College of Allied Health Professions

Virtual Evidence-Based Healthcare Forum

2020
Due to social distancing in response to COVID-19, the 2020 forum is presented virtually in this booklet. 

Clinical Perfusion Education

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### Annual College of Allied Health Professions Awards

Each spring, in conjunction with the Evidence-Based Healthcare Forum, we honor faculty award recipients. This year, these individuals will be honored at the Annual CAHP Employee Recognition event held in August.
Oxygen Delivery Assessment in a Prescriptive Perfusion Profile: Continuous vs Intermittent Monitoring
Scott O’Neal, Nicholas Anderson, David Holt. Clinical Perfusion Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Background: Acute kidney injury (AKI) occurs in roughly one out of every five patients undergoing open heart surgery in the United States and costs the healthcare industry over a billion dollars per year. There have been numerous links between AKI and oxygen delivery (DO2) including the relationship between nadir DO2 and increased incidence of post-operative AKI. It is imperative to understand the differences between various methods of DO2 monitoring in order to ensure metabolic demands are being met and kidney function is maintained throughout the procedure. Variation in DO2 monitoring has been identified in equipment and circuit design, but the relationship between intermittent and continuous monitoring has not been discussed. The purpose of this study was to compare and evaluate the level of agreement between continuous DO2 monitoring, intermittent DO2 monitoring using CDI values, and intermittent monitoring using Epoxy values to assess potential clinical advantages and disadvantages between the strategies.

Methods: 12 trials were conducted during in-vivo labs while students practiced initiation, maintenance, and termination of cardiopulmonary bypass. The time labs while students practiced initiation, maintenance, and termination of cardiopulmonary bypass. The time

ABSTRACT #1
Cardiovascular

Oxygen Delivery Assessment in a Prescriptive Perfusion Profile: Continuous vs Intermittent Monitoring
Scott O’Neal, Nicholas Anderson, David Holt. Clinical Perfusion Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Background: Acute kidney injury (AKI) occurs in roughly one out of every five patients undergoing open heart surgery in the United States and costs the healthcare industry over a billion dollars per year. There have been numerous links between AKI and oxygen delivery (DO2) including the relationship between nadir DO2 and increased incidence of post-operative AKI. It is imperative to understand the differences between various methods of DO2 monitoring in order to ensure metabolic demands are being met and kidney function is maintained throughout the procedure. Variation in DO2 monitoring has been identified in equipment and circuit design, but the relationship between intermittent and continuous monitoring has not been discussed. The purpose of this study was to compare and evaluate the level of agreement between continuous DO2 monitoring, intermittent DO2 monitoring using CDI values, and intermittent monitoring using Epoxy values to assess potential clinical advantages and disadvantages between the strategies.

Methods: 12 trials were conducted during in-vivo labs while students practiced initiation, maintenance, and termination of cardiopulmonary bypass. The time

ABSTRACT #2
Filtration of Shed Blood in Autotransfusion: Does gross filtration of shed blood impact end-product quality?
Michael Plymell, Jonathan Vidak, Fang Qiu, David Holt. Clinical Perfusion Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Until recently, fine filtration of shed blood has been a standard practice in autotransfusion through modern cell salvage devices. The HEMAsavR blood collection canister has been produced as the first cell salvage reservoir which features a gross 1mm (1000µm) filter rather than conventional 20µm to 120µm filter media. The HEMAsavR’s novel design may yield more red cells recovered with lower potassium and PFHb, with a higher HCT and Hgb. Therefore an equivalency test was performed between three reservoirs featuring different filter pore sizes, analyzing potassium (K+), hematocrit (HCT), hemoglobin (Hgb) and plasma-free hemoglobin (PFHb). Among each group, 20 trials were performed. K+, HCT, Hgb and PFHb samples were collected and analyzed at baseline, pre-wash, post-wash and post-filter after passing through a 40µm transfilter. Additionally post-filter samples from each group were analyzed for schistocytes and spur cells. The mean post-filter K+ percentage removal was 72.7% for the 1000µm group, 70% for the 200µm group and 72.1% for the 25µm group. The mean post-filter PFHb percentage removal was 20% for the 1000µm group, 43.6% for the 200µm group and 19.7% for the 25µm group. The mean post-filter Hgb percentage gain was 108.7% for the 1000µm group, 161.3% for the 200µm group, and 138.9% for the 25µm group. The mean post-filter HCT percentage gain was 61.9% for the 1000µm group, 62.2% for the 200µm group, and 65.2% for the 25µm group. Additionally, in all three samples acquired for RBC morphology scans, no schistocytes were noted and all three of the samples contained fewer than 5-10% of spur cells. With a primary outcome of percentage K+ removal, the HEMAsavR and HEMAsavR+ In Line Filter interventions were found to be equivalent to the Haemonetics (control) group intervention. Thus, the novel design of a gross 1000µm filter was shown to yield an equivalence in K+ removal to that of the more conventional 20-120µm filters used in traditional cell salvage reservoirs.
to decipher the benefits of ultrafiltration during surgery, as well as ensure the same benefits carry into post-operative values.

