cardiac physiology but is likely to be applicable to other courses as well as other topics within medical physiology.



## **An Ultrasound Simulation Based Approach to Teaching Third Year Medical Students Female Pelvic Anatomy**

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**Background:** Medical students have limited exposure to ultrasounds education during their clinical years which prevents them from learning how to identify anatomical structures on ultrasound images. In Obstetrics and Gynecology, ultrasound is an integral imaging and diagnostic tool. Given the limited exposure that medical students have to ultrasound imaging and its clinical importance in OBGYN, we developed a self-directed educational module to teach students proper pelvic ultrasound technique and how to localize pelvic anatomical structures. In this study, we utilized SonoSim educational videos and software to determine if exposure to educational ultrasound videos and practice pelvic ultrasound cases increased third year medical students' confidence and ability to identify female pelvic anatomical structures while on their Obstetrics and Gynecology clerkship.

**Method:** Eligible participants of this study were third-year medical students at the Brody School of Medicine on their Obstetrics-Gynecology clerkship. Each student initially completed a pre-test to assess their ability in identifying pelvic anatomical structures on ultrasound images. Students then watched a series of educational videos which provided an overview of the technique involved in obtaining a proper female pelvic ultrasound. Students also used the SonoSim computer software with an attached artificial ultrasound probe to complete three cases that reflected normal female pelvic anatomy. For each case, students located key anatomical structures including the bladder, ovaries, uterus, cervix, and blood vessels. Upon completion of the ultrasound module, participants completed a post-test evaluation and a post-module evaluation survey. The scores between the two tests were assessed using a two-tailed Student's t-test in Microsoft Excel.

**Results:** Data from six cohorts of students (N=83) was analyzed. There was a significant improvement in scores between the overall average pre-test and post-test results [7.97 vs 12.77 ( $p<0.001$ )]. There was a significant improvement in average scores between the pre-test and post-test results for each individual cohort of students (for each cohort:  $p<0.001$ ). There was a significant difference in the number of students who answered each question correctly between the pre-tests and post-tests (for each question:  $p<0.001$ ). Survey results showed that on average, students agreed that the ultrasound module helped them recognize important pelvic anatomy on ultrasound images, the module would help them on their OBGYN clerkship, and that they would like to use the SonoSim simulator to practice ultrasound techniques in the future.

**Conclusion:** An ultrasound educational activity using the SonoSim videos and interactive computer program improved students' ability and confidence in identifying female pelvic anatomy on ultrasound images.

*Research Distinction Track*

## **Female Genitourinary Dysfunction following Pelvic Radiation Therapy**

Lindsey Burleson

**Background:** Radiation therapy (RT) has become standard of care treatment for cervical cancer throughout the world. While RT has increased mean survival of cancer patients, women who receive it often experience genitourinary dysfunction. While the side effect profile of this treatment is well documented, little is known about the mechanism or temporal effects pelvic RT. This study's objective was to determine the time course of RT-induced oxidative stress and inflammation on the rat vaginal and bladder function.

**Methods:** Female Sprague-Dawley rats were separated into 3 groups (n=7-8/group): Sham, 4wk RAD, and 9wk RAD. The 4wk RAD and 9wk RAD groups each received one dose of 20 Gy external beam radiation and experiments were performed at 4 weeks and 9 weeks post-RT, respectively. Vaginal blood flow was measured in vitro via laser doppler probe following pelvic nerve stimulation. Ex vivo tissue bath studies assessed vaginal smooth muscle contractility in response to adrenergic agonists, cholinergic agonists, and electric field stimulation (EFS). Vaginal relaxation was measured in response to a nitric oxide donor. Bladder and urethral internal and external sphincters were also assessed for cholinergic, caffeine and EFS neurogenic contractility. Quantitative PCR measured gene expression of oxidative enzymes from vaginal tissue.

**Results:** Total vaginal blood flow is decreased at 4 weeks post-RT and returns to baseline levels. Bladder smooth muscle neurogenic contractions are decreased at 4 weeks following RT and remain decreased. An acute rise in inflammatory gene expression correlates these findings. Vaginal neurogenic and adrenergic-mediated contractile response is increased 9 weeks following pelvic RT. Internal urethral contractions are acutely increased 4 weeks following pelvic RT and return to Sham levels 5 weeks later. External urethral neurogenic contractions are increased by pelvic RT and remain increased.

**Conclusion:** This model will allow us to understand the pathophysiology of RT-induced sexual and urinary dysfunction and discover radioprotective therapies.

## **Association of Sex and Pregnancy Status with Naloxone Administration During Emergency Department Visits**

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**Objective:** To evaluate the association of sex and pregnancy status with rates of naloxone administration during opioid overdose-related emergency department (ED) visits using the Nationwide Emergency Department Sample (NEDS).

**Methods:** A retrospective cohort study was conducted using NEDS 2016 and 2017 datasets. Eligible records included men and women, 15-49 years of age, with an opioid overdose-related ED visit (ICD-10 codes: T40.0-40.4, T40.6, F11, F19, O99.32, R41.82, or I46.9 codes); records for women were stratified by pregnancy status (ICD-10 O codes). A multivariable logistic regression model was used to assess the primary outcome of naloxone administration (CPT code: J2310). Secondary outcomes included subsequent admission and mortality. A subgroup analysis compared pregnant women who did versus did not receive naloxone.

**Results:** Records from 443,714 men, 304,364 non-pregnant women, and 25,056 pregnant women were included. Non-pregnant women had lower odds for naloxone administration (1.70% vs 2.10%; aOR: 0.86 (0.83-0.89); p-value<0.01) and mortality (2.21% vs 2.99%; aOR: 0.71 (0.69-0.73); p-value<0.01) but higher odds of subsequent admission (30.22% vs 27.18%; aOR: 1.04 (1.03-1.06); p-value<0.01) compared with men. Pregnant women had lower odds for naloxone administration (0.27% vs 1.70%; aOR: 0.16 (0.13-0.21); p-value<0.01) and mortality (0.41% vs 2.21%; aOR: 0.28 (0.23-0.35); p-value<0.01) but higher odds of subsequent admission (40.50% vs 30.22%; aOR: 2.04 (2.00-2.10); p-value<0.01) compared with non-pregnant women. Pregnant women who received naloxone had higher odds of mortality (14% vs 0.39%; aOR: 6.30 (2.11-18.78); p-value<0.01) compared with pregnant women who did not receive naloxone. Pregnant women who did not receive naloxone were more likely to have Medicaid as their expected insurance payer, be in the lowest quartile of median household income for residence ZIP code, and have a concurrent mental health diagnosis compared with pregnant women who did receive naloxone.

**Conclusion:** Reproductive-aged non-pregnant and pregnant women were less likely to receive naloxone during opioid overdose-related ED visits compared to reproductive-aged men. Naloxone administration for reproductive-aged women should be prioritized in the efforts to reduce opioid- and pregnancy-related morbidity and mortality in the United States.

## **Mitochondrial Respiration is Markedly Increased in the Bladder Following 12-Week High Fat Diet in Male and Female Mice**

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**Background:** Bladder dysfunction is a chronic and debilitating medical problem that affects millions. Mitochondrial content, respiration, and reactive oxygen species (ROS) production in the bladder vary by sex and tissue type; however, the role of these dimorphisms in the onset of bladder dysfunction is currently understudied. Previously, we demonstrated that male mice fed a 20-week high fat diet (HFD) develop decreased detrusor mitochondrial respiration, increased ROS production, and bladder dysfunction. If these processes are involved in earlier pathogenesis, mitochondrial-targeted antioxidants could be a promising initial treatment for male or female bladder dysfunction. This study characterizes sex differences in bladder detrusor and mucosa mitochondrial function following 6 or 12 weeks of HFD in mice.

**Methods:** Male and female C57BL/6N mice (10 weeks) were fed a control diet (10% fat) or HFD (45% fat) for 6 or 12 weeks (n=6-8/group). Food intake, body weight, and fat composition were assessed weekly. Voiding spot assays (VSA) were used as a surrogate of bladder function. Bladders were excised, weighed, separated into mucosal and detrusor layers, and placed into an Oroboros Oxygraph-2K for high-resolution respirometry. Mitochondrial oxygen consumption was assessed following the activation of complexes I, II, and IV. Mitochondrial content was measured via citrate synthase assay.

**Results:** Mitochondrial content was similar in mucosal and detrusor layers between sexes. Mitochondrial respiration was equivalent at complexes I and II but females had lower mucosal maximal respiration at complex IV compared to males (p<0.05). Following 6 weeks of HFD, bladder weight, function measured by VSA, and mitochondrial content were unchanged in both sexes. Mitochondrial respiration was unaffected in males while females had increased complex IV activated respiration after 6 weeks HFD (p<0.05). After 12 weeks of HFD, there were no changes in VSA, but bladder weight and detrusor mitochondrial content were decreased in both sexes (p<0.05). Complex IV mitochondrial respiration was markedly elevated in both mucosal and detrusor layers with HFD (p<0.05).

**Conclusion:** Short-term 6-week HFD did not change bladder physiology or mitochondrial function in males or females. Following 12 weeks of HFD, increased mitochondrial respiration at complex IV was evident in mucosal and detrusor layers of both sexes. Increased respiration at complex IV can lead to electron leak and ROS production suggesting that HFD can lead to bladder dysfunction. Targeting mitochondrial function may be a new therapeutic avenue to restore HFD-induced bladder dysfunction in both males and females.

## **Opportunity Costs of Surgical Resection and Perioperative Chemotherapy for Locoregional Pancreatic Adenocarcinoma**

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**Background:** Given the intensity of multimodality treatment and high perioperative morbidity rates, patients with resected pancreatic ductal adenocarcinoma (PDAC) spend a substantial amount of time in clinical care. However, time spent in receipt of care relative to overall survival time has not been previously described. The primary aim was to determine total time spent receiving surgical, radiation, and perioperative chemotherapy care for patients undergoing resection for PDAC.

**Methods:** A retrospective cohort study of all patients who underwent curative-intent resection for a pancreatic mass at Vidant Medical Center was performed between January 2015 and August 2019. Patients with pathology other than PDAC or who died within 30 days of resection were then excluded. Exact times for all relevant clinician visits, laboratory, radiologic and procedural studies, admissions, and treatment visits were abstracted from the primary medical record, and estimated travel time was calculated based on patient address. Care time was divided into preoperative, surgical, radiation, and systemic therapy phases of care.

**Results:** A total of 107 patients were included after 31 patients were excluded. Median total preoperative care time was 23 hours (IQR 10-115; 0.3% of survival time, IQR 0.1%-0.9%). Median total time spent in surgical care was 223 hours (IQR 165-391; 2.1% of survival time, IQR 1.2%-5.1%). Median total radiation therapy care time was 102 hours (IQR 61-157; 0.6% of survival time, IQR 0.2%-2.5%). Among the patients who received systemic chemotherapy care within the Vidant health system (N=52), median total time spent in receipt of systemic therapy was 481 hours (IQR 267-696; 3.6% of survival time, IQR 1.7%-6.0%). Patients spent a median of 5.0% (IQR 2.4%-10.1%) of total survival time in receipt of clinical care. Thirteen percent (N=14) and 7.8% (N=4) of patients spent >10% of total survival time in receipt of surgical and systemic therapy care, respectively. Median per-visit travel time was 60 minutes (IQR 32-120), and median cumulative travel time was 22 hours (IQR 12-52).

**Conclusion:** Time spent receiving multidisciplinary care does not represent a substantial time burden relative to total survival time for most patients with resected PDAC; however, for some, it is considerable. Further research to determine predictors of time burden is warranted to better inform patient and surgeon communication and decision-making.

## **IFN- $\beta$ Induces a Novel Lineage of Murine CD4<sup>+</sup> CD8<sup>+</sup> “Double-Positive” FOXP3<sup>+</sup> Regulatory T Cells**

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**Background:** IFN- $\beta$  is a primary therapy for Multiple Sclerosis (MS). However, its mechanism is not understood. Indirect evidence suggests IFN- $\beta$  may drive differentiation of regulatory T cells (Tregs). This study investigates IFN- $\beta$  in Experimental Autoimmune Encephalomyelitis (EAE), a murine model of MS, mediated by CD4 T cells. Previous study of Tregs in EAE has shown that Tregs express primarily CD4<sup>+</sup> alone. This study revealed IFN- $\beta$  and TGF- $\beta$  elicit/maintain novel “double-positive” CD4<sup>+</sup> CD8<sup>+</sup> Tregs, an unstudied lineage. This study’s initial objective was to determine if high concentrations of IFN- $\beta$  elicited elevated percentages of CD4<sup>+</sup> Tregs, but shifted to understanding the induction, maintenance, and phenotype of the novel Treg subset. We hypothesized culture with IFN- $\beta$  or TGF- $\beta$  would result in greater percentages of double-positive Tregs, and their CD8 coreceptor would be a CD8 $\alpha\beta$  heterodimer.

**Methods:** To evaluate the inductive/stabilizing actions of IFN- $\beta$  or TGF- $\beta$  in vitro, naïve conventional T cells (Tcons) or established Tregs were cultured with TGF- $\beta$  and/or IFN- $\beta$ . FOXP3 expression was tracked using the FIG (Foxp3-IRES-GFP) mouse strain. T cells specific for Myelin Oligodendrocyte Glycoprotein (MOG) were tracked using the 2D2 TCR transgenic mouse strain. Cells were stained with fluorochrome-conjugated antibodies and analyzed with a LSRII Flow Cytometer. Data analysis was performed using FloJo Software, SigmaPlot, and GraphPad Prism.

**Results:** CD4<sup>+</sup> T cells exposed to high concentrations of IFN- $\beta$  (1  $\mu$ M) elicited greater percentages of Tregs compared to controls ( $29.2 \pm 1.5\%$  versus  $9.77 \pm 0.9\%$ ,  $p < 0.001$ ). In a comparison of CD8 signal intensity, Tregs activated with 1  $\mu$ M IFN- $\beta$  or 10 nM TGF- $\beta$  had higher mean fluorescence intensity for CD8 than control Tregs ( $12,205 \pm 743$  versus  $6,924 \pm 99$ ,  $p < 0.001$ ;  $10,351 \pm 433$  versus  $6,924 \pm 99$ ,  $p < 0.001$ ). To analyze optimal TGF- $\beta$  concentrations for stabilization of CD4<sup>+</sup> CD8<sup>+</sup> Tregs, TGF- $\beta$  concentrations over 100 pM elevated percentages of CD8<sup>+</sup> expression compared to control ( $60.7 \pm 0.6\%$  versus  $21.3 \pm 4\%$ ,  $p < 0.001$ ). Most CD4<sup>+</sup> CD8<sup>+</sup> Tregs expressed a CD8 $\alpha\beta$  heterodimer phenotype. Linear regression showed positive correlation between CD8 $\alpha$  and CD8 $\beta$  expression ( $y = 1.86x - 373.98$ ,  $r = 0.72$ ,  $R^2 = 0.52$ ).

**Conclusion:** IFN- $\beta$  induces concentration-dependent differentiation of CD4<sup>+</sup> Tregs from naïve Tcon populations. IFN- $\beta$  and TGF- $\beta$  elicits/stabilizes novel CD4<sup>+</sup> CD8<sup>+</sup> double-positive Tregs. The CD8<sup>+</sup> coreceptor was largely CD8 $\alpha\beta$  heterodimers, consistent with the phenotype of effector CD8 T cells. Future experiments will determine the function of these Tregs as compared to “single-positive” counterparts.

## **Schwann Cell Coculture Promotes Neuritogenesis and Survival in Irradiated Pelvic Neurons**

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**Background:** Prostatic radiation therapy (RT) damages the major pelvic ganglia (MPG) and nerves leading to erectile dysfunction (ED). Schwann cells (SCs) are known to facilitate neuron repair following mechanical injury, but their role in RT-induced neuron injury and repair has not been established. This study investigates the effects of co-culturing MPG neurons with SCs after *ex vivo* RT.

**Methods:** SCs were isolated by collecting MPGs from male Sprague-Dawley rats (n=12) which were digested in collagenase/dispase, and grown in SC medium. SCs were plated on poly-L lysine-coated coverslips and incubated to confluence for 24 hours. Confluent SCs were irradiated (0 or 8 Gy) prior to plating of neurons. Additional MPGs (n=18) were irradiated (0 or 8 Gy) and digested to isolate neurons. Dissociated neurons were plated alone or on SC-coated coverslips to create 6 experimental groups (n=3/grp): 1) CON MPG; 2) RT MPG; 3) CON SC+CON MPG; 4) RT MPG+CON SC; 5) CON MPG+RT SC; and 6) RT MPG+RT SC. After 72 hours, coverslips were fixed and stained for beta-tubulin (neuron marker), S100 protein (myelinating SC marker), neuronal nitric oxide synthase (nNOS; nitrergic marker), tyrosine hydroxylase (TH; sympathetic marker), and TUNEL to assess neurite length, branching, specific neuron populations and apoptosis.

**Results:** As previously demonstrated, *ex vivo* RT decreased MPG neuron length, increased apoptosis and decreased nitrergic neurons. In the current study, co-culturing RT MPG+CON SC increased neurite outgrowth compared to all other groups (p<0.001). Neurite branching was markedly reduced in the RT MPG+RT SC co-culture, but unchanged in other groups. The proportion of apoptotic neurons was markedly greater in RT MPG neurons, but when co-cultured with CON SC RT-induced neuronal apoptosis was prevented (p<0.01). The proportion of adrenergic TH positive neurons was unchanged while nitrergic neurons were significantly lower in RT neurons and co-culture with CON SCs was unable to prevent nitrergic loss.

**Conclusion:** RT increases MPG neuron death and decreases pro-erectile nitrergic neurons. CON SC co-culture appears to stimulate neurite growth and restore branching networks in RT MPGs. While CON SCs significantly reduced apoptosis in RT MPG neurons, they were unable to prevent RT-induced nitrergic neuron loss. These data suggest that healthy SCs may promote survival and growth in RT-injured MPG neurons. Further *in vivo* studies are required to confirm whether administration or activation of SCs can help prevent RT-induced neuronal injury and ED.

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## **The Economic Impact of National Standardization of Virtual Crossmatch Usage in Kidney Transplantation**

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**Introduction:** Donor specific antibodies are associated with inferior graft survival in patients receiving kidney transplants. Flow cytometric crossmatches (FCXM) are widely used pre-transplant for the detection of donor-specific antibody. However, each crossmatch can cost in the thousands of dollars. Virtual crossmatch (VXM) has been shown to have similar concordance to FCXM, but with the added benefit of being markedly cost effective. The primary objective of this study was to determine if transitioning to a VXM screening protocol was associated with significant cost savings when compared to conventional FCXM.

**Methods:** A single center retrospective analysis of the total number of flow cytometric crossmatches (FCXM) performed for deceased donor kidneys between October 1, 2016 to September 30, 2017 (before VXM) was compared to the total number performed from January 1, 2018 to December 31, 2019 (after VXM implementation) and extrapolated to all kidney transplants performed nationally. Wilcoxon Rank Sum Test was used to compare the pre-VXM and post-VXM sample periods.

**Results:** 64 patients were transplanted with deceased donor kidneys before VXM and 151 patients were transplanted after VXM implementation. There was a statistically significant reduction ( $p < 0.0001$ ) in number of FCXMs performed in the period following implementation of VXM screening than the year prior. At our center, there is a cost-savings of \$2085 per FCXM that is deferred due to VXM. If we were to extrapolate the cost-savings associated with VXM to the 64 patients in the pre-VXM group, our center would expect to save \$65,495 over the course of that year. Based on the national OPTN report for 2018, there were 9,867 deceased kidney donors which resulted in 14,725 transplants. If every center in the nation adopted a standardized virtual crossmatch protocol, we estimate roughly \$15,314,000 in savings annually.

**Conclusion:** Implementation of a VXM screening protocol reduces the total amount of FCXMs performed on deceased donor kidney transplants, and thus confers a cost savings to both the total cost of healthcare nationally.

## **Survival is worse in patients completing immunotherapy prior to SBRT/SRS compared to those receiving it concurrently or after**

Susan Woody MS PharmD, Aparna Hegde MD, Hyder Arastu MD, M. Sean Peach MD PhD, Nitika Sharma MD, Paul Walker MD, Andrew Ju MD

**Background:** The abscopal effect could theoretically be potentiated when combined with immunomodulating drugs through increased antigen production. The optimal dosing and schedule of radiotherapy with immunotherapy is unknown, although it is actively investigated in laboratory and clinical models. Clinical data in patients treated for metastatic disease with both modalities may guide future studies.

**Methods:** This is a single institution retrospective review of all patients treated with stereotactic body radiotherapy (SBRT)/stereotactic radiosurgery (SRS) and immunomodulating therapy within 6 months before or after SBRT/SRS for metastatic cancer. Clinical and tumor characteristics were recorded, as well as SBRT/SRS details, immunotherapy details, and survival. Log-rank tests on Kaplan-Meier curves for overall survival (OS) calculated from end of SBRT/SRS were used in univariate analysis, Cox proportional hazards regression for multivariate analysis.

**Results:** Since 2014, 127 patients were identified who met the inclusion criteria, 44% female, 56% male, median age 62. 70 received SBRT, 57 SRS. 80% of patients were treated for lung cancer, 20% other primary sites. 53% of patients received nivolumab, 29% pembrolizumab, 13% atezolizumab, 5% other. 20% received immunotherapy before SBRT/SRS, 39% during SBRT/SRS, 41% after. 86 patients had died by the time of analysis, the median OS for the whole cohort was 9.7 months. Patients who had completed immunotherapy prior to SBRT/SRS had worse OS than those who received concurrent therapy or immunotherapy after SBRT/SRS, with a difference in median OS of 3.6 months versus 13.0 months ( $p=0.010$ ), this was retained on multivariate analysis ( $p=0.011$ ). There was no significant difference in OS between patients receiving SRS versus SBRT ( $p=0.30, 0.21$ ), gender ( $p=0.43, 0.60$ ), age  $>62$  ( $p=0.73, 0.84$ ), or lung primary vs. others ( $p=0.89, 0.41$ ) on univariate or multivariate analysis.

**Conclusions:** Overall survival appears to be worse in patients who complete immunotherapy prior to SBRT/SRS compared to those receiving it concurrently or after. The design of this retrospective review may be prone to lead-time bias, although the difference in median survival is longer than the 6 month window before SBRT/SRS and could only account for part of this difference. Further analysis into causes of death and toxicity as well as prospective studies are needed to confirm the results of this analysis.

## Using Fluoroscopic Techniques to Determine $\alpha$ -Synuclein Macromolecular Assembly and Lewy Body Amyloidosis Endogenously and Post-SARS-CoV-2

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**Background:** Parkinson's Disease (PD), the second most common neurodegenerative disorder, is characterized by dopaminergic-neuronal cell death; this neuronal cell-death contributes to the clinical presentation of bradykinesia, resting tremor, and rigidity. In addition to progressive neurodegeneration within mesencephalic nuclei, PD is marked by proteinaceous intraneuronal inclusions, termed Lewy bodies. These inclusions largely contain aggregated, insoluble  $\alpha$ -synuclein amyloids. These post-translational modified  $\alpha$ -synuclein exhibit increased oligomerization and aggregation proclivities; as such, they are major contributing factor to PD and  $\alpha$ -synucleinopathy amyloidosis. Familial mutants of  $\alpha$ -synuclein, not only exhibit these tendencies, but exhibit exaggerated inclusions and polymerization, where it clinically presents with earlier diagnosis and rapid progression of symptoms. The TG2-mediated, post-translational modification of  $\alpha$ -synuclein, is initiated by the formation of a TG2:  $\alpha$ -synuclein encounter complex; however viral post-infection neurological complications resembling PD have also been observed following SARS-CoV-2. These reports lead to further investigation into the notion that viral coat proteins in SARS-CoV-2 serve a catalyst that accelerate aggregation-prone proteins to form amyloids more readily and incite neurodegeneration.

**Methods:** The utilization of fluorescence spectroscopy aided in mapping the solution state protein-protein interaction interface between recombinant host and virus proteins, namely NSP9, a viral replicase and thought to associate with the host nuclear pore. Both equilibrium binding studies and fluorescence anisotropy monitored the macromolecular complex interactions between  $\alpha$ -synuclein and NSP9. Assessment of the binding microenvironment – by both using different, throughput assays and steady-state anisotropy measurements- has allowed us to qualitatively probe the topography of the NSP9:  $\alpha$ -synuclein complex.

**Results:** Fluorescence spectroscopy with NSP2 at a concentration of 1mM with varying  $\alpha$ -synuclein exhibit a leftward complex shift seen with excited at 280 nm. Decreased relative fluorescence intensity at excessive NSP2 as the protein substrate demonstrate quenching.

**Conclusions:** Taken together, these results represent the first steps towards understanding the kinetic, thermodynamic, and structural mechanisms driving the formation of the pathogenic NSP9:  $\alpha$ -synuclein complex; understanding these mechanisms is key to advancing potentially novel and repurposed cyclic peptide inhibitors that bind to both host and SARS-CoV-2 viral coat proteins as both therapeutic and prophylactic candidates. Longitudinal clinical study of patients inoculated with SARS-CoV-2 is warranted to monitor for progression of possible nascent neurological symptomology with progression of potential neurogenerative change.

*Service-Learning Distinction Track*

## **Pilot Curriculum in Student-Initiated International General Surgery Observership**

Ryan Accomazzo, Megan Freeze, Lacie Wallace, Carl Haisch

**Introduction:** International surgical observerships for medical students and residents are becoming more popular with the increased interest among US medical graduates in global surgery. The hospital policy barriers, administrative duties, and educational modules associated with a sustainable experience can be viewed as too daunting to pursue. The aim of this article is to describe the student-initiated curriculum development and execution of an international general surgery observership while also discussing the most valuable educational benefits as perceived by the participants.

**Methods:** In August 2017, planning was initiated between two medical universities, one domestic and one Ecuadorian. A clinical curriculum was developed with an emphasis on clinical observership, lecture-based learning, simulation-based learning, and research collaboration. This was coupled with didactic curriculum focused on United States healthcare. For the visiting attending surgeon, an additional aspect was added to discuss resident education including resident evaluation, resident autonomy, and resident proctoring in the operating room. Selection for the observership was based on inclusion criteria to include completion of four years of medical school, English proficiency, current and complete vaccination status, and the ability to obtain a visa. The feedback was collected via formal surveys after the completion of the experience.

**Results:** In May 2019, the department of surgery at the domestic medical school accepted four senior medical students and one attending surgeon to participate in a two-week general surgery observership from Ecuador. Evaluation of the observership revealed a beneficial educational and cultural experience. 100% of the visiting students indicated that the MS3 surgery cohort lectures, M&M conference, da Vinci training modules, research collaboration, and the opportunity for case presentation were most valuable. Furthermore, the majority (80%) stated that the healthcare curriculum not educationally valuable as it was viewed as too detailed and complex.

**Conclusion:** Our first attempt at an international observership resulted in a mutually beneficial experience for both U.S. and international students. This student-initiated opportunity was achievable, sustainable, and scalable to fit the fluctuating logistical constraints between the universities. The feedback received from the domestic and international students as well as the faculty has helped guide the future of this program.

## **Literacy promotion in children via book distribution programs and primary care providers**

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**Introduction:** Regularly reading aloud with young children stimulates early brain development in language and expression, while also strengthening the parent-child relationship.<sup>1</sup> Reading experiences with young children also promote kindergarten readiness, which affects their future education trajectory.<sup>2</sup> Initiatives to promote childhood literacy and to combat socioeconomic disparities have been pursued in the community and primary care setting via Reach Out and Read (ROR) and Dolly Parton's Imagination Library (DPIL). The goal of this project is to expand literacy promotion in the local community by utilizing the existing programs of ROR and DPIL through visits with primary care providers.

**Methods:** This project was achieved via two pathways. First, one pathway includes improving efficiency of offices that already utilized ROR (such as ECU Pediatrics) by posting reminders in patient rooms to discuss reading and gift books to patients at well checks. The second pathway includes introducing ROR and DPIL to other clinics. All academic offices that see children at ECU—including ECU Pediatrics, ECU Family Medicine, ECU Medicine-Pediatrics, and ECU Pediatric Dentistry—utilized DPIL sign-ups by QR codes that were displayed in patient rooms. If a parent did not have adequate technology, paper forms were offered.

**Results:** From August 1, 2020 to March 31, 2021, there were 78 QR codes utilized for DPIL sign-ups. It is important to note that multiple children within a single family can sign-up under one QR code, making this number a likely underestimate. Within the QR code sign-ups, 76.9% were from ECU Pediatrics, 11.5% were from ECU Family Medicine, 6.5% were from ECU Pediatric Dentistry, and 5.1% were from ECU Medicine-Pediatrics. ECU Family Medicine decided in September 2020 to attach paper DPIL sign-ups to well-child paperwork for eligible children. From September 1, 2020 to December 31, 2020, there were 54 children that were signed up via paper registration forms at ECU Family Medicine.

**Conclusion:** COVID-19 impacted many aspects of children's lives, including school attendance and in-person well-check visits. While this influenced data collection, it also emphasized the importance of at-home reading experiences. Ultimately, more children in the local community, regardless of socioeconomic status, have access to more reading resources prior to beginning school in hopes of improving language skills and kindergarten readiness.

## **Promoting Reproductive Health Education in Pitt County (PREP): An Educational Program to Address High STI and Adolescent Pregnancy Rates**

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**Background:** Pitt County, North Carolina has higher rates of sexually transmitted infections (STIs) than the state as a whole. Also, Pitt County teen pregnancy rates increased from 19.0 in 2017 to 22.1 in 2018. While education alone does not decrease risky sexual behaviors, current evidence shows that states that taught comprehensive sex education, which included information on contraception, condom use, and encouragement of abstinence, tended to have lower pregnancy and STI rates than states that taught abstinence-only education. This project seeks to demonstrate positive effects of comprehensive sex education on self-efficacy, sexual health knowledge, and rates of condom use.

**Methods:** 8<sup>th</sup> to 12<sup>th</sup> graders at two Pitt County Boys and Girls Clubs were enrolled in the sessions after obtaining parental consent. The Rights, Respect, Responsibility curriculum was used. Covered topics included basic anatomy of reproduction, STIs, healthy relationships, contraceptive methods, and appropriate use of social media. Participants completed written pre- and post-program validated surveys to assess self-efficacy, knowledge, and intended sexual behaviors. These items were scored and analyzed using paired *t* tests.

**Results:** 110 participants were enrolled and attended at least one session. Mean self-efficacy increased from pre- to post-program (pre-program score: 29.29 vs post-program score: 31.53 (range 10-40);  $P=0.0496$ ). Knowledge assessment scores increased from a mean of 70.45% to 79.55% (range 0-100;  $P=0.003$ ). Mean condom use intention rate increased from pre- to post-program (pre-program score: 3.83 vs. post-program score: 4.18; range 1-5;  $P=0.029$ ). Percent of correct responses about condom knowledge increased from 39.58% to 54.17% (range 0-100;  $P=0.0005$ ). Percent of correct responses about pregnancy knowledge increased from 48.61% to 62.50% (range 0-100;  $P=0.031$ ).

**Conclusion:** This data suggests that comprehensive sex education can affect teenagers by increasing self-efficacy, knowledge about condoms and pregnancy, and condom use intention rate. These positive effects can assist in decreasing teen pregnancy and STI rates. Future research should further investigate longitudinal data to better understand program benefits and adapt strategies to improve effects.

## **The Development of an Integrative Medicine based Intervention to Support the Mental, Physical, and Emotional Health of the Home Insecure.**

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**Background:** The medical community has developed an invested interest in understanding the relationship between the mind and body. Despite the growing body of evidence, demonstrating the mind body connection there continues to be a lack of comprehensive responses to addressing mental health illness and how it relates to physical state of health. There has been increasingly encouraging results seen from studies specifically centered around integrative medical interventions in vulnerable populations. Practices such as yoga, mindfulness, and meditation have been shown to help with mental health quality indicators, specifically emotional regulation and control. In this study we aim to create a holistic wellness program geared towards providing the home insecure population of Greenville, North Carolina with an arsenal of tools and techniques centered on mindfulness and yoga to support their mental, physical, and emotional health.

**Methods:** We used an intervention mapping framework to guide the development of our intervention. We identified the needs of the target population through a comprehensive literature review as well as consulting with residents and surveying Operation Committee members of the Cross Road Community Center. These surveys utilized a qualitative approach asking surveyors to rate past experiences with medical students, the overall medical students' understanding of needs of the residents, sustainability of projects implemented, and ranking the following items in order of importance for programming: arts and crafts, healthy habits, mental health support. This information in combination with core concepts and principles of community engagement were utilized to create a four-part Holistic Wellness pilot program was introduced in the Spring of 2021 at the Crossroads Community Center in Greenville, North Carolina.

**Results:** Due to COVID-19 related delays, responses are still being collected and classes are still being implemented, so there is not enough data to analyze at this time.

**Discussion:** This study is aiming to provide the home insecure population of Greenville, North Carolina with an arsenal of tools and techniques centered on mindfulness and yoga for them to use to support their mental, physical, and emotional health. We hope that our pilot study will demonstrate the feasibility of creating a sustainable holistic wellness program that is targeted to address the specific health needs of a vulnerable population such as the home insecure in Eastern North Carolina.



## **The Impact of Sex Education on Adolescent Men in Juvenile Detention Centers**

Brittany M. Lee, Brody School of Medicine

**Background:** Several studies suggest that delinquent youth are less knowledgeable about safe sexual practices but are more likely to engage in risky sexual behaviors than their peers. The purpose of this Service Project, known as Project Alpha, was to offer sex education classes to promote healthy sexual behaviors amongst young adolescent men currently incarcerated in a juvenile detention center.

**Methods:** This service project was conducted over the course of 3 years, with a different group of student learners each year. There was a maximum of 10 educational sessions, with a combined total of 25 student learners taught by medical students at the Brody School of Medicine. Topics included healthy relationships, gender orientation, STD prevention, pregnancy and parenting. At the completion of the course, student learners were asked to complete a questionnaire to determine the perceived impact of the course and simple background information.

**Results:** There were a total of 25 student learners, 92% of which were African American, 8% Hispanic and 4% Caucasian. A total of 16 students completed the post curriculum questionnaire. 50% of student learners reported never having a sexual education class in school. 43.8% of student learners had already become a parent. 100% of student learners reported that the course encouraged them to have safer sex practices upon release from the juvenile detention center. 100% of student learners also reported that they had learned something new from the curriculum.

**Conclusion:** Project Alpha had a successful impact on each and every student learner. The course encouraged each student to practice healthier sexual behaviors and provided them with an education that they may not have otherwise been exposed to. All juvenile detention centers should consider providing a sex education curriculum to their youth, as they are already considered less knowledgeable and more likely to engage in risky sexual behaviors.

## **Mobilizing Students as Volunteers During the COVID-19 Pandemic**

Jessica Tucci-Herron

**Background:** At the start of the COVID-19 pandemic in March of 2020, there was a need for help for the medical community and the greater Greenville community at large. This need for volunteers was recognized by medical students and other healthcare professional students, who suddenly were pulled out of the curriculum and had both the time and desire to find ways to help.

**Objectives:** Utilize health professions students as volunteers for childcare, errands, and other needs in the ECU and Greenville community.

**Methods:** Students were communicated with via email regarding volunteer opportunities. This was done via appropriate listservs for each health professions school through their Student Affairs department, as well as through fourth year Brody medical students that were part of a volunteer organizing group. Healthcare providers were similarly emailed forms to fill out, indicating their needs for childcare, pet sitting, or other errands. Additionally, there were options for ECU faculty to offer other opportunities for volunteering that had arisen due to the uncertainty and changes due to the pandemic. These volunteer opportunities were combined onto a singular Google sheet that students had access to, where they signed up for various opportunities and contacted by students participating on the volunteering organizing committee.

**Conclusions:** Students were involved in various types of volunteering during the start of the COVID-19 pandemic. Through this initiative that gathered all the various opportunities in one central online site, there were 48 students that signed up to volunteer. 3 students participated in childcare for healthcare professionals, and 2 participated in pet sitting. Other volunteer opportunities (and the respective number of students involved) that arose included: hospital follow-up appointment scheduling for the Physical Medicine and Rehabilitation department (4 students), K-12 Video Tutoring (3 students), “Feeding Greenville’s Frontlines” (meal delivery to Vidant employees, 6 students, \$600 in donations raised), and Meals on Wheels Delivery Drivers (35 students). Providing a centralized location for students allowed for a streamlined process that maximized student involvement and helped ECU faculty and the Greenville community during a challenging time.

## **Understanding the Experiences of Patients with Autism and their Families**

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**Background:** A positive physician-patient relationship is key to helping patients better understand their health and treatment options, contributes to better adherence with treatment plans, and increases overall satisfaction with health care. However, people with Autism Spectrum Disorder have historically had less satisfaction with this relationship. One study showed that autistic adults reported lower satisfaction with patient-provider communication and health-sufficiency as well as higher odds of unmet healthcare needs than comparable adults without Autism<sup>1</sup>. There also seems to be a disconnect in medical education and education on caring for patients with Autism as studies show many medical students around the world have shortcomings in knowledge about caring for patients with Autism<sup>2,3,4</sup>. This knowledge gap is additionally reflected in surveys of physicians actively working with patients with Autism who report needing additional training on Autism Spectrum Disorder<sup>5</sup>. The aim of this project is to better understand the experiences and needs of families in Greenville, North Carolina who have children with Autism Spectrum Disorder. The ultimate goal is to use this information to better inform the medical community about how they can best care for this specific population in terms of meeting the needs of these families and fostering a supportive and understanding physician-patient relationship.

**Methods:** In order to gather this information, a phone survey was conducted with parents of children with Autism at the Family Autism Center in Greenville. This survey used a Likert scale to quantify satisfaction with all medical providers in the past in terms of how well providers listened to, communicated with, and included the child/family in decision making when appropriate. Open ended questions were also asked to better understand what problems these families have faced, what things have made them more comfortable, and what they would like for physicians to know in the future. This survey is still a work in progress with hopes to interview 40 families. Statistical analysis will be performed to look for average satisfaction in different areas of physician-patient interaction on the Likert scale and look for themes in answers to the open-ended questions.

**Results:** Due to COVID-19 related delays, responses are still being collected and there is not enough data to analyze at this time.

**Conclusions:** This information will hopefully provide insight on the satisfaction of families with children with Autism and how we as future providers can better educate and prepare ourselves to care for these patients.

## **Effectiveness of Medical Play in Decreasing Stress and Anxiety in the Siblings of N.I.C.U. Patients**

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This study will investigate the effectiveness of medical play in decreasing the anxiety and stress experienced by the younger siblings of N.I.C.U. patients throughout their stay in the Ronald McDonald House. It has been found that prolonged exposure to toxic stress in children can cause long term alterations to their brain circuitry resulting in a lower threshold for stress and permanent increases in body cortisol levels (CDC, 2008). As a result of these consequences, medical professionals have begun to seek means of preventing young children from experiencing these “medical traumas” (NCTSN, 2014). While the benefits of medical play in decreasing children’s stress levels have been documented for children in the inpatient setting, few studies have been tailored toward the siblings and families of these patients. Therefore, studies on the effectiveness of medical play in decreasing the stress and anxiety experienced by the healthy siblings of ill patients are necessary (Dinleyici & Şahin Dağlı, 2018). In this study, the Ronald McDonald House in Greenville, North Carolina will be outfitted with a medical play area that will allow participants to be led through predetermined medical play scenarios. The children will be asked to complete pre- and post-play questionnaires that will be an abbreviated version of the State-Trait Anxiety Inventory for Children (STAIC). The questionnaire will evaluate the children’s current level of anxiety and their propensity toward becoming anxious both before and after completing the medical play scenario. A group x time interaction will then be calculated using the data to determine the success of the medical play interventions in lowering the child’s stress and anxiety. Ultimately, the hope is to find that medical play can decrease the stress and anxiety experienced by the healthy siblings of N.I.C.U. patients and diminish the negative consequences of these stressful experiences on their lives.