School of Allied Health Professions

Forum on Evidence-Based Medicine and Awards Ceremony

May 6, 2015
Annual School of Allied Health Professions Awards Ceremony
including remarks from the 2015 Excellence in Research recipient
MSC 3001 at 1:05 P.M.

Excellence in Research
Amber Donnelly, PhD, MPH, SCT(ASCP)

Excellence in Teaching
David Holt, MA, CCT

Innovative Scholarship
Betsy Becker, PT, DPT, CLT-LANA

Outstanding Service
Clinical Skills Lab Team: Dan Brick, Patti Carstens, and Jonathon Sample

Poster Display and Reception
Truhlsen Campus Events Center from 2:00-3:00PM

The School of Allied Health Professions would like to thank the faculty and staff who have contributed time and effort to the success of this Forum.

The book of abstracts is online at: www.unmc.edu/alliedhealth/research/forum
Each spring the School of Allied Health Professions sponsors a forum. This interprofessional event is intended as an opportunity for students and faculty in all 13 SAHP programs to share scholarly activity that supports evidence-based clinical practice.

The primary goal of the scholarly activity that is presented in the forum is to promote the understanding of the research process in allied health. The ultimate goal is the continuous updating of best practices in clinical settings. The following research projects, critical reviews of the literature, and educational exhibits are organized by topic.

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**ABSTRACT #1**

The Effect of Flow and Level on Gaseous Microemboli Production in Hard-Shell Venous Reservoirs

Devin Eilers, Willie Glaze, David Holt. Clinical Perfusion Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Patients undergoing cardiopulmonary bypass (CPB) can suffer from neurological dysfunction following the procedure. Gaseous micro-emboli (GME) introduced and created in the extracorporeal circuit have been implicated as one of the causes for postoperative neurological impairment. In this study, the number of GME in hard-shell venous reservoirs (HSVR) were measured at low volume levels (100, 200, 300, 400, 500, and 600 mL) and at different flows (1, 2, and 3 L/min). An Emboli Detection and Classification quantifier (EDAC) (Luna Innovations, Roanoke, VA) was the instrument used to measure count GME in the circuit. The EDAC probes were placed in three locations on the circuit: venous line, outlet of the HSVR, and distal to the arterial line filter (ALF). Using the EDAC’s data management system the emboli count and volume were measured for two minutes at each level and flow. The data showed an increasing linear trend (p <0.001) as flow was increased with constant level for each reservoir, and also an increasing linear trend (p <0.001) as level decreased and flow remained constant for each reservoir. The study also showed there was a strong positive linear correlation (p <0.001) between the amount of emboli produced in the venous reservoir and the number making it through the arterial line filter, on average 1.3%. The number of emboli produced in the HSVR increases the total embolic load that the filter needs to handle, and ultimately linearly increases the amount of GME delivered to the patient. In conclusion, a perfusionist can further minimize the patient’s risk for neurological dysfunction by attenuating flow as the reservoir level approaches the manufacturers’ recommended minimum operating level.

**ABSTRACT #2**

The Effects of Pulse Parameter Variations, Hematocrit, and Arterial Filter Integration on Emboli Counts in Terumo Capiox Oxygenators

Luke Estes, David W Holt. Clinical Perfusion Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Background: While cardiac surgery and cardiopulmonary bypass (CPB) have improved significantly over the years, the most common issues that remain surround those affecting post-operative morbidity. Of significant concern is post-operative neurocognitive deficit, found in as high as 80% of patients and gaseous micro-emboli (GME) which is found in almost all CPB patients. While both the heart-lung machine (HLM) and CPB equipment have continued to evolve and improve patient outcomes, the method of flow delivery has remained unchanged. As non-pulsatile perfusion remains the standard method of support on CPB, a more physiological, pulsatile perfusion remains at the disposal of the perfusionist and surgeon. Pulsatile perfusion has shown it is at least as effective as non-pulsatile methods and even offers superiority over its counterpart in several perfusion related aspects. However, widespread adaptation has been hindered by the lack of definition of what constitutes pulsatile flow and the fear that pulsatile perfusion contributes to increased GME and consequently post-operative morbidity. Methods: Using the Emboli Detection and Classification (EDAC) (Luna Innovations, Roanoke, VA) we evaluated three points in the circuit: venous line, post-pump and post-arterial filter (AF). GME evaluation was in terms of total count and volume distal to the AF over a period of three minutes. GME counts were taken while pulse parameters remained constant through CAPIOX RX and FX 25 oxygenators (Terumo Cardiovascular Systems Corp., Ann Arbor, MI) at three levels of hematocrit (HCT): high (35%), medium (25%) and low (15%). Counts were also taken when the oxygenator (CAPIOX FX25) and HCT (25%) were fixed while five variations of pulse parameters were tested. Results: The study found there to be significant interaction between HCT and oxygenator type (RX and FX) in terms of emboli volume (p<.0001) and count (p=.03). In addition, the study found that there was a significant difference in post-AF emboli volume among the five pulse parameters (p<0.0001) as well as post-AF emboli count (p<0.0001). Conclusion: Utilizing pulsatile flow at lower HCT (15%) may compromise the ability of non-integrated ALF to filter GME. In addition, the lack of a definition of how to pulse continues to be a problem. GME count and volume were found to be significantly different among the pulse variations that were tested.

CARDIOVASCULAR
**ABSTRACT #3**

**Autotransfusion Suction Line: A Comparison of Types and Effects on Blood Collected**
Laura McQuiston, Kevin Hagemann, David Holt. Clinical Perfusion Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Autotransfusion is a blood salvage technique that involves shed blood being collected at the field with suckers and transferred to a reservoir by a dual lumen line. This dual lumen line allows for the administration of anticoagulant at the tip of the sucker in order to anticoagulate the shed blood before it travels to the reservoir. The purpose of this research was to help determine if coated suction tubing can replace a dual-lumen suction line in autotransfusion. The use of biocoated tubing could reduce the complexity of the circuit and also reduce costs. Three different types of autotransfusion suction tubing were used in order to collect bovine blood: dual lumen, X-coated, and Astute coated suction tubing. Samples were collected from two different points in the line, one located at the beginning and one located at the end of the tubing length, and blood analysis was performed using plasma free hemoglobin, TEG R-value, and TEG alpha angle. The mean plasma free hemoglobin for X-coated tubing differs significantly from the mean plasma free hemoglobin for dual lumen coating. The mean R-value for X-coated tubing differs significantly from the mean R-value for dual lumen coating and astute coating. Both Astute and Dual lumen line had a statistically significant difference in R-value when comparing between port 1 and port 2. Also there was a statistically significant difference in the mean alpha angle between the dual lumen tubing of Port 1 and the dual-lumen tubing of Port 2. X-coated suction tubing differed most from Astute and dual lumen suction tubing as seen by significantly higher plasma free hemoglobin levels, lower R-values, and greater alpha angle. Astute and dual lumen on the other hand did not significantly differ in all three measures showing similarity between these two types of tubing used to preserve blood function and potentially giving support to the use of Astute coated suction tubing for autotransfusion.

**ABSTRACT #4**

**The Correlation between Supersaturated Conditions and Gaseous Microemboli in an Extracorporeal Circuit**
Zach Miller, David Holt. Clinical Perfusion Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

High fraction of inspired oxygen in extracorporeal circulation has been a topic of frequent debate in the perfusion field. While its use reduces ischemic organ injury, provides adequate cerebral perfusion and produces a decline in surgical site infections it may also cause gas to be released from a supersaturated solution. According to Henry’s Law, at a constant temperature the atmospheric pressure is proportional to the amount of gas dissolved in a liquid until equilibrium is established. Based on this it is believed an increase in delta pressure (gas tension+ circuit pressure– hydrostatic pressure) will contribute to the formation of bubbles in a supersaturated condition. Gas is released from an unstable supersaturated solution after it has been exposed to a sudden increase in circuit pressure in order to restore equilibrium. Given this evidence the administration of high fraction of inspired oxygen during extracorporeal circulation will yield gaseous microemboli, therefore indicating patients are at increased risk of cognitive dysfunction. The experiment consisted of two parts: the manipulation of three distinctive pressures (100 mmHg, 200 mmHg, 400 mmHg) exerted upon the extracorporeal circuit and delivery of three dissimilar FIO2 levels (21%, 80%, and 100%) to the bovine blood. Gaseous microemboli were then measured for three minutes for each FIO2 and pressure, with a sweep rate set at 2.4 liter per minute and blood flow rate of 3 liters per minute at 37°C. The Emboli Detection and Classification (EDAC) Quantifier was utilized in the study to identify microemboli within the extracorporeal circuit with a size greater than five microns. A sample size of 54 trials was used to identify the relationship between extracorporeal pressure and the variation of FIO2 levels. Six trials per FIO2 level were completed with a total of eighteen trials for each circuit pressure. Pairwise comparisons between FIO2 levels were made when the overall Kruskal-Wallis test was shown to be statistically significant (p <0.05). The results illustrated by this study identified that increasing the total gas tension in combination with increasing PaO2 levels, circuit pressure, and a drop in hydrostatic pressure lead to an increase in GME production.
**ABSTRACT #5**

**Identifying Risk Factors for Developing an Ileus after a Coronary Artery Bypass Graft**
Kara Hannon. Medical Nutrition Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Objective: This is a retrospective study examining electronic medical records to identify preoperative risk factors for development of an ileus after a coronary artery bypass graft.

Clinical Relevance: Postoperative ileus is associated with a high mortality rate, ranging from 11-72%. Research has demonstrated that postoperative ileus leads to increased hospital length of stay, health care cost, and mortality and morbidity. Postoperative ileus often results in delayed initiation of oral diet, therefore, increasing the risk for decline in nutritional status. Complications that may arise due to postoperative ileus emphasize the importance of prevention and development of risk factors. Identification of risk factors for development of an ileus following a coronary artery bypass graft could highlight the need for preoperative or early postoperative nutrition intervention.

Methods: Electronic medical records will be assessed retrospectively for eligible adults admitted to Nebraska Medicine for a coronary artery bypass graft. Participants must be legal adults aged 19 years or older. Medical records will be assessed for demographic and clinical data throughout the duration of each participants' hospital stay. The primary outcome will be the occurrence of postoperative ileus. Preoperative characteristics (i.e. BMI, albumin, comorbid conditions, etc.) of participants who do not develop an ileus will be quantified in comparison to participants who do develop an ileus following coronary artery bypass grafting.

Expected Outcomes: Characteristics of participants who develop an ileus after coronary artery bypass grafting will be significantly different from those who do not develop an ileus. Significant results may provide a focus for preoperative nutrition intervention and indicate a need for early postoperative nutrition intervention.