Methods: A sample size of 109 patients was categorized into three groups: ZBUF with saline, ZBUF with dialysate, and a control group which received no ZBUF. Potassium concentration was documented during preoperative, perioperative, and postoperative time points. Perioperative time points consisted of pre-ZBUF potassium, post-ZBUF potassium, and potassium at termination of surgery. Five time points were documented during the patient's postoperative stay.

Results: By the third postoperative measurement, all patients but one patient treated with saline were within normal K+ range (3.5-5.3 mEq/L). No significant statistical difference was found between patients treated with ZBUF or saline. This may be due to the variability of K+ during the anesthetic period (Lowest p=0.1567 at first postoperative measurement using Fisher's Exact Test). In summary, performance of these two solutions may be shown by overlapping 95% confidence intervals (Second postoperative 95% CI: Dialysate 0.73-0.96 and Saline 0.73-0.98).

Conclusion: Although the null hypothesis was unable to be statistically disproven, striking similarities in performance may promote the use of a 0 mEq/L K+ Dialysate solution should there be any shortage of 8.4% Sodium Bicarbonate solution. This retrospective analysis provides introductory information for a prospective study to eliminate variables such as replacement fluid container sizes, metabolic panel blood draw intervals, and clinical ZBUF triggers.

ABSTRACT #6
Assessing Anticoagulation Effects of Heparin: Hemochron ACT versus Sienco Sonoclot
Katherine Sallet, Right Heart Clinical Perfusion Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Background: Prior to patients being placed on cardiopulmonary bypass, it is necessary to ensure the patients adequately anti-coagulated so blood will not clot in the bypass pump circuit. Heparin in the anticoagulant that is administered to patients prior to being placed on bypass. After heparin administration, an activated clotting time test is run to ensure that patients are adequately anti-coagulated. Activated clotting time (ACT) is a parameter quality control test for monitoring anticoagulation during cardiopulmonary bypass (CPB). The purpose of this study is to compare the Sienco Sonoclot and the Hemochron (cardiac monitoring devices) to provide a comparable alternative, and more complete clinical picture of anticoagulation for patients during open heart surgery.

Methods: A total of 10 subjects were recruited for this research. A 10ml blood sample was drawn from each subject and tested on the Hemochron and Sienco Sonoclot at a baseline condition, low-dose heparin condition and a high-dose heparin condition.

Results: The Sonoclot yields higher ACT values (median = 133.00) in the Low Heparin condition (p = 0.009). The Hemochron also yields higher ACT values (median = 193.25) than the Hemochron in the High Heparin condition (p = 0.10). The clot rate becomes less sensitive to changes in heparin at higher heparin concentrations. From our data, we can see that the slopes greatly decrease between the baseline and the Low Heparin condition and show little change between the Low Heparin condition and the High Heparin condition.

Conclusion: With a P value of 0.52 for the baseline condition, we cannot conclude that a significant difference exists between the Hemochron ACT and Sienco Sonoclot ACT. The sample size will only power the no heparin condition. The heparin conditions would require a larger sample size (due to their greater variability) and so those can be considered secondary analyses, which we can acknowledge, are underpowered.

ABSTRACT #7
Aortic Stent Graft Placement due to Aortic Rupture
Radel Carderivel-Uranga, Cardiovascular Interventional Technology program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

The aorta is the largest artery in the human body and operates under a high-pressure system. Since the aorta receives most of the oxygenated blood that will perfuse most tissues in the body, it is crucial to seek medical help in the event of an emergency involving said structure. Aortic rupture is a condition that typically presents after a motor vehicle accident or other external traumatic stimuli. This tear of the vessel wall will cause the patient to bleed out within minutes if no medical help is available. Each rupture is classified by the severity of the injury. There are treatment options that, after careful considerations, may be employed in order to stop the bleeding. One option would be open surgery, and the other option would be endovascular stent-graft placement. This last one is less risky than open surgery and has faster recovery times. Computed Tomography (CT) is used to check the patency of the newly implanted graft. The purpose of the poster is to create awareness of how the rupture of the aorta can happen and how endovascular surgery and interventional radiology can help fix the problem.

ABSTRACT #8
Treatment of Budd Chiarri with DIPS Procedure
Kiley Gosler, Bailey Schnitzler, Diagnostic Medical Sonography program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Budd Chiarri is a rare disease characterized by thrombus of the hepatic veins. This thrombus impedes the normal venous flow out of the liver which results in portal hypertension. A direct intrahepatic portocaval shunt (DIPS) is a form of treatment for those that have been diagnosed with Budd Chiarri syndrome. Ultrasound imaging is used to diagnose Budd Chiarri by checking the patentcy of the hepatic vasculature and to monitor the patency of a DIPS. The objective of this poster is to provide relevant information on the etiology and diagnosis of Budd Chiarri, the use of a DIPS as treatment for Budd Chiarri, and the use of ultrasound to monitor the shunt’s durability and patency. Additionally, a case study of Budd Chiarri treated with a DIPS will be discussed in detail.

ABSTRACT #9
Echocardiography: An Approach to Right Atrial Myxomas
Brooke Zentz, Victoria Seaman. Diagnostic Medical Sonography program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Right atrial myxomas are a rare finding, accounting for 15-20% of all intracardiac masses. Prior to use of echocardiography, patients were often misdiagnosed preoperatively. With the application of transthoracic echocardiography (TTE) and transesophageal echocardiography (TEE) accuracy in proper diagnosis is now 90% effective. This case study emphasizes the importance of an echocardiographic approach in the diagnosis of nonprimary right atrial myxomas. Compared to other imaging modalities echocardiography is superior in real time assessment of mass dynamics, as well as physiological compromises it may impose.

ABSTRACT #10
Role of MRI in the Assessment of Valvular Heart Disease
Danielle Thelen. Magnetic Resonance Imaging program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

This literature review discusses using cardiac magnetic resonance imaging (MRI) as a tool in diagnosing and creating care plans for patients with heart conditions. Pathologies best visualized using cardiac MRI are mitral and tricuspid regurgitation and myocardial fibrosis. Cardiac MRI can also be used for other cardiovascular diseases, which can provide a complete picture of the heart that may not be achieved with other imaging modalities.

ABSTRACT #11
Balanced vs. Unbalanced Crystalloid Intravenous Fluids for Resuscitation in Sepsis and Septic Shock
Nicole Linton. Division of Physician Assistant Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Sepsis leads to a number of complications and may progress to septic shock, which has a mortality rate of up to 40% (1,4). A mainstay of treatment in sepsis is appropriate fluid resuscitation. The Surviving Sepsis Guidelines were most recently updated in 2016 and recommended the use of crystalloid fluids for fluid resuscitation (4). The two most common crystalloid fluids utilized are normal saline (unbalanced) and Lactated Ringer’s (balanced). Balanced crystalloids are developed to more closely mimic the composition of plasma compared to unbalanced crystalloids. However, there is little evidence supporting the use of a particular fluid in sepsis. The goal of this literature review was to analyze the available research for outcome-based recommendations of the use of balanced or unbalanced crystalloid fluid for fluid resuscitation in sepsis and septic shock. A PubMed search was completed, and three systematic reviews, two analytical reviews, and one randomized trial were analyzed. There was little definitive research, but multiple articles reviewed acknowledged the increased risk of hypernatremia, hyperchloremic metabolic acidosis, and acute kidney injury with the use of normal saline (1). A recent randomized trial found a significant decrease in mortality with the use of Lactated Ringer’s compared to normal saline in patients with sepsis (7). As a result, balanced crystalloids are recommended for fluid resuscitation in sepsis patients with sepsis and septic shock. It is important to understand the high incidence of sepsis and the numerous factors regarding patient outcome. Further research is needed to provide stronger evidence regarding use of balanced crystalloid fluids in sepsis.
ABSTRACT #12
Effect of Physical Therapy on Hospital Readmission for Older Adults with Acute Exacerbation of COPD: A Critical Review
Aaron DeWaard, Kaylee Glover, Amanda Hawkins. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Introduction: Chronic obstructive pulmonary disease (COPD) is a common health problem due to the healthcare system. Cardiorespiratory exercise has been found across a multitude of health conditions to contribute to improved health status and functional ability. Recent studies have reviewed the effect on hospital readmission rates to reflect hospital resource utilization with the combination of exercise therapy in conjunction with standard care. Studies were reviewed to identify if physical therapy combined with usual care for acute exacerbations (AECOPD) would improve patient health status and reduce readmission.

Methods: A search of Medline via PubMED was completed using key terms such as physical therapy, COPD, and hospital readmissions. Peer-reviewed articles were identified and narrowed to three randomized controlled trials for appraisal. Outcome measures for these studies included hospital readmissions, analysis of health care utilization, exercise performance measures, and mortality.

Results: The RCTs compared “usual” medical care to groups receiving early rehabilitation, a self-managed intervention group, or a pulmonary rehabilitation program. The first study found no differences in hospital readmissions between usual care and early rehabilitation groups after twelve weeks of treatment. The second study showed that the early rehabilitation group reported fewer hospital readmissions compared to usual care over twelve months. The third study observed patients in the pulmonary rehabilitation group had improved health status and decreased hospital admissions after three and six months compared to usual care. Although, these results were not sustained after twelve months.

Conclusion: The evidence indicates that patients who received physical therapy interventions had fewer hospital readmissions at twelve months than patients who did not receive physical therapy. When comparing standard physical therapy treatments to an intensive form of physical therapy with aerobic training there were no differences in hospital readmissions at twelve months. This shows the importance of physical therapy with this population, but in order to achieve fewer hospital readmissions, intensive aerobic training after the acute exacerbation of COPD may not be necessary. Rehabilitation interventions for AECOPD are still being studied to identify the most effective duration and intensity of physical therapy combined with standard treatment interventions for long-term health benefits.

Clinical Predictions of Acute Exacerbation of COPD: A Critical Review
Darian Haynes, Caleb Nabower, Jessica Schott. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Introduction/Purpose: Acute re-exacerbation of chronic pulmonary obstructive disorder (AECOPD) has been linked to increased healthcare utilization and therefore increased cost to the patient, as well as decreased overall health of the patient. Much research has been completed to determine factors associated with AECOPD, but little has been researched in order to determine a tool or selection of easily collected factors that can predict re-exacerbation risk. This critical review of the research literature attempts to identify developed objective measures for healthcare professionals to use in order to determine risk of AECOPD.

Methods: PubMed was used for this critical review included Medline via PubMed with MeSH terms: pulmonary disease, chronic obstructive, predictive value, disease progression, pulmonary disease, and chronic obstructive drug therapy. Inclusion criteria consisted of patients who were 45 years or older, publications dated from 2010-2019 and studies written in English. Randomized controlled trials and cohort studies were considered. After reviewing literature using search criteria specific to the topic of AECOPD and risk factors, three articles were selected. These articles were selected based on their research design, relevance to the clinical scenario, inclusion/exclusion criteria, validity, and reproducibility.

Results and Conclusions: These studies developed three sets of criteria that can be used to predict the risk of re-exacerbation. High intensity exercise (HIE) was reported to reduce hospitalization compared to usual care. HIE was also reported to reduce hospitalization compared to usual care. The final article found that at 40% maximum inspiratory pressure (MIP) the IMT program had significant improvements in the level of perceived dyspnea when compared to the sham treatment group.

Conclusion: This study indicates that inspiratory muscle training is an effective treatment option for patients with heart failure who experience dyspnea. More research is needed to help to better utilize inspiratory muscle training in conjunction with traditional cardiac rehabilitation to provide optimal results for patients including improvements in overall functional capacity and quality of life.
at birth. Some common defects that may be identified include septal defects, atrial septal defects, complete orowar ifular vertebral defects. The leg this of the poster was to understand how each imaging technology modality has impacted the ongoing interpretation of these defects. Multiple modalities were examined to get a comprehensive understanding of each one separately and to then further understand how each modality could visualize and help with the interpretation and treatment of the different defects. It was concluded that each modality had a separate role in the interpretation of congenital heart defects, but that the modalities with a large impact included ultrasound, computed tomography, magnetic resonance imaging, and diagnostic imaging.

**ABSTRACT #18**

The Use of Immersive 360-Degree Videos to Induce Different Strategies of Postural Control

Chenzhen Gu, Junhui Chen, Ka-Chun Siu. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Purpose/Hypothesis: Visual perception is a decision-making process of the central nervous system based on recognitions of relative distances and velocities between objects. With the input from visual perception, an appropriate postural control is set to maintain balance. Previous studies on how visual perception affects the postural control were only in one direction. Therefore, this study introduced immersive 360° videos to identify how visual perception affects the postural control in multiple directions. We hypothesized that video with more turns could induce more ML body sway, and video with higher elevation could induce more AP body sway.

Number of Subjects: Nineteen healthy young adults (20-31 years, 12 females).

Materials/Methods: A Wii Board (Nintendo, Redmond, WA) was used to measure body sway. A smart phone placed in a pair of goggles displayed three 360° videos: 1) a static room (baseline); 2) a roller coaster (MA) at a height of 205 feet with two intense hills, several small hills and one hill; 3) and a roller coaster (PA) at a height of 149 feet with one intense hill, one big loop and one quick corkscrew. Three standing trials on the Wii Board and three standing trials on the chair were randomly performed. After each trial, subject rated their fear of falling (FOF) by using visual analog scale. Dependent variables were body sway range (distance in AP and ML directions of the center of pressure trajectory) and FOF grading (0-100). Two-way repeated measures ANOVA were used to examine the interactions between virtual video and visual effect (three videos) on body sway range and FOF.

Results: A significant interaction was found in body sway range in AP (p = 0.02) and ML directions (p = 0.009). The post-hoc comparisons indicated that the body sway range was larger in standing than sitting in both directions (pAP=0.008, pML=0.001). Baseline body sway range in AP direction was smaller than in viewing PA (p = 0.016) but no difference than in viewing PA (p = 0.02). However, in ML direction, baseline body sway range was smaller than in viewing both MA (p = 0.001) and PA (p = 0.02). Both PA and MA induced higher FOF than baseline (p < 0.01), and the FOF was higher in viewing PA than MA (p = 0.016).

Conclusions: Different 360° videos induced different postural control strategies and visual effect (ML and AP directions) in young adults. The visual perception affected more in ML than AP direction. Based on the active control hypothesis, higher attention would be required to maintain balance. Increasing FOF indicated that 360° videos could pose an environment with certain postural threat, and rotational roller coaster induced higher FOF than taller roller coaster.

Clinical Relevance: Since ML direction is more sensitive to postural threat, ML balance training for patients with compromised balance should be emphasized to reduce falls risk. The immersive 360° video could be a useful tool in generating challenging environments for clinical use and research.

**ABSTRACT #19**

The Effect of Planter Vibrotactile Stimulation on the Locomotor Adaptability of Older Adults when Negotiating Multiple Obstacles

Monie Habron, Jung-Hun Chien, Ka-Chun Siu, Weihu Li, Tangdi Li, Muchen Ren. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

The ability to adapt to environmental obstacles is crucial to successful locomotion, and for people who are experiencing decreased sensation for medical reasons, or astronauts in environments of partial weightlessness, the ability to adapt to environmental obstacles could be critical. The locomotor space may hinder successful locomotion. We hypothesized that vibrotactory stimulation on the soles of older adults’ feet would result in an altered strategy for negotiating multiple obstacles when compared to the strategy used without vibrotactory stimulation.

Ten healthy adults (60-70 years old) had ten retro-reflective markers placed on bony landmarks. Participants stepped over two obstacles (10% of participants’ height) placed three steps apart. They completed 5 trials without vibration and 5 trials with vibration at a supra-threshold frequency-amplitude of 250Hz and 175db at normal walking speed. Kinematic data of four gait events were recorded: maximum toe elevations (MTE) of the leading leg and trailing leg when clearing an obstacle, and distance of heel strike and toe-off from the obstacle of the leading leg and trailing leg respectively. The MTE was normalized by the height of participant.

A significant difference between no vibration and supra-threshold vibration for MTE the leading leg over the second obstacle (p = 0.01) was recorded. The mean MTE crossing over the first obstacle was 0.115 cm (95% CI: 0.104-0.125) and the second obstacle was 0.118
Introduction: Older adults are at higher risk for falls and decreased levels of function. Many receive physical therapy services for this reason, but little research has examined the ideal setting for improving function outside of these direct physical therapy services. Common indicators of physical function include, but are not limited to, physical activity level, balance, strength, and cognition. To improve these factors, two common exercise interventions include home-based and community-based exercise programs. The purpose of this critical review is to compare the effects of individual versus group exercise on function for older adults receiving physical therapy.

Methods: The Medline database was searched via PubMed, and results were narrowed to three randomized controlled trials. Primary outcome measures included level of physical activity, using the Community Healthy Activities Model Program for Seniors (CHAMPS); static balance, using the Berg Balance Scale (IBBS); fall risk and mobility, using the Timed Up and Go (TUG); and functional mobility, using the Short Physical Performance Battery (SPPB).

Results: Study findings indicated that both community-based and home-based exercise interventions were beneficial for older adults on measures of function; however, two of the three studies indicated that community-based interventions had a greater effect. One study found that moderate to vigorous physical activity levels significantly increased with both interventions but significantly increased to a greater extent with community-based exercise. Another study found that both exercise intervention groups showed a clinically meaningful change in BBS scores, but the change in the community-based group was significantly greater. The last study showed no difference between home- and group-based exercise programs, as both showed clinically meaningful changes in physical performance and cognition.

Conclusion: For various measures of physical function, both home- and group-based exercise programs are beneficial; however, results showed that the group exercises showed greater outcomes than those in the home exercises. The authors suggest that future research in this area be conducted to determine the most effective approach to improving physical function in older adults.

ABSTRACT #21
Comparison of Individual vs. Group Exercise on Function for Older Adults Discharged from Physical Therapy: A Critical Review
Natalie Kurtenbach, Hanna Slosson, Lauren Tondl. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

The effect of dual-task training on cognitive performance for individuals with cognitive impairments: a critical review
Zhuo Wang, Yuhang Zhang. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Introduction: MCI is recognized as a cognitive decline that is greater than expected in terms of a person’s age and educational level. It is considered a transitional phase between normal cognitive function and dementia. A recent meta-analysis shows a small-to-medium overall effect of physical activity on global cognitive function, indicating that physical exercise interventions can improve cognitive function in patients with dementia. It has been revealed that exercise increases the volume of hippocampus as well as the anterior hippocampus, and it may facilitate neurogenesis and angiogenesis. Several studies have combined physical exercise with cognitive components to enhance the cognitive benefits in a dual-task setting. However, due to the heterogeneity of the study designs, there is no conclusion of its clinical use. The purpose of this critical review is to explore the effect of dual-task training on cognitive performance for individuals with cognitive impairments.

Method: MEDLINE via PubMed database was searched using the search term of “dual-task training” OR “cognitive therapy” OR “memory training” OR “cognitive training” OR “cognitive load training” OR “cognitive components” OR “dual-task training.” Three articles were selected considering the study type (randomized controlled trial), year of publication (within 10 years), language (English), age of study population (45 and over), and species (human).

Results: Three randomized controlled trials examining cognitive functions with dual-task training were reviewed from current available evidences. These studies were critiqued on sample population, intervention, outcome measures, data analysis, internal/external validity, and clinical/biological benefit. All three studies revealed a positive effect of dual-task training on cognitive performance for patients with cognitive impairments.

Conclusion: This study indicated potential use of dual-task training for patients with cognitive impairments. Practitioners should consider severity of cognitive impairments, environment, safety, and other aspects when applying dual-task training.
What to Choose? Physical Therapy or Arthroscopic Impingement: A Critical Review
Logan Engel, Samantha Sattler. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Introduction: Femoroacetabular impingement syndrome, also known as FAI, is a motion-related clinical disorder of the hip diagnosed by symptoms, clinical signs, and imaging. FAI represents symptomatic abnormal contact of the femur and acetabulum. Femoroacetabular impingement syndrome is a relatively new diagnosis, therefore high-quality evidence regarding optimal treatment methods is lacking. Between 2005 and 2013, there has been a 463% increase in arthroscopic hip surgery, but evidence has not yet determined that arthroscopic surgery is the “end-all” treatment. The purpose of this critical review is to compare the outcomes of physical therapy to those of arthroscopic hip surgery for the treatment of FAI in active, young adults.

Methods: A database search of Medline via PubMed we completed. Medical subheading (MeSH) terms used for database search included: femoroacetabular impingement, physical therapy, and arthroscopy. Filters applied to the initial results consisted of: Results by year (2018-2020), Species (Human), Language (English), and Age (Adult: 19+ years). This search yielded 21 articles for potential selection. Three articles were selected based on level of evidence, applicability to the clinical question, and specific interventions.

Results: The first randomized controlled trial (RCT) failed to identify statistically significant differences between groups regarding surgical versus physical therapy on the HOSS and iHOT33. The second RCT determined that both hip arthroscopy and personalized hip therapy improved quality of life as measured by the HOSS-33, but hip arthroscopy led to greater improvement which was clinically significant. In a cohort study the majority of subjects (69.9%) were able to be treated with physical therapy and did not require further surgical intervention.

Conclusion: As the diagnosis of FAI continues to increase in frequency, current research has not yielded substantial evidence to identify the best method of treatment. Overall, arthroscopic surgery and physical therapy have shown clinical benefits, but further investigation is indicated to determine which treatment option should be considered as standard care.

ABSTRACT #26
Comparing Risk of Rupture in Autograft vs Allograft Anterior Cruciate Ligament (ACL) Reconstruction in Adolescent Athletes: A Critical Review
Masie Habron, Aubrey Pedcham. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Introduction/Purpose: An increasing number of adolescent athletes require repair or reconstruction of the anterior cruciate ligament (ACL) due to a result of sport-related injury. Unfortunately, a number of these adolescents later require a revision of the repair due to graft failure. An autograft utilizes the patient’s own tissue to repair the ligament; an allograft is harvested from another organism, typically a cadaver. The purpose of this critical review is to determine whether autograft or allograft results in decreased risk of rupture in the adolescent athlete population.

Methods: A search of Medline via PubMed was conducted using the following search terms: adolescent, teenager, child, youth, athletics, sports, ACL repair, ACL reconstruction, autograft, allograft, graft repair, bone-patellar tendon-bone autograft. A total of 59 articles resulted, from which a meta-analysis, a randomized controlled trial, and a case-control study were selected because they included risk of rupture soon after surgery, as well as the survivability of the rupture several years after the repair.

Results: One study found that allografts are associated with a three-fold risk of re-rupture compared an autograft. Another study found that at two years after the initial surgery, the survivorship of an autograft repair was 96%, compared to the 85% survivorship for an allograft repair. The third study found that the risk for allograft failure increased to 28.96% by 24-48 months after surgery, but the risk remained decreased for 24-48 months after initial surgery with an autograft.

Conclusion:ACL repair for adolescent athletes is increasingly common, and as a result, a generous amount of research has been done to investigate the risk of graft failure immediately after surgery and for several years post-surgery. The literature overwhelmingly indicates that an autograft repair is the better choice for adolescent athletes.

ABSTRACT #27
Effect of Strengthening Intervention on Hip Pain, and Function in Patients with Femoroacetabular Impingement (FAI): A Critical Review
Austin Horan, Jackson Matuellea, Shannon Siert. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Purpose: In the last ten years, new diagnoses of femoroacetabular impingement (FAI) have risen dramatically, which has led to a concurrent rise in surgery to treat symptoms due to FAI. This critical review evaluates recent literature exploring the use of strengthening interventions in physical therapy as a conservative treatment for patients with FAI.

Methods: Medicine via PubMed searched with key words focused on randomized controlled trials and meta analyses published between 2010-2020 that examined strengthening interventions in physical therapy for patients suffering from FAI syndrome. From an initial yield of twenty-two articles, three were selected because they involved targeted strengthening as an intervention and used hip pain and function as outcome measures.

Results: The last study’s results showed that patients’ hip pain and function improved when strengthening was included in their physical therapy treatment. The first study showed that trunk strengthening decreases overactive hip musculature and increases stability of the pelvis, which reduces pain associated with FAI, shown by improvements in HOSS-12 (International Hip Outcome Tool). The second study found that patients with FAI surpassed the minimal clinically important difference (MCID) for change in hip outcome measures when trunk and hip strengthening were included in their treatment compared to when they received manual therapy, stretching, and health education alone. The last study’s results showed that patients receiving hip/hand strengthening, stretching, and manual therapy in combination demonstrated significant improvements in function that exceeded the MCID for change, while the group using self-management techniques and analgesia did not.

Conclusion: Including strengthening in the treatment of FAI syndrome is beneficial, particularly when pairing hip and trunk strengthening together. However, it is unclear what other conservative treatments are best to include in a physical therapy treatment plan for FAI syndrome. Further large scale randomized controlled trials are needed to compare physical therapy interventions and to develop evidence-based strengthening programs and protocols for treating these patients.

ABSTRACT #28
Maisie Habron, Aubrey Pedcham. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Introduction: Down Syndrome (DS) is a genetic disorder occurring in 1 in 800 births in America. It is a common cause of developmental disability including multi-joint laxity, decreased postural control, delayed motor milestone goals achieved, and hypotonia. Children with DS may continue to have gait and posture problems into adolescence. These developmental problems can lead to delayed onset and inability of independent gait at a young age. Conservative interventions may include traditional physical therapy, treadmill training, or a combination of each with the addition of orthoses.

Purpose: The goal of this critical review is to determine if the use of supramalleolar orthoses (SMOs) in children with DS may allow for improvements in postural stability and gait.

Methods: Medicine via PubMed was searched. Key terms include: Physical Therapy AND Down Syndrome; Foot orthotics /Ankle orthotics; Children AND Down syndrome and SMOs; Knock knees and Supramalleolar Orthotics; Down Syndrome AND ankle orthotics. Initial search yielded over 35 total articles. The three articles selected for appraisal directly related to children with Down syndrome who were introduced to foot/ankle orthoses, and direct measurements were taken to indicate improvements in posture, balance, and gait, including the Gross Motor Function Measure (GMFM).

Results: Studies revealed that most children exhibited improvements in gait speed, decreased standing ankle eversion and excessive pronation, as well as an immediate improvement in postural stability when provided SMOs. GMFM scores also improved.

Conclusion: Therefore, improved scores in these outcome measures and foot/ankle measurements due to the use of SMOs could be directly attributed to improved outcomes, gross motor skills and potentially improved quality of life for children with Down syndrome.

ABSTRACT #29
Comparing Risk of Rupture in Autograft vs Allograft Anterior Cruciate Ligament (ACL) Reconstruction: A Critical Review
Abigail Kowal, Elizabeth Foschino. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Methods: A database search of Medline via PubMed we completed. Medical subheading (MeSH) terms used for database search included: femoroacetabular impingement, physical therapy, and arthroscopy. Filters applied to the initial results consisted of: Results by year (2018-2020), Species (Human), Language (English), and Age (Adult: 19+ years). This search yielded 21 articles for potential selection. Three articles were selected based on level of evidence, applicability to the clinical question, and specific interventions.

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In the same session, participants performed 3 sets of 5 bilateral and unilateral squats at self-selected speed and depth. Ankle joint moment included peak external knee flexion moment index (LSI) (uninvolved/uninvolved x 100%) and RTD LSI during the first 200 ms of the MVIC. Biomechanical variables of interest in the involved limb included peak external knee flexion moment (PKFM), the ratio of the external hip flexion moment impulse to external knee flexion moment impulse (hip/knee ratio), and peak knee power.

Results: No significant relationships existed between quadriceps performance and bilateral squat biomechanical variables. The following results pertain to a unilateral squatting test. After controlling for graft type and meniscus repair, RTD LSI (mean: 65.2±21.7%) and PKFM but was not significant. After controlling for graft type and meniscus repair, RTD LSI explained an additional 51.4% of the variance in peak knee power (R2=0.875, p=0.002) and was the only significant predictor in the model (R2=0.753, p=0.001). Similarly, RTD LSI explained an additional 