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**ABSTRACT #6**

**Proportion of Heart Failure Patients who Meet Criteria for Malnutrition upon Hospital Admission Based on ASPEN Guidelines**
Sarah Johnson. Medical Nutrition Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Objective: To determine the proportion of patients with a diagnosis of congestive heart failure (identified as heart failure core measures patients) who meet criteria for malnutrition upon admission based on the American Society for Parenteral and Enteral Nutrition (ASPEN) guidelines at Nebraska Medicine. To identify if certain patient characteristics (age, sex, co-morbid conditions, or body mass index) are associated with a diagnosis of malnutrition (based on ASPEN guidelines) in heart failure patients as compared to heart failure patients who do not meet criteria for malnutrition.

Clinical Relevance: From current research it is estimated that approximately 50% of heart failure patients are categorized as malnourished. Heart failure patients are at increased risk of malnourishment due to increased catabolic processes that increase resting energy expenditure, decrease appetite, and can lead to rapid unintentional weight loss. The goal of standardized diagnostic criteria is to identify malnutrition early for more effective treatment. Current studies suggest the association of early diagnosis and nutrition intervention with increased positive patient outcomes and improved quality of life for heart failure patients. However, the proportion of patients with heart failure who meet criteria for malnutrition at Nebraska Medicine is unknown.

Methods: Descriptive statistics will be used to determine the proportion of heart failure patients who meet the criteria for malnutrition as defined by ASPEN guidelines will be calculated. To determine if patient characteristics are different between the group of patients who are malnourished and the group who are not malnourished, a test of means using a student t-test will be performed.

Expected outcomes: We expect to find that a large proportion of heart failure patients will be assessed to be malnourished based on ASPEN criteria which may impact clinical practice and lead to early diagnosis and nutrition intervention.
**ABSTRACT #7**

**Efficiency of High-Energy D-SPECT compared to SPECT: Lowering Patient Dose and Maintaining Image Quality**

Chelsie Blanke, Marcia Hess Smith. Nuclear Medicine Technology program, Division of Radiation Science Technology Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Purpose: This research presents a critical review of published literature detailing the effectiveness of high-efficiency D-SPECT compared to conventional SPECT in myocardial perfusion imaging, the outcome and effects of lowering patient dose while maintaining good image quality.

Methods: Search engine Medline EBSCO Host and PubMed were used to search for peer reviewed articles. Following the literature search of electronic databases, 10 articles were used that met the criteria and discussed the comparison of high-efficiency D-SPECT and conventional SPECT in MPI studies focusing on patient dose and image quality.

Results: The advancement of SPECT into high-efficiency D-SPECT, has allowed routine stress / rest MPI imaging with lowered patient dose and faster imaging times. Faster imaging times can also aid in eliminating motion artifacts due to greater patient comfort. The improvements in the new reconstruction methods have allowed better sensitivity and a reduction in image noise.

Conclusion: The new and advanced high-efficiency D-SPECT technology in myocardial perfusion imaging is used to significantly reduce patient dose, and reduce acquisition times while still maintaining high image quality.

Relevance to Clinical Practice: The new high-efficiency D-SPECT can be an advantage to the clinical setting. With the increase in cardiac imaging, more exams can be performed daily, while improving image quality and enabling physicians to improve diagnostic capabilities.

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**ABSTRACT #8**

**Effects of Sleep and Depression on Physical Activity Performance in Individuals with Heart Failure**

Candice Chessum, Joseph F. Norman, Bunny Pozehl, Kathleen Duncan, Melody Hertzog. Division of Physical Therapy Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Purpose: To use validated questionnaires to compare the effects of daytime sleepiness and depression on physical activity (PA) in 24 individuals with chronic heart failure (CHF) (73.1±7.2 yrs) to age (±2 years) and gender (9m/15f) matched individuals without CHF (72.7±7.3 yrs).

Methods: All 48 individuals completed the following questionnaires: a) Human Activity Profile (HAP) to estimate physical function and PA level, b) Duke Activity Status Index (DASI) as an indirect estimate of functional capacity, c) Modified 7-Day Physical Activity Record (7DAR) to estimate daily kilocalorie energy expenditure, d) Epworth Sleepiness Scale to identify excessive daytime somnolence, and e) Patient Health Questionnaire-8 (PHQ-8) to assess depression severity. Descriptive statistics, paired t-tests and correlation analyses were used for comparing the two groups.

Results: There were no significant differences in age and gender between two groups (p=0.86). Significant differences existed between groups where participants without CHF performed greater levels of PA (HAP, p<0.001; DASI, p<0.001; 7DAR, p<0.001). There was no significant difference between groups regarding daytime somnolence (p=0.29) and means for both groups were in the normal clinical range. The PHQ-8 showed a significant difference between groups (p = 0.025). However, the means for both groups were in the same “none-minimal” depressive severity category. For individuals without CHF, correlation analyses did not reveal significant relationships between sleepiness and depression with PA levels. For individuals with CHF, mild to moderate inverse relationships were noted between the HAP measure of PA and sleepiness (r = -0.57) as well as depression (r = - 0.45). No significant relationships were noted with the other measures of PA.

Conclusions: In individuals with CHF, PA performance is significantly less (20-40%) than in comparable individuals without CHF as assessed by HAP, DASI and 7DAR. Also, greater levels of daytime sleepiness and depression were associated with lower levels of PA in individuals with CHF compared to individuals without CHF. Relevance: Clinicians concerned with monitoring the impact of daytime sleepiness or depression on PA in individuals with CHF should consider using the HAP for assessment of PA rather than the DASI or 7DAR.
Validity of the RT-3 and Actiwatch Accelerometers in Estimating Daily Physical Activity in Individuals with Chronic Heart Failure

Yanlong Li, Joseph F. Norman, Bunny J. Pozehl, *Kathleen A. Duncan,* Melody A. Hertzog,* Division of Physical Therapy Education, School of Allied Health Professions, *College of Nursing, University of Nebraska Medical Center, Omaha, NE

The purpose of this preliminary study was to evaluate the validity of two accelerometers, the RT-3 and Actiwatch, to oxygen consumption during the performance of typical daily activities in individuals with CHF. Fifteen subjects (9 men/6 women) with CHF (mean LVEF = 31±8%) consented to participate in this study. A descriptive correlational design was used in this study. Subjects were recruited from a heart failure clinic at a large Midwest medical center. Subjects were fitted with a facemask and pneumotach connected to MedGraphics VO-2000 portable metabolic gas analyzer (indirect calorimetry). In addition, each subject was fitted with an RT-3 and an Actiwatch accelerometer. Following a 5-minute rest period to collect baseline data, subjects performed a total of 30 minutes of continuous physical activity, involving 4 light (reading newspaper, washing dishes, watching TV, dusting for 6 minutes each) and 2 moderate (climbing stairs, vacuuming for 3 minutes each) intensity activities, in a random sequence. Data were analyzed using descriptive statistics, Wilcoxon Signed-Ranks Tests and Spearman Correlation Coefficients. No significant difference was noted between the calculated energy expenditure from RT-3 and VO2 based on indirect calorimetry (p=0.67). However, comparing higher versus lower intensity activities the higher intensity activities showed a trend towards a significant difference in caloric expenditure between from the RT-3 and from indirect calorimetry while for the lower intensity activities there were no significant differences. In addition, a strong correlation (r2=0.81, p< 0.02) was found between RT-3 activity counts and VO2 across all activities. Though no significant difference (p=0.48) was noted in mean activity counts between the RT-3 and Actiwatch, there were differences (p< 0.05) noted in activities requiring more upper extremity movement (washing dishes and dusting). No significant relationship was noted between the Actiwatch activity counts and VO2 from indirect calorimetry (p=0.46). In conclusion, compared to the Actiwatch, the RT-3 accelerometer is a better and more valid device for measuring daily physical activity in individuals with CHF.

Interventional Radiology: An Imaging Asset in Pediatric Venous Access

Nathaniel Deeds. Radiography program, Division of Radiation Science Technology Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

The objective of this exhibit is to assess the use of interventional radiography in achieving pediatric venous access. Gaining pediatric venous access is vital but can pose difficult, especially when the child is brought to the emergency department with life-threatening issues. With the use of image-guided techniques, offered by interventional radiography, the ease and effectiveness of venous access in children is increased. With the capability of interventional radiography imaging techniques, venous access is less costly and leads to fewer complications when compared to venous access acquired in the operating room. There has been a recent study demonstrating that the saphenous vein can be a good alternative to the femoral vein when gaining venous access. This vein has also shown lowered infection rates and preserves the upper extremity to be used later if needed for surgical purposes. Pediatric interventional radiologists can expect to place peripherally inserted central catheter lines, implantable ports, and tunneled central venous lines. This exhibit will explain the benefits of each, along with the procedural techniques used in pediatric interventional radiography.

Diagnosing Infective Endocarditis: Transesophageal Echocardiograms vs. Multi-Slice CT

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Infective endocarditis is a serious heart disease that utilizes medical imaging in the diagnosis process. Transesophageal echocardiography (TEE) is the primary imaging modality used when infective endocarditis is suspected. This is partly because the cardiac structures are not obstructed by bones or the lungs due to the esophagus’s close proximity to the heart. It is more reliable than other modalities in revealing small vegetations, which is one of the major indications of this specific heart disease. These vegetations are most commonly found on the ventricular aspect of all three valve cusps. While TEE does detect anatomical differences of the heart’s valves, multi-slice computed tomography (MSCT) provides a more accurate reading when valvular abnormalities are involved. When TEE is
inconclusive, MSCT is useful in complementing the cardiac lesion visualizations. When infective endocarditis is the confirmed diagnosis, surgery plays a big role in the treatment stage. If the patient is diagnosed early enough, surgery and antibiotics will have a more positive effect, rather than a late diagnosis. This reason alone is why imaging should be taken seriously to catch the earliest of signs for diagnosing this heart disease.

**ABSTRACT #12**

**The effect of prenatal gestational diabetes nutrition education class and individual follow-up administered by Certified Diabetes Educators on maternal and fetal outcomes**

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Objective: Assess the impact of gestational diabetes education classes, offered through the Nebraska Medicine Diabetes Center, and follow-up with a Certified Diabetes Educator (CDE) on maternal and fetal outcomes in women diagnosed with gestational diabetes. Additionally, establish the proportion of mothers with gestational diabetes who attend gestational diabetes class in addition to one or more follow-up appointments with a Nebraska Medicine CDE in comparison to the number of gestational diabetes mothers who attend class alone.

Clinical Relevance: Gestational Diabetes Mellitus (GDM) is defined by glucose intolerance detected with the onset of pregnancy. If gone undetected and untreated, GDM can lead to significant morbidities for the mother and baby, during pregnancy and for the long term including higher rates of stillbirth, macrosomia, and caesarean delivery. The implementation of nutrition counseling, however, can work to reduce the risk of GDM complications through healthy dietary patterns promoted and adopted during pregnancy. Close follow-up is important to ensure nutritional adequacy, as individual assessment of diet, weight changes, and blood glucose monitoring data is used to modify nutritional recommendations. GDM class and follow-up provided through the Diabetes Center of Nebraska Medicine is meant to cover and promote proper management of blood glucose during pregnancy in mothers with gestational diabetes. Results of this study will help evaluate the maternal and fetal impacts of GDM class and follow-up as well as establish the rate of follow-up education after gestational diabetes class attendance.

Methods: A retrospective medical record review was conducted on mothers with GDM who attended gestational diabetes class. Clinical outcomes collected include pre-pregnancy BMI, maternal weight gain, mode of delivery, presence of infant hypoglycemia, and infant birth weight. An analysis of proportions and means, via Chi square and student t-test, will be performed, as appropriate, on maternal and fetal outcomes between the two groups: mothers who attended class and follow-up verse those who came to class alone. Additionally, rate of follow-up with a CDE post gestational diabetes class will be calculated.

Anticipated Results: It is hypothesized that women who attend one or more follow-up appointments post GDM class will have significantly improved maternal and fetal outcomes.

**ABSTRACT #13**

**Effects of Visual Perception of Self-Motion on Gait in People with Diabetes**

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Visual perception of self-motion impacts the gait characteristics that associate with balance control during walking. People with diabetes mellitus (DM) whose sensorimotor function possibly affected due to hyperglycemia may rely on the potential effect through visual perception. The aim of this study was to investigate the gait alterations between people with DM and their age-matched healthy control when self-motion was perceived during locomotion. We hypothesized that the perception of self-motion would alter gait patterns more prominently in DM group when compared those in age-matched group. Three chronic Type 2 DM and two healthy age-matched adults were recruited to walk on a treadmill while the perception of self-motion were generated through the speed-matched virtual optic flow that moved toward subjects. Three-dimensional spatiotemporal gait characteristics were collected using motion capture system and processed afterward as step length, step width and step time. Two-way ANOVA with repeated measure was applied to examine the effects of within factor (visual perception of self-motion, VP) and between factor (group). A significant group effect was found in step length where DM had shorter step length
than control group. A significant interaction between group and VP exhibited in step width. Individuals with DM decreased their step width more than those in control group when VP was presented. Overall, compared subjects with Type 2 DM with their age-matched healthy control, this preliminary study provides further evidence that visual perception of self-motion plays a prominent role on gait adjustment/alteration in DM during treadmill walking. Virtual environment could be useful for DM to establish a walking strategy that is safe to prevent from future incidence of falls.

MUSCULOSKELETAL

ABSTRACT #14

Plantar Fasciitis
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Plantar Fasciitis is the most common cause of inferior heel pain in adult patients and accounts for 25% of all foot injuries related to running. The main symptoms that patients diagnosed with plantar fasciitis experience are heel pain at the beginning of the day or at the start of an activity and pain at rest or at the end of the day. Heel tenderness and pain may be higher with dorsiflexion of the toes. MRI is considered the modality of choice for diagnosing plantar fasciitis, however, the use of ultrasound has increased both in the diagnosis and treatment of plantar fasciitis. The purpose of this case report is to discuss the use of ultrasound in plantar fasciitis.

ABSTRACT #15

The Effectiveness of ACL Prevention Programs in Reducing Incidence of ACL Injuries in Female Athletes
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One of the most common injuries in high demand sports, such as soccer and basketball, is an anterior cruciate ligament (ACL) sprain or tear, often resulting from a non-contact mechanism such as quick change of direction, landing incorrectly, or stopping suddenly. Of those at risk, female athletes are reportedly 2 to 8 times more likely to incur an ACL injury than male athletes. In turn, it has been shown that ACL injuries increase the likelihood of developing posttraumatic knee osteoarthritis at an early age. Several neuromuscular and biomechanical factors have been suggested to predispose female athletes to ACL injury, including sex specific anatomical and hormonal disparities and differences in physical conditioning, muscular strength, and performance of athletic maneuvers. Because of these factors, an emergence of studies has been investigated the effectiveness of neuromuscular training programs on preventing the incidence of ACL injuries. This paper reviewed studies that investigated the effectiveness of neuromuscular training programs on reducing the risk of ACL injuries in female athletes (training program versus no training program) and the effects of such training on the biomechanical risk factors of ACL injuries. Research articles were selected based on their inclusion criteria, applicability, and reproducibility. Based on the results of those reviewed studies, incorporation of a neuromuscular training program that focuses on improving specific biomechanical risk factors appears to significantly reduce the incidence of ACL injuries in female athletes. While these results suggest a reduction in rates of ACL injuries in athletics, they also imply a decline in the development of premature osteoarthritis and a reduced need for surgery, and ultimately reduce the extensive medical costs relating to rehabilitation. Further research is needed to solidify the effectiveness of neuromuscular training programs in reducing incidence of sport injuries, and potentially investigate the biomechanics involved in specific sport maneuvers that would enable programs to be tailored to different sports.

ABSTRACT #16

Comparison of Corticosteroid Injection and Conservative Physical Therapy Treatment in Shoulder Pain Reduction
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Objective: The purpose of this critical review was to investigate the effectiveness of two different treatment options for reducing shoulder pain.

Clinical Relevance: Shoulder pain is a very common complaint, with a one year prevalence of up to 46.7 percent. Common interventions for shoulder pain include corticosteroid injections (CSI) and physical therapy (PT).
Methodology: Three randomized controlled trials were chosen and critiqued that directly compared CSI to PT for shoulder pain.

Results: All three studies showed similar effectiveness for both interventions on shoulder pain reduction, with no significant differences found between CSI and PT at reducing shoulder pain. Although the first study reported significant improvement in each intervention at one year post treatment, the patient received the CSI required more shoulder impingement related health care services than the manual PT group. The second study reported no significant difference in the reduction of shoulder pain at 11 weeks between CSI, manipulation only, and therapeutic exercise only. This study also found that the CSI relieved the shoulder pain significantly faster than the other interventions. The third study also reported no significant difference in the reduction of shoulder pain at 6 months between CSI and PT, but those receiving CSI had more co-interventions.

Conclusion: Both CSI and PT are effective at reducing shoulder pain, with no significant difference at 11 weeks, 6 months, or 1 year post intervention. CSI may need more health care related services and more co-interventions related to shoulder pain. CSI may decrease shoulder pain quicker, but the long term effectiveness is not significantly different than PT. Therefore, both interventions seem to be effective treatment options for decreasing shoulder pain.

ABSTRACT #17
The Effect of Aquatic Physical Therapy on Gross Motor Skills of Children with Cerebral Palsy
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Cerebral Palsy (CP) describes a group of non-progressive neuromuscular disorders resulting from disturbances to the brain acquired before, during, or after birth. CP is the most common childhood physical disability and its associated impairments permanently affect gross motor function. Aquatic interventions have been implemented by physical therapists as a method for improving strength, cardiorespiratory function, and overall motor function. Many studies have been conducted to evaluate the effectiveness of aquatic therapy in children/adolescents. This critical review compares three studies to evaluate the efficacy of aquatic therapy on gross motor function. These studies were chosen based on their reproducibility, strict inclusion criteria to a CP population, and the use of the gross motor function measure, which is applicable to children with CP.

Aquatic therapy interventions appear to provide significant improvement regarding gross motor function for children with CP ages 4-14 as compared to conventional therapy alone. Because these studies did not isolate aquatic therapy, further research is necessary to compare the efficacy of aquatic therapy alone versus conventional therapy.

ABSTRACT #18
Osteonecrosis: Etiology, Associated Diseases, and Imaging Characteristics
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Osteonecrosis is a disease that is caused by an insufficient amount of blood flow to bones in their joint spaces. When this occurs, the bones break down faster than the body can make new bone. This causes destruction of bone, or maybe even bone death. The most common area for osteonecrosis to occur is in the upper leg. It also occurs in other sites such as upper arms, knees, shoulders, and ankles. Osteonecrosis can affect men and women, but usually affects men in their twenties to fifties. The cause is uncertain, but there are a few risks which include: long term steroid treatment, alcohol abuse, joint injuries, and having certain diseases such as arthritis and cancer. Patients diagnosed with osteonecrosis can be divided into two groups: patients with no apparent etiologic or risk factor and patients with clearly identified pathology. To diagnose a patient with osteonecrosis, doctors can use different types of imaging tests. Diagnostic radiography as well as other imaging modalities can help radiologists determine if osteonecrosis is present.

ABSTRACT #19
Osgood-Schlatter Disease
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Osgood-Schlatter disease is characterized by the painful swelling and possible bump that may arise from the pulling of the quadriceps muscle on the tibial tubercle. This disease is most commonly a clinical diagnosis in active adolescent children. Imaging may be used to rule out other pathologies. A lateral radiographic examination, MRI, or Ultrasound of the knee may be utilized to locate soft tissue swelling anterior to the tibial tuberosity, separation and fragmentation of the
apophysis and irregular ossification of the tubercle. Conservative methods and physical therapy should be considered to help alleviate the symptoms associated with Osgood-Schlatter disease. Current technology in radiology and other aspects of healthcare are working together to help adolescents continue to carry out daily activities and participation in athletics.

**ABSTRACT #20**

**Caudal Regression Syndrome**

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Caudal Regression Syndrome is a rare congenital disease characterized by varying degrees of prenatal developmental failure involving the lower extremities, lower spine, and corresponding segments of the spinal cord. Little is known about the cause of Caudal Regression Syndrome, though there is a correlation with maternal diabetes, genetic predispositions, and fetal irregularities. Early diagnosis of the disease using sonography, magnetic resonance imaging, and diagnostic radiography is essential in determining the extent of the syndrome. Treatment and prognosis of Caudal Regression Syndrome varies, depending on the severity and the associated anomalies. Severe cases of Caudal Regression are fatal. Those with less severe cases require a multidisciplinary approach to achieve as much normalcy as possible. This exhibit explores the hypothesized causes of Caudal Regression, the various levels and forms of the disease, how it is diagnosed, as well as the treatment and prognosis for those with Caudal Regression Syndrome.

**ABSTRACT #21**

**Utilizing Cerebral Angiography to Treat Aneurysms**

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A cerebral aneurysm (CA) is a bulging in a weak area of the arterial wall that supplies blood to the brain. Possible symptoms that may appear are pain above and behind the eye, numbness, weakness, or paralysis on one side of the face. In cases in which CA’s go unnoticed there is a chance for rupture. In cases of a hemorrhage, an individual may experience sudden, severe headaches, double vision, nausea, vomiting, a stiff neck, and/or loss of consciousness. Prolonged headaches may be a precursor to a ruptured aneurysm due to leaking over a period of days to weeks; those headaches are termed sentiental or warning headaches. When an aneurysm ruptures, blood is released into the skull and causes a stroke, possibly causing brain damage or even death. In cases in which an aneurysm is suspected, a cerebral angiographic procedure may be used to diagnose and treat the issue. The use of fluoroscopy in an interventional suite provides selective imaging of vascular anatomy. A cerebral angiogram may be used to confirm the presence of a CA when other methods of detection do not provide enough information. Also, fluoroscopy may be used for guidance during an endovascular coiling procedure which seals an aneurysm off from the artery. Although it is an effective method of detection, a cerebral angiogram is more invasive than other means of diagnosing. Also, even though endovascular coiling is a less invasive treatment than surgical clipping, there are specific risks and complications associated with such a treatment.
ABSTRACT #22

Sonographic evaluation of a pectoralis muscle schwannoma: A case study
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Schwannomas are benign neural sheath tumors derived from the Schwann cells of the peripheral nerves. The majority of these tumors involve the head and neck, while occurrence in the muscle of the lateral chest wall is uncommon. We report a rare case of a schwannoma of the pectoralis muscle originating from the small nerves of the brachial plexus. The purpose of this case study is to highlight the sonographic findings of pectoralis muscle schwannoma using high-resolution gray scale and color Doppler ultrasound.

ABSTRACT #23

Clinical Presentation and Imaging Evaluation of Stroke
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As the fourth leading cause of death in the United States, stroke kills almost 130,000 Americans each year; that is 1 out of every 19 deaths. In fact, one American dies from a stroke every four minutes. Because stroke is a leading cause of death, advances in education, technology, and imaging have been made in order to aid doctors in diagnosing this medical event. Stroke was originally the third leading cause of mortality; however, in 2008 it fell to the fourth leading cause due to these advancements. Computed tomography (CT) and magnetic resonance imaging (MRI) are the top two imaging modalities used today to aid in the diagnosis of stroke. With the advances in CT and MRI, localization of brain infarction and hemorrhage through high spatial resolution is possible. The purpose of this exhibit is to explain how using the combination of imaging modalities, laboratory tests, and clinical assessments a physician can make an accurate diagnosis of stroke.

ABSTRACT #24

The Relationship between MRI and Multiple Sclerosis
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Magnetic resonance imaging (MRI) plays a significant role in the timely detection of Multiple Sclerosis (MS). Lesions of MS typically occur at different times and in different central nervous system locations. MRI surpasses computed tomography (CT) scanning in imaging the presence of plaques or scarring caused by MS. Manifestations of this condition may be from a benign illness to a rapidly evolving and incapacitating disease requiring profound lifestyle adjustments. Recent advances in MRI scans may improve the doctors understanding of the patient’s condition and help with the prognosis of the patient. The purpose of this exhibit is to educate individuals on MS as well as discuss the role MRI plays in the recognition of this debilitating disease.

ABSTRACT #25

Effects of Exercise Therapy on Fatigue in Patients with Multiple Sclerosis
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Multiple sclerosis (MS) is a chronic and progressive disease of the central nervous system. MS is characterized by relapsing and remittent inflammation of the central nervous system resulting in demyelination and neuroaxonal loss. Clinical features of MS include motor weakness, sensory deficits, fatigue, spasticity, decreased mobility and balance. In the past, individuals with MS were advised to avoid exercise as increased body temperature can lead to exacerbation of symptoms. Also due to the prevalence of fatigue symptoms, it was believed that individuals with MS could not tolerate exercise. Fatigue is one of the most disabling symptoms of MS and is predominantly being treated with pharmacological and energy conservation interventions. There has been positive research to support exercise as a treatment strategy, however no exercise approach has been noted as superior over all. Nevertheless, a clear statement has not been reached on this topic in the past due to heterogeneous results and fatigue not being the primary outcome of interest in research. The purpose of this critical review was to determine if exercise is a beneficial treatment for fatigue in individuals with MS. Three research articles were
Two of the studies used the Fatigue Severity Scale (FSS) to assess severity of fatigue. The first study showed a significantly decrease in fatigue in a 12-week exercise group. Additionally, the research indicated a significantly increase in fatigue in the control group. The second study showed reduced fatigue of a 4-week exercise group; however it was not statistically significant. The third study used the Modified Fatigue Impact Scale (MFIS), which has shown good validity when compared to the FSS. The results of this study included a statistically significant decrease in fatigue at three and six months in the exercise group. Though evidence is heterogeneous in regards to this topic, exercise seems to improve fatigue as well as spasticity, exercise capacity, health perception, and quality of life in individuals with MS. Consequently, more research is needed to determine the length of time needed to induce changes in levels of fatigue and to determine specific exercise therapies that could be superior.

ABSTRACT #26

Use of a Team Building Activity to Teach Clinical Decision-Making Concepts to Physical Therapy Students

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Purpose: The purpose of this research was to find out if a team building exercise carried out by student groups will facilitate learning how to make clinical decision involving concepts from the International Classification of Function (ICF).

Significance: Scant literature exists regarding the concept of integrating student and expert team case-based learning with the ICF to develop clinical decision-making skills.

Subjects: Subjects were 51 first-year physical therapy students in the DPT program at UNMC in the first semester of the curriculum.

Methods and Materials: A patient case was developed which included clinical decision making steps using concepts from the ICF. The authors were surveyed in order to rank the decision-making steps in order of priority and identify each item’s ICF component. Students then re-ranked the decision items and identified ICF components as groups, then compared their individual rankings and ICF categorizations with those of the expert panel, and calculated the absolute values of the ranking differences and the number of correct categorizations of the items in the ICF scheme. Students then completed a post-test and later a 12-question electronic survey find out their opinions about the usefulness of the exercise.

Results: For the 51 students participating, the mean of differences between sums of individual ranks and those of the expert panel was 40.1 (range 12-74). The mean of ICF category matches for all students was 6.7 (range 3-11 out of 15). The mean of the sums of group rank differences was 27.6 (range 16-46), and the mean of the group ICF matches was 8.6 out of 15 (range 7-10). For 4 of the 5 groups the sum of group rank differences was lower than the mean of the individual rank differences. Also, 4 of the 5 groups had higher ICF category matching rates than those of individuals. Pre-test score for ICF knowledge was 5.18/8 (mean), and post-test mean was 5.78. Twenty-nine of 34 respondents believed that group discussion was more helpful to decision-making.

Conclusions: The first-year physical therapy students in the UNMC PT program discovered that team decision-making almost always results in better outcomes. Knowledge of use of the ICF was enhanced. Students generally believed that the activity was useful to their learning.

ABSTRACT #27

Improving the Postural Control of Individuals with Multiple Sclerosis

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Objective: The purpose of this investigation was to determine if our intensive physical therapy protocol has the potential to improve the temporal sway variations seen in the standing posture of individuals with MS.

Methods: Fifteen adults with MS were enrolled. Biomechanical assessments of postural sway were taken at baseline and after 6-week therapy. Changes in the postural sway were measured by the force platforms using the Neurocom balance testing system at the Clinical Movement Analysis (C-MOVA) Laboratory.
The medial-lateral (ML) and anterior-posterior (AP) center of pressure (COP) time series were exported. The range was calculated to determine the amount of sway in the COP, while the approximate entropy (ApEN) was calculated to quantify the degree of the temporal sway variations. The initial two weeks of the rehabilitation program were completed on campus and the remaining 4-weeks of training were accomplished at home. Wilcoxon signed rank tests were used to determine significant differences.

Results: The ApEN values for the ML-COP and AP-COP while the patients stood with their eyes open were not different after therapy. In addition, the ApEN values for the ML-COP did not change when the patients stood with eyes closed. However, there was a change in the ApEN values for the AP-COP for the eyes closed condition (P=0.03; Baseline= 0.16 + 0.02; Post=0.23 + 0.03). This result indicates that the AP temporal sway variations were larger after therapy. The range of the AP-COP while the patients stood with eyes open did not change. However, the range of the ML-COP was greater after therapy (P= 0.02 Baseline = 0.74 + 0.1 mm; Post= 0.81 + 0.1 mm), indicating that the magnitude of the postural sway was greater in the ML direction while standing with the eyes open. There were no significant changes in the range of the AP-COP and ML-COP while the subjects stood with eyes closed.

Conclusions: The results indicate that our protocol increased the range of the postural sway and resulted in greater temporal sway variations. We suggest the larger range may indicate that the patients increased their postural stability boundaries, while the larger temporal variations may suggest improved adaptability within the postural sway.

ABSTRACT #28

Multiple Sclerosis: The Deteriorating Disease with Continuous Research
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Multiple Sclerosis (MS) is a debilitating autoimmune disease that a large number of individuals are diagnosed with throughout the day, every day. A variety of symptoms can be present with MS, and so the disease can also be divided into different categories based on the symptoms that are present as well as how the deteriorating disease’s attacks affect a particular individual with it. The exact cause of Multiple Sclerosis is still unknown; however, genetics and the environment that the individuals live in are thought to play an important role in leading to MS. Magnetic Resonance Imaging and fluoroscopy are two diagnostic imaging modalities that can be used to help support the diagnosis of multiple sclerosis. Once the diagnosis is found, treatment options can be discussed with the patient depending on his/her severity and category of his/her multiple sclerosis.

ONCOLOGY

ABSTRACT #29

Chemoembolization as a Palliative Intervention for Hepatocellular Carcinoma
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Hepatocellular carcinoma (HCC) is the third leading cause of cancer related deaths worldwide. HCC is a type of cancer that originates in the liver, and it is not the same as metastatic liver disease. One of the leading causes of HCC is liver cirrhosis, and although patients with liver cirrhosis are closely monitored, the development of hepatocellular carcinoma usually goes unnoticed until it has reached an advanced stage. Hepatocellular carcinoma is not a curable form of cancer without undergoing a resection or transplantation. However, even then, only 20-25% of patients will benefit from either type of treatment. Patients who are not suitable for either type of surgery do have different options in terms of palliative interventions. Chemoembolization is a type of palliative intervention that can be used on patients with hepatocellular carcinoma.

For HCC patients who are not eligible for surgical resection or transplantation there is the option of palliative interventions. These are an important factor in improving the quality of life for many of these patients. With the ability to directly apply chemotherapy to a desired tumor without harming healthy tissues, chemoembolization is quickly becoming one of the more popular palliative interventions for hepatocellular carcinoma.
**ABSTRACT #30**

**Virtual microscopy teaching module: cytologic-histologic correlation**

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Introduction: Cytologic-histologic correlation is associated with higher diagnostic accuracy and is an important method of quality assurance within cytology laboratories. Hence, it is essential for cytotechnology (CT) students and pathology residents to understand the morphology of both cytology and histology specimens to increase diagnostic accuracy and to improve patient outcomes. This study aimed to assess whether a teaching module on cytologic and histologic specimens of three body sites (female genital tract (FGT), respiratory tract (RT), and urinary tract (UT)) using virtual microscopy (VM) can aid as an educational tool for CT students and pathology residents to better understand the morphology of the specimens.

Methods: Cytotechnology students and pathology residents participated in this study. Sixteen participants completed a pre-survey to report their personal confidence levels on interpreting cytology specimen and histology specimen glass slides, and whether they believed the VM teaching module would enhance their confidence in interpreting cytology and histology specimens. The participants reviewed the scanned and annotated virtual images (VI) of the above mentioned body sites. Fourteen participants documented their experience on the teaching module in a post survey.

Results: The post-survey results indicated that after viewing the VM teaching modules, 10 participants were more than confident in interpreting the cytology specimens of FGT body site (pre-survey n=9); 7 participants in RT body site (pre-survey n=3); and 8 participants in UT body site (pre-survey n=4). Regarding the interpretation of histology specimens, 6 participants were more than confident in FGT body site (pre-survey n=4); 5 participants in RT body site (pre-survey n=3); and 7 participants in UT body site (pre-survey n=3). Also, for most of the participants, the VM teaching module improved their understanding on morphology of cytology and histology specimens for FGT, RT, and UT body sites.

Conclusion: This study found that the VM teaching module improved the participants’ understandings on morphology and also increased their confidence level in interpreting the cytology and histology specimens of FGT, RT and UT body sites.

**ABSTRACT #31**

**Characterizing Successful Diet Advancement in Patients with Stage III & IV Graft-Versus-Host Disease**

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Objective: To characterize successful diet advancement in patients with stage III & IV graft-versus-host disease affecting the digestive tract (GVHD-DT) at 4, 8 and 12 weeks of hospitalization.

Clinical Relevance: GVHD is one of the most common and challenging complications of allogeneic hematopoietic stem cell transplantation (HSCT). GVHD occurs when the donor immune cells from HSCT begin to recognize the transplant host as foreign, and attack the transplant recipient. GVHD most commonly affects the skin, liver and digestive tract (DT). For this study’s purpose we will focus on GVHD affecting the DT. Determining an appropriate and effective diet advancement protocol is clinically relevant as GVHD is the most common cause of non-relapse mortality of patients who receive allogeneic HSCT. Currently, at Nebraska Medicine there is no standard protocol for diet advancement in patients with GVHD-DT. By creating an evidenced based protocol that is successful in diet advancement we can decrease complications affecting patients with GVHD-DT.

Methods: A retrospective chart review of patients admitted to Nebraska Medicine was performed to identify clinical data (stool output, presence of blood in stool, steroid regimen, anti-diarrheal regimen, and initiation date of nutrition) to categorized patients into two groups, those with successful advancement of diet and those without successful advancement of diet. Student T-test will be used to calculate means of patients between the two groups and correlation coefficients will determine associations between patient characteristics and successful advancement of diet.

Expected Outcomes: Patients found to have successful advancement of diet had stool output < 1000 mL; did not have blood in their stool at time of advancement; maintained steroid regimen at time of advancement; were prescribed anti-diarrheal agent at time of advancement; and had nutritional support initiated within 7 days of admission.
**ABSTRACT #32**

**Intra-operative Magnetic Resonance Imaging (iMRI): Imaging the Brain Shift**

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During neurosurgical procedures, precise knowledge of the position of pathology within the brain is vital. Neurosurgeons utilize technology generally referred to as neuro-navigation systems to fuse structural and functional magnetic resonance image (MRI) sets in order to plan surgical procedures that will result in the best outcomes for patients. One of the limitations of this technology is that the images are acquired prior to surgery and the position of the brain relative to the cranium changes during the procedure. This change in position is referred to as the “brain shift” and it presents significant challenges during neurosurgery when every millimeter is critical. Intra-operative magnetic resonance imaging (iMRI) enables physicians to image patients during surgery allowing more accurate visualization of pathology in real-time and diminishing the undesirable effects that the brain shift may have on surgical outcomes.

**ABSTRACT #33**

**The Role of Physiological Imaging Compared to Anatomical Imaging in the Assessment of Brain Tumors: A Review and Future Perspectives**

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Purpose: The purpose of this paper is to present a critical review of published literature detailing a comparison of anatomical to functional medical imaging of brain tumors and the impact of combining them for relevance in the assessment and diagnoses of progression.

Design: A literature review was performed to inquire the importance of different medical imaging modalities for the assessment of brain tumors. A combination of thirteen articles were retrieved from databases such as Medline PubMed, Ebsco-Host, and Google Scholar that met specific criteria relating to the use of ionizing radiation to image the brain. Keywords searched were: conventional, anatomical, functional, physiological, brain, tumor, neuroimaging, radiology, survival-rate, oncology, PET, CT, PET/CT, MRI, PET/MRI.

Discussion: Diagnosing and treating brain tumors require the use of diagnostic imaging to evaluate the disease process. Reviewing historical and future perspectives in medical imaging supports utilizing the field of nuclear medicine over conventional imaging such as MRI. Research of why using a functional evaluation of a tumor is better to diagnose and treat compared to using an anatomical evaluation, will better assist patients

Conclusion: Through research of functional compared to anatomical imaging, PET is the optimal image modality of choice to image brain malignancies. Advantages in PET over MRI, such as higher detection efficiencies and having the capability to study the disease status, cause an increase in patient care and survival rate. Relevance to clinical practice provides a better understanding of the two imaging classifications recognized, anatomical and physiological; providers can increase the effectiveness of diagnosing and treating patients.

**ABSTRACT #34**

**F-18 FDG-PET/CT: Detection of Recurrent Thyroid Cancer in Patients with Negative I-131 Whole Body Scans**

Jillian Rutan, Marcia Hess Smith. Nuclear Medicine Technology program, Division of Radiation Science Technology Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Background: Patients with thyroid cancer undergo surgical removal followed radioactive thyroid ablation. Within 6-12 months following these two procedures patients receive follow up exams that include ultrasonography, thyroglobulin testing, and radioactive iodine whole-body scans. At the present time PET/CT exams are not a standard follow up exam on thyroid cancer patients.

Purpose: The purpose of this paper was to review studies investigating the use of F-18 FDG PET/CT scans for determining recurrence of thyroid cancer in patients. The studies were reviewed to determine if there is a need to add PET/CT scans to the list of types of standard follow up exams.

Method: A systematic review of the literature using PubMed and EBSCO. Ten articles from 2003 to the present were included due to the patient studies on thyroid cancer patients. These studies were used to determine the significance of F-18 FDG-PET/CT scans in
diagnosing the recurrence of thyroid cancer. Key words: thyroid cancer, thyroid ablation, I-131 whole body scan, PET/CT

Discussion: Standard follow up exams are discussed in this paper to show the differences in sensitivity between exams. The need to go beyond the standard exams used on post-ablation patients is also discussed. There is also a need to determine the reliability of the F-18 FDG testing in patients and how it relates to the thyroglobulin levels in patients.

Conclusion: The data shows that PET/CT scans were able to detect a recurrence of cancer in a percentage of the patients with negative I-131 whole-body scans. It was also determined that there was an increased sensitivity when compared to ultrasound and I-131 whole-body scans. Some of the literature points toward further research in the determination of increased thyroglobulin levels and the decision to perform PET/CT exams.

**ABSTRACT #35**

**Osteosarcoma: Imaging the Pathology**
Emily Miksch. Radiography program, Division of Radiation Science Technology Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

The purpose of this exhibit was to examine the prevalence of osteosarcoma. Annually, 800 new cases of osteosarcoma are diagnosed. Osteosarcoma is known as one of the most common primary malignant mesenchymal tumors of bone found in both children and adults, next to multiple myeloma. This malignancy usually occurs in long bone, resulting from rapid rates in bone growth. Osteosarcoma has a high incidence in people ages 10-25 and people over 60 years old. Although the cause of osteosarcoma is unknown, risk factors remain which present possible threats of diagnosis. This form of bone sarcoma has various types, etiologies, manifestations, symptoms, diagnoses, and treatment options, with prognosis depending on the stage of the tumor. Physicians are able to accurately determine a diagnosis and prognosis for patients by observing images of the pathology obtained through several imaging procedures. Material presented in this exhibit will evaluate the medical imaging that takes place when patients experience the manifestations of osteosarcoma.

**ABSTRACT #36**

**Astrocytoma**
Katelyn Tank. Radiography program, Division of Radiation Science Technology Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Astrocytoma is a brain tumor, which originates from astrocytes. Astrocytes are supportive cells in the nervous system that have many important functions. Astrocytoma is the most common type of brain tumor. It can be either a benign or a malignant tumor. There are a few symptoms that are related to astrocytoma, which include headaches and in more severe cases seizures and neurologic deficiencies. The cause of astrocytoma is not yet known but is believed to be connected to genetic mutations. When diagnosing astrocytoma Magnetic Resonance Imaging (MRI) is usually used. Biopsies are also used when diagnosing a patient with astrocytoma. There are only a few ways to treat astrocytomas and that is by resection and radiation. Research is studying whether chemotherapy is helpful or not. Even with new technologies and advancement of treatments, the prognosis of astrocytoma is low and not very promising. This exhibit discusses the sign and symptoms, causes, diagnosis, treatment and prognosis of astrocytoma.

**ABSTRACT #37**

**Proton Therapy vs Photon Therapy**
Jessica Backhaus, Megan Kuster, Charlene Vance. Radiation Therapy program, Division of Radiation Science Technology Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Radiation has been utilized in cancer treatment since shortly after x-rays were discovered. Major advancements have occurred since then, but chronic side effects still occur in many patients. 3D conformal therapy, intensity modulated radiation therapy (IMRT), and proton therapy are all treatment options that adequately treat certain cancers such as retinoblastoma while sparing normal tissue. Both 3D conformal and IMRT techniques produce exit dose that goes beyond the tumor volume, ultimately irradiating healthy tissue and increasing the likeliness of side effects. An advantage of proton therapy is that the potential of damaging tissue from exit dose is eliminated. This exit dose is eliminated through a property of protons called Bragg’s Peak which can be very valuable to the well-being of patients.
ABSTRACT #38

Hodgkin’s Lymphoma Treatment History
Dustin Hahn, Nicolas Steidl. Radiation Therapy program, Division of Radiation Science Technology Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Hodgkin’s Lymphoma (HD) under the microscope is known for the presence of Reed Sternberg cells and originates in T and B-cell lymphocytes. The advancements in treatment for HD over the years and has changed a disease that used to have a poor prognosis to a malignancy where most of its victims survive. The treatment modalities used are still the same, but the techniques used have evolved to treat specific areas and make the treatments more specific to the disease. These techniques can be contributed to the hard work and research of many people who have had a significant impact on the way things are approached today. Vera Peters and Henry Kaplan are two physicians that have carved the path for Hodgkin’s lymphoma treatment and the advancements that have been made over time.

ABSTRACT #39

An Interprofessional Guide to Laboratory Testing for Student-Run Free Clinics: Reference Guide to Sexually Transmitted Infection Diagnostics and Monitoring
Megan Gunderson, Natalie Harmon, Ulrike Otten. Clinical Laboratory Science Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

The University of Nebraska Medical Center’s SHARING clinics are student-run, free clinics designed to allow medical access to underserved populations in our community and encourage interprofessionalism within emerging healthcare professionals. The three clinics, RESPECT, SHARING, and GOODLIFE, each focus on specific healthcare issues, such as sexually transmitted infections (STI), acute and chronic medical treatment, and diabetic management, respectively. Along with contributing greatly to the community, these clinics expose students to those from other healthcare backgrounds than their own, emphasizing teamwork to provide the best patient care possible. This sense of collaboration is highly important in today’s healthcare environment, and the presence of student laboratory personnel has proven to be a valued resource. On-site specimen collection and handling and laboratory testing by clinical laboratory science students connects student providers directly with helpful laboratory information, reduces pre-analytical error in the testing process, and relieves patients of additional transportation and psychological burdens. Strengthening interprofessional knowledge and communication within these clinics is an area clinical laboratory science students seek to constantly improve upon. A past survey of UNMC’s SHARING Clinics student providers showed an interactive guide to common laboratory testing would be beneficial toward effective patient care and student provider knowledge. Under the Physician Performed Microscopy (PPM) category of the Clinical Laboratory Improvement Amendments of 1988 (CLIAA’88), physicians and mid-level practitioners are able to perform direct wet mount and KOH preparations on vaginal specimens obtained during the patient’s examination. At UNMC’s RESPECT clinic, student practitioners learn to perform these laboratory procedures with direct faculty guidance and assistance from the Clinical Laboratory Science (CLS) students and faculty. To facilitate this learning process, the CLS students developed a reference guide for microscopy evaluation and interpretation with explanations of frequently utilized tests for the diagnosis and management of STIs.

ABSTRACT #40

Determination of Minimum Thrombin Concentration Required to Generate the Most Efficacious Clot for Platelet Gel Therapy
Cara Michelson, Janae Limley, David Holt. Clinical Perfusion Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Many patients who suffer from post-operative bleeding or non-healing open wounds can receive and benefit from autologous platelet gel (APG) therapy. Methods for utilizing this blood saving technique involves the collection of the patient’s own platelet rich plasma and adding thrombin and calcium chloride to make a gelatinous covering that will be applied directly to the site of bleeding or wound. Thrombin concentrations (500 IU, 250 IU, 125 IU, 63 IU, 31 IU, 16 IU, 8 IU) were added to a single donor’s plasma and calculated calcium chloride dose. Thromboelastography (TEG) (Need manufacturer and location) was used to analyze each thrombin-PRP mixture with emphasis on reaction time (R), maximum amplitude (MA), percent of lysis 30
minutes after MA (LY30), and alpha angle. The data for clotting time (R) and clot stability showed a peak of reaction time at 250 IU and 62.5, respectively, but no significant pattern (p = 0.368 and p = 0.056). The data showing the most significance was the alpha angle (p = 0.033) which showed a bell shaped curve with a peak at 62.5 IU thrombin. Further investigation of thrombin concentrations should be conducted to perfect platelet gel therapy.

**ABSTRACT #41**

**A Dose of Reality: The Increasing Role of Computed Tomography**

Stephanie Lough, Tammy Jones. Computed Tomography program, Division of Radiation Science Technology Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

CT has become the diagnostic method of choice for a growing number of indications and the list is getting longer. Sixty eight million! That is the number of Computed Tomography scans that were performed in the United States in 2013. The volume of CT exams has been on the rise for a variety of reasons ranging from diagnostic accuracy, speed and availability to lack of need for surgical intervention and fear of malpractice lawsuits. CT is now the initial diagnostic exam for a variety of indications including stroke, pulmonary embolism, lung nodules and traumatic injury and the list continues to grow. CT is utilized in conjunction with nearly every imaging modality and technologists in command of this skill will benefit greatly through enhanced marketability, flexibility and job satisfaction. As technology advances and research is conducted on new ways to merge various imaging methods; knowledge, training, and education in the proper use of these techniques will be vital.

**ABSTRACT #42**

**Migration into the Digital Frontier: A Business Case Exploring the Diagnostic Value of High Frame Rates in Telepathology of Fine Needle Aspirations**

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Introduction: “FNA [Fine Needle Aspiration] biopsy” can be defined as “the removal of a sample of cells, using a fine needle, from a suspicious mass for diagnostic purposes.” FNA biopsy is simple, accurate, fast, and economic, as well as safe. Immediate interpretation of the FNA biopsy allows determination of the adequacy of the sample, rendering of a specific diagnosis, guiding further clinical investigations or treatment, and determining whether ancillary studies are needed to make the final diagnosis. In order to determine the adequacy of the sample, a pathologist evaluates the specimen on site or uses telepathology technology to remotely evaluate a virtual image of the specimen with the assistance of a cytotechnologist. The use of live camera feed from the procedural to the diagnostic location facilitates a timely preliminary diagnosis and allows for the acquisition of additional cellular material if needed. However, the technical capabilities of the telepathology system can limit the accuracy of adequacy and preliminary diagnosis.

Methods: In an attempt to advance current telepathology systems used for FNA procedures, a high definition camera with a higher frame rate has the potential to emulate a more natural screening interface. Providing the pathologist with a higher quality image to evaluate the specimen is likely to result in less false adequate preliminary diagnoses during the FNA procedure. Discovering the optimum balance of frame rate and resolution will simulate an enhanced screening interface.

Anticipated Results/Conclusion: An ideal combination of resolution and frame rate will facilitate a more natural screening interface to optimize FNA adequacy assessments. In order to determine the minimum resolution appropriate for the telepathology system, the pixels per cell will be calculated for a cellular field of view from a recent FNA procedure at multiple resolutions. Various frame rates will be assessed by multiple cytopathologists to evaluate the point of discernible camera fluidity of a screening interface.

**ABSTRACT #43**

**Comparison and Optimization of Different Reagents to Lyse Blood in Cytology Samples**

Rosa Lopez,1 Mahan Matin,2 Alaa Afify,1,2 1 – Cytotechnology Education Program, School of Allied Health Professions, University of Nebraska Medical Center, Satellite program Location, University of California Davis Medical Center, Sacramento CA. 2 – Department of Pathology and Laboratory Medicine, University of California, Davis, Sacramento, CA

Introduction: Cytology evaluation could be hampered by the presence of blood. The blood can prevent appropriate fixation, staining and evaluation of diagnostic cells. There are several established reagents to lyse blood in cytology samples. The aim of this study was to
compare the commonly available methods and optimize them for diagnostic purposes.

Methods: Bloody specimens were selected based on gross examination. All specimens were from body fluids that were proven malignant by cytology examination. At least 50cc’s of the fluid were centrifuged and the pellet was smeared onto a slide. The slides were submerged into the hemolysing reagents (6 dips, 2, 5 and 10 minutes). Three known hemolysing reagents were evaluated: Clark’s solution (95% alcohol and glacial acetic acid; 3 to 1), Hydrochloric acid solution (500cc’s of 95% alcohol and 1 drop of HCL) and CytoRich Red (methanol 10%, propan-2-ol 20-25%, ethylene glycol 5-10%, and formaldehyde <1%; TriPath Imaging Inc.). Slides were stained with Papanicolaou stain, cover slipped and reviewed for red blood cells and cellular components on freshly made smears. Control slides were prepared without exposure to any of the lysing solutions.

Results: Clark’s solution and CytoRich Red lysed the blood completely and revealed similar results; 6 dips in the lysing reagent was the optimum duration to lyse the blood. Cytology details of the malignant cells, mesothelials and inflammatory cells were preserved. HCL solution did not lyse the blood compared to the other two reagents.

Conclusion: This study confirmed that Clark’s solution and CytoRich Red could be used in the cytology laboratory to lyse blood in a short period of time (6 dips).

ABSTRACT #44

Multi-Credentialed technologist in radiology: determining current employment practices and future preferences for multi-credentialed technologists in Nebraska
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Diagnostic Medical Sonography, Division of Radiation Science Technology Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

The University of Nebraska Medical Center’s Division of Radiation Science Technology Education strives to graduate highly qualified students that will be competent Radiologic Technologists in the state of Nebraska. After graduating from a Radiography program, students have the opportunity to continue their education in a secondary modality. UNMC offers five options including Cardiovascular Interventional Technology, Diagnostic Medical Sonography, Magnetic Resonance Imaging, Nuclear Medicine Technology, and Radiation Therapy. Our research study focuses on current hiring practices of hospitals in the state of Nebraska, the importance of hiring employees who hold multiple credentials, and the future hiring preferences. The survey was mailed out to 104 hospital administrators throughout the state of Nebraska.

ABSTRACT #45

The Effect of Body Mass Index on Kidney Transplant Outcomes
Morgan Galle. Medical Nutrition Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Objective: To determine an association between body mass index (BMI) and clinical outcomes (length of hospital stay, wound healing through the use of a wound VAC or wound revision, readmission to hospital for wound infection, drainage, or opening, graft function measured by creatinine, steroid induced hyperglycemia, and albumin levels) upon initial hospitalization up to 6 months following kidney transplantation.

Clinical Relevance: When determining eligibility for kidney transplant, BMI is often a debatable criterion for transplant. There is a gap in research on whether or not BMI has clinical significance on patients post-kidney transplant outcomes. Therefore it remains unclear how BMI prior to transplant can affect the overall post-kidney transplant clinical outcomes.

Methods: This will be a retrospective study using medical records to determine if BMI has an effect on post-kidney transplant outcomes. Participants must have had a kidney transplant and be legal adults aged 19 years or older. Medical records will be assessed for demographic and clinical data from initial kidney transplant admission, the duration of hospital admission and up to 6 months post-kidney transplantation. The mean of post-kidney transplant clinical outcomes during hospitalization up to 6 months post-kidney transplant will be assessed and quantified using body mass index at transplantation. This will be analyzed using a student t-test.

Expected Outcomes: We expect to find that patients with a BMI less than 35 kg/m2, is associated with fewer clinical outcomes during their initial hospitalization and up to 6 months post-kidney transplant.
ABSTRACT #46

Quantity of Intensive Care Unit Patients Receiving Soy-Based Lipids during the First Seven Days of Total Parenteral Nutrition

Katie Schreck, Medical Nutrition Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Background: The American Society for Parenteral and Enteral Nutrition (ASPEN) reviews research literature involving parenteral and enteral nutrition and provides recommendations and guidelines to improve nutrition care. In conjunction with the Society of Critical Care Medicine, ASPEN published evidenced based recommendations related to nutrition support therapy in critically ill adults in 2009. Critically ill individuals were defined as medically or surgically critical patients who are expected to require more than 2-3 days of intensive care unit (ICU) stay and are not in the ICU for monitoring. Based on published research at the time, ASPEN made the recommendation, “in the first week of hospitalization in the ICU, when parenteral nutrition is required and enteral nutrition is not feasible, patients should be given a parenteral formulation without soy-based lipids.” This is recommended due to limited research which has shown mixed results with soy-based lipids including statistically significant differences in length of time requiring mechanical ventilation, length of ICU stay and total length of hospital stay. Higher incidence of infection was also seen in research participants receiving soy-based lipids.

Objective: To determine the quantity of intensive care unit patients receiving total parenteral nutrition including intravenous lipids in the first seven days of hospitalization.

Methods: This is a retrospective study examining electronic medical records to determine the number of critically ill patients who received total parenteral nutrition (TPN), with and without lipids, during the first seven days of hospitalization. Participants were in the intensive care unit (ICU) at Nebraska Medicine and received TPN during the first seven days of hospitalization. All participants were legal adults aged 19 years or older.

Expected outcomes: We expect to see a majority of critically ill patients receiving TPN in the first week of hospitalization to also receive lipids.

ABSTRACT #47

Milestones of the UNMC Physician Assistant Program

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Beginning with a legislative mandate and funding for the UNMC College of Medicine to establish a program for the training of physician assistants (PA) in 1971, the PA profession has flourished now over four decades in the State of Nebraska and beyond. The first program was in collaboration with Sheppard Air Force Base in Texas, awarding a BS degree. The first 29 PA graduates entered clinical practice in 1975, 23 providing patient care in Nebraska. Milestones moving forward included federal grant awards, UNMC PA alumni published in JAMA, and the advent of computer-assisted instruction in the PA curricula. In 1988, 49% of UNMC PA graduates practiced in family medicine, 18% in surgical specialties and the remainder in other medical specialties. In the 1990s, the program transitioned its curriculum to offer a Master of PA Studies (MPAS) degree which became the most common professional degree across the country for PAs. The program also launched a distant-learning degree completion program for PA alumni seeking a master’s degree, which later became the current 26-semester hour MPAS Degree Advancement Option. The Interservice PA Program continued the long-standing relationship with UNMC to grant US military-trained PAs a diploma from UNMC. In the first decade of the new millennium, the PA Program established a collaboration with the Canadian Forces PA Program leading to their graduates receiving the UNMC diploma. The current decade includes a nearly $1 million federal grant titled, “Making Primary Care Primary,” as well as launching the UNMC-Kearney site providing the same PA education in central Nebraska.

ABSTRACT #48

For physical therapy students, how effective is electronic based learning compared to traditional classroom education in improving clinical skill performance?

Marisa Johnson, Taylor Majerus. Division of Physical Therapy Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

The development of foundational clinical skills for utilization in patient examinations and treatment is an essential component in many physical therapy education programs. Clinical skills are developed through live lecture, hands-on laboratory time, clinical education experiences, and practical exams. In order to enhance
the psychomotor skill set necessary for entry-level physical therapy students, an increasing number of programs are utilizing electronic learning (e-learning) mediums. In an era where the majority of students are millennial, e-learning complements current students’ communicative upbringing. The advent of e-learning has been well received among physical therapy students and proven to be as effective as traditional learning in cognitive domain outcomes. However, minimal research demonstrates the impact of e-learning on physical therapy students’ clinical skill performance. A literature search was conducted through PubMed and Scopus to investigate the effectiveness of e-learning on clinical skill performance, utilizing the following key terms: e-learning, blended learning, physical therapy, practical examination and clinical skills, the search resulted in eight studies, in which four were chosen for this critical review. Selected studies closely aligned with the question of interest, and compared the use of adjunctive e-learning methods to a control group who received only traditional, face-to-face lecture, lab, and access to textbooks. In each study, at least one outcome measure assessed clinical skill performance based on a practical examination. Four studies support the use of e-learning as it is more sustainable over time than traditional methods and affords the learner individualization, self-paced learning, and instructional consistency. In each study, students who utilized e-learning to enhance their understanding of the material performed slightly higher on the practical exam, but not all findings were statistically significant. Additionally, those students reported having more confidence, less anxiety and better understanding of grading standards prior to the practical exam. Overall, students continue to value in-class time to discuss material at a higher level, work through clinical cases, and ask questions for clarification of course content and objectives. E-learning could be better utilized as a complementary means of learning clinical skills, but not as a stand-alone source of learning.

ABSTRACT #49

Effects of an Exercise Program Versus Lower Limb Orthotics in the Prevention of Overuse Injuries in the Military Population
Greggory Schlueter, Jerod Post. Division of Physical Therapy Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Lower extremity overuse injuries are prevalent within the military population. These injuries remain a prevalent concern throughout the career of military personnel due to the high physical fitness standards set by military governing bodies as well as the inherent nature of military service. Prevention of overuse injuries in the lower limb is thus increasingly important in the military population. A literature review was conducted utilizing PubMed in order to access appropriate articles. All articles utilized in our critical review are randomized controlled trials (RCT) between 2006 and 2011, and focused on preventing lower limb overuse injuries in the military population utilizing either an exercise program or lower limb orthotics. Six RCT papers were included. An article by Coppack et al., 2011 found that using a strengthening and stretching exercise plan resulted in substantial and safe reduction in anterior knee pain. Parkkari et al., 2011 found that a neuromuscular training intervention including education was effective in preventing anterior knee pain. The Cochrane review by Yeung et al., 2011 utilized >30,000 subjects and found mixed results on exercise and orthotic effectiveness in preventing lower limb overuse injuries. Two articles (Baxter et al., 2011 and Meardon et al., 2009) support the use of lower limb orthotics in prevention of lower limb injury. An article by Withnall et al., 2006 compared three types of shock absorbing and non-shock absorbing orthotics in their effectiveness of preventing lower limb injuries. Similar rates of lower limb injuries were observed with the use of all insoles. While the articles reviewed found supports for and against the use of exercise and orthotics in preventing lower limb overuse injuries, none of them directly compared the two interventions. Future studies are needed to directly compare the effectiveness of lower limb orthotics to a concurrent exercise program.

ABSTRACT #50

Rehabilitation therapists in inpatient fall risk reduction: Playing a more valuable role
Kristen Topliff, Dawn Venema, Robin High*, Katherine Jones, Division of Physical Therapy Education, School of Allied Health Professions, *College of Public Health, University of Nebraska Medical Center University of Nebraska Medical Center, Omaha, NE

Purpose: To describe the role of rehabilitation therapists—physical therapists (PTs), occupational therapists (OTs) and their assistants—in inpatient fall risk reduction after participating in an interprofessional fall risk reduction program.

Background: Nearly one million falls occur annually in US hospitals; many of these falls result in injury and increased cost of care. Patient falls result from multiple, interdependent causes. Thus, an interprofessional team is the best structure to address fall risk reduction in hospitals. With their specialized knowledge of mobility and functional abilities, rehabilitation therapists can play a role in fall risk reduction as members of the coordinating team (accountable for organizational level
outcomes) as well as the core team (accountable for direct patient care).

Methods: Seven PTs, one PT assistant, two OTs, and one OT assistant from nine rural hospitals participated in one of three semi-structured focus groups and one interview via telephone Conference Bridge. Digital recordings were transcribed verbatim and analyzed using NVivo 10. Themes were developed deductively from existing theoretical frameworks, and inductively from concepts that emerged during coding of the data. We conducted theme queries to identify relationships between structures and processes intended to decrease fall risk, and used member checking to establish credibility of our results.

Results: Qualitative analysis revealed that therapists perceived their function on the coordinating team as “playing a more valuable role”. On the coordinating team, therapists assisted in determining the etiology of falls and selecting standardized assessments to determine fall risk. Therapists described their function on the core team as improving quality outcomes. The development of team orientation (recognizing the value of other team members) among coordinating team members resulted in improved communication among core team members – especially between rehabilitation therapists and nurses – which contributed to the desired outcome of safe, patient centered care.

Conclusions: Including rehabilitation therapists in fall risk reduction coordinating teams may increase the quality and safety of patient care directly by contributing to organizational policy/procedures and indirectly by improving communication between professions. Further research is needed to quantify the relationship of this dual role of therapists and its effect on patient safety and patient-centered care.

ABSTRACT #51

An Examination of Unnecessary Radiation Exposure: Causes and Potential Solutions
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The use of ionizing radiation in healthcare has increased with advances in technology and the improvement of image quality that is now being produced. In urgent and emergent situations, the risk of missing a potentially fatal diagnosis greatly outweighs the long-term risk associated with ionizing radiation exposure; however, there is reason for concern. With increase in the number of exams utilizing ionization radiation, patients – especially pediatrics and adolescents, are exposed to more medical radiation than ever before. Ordering providers often rely on the work of imaging departments to help them diagnose diseases and pathologies in their patients. Imaging can be of great diagnostic value, but there is evidence that many healthcare providers and patients are unaware of the amount of radiation dose received in exams and the potential harmful effects of radiation exposure. Efforts have been made at implementing systems to aid ordering providers when it comes to exams involving the use of ionizing radiation, but these systems and programs are often underutilized or unavailable to many facilities. Although the benefits of an exam often do outweigh the risks, each patient and provider must thoroughly examine the risk and need. More education for providers, patients, and others involved with ionizing radiation means less patient exposure and more healthcare dollars saved every year. As the use of ionizing radiation exams increases, measures must be taken to ensure the highest quality of health care can be achieved – at minimal risk to the patient.

ABSTRACT #52

Graves’ Disease: Roles of Various Imaging Modalities in Diagnosis and Treatment
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Graves’ disease (gd) is not only the most common disease related to hyperthyroidism of the thyroid gland, but also is difficult to diagnosis due to its heterogeneous nature of signs and symptoms. Even a commonly thought, telltale sign called ophthalmopathy linked to gd can be difficult to visualize at more subtle degrees and may not even occur in a small percentage of gd patients. Regardless, graves’ disease can cause morbid outcomes in subtle forms and is often paired with other comorbid conditions so proper diagnosis and treatment is crucial. Various modalities within imaging can each play a unique and crucial role in the diagnosis and treatment of graves’ disease. However, it is not suggested that every imaging tool be used for every patient with gd, especially if the disease has presented itself in a blatant manner. Instead these imaging modalities can prove most useful in examining a specific sign and/or symptom a patient is having related to gd. As well, in patients with a confirmed diagnosis of gd, these modalities can aid in determining quantities for medication doses and selection of other forms of treatment to best suit the patient’s needs.
ABSTRACT #53

Pediatric Appendicitis Imaging Protocols
Lea Lambing. Radiography program, Division of Radiation Science Technology Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Pediatric Appendicitis Imaging Protocols
Lea Lambing. Radiography program, Division of Radiation Science Technology Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

This paper examines the role of diagnostic imaging in the diagnosis of appendicitis among pediatric patients. Appendicitis continues to be the most common cause of surgery for pediatric patients. The diagnosis may be difficult without the use of imaging techniques. Both ultrasound and computed tomography are exams performed to assess for appendicitis. The sensitivity and specificity of both computed tomography and ultrasound is similar, but computed tomography continues to be ranked ahead of ultrasound. The rate of computed tomography utilization, especially in the pediatric population, has continued to increase and leads to concerns over the harmful effects of ionizing radiation on pediatric patients. Additionally, the majority of pediatric computed tomography exams are ordered in adult-centered emergency departments. These facilities may not have adequate knowledge of pediatric computed tomography protocols and proper radiation dose exposure for pediatric patients. To mitigate the harmful effects of ionizing radiation, a decreased utilization of computed tomography when diagnosing pediatric appendicitis cases would be beneficial. Two studies conducted by separate medical facilities evaluated the implementation of protocols designed to reduce the rate of computed tomography exams for pediatric patients with appendicitis. This exhibit examines computed tomography, ultrasound, the negative effects of ionizing radiation in pediatrics, and methods for non-computed tomography guided appendicitis diagnosis.

ABSTRACT #54

Picture Perfect? The Risks Associated With Diagnostic Medical Sonography
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The use of high frequency sound waves in diagnostic medical sonography has been a valuable tool in imaging the human body for over three decades. Sonography’s flexibility in multiple specialties, speed of image acquisition, and utilization of a non-ionizing energy form makes it one of the most popular imaging modalities. New technology involving three-dimensional and four-dimensional, or real time, imaging has also increased the popularity of ultrasound. However, some questions have been raised about the potential biological effects and developmental hindrances that ultrasound energy may cause through thermal and mechanical processes. These mechanisms include radiation force, acoustic streaming, formation of free radicals, acoustic cavitation, and increases in internal temperature. Multiple studies have been conducted on the potential risks of ultrasound, including prevention of neuronal migration, decreased birth weight, dyslexia, delayed speech, and an increase in the frequency of left-handedness, which may be linked to autism. These studies show that there should be more stringent regulations in place to ensure that ultrasound energy is only being used for medical reasons, by licensed professionals, and using the lowest exposure setting possible. The safety of patients in diagnostic ultrasound can be assured through the skills and judgment of professionally licensed sonographers.

ABSTRACT #55

The Use of X-Ray and Fluoroscopy in the Diagnosis of Bulimia Nervosa Related Conditions in the GI System
Bethany Raabe. Radiography program, Division of Radiation Science Technology Education, School of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Bulimia nervosa has detrimental and irreversible effects on the pharynx, intestines, and colon of the gastrointestinal system undetected to the plain eye. Visible damages can be seen in the oral cavity. A current method for the identification of bulimia nervosa related conditions arising in the gastrointestinal system within the field of Radiology include the use of real-time imaging, or fluoroscopy. Detection of pathologies in the oral cavity can be further investigated with the use of X-ray. Under the direction of a radiologist, esophagram procedures can reveal conditions such as achalasia and Barrett’s esophagus. Panoramic images of the mandible taken by a Radiologic Technologist can highlight damages to the dental anatomy.
ABSTRACT #56

**Diagnostic Imaging of Asbestos Exposed World Trade Center Attack Survivors**

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The purpose of this exhibit is to evaluate asbestos exposures to World Trade Center attack survivors, and determine the most appropriate imaging modalities necessary to the diagnosis of asbestos related lung diseases in World Trade Center attack survivors. This exhibit seeks help imaging professionals accurately assess and screen World Trade Center attack survivors for relevant pathology. The information presented pertaining to asbestos exposures, risk factors for asbestos related lung diseases, current screening protocols and the strengths and weaknesses of different imaging modalities was found to be useful to imaging professionals. With such a large number of individuals exposed to asbestos (many of them children) in addition to the very long latency period for the manifestation of asbestos related lung diseases, these cases will continue to unfold for many years to come. The competent imaging professional needs to be equipped with a working knowledge of these diseases and how to screen for them effectively.

ABSTRACT #58

**Marfan Syndrome**

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Marfan syndrome is an autosomal connective tissue disorder that affects about 1 out of every 5,000 people in the United States. It is caused by a mutation in the fibrillin 1 gene (FBN1). This condition is named after Antoine Bernard-Jean Marfan who played a significant role in the research and definitions of the clinical manifestations that accompany this syndrome. These manifestations target three main organ systems: cardiovascular, musculoskeletal, and ocular. Due to Marfan syndrome’s clinical manifestations occurring in other diagnoses the Ghent criteria for Marfan syndrome was produced in order to minimize the amount of over diagnosis that can occur. Since the highest prevalence occurs in the 15-19 age group it is vital to the survival of these patients to properly identify and diagnose their disorder and associated manifestations to allow for the best treatment and management. Diagnostic imaging such as magnetic resonance imaging, ultrasound, and computed tomography are modalities that are greatly utilized in diagnosis, monitoring and treatment of Marfan syndrome. These modalities focus on discovering the associated clinical manifestations such as pectus excavatum, dural ectasia, aortic dilatation, aortic aneurysm and dissection, and ectopia lentis. Even though there is no cure for Marfan syndrome, treatment aims to minimize the effects the syndrome has on the systems of the body primarily targeting the cardiovascular system. Aortic dissection and aneurysm are the leading cause of death associated with Marfan syndrome, and thus are the major risk factors associated with the late diagnosis of the disorder. This emphasizes the importance in proper imaging of specific manifestations to allow for maximum treatment time before the associated conditions lead to the ultimate death of the patient.
ABSTRACT #59

Oxidant-Antioxidant Status in Workers Occupationally Exposed to Long Term Low Levels of Ionizing Radiation - A pilot study
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Background: Reactive oxygen species (ROS), including superoxide (O₂•-), plays an important role in the biological effects of ionizing radiation. The human body has developed different antioxidant systems to defend against free radical attacks. We investigated changes in the antioxidant status in the blood of radiologic technologists and compared these changes to control individuals.

Method: We enrolled 20 healthy radiologic technologists occupationally exposed to radiation (12 subjects from conventional radiography (CR), 4 from computerized tomography (CT) and 4 from interventional radiography (IR)) and 40 age- and gender-matched unexposed control individuals. Exposed subjects had a mean exposure of 2.04 mSv/year. Levels of O₂•- and malondialdehyde (MDA) were measured as an index of oxidative stress along with the examination of the activities of superoxide dismutase (SOD), catalase, and reduced glutathione (GSH).

Results: The results showed that levels of O₂•- and MDA, and the SOD activity in the blood of the exposed subjects in IR and CT were significantly higher than both the CR and control individuals. However, there were no statistically significant differences in the levels of catalase, GSH and ratio of GSH/GSSG between exposed and control individuals.

ABSTRACT #60

Use of a Virtual Dissection Table for Instruction of Health Professions Students
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Human anatomy education plays a vital role in the curriculum of all health care professional programs. Teaching anatomy to health profession students is a challenge for most educational institutions. Gross anatomy labs utilizing cadavers can be expensive and difficult to maintain. The use of anatomy visualization systems for anatomy education is currently being adopted by many academic medical centers. The system of choice in our institution is the Anatomage Virtual Dissection Table©. The Anatomage table allows for visualization of real patient scans or cadavers in a life-size scale. The human anatomy can be illustrated in 3D format or in coronal, axial or sagittal planes. Another unique instructive feature of the Anatomage Table is the ability to use both pre-installed and customized case study files to highlight patient pathology. Research shows that medical education utilizing inquiry-based analysis, such as case studies, offers a unique, but comprehensive method to teach anatomy, pathology, and critical thinking skills1. The purpose of this exhibit will be to highlight how the Anatomage Table can be used to enhance the education of Allied Health Students.

ABSTRACT #61

The Role of the Radiologic Technologist in the Treatment of Ebola Virus Disease
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Ebola Virus Disease (EVD) is a rare, highly infectious and deadly disease caused by a viral infection from the family Filoviridae, of the genus Ebolavirus. The 2014 EVD epidemic has forced medical facilities throughout the United States to place a major emphasis on preparedness training for clinicians who may find themselves caring for patients affected by EVD. Although the role of medical imaging in the diagnosis and treatment of EVD has not clearly been defined, radiologic technologists have played a part in the care of Ebola patients treated within the United States. The purpose of this exhibit is to provide a basic overview of EVD and discuss the role of the radiologic technologist in regard to the diagnosis and management of the disease.
ABSTRACT #62

Putting the Patient First: Best Practices in the Imaging Sciences
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Quality patient care remains at the forefront of healthcare services today. Professionals are entrusted with providing patient care and safety while performing exams that may be diagnostic, therapeutic, or both. The quality of care received is often influenced by the best practices of the professional. When the professional carries out the educational principles learned, adheres to the protocols suggested by governing bodies, functions as part of a healthcare team, is committed to ongoing training and development, and exhibits professionalism...then best practices have been employed and the patient wins in the end.

ABSTRACT #63

Multi-Modality Analysis of Dense Breast Imaging
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Background: The standard for screening breast cancer has been mammography, but due to the attenuation of x-ray in dense breast tissue, atypical breast masses can be overlooked. Other imaging modalities can be useful for producing more sensitive and specific diagnostic images. Ultrasound and magnetic resonance imaging (MRI) avoid the use of radiation on the radiosensitive breast tissue, but can be more expensive and the procedure is more time consuming. Ultrasound and magnetic resonance imaging (MRI) avoid the use of radiation on the radiosensitive breast tissue, but can be more expensive and the procedure is more time consuming. Ultrasound and magnetic resonance imaging (MRI) avoid the use of radiation on the radiosensitive breast tissue, but can be more expensive and the procedure is more time consuming.

Purpose: The purpose of this paper was to answer the research question: Should molecular breast imaging become a normal procedure when screening dense breast?

Method: A search of peer reviewed literature was performed using PubMed and Google Scholar including the keywords: Miraluma, molecular breast imaging, scintimammography, dense breasts, breast cancer.

Discussion: Each modality has its own merits. Mammography is inexpensive and much less time consuming than other modalities, but cannot differentiate a mass from dense tissue. Ultrasound and magnetic resonance imaging (MRI) avoid the use of radiation on the radiosensitive breast tissue, but can be more expensive and the procedure is more time consuming. Ultrasound and magnetic resonance imaging (MRI) avoid the use of radiation on the radiosensitive breast tissue, but can be more expensive and the procedure is more time consuming.

Conclusion: MBI is accurate and can be more sensitive and effective than other imaging modalities for screening and staging dense breast tissue. Combining physiological MBI information with integrated computed tomography (CT) imaging provides additional anatomical information for screening and staging dense breast tissue. It should be considered to become normal practice when cross sectional images of dense breast tissue must be acquired without the cost of an MRI.

Relevance: With breast cancer being one of the most common cancers in women, it is important all women receive the same reliability from their screening method regardless of dense breast tissue.

ABSTRACT #64

The Use of Optical Imaging in Detection and Diagnosis of Breast Cancer
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Optical imaging is a non-invasive imaging technique that uses near infrared light to visualize translucent body anatomy, such as the breast and brain. Optical imaging transmits light through the soft tissue, either the light is absorbed or scattered depending on the characteristics of the breast tissue it comes in contact with. To date, there is not one standard optical imaging system. Currently, there are a combination of three illumination methods, three types of light sources, and four different detectors. Optical imaging does not use ionizing radiation, and has the ability to have better specificity and sensitivity, especially in more dense breast of younger women, than an x-ray mammogram used in routine breast imaging. Optical imaging has unique characteristics to aid in the diagnosis and detection of breast cancer.
breast cancer, both on its own and used with x-ray mammography. Optical imaging has the potential to play a large part in the surgical setting. It would be able to supply surgeons real time images with information about the tumors margins and location. Using optical imaging in tumor resection would make it possible to help surgeons avoid important anatomical structures such as nerves and vessels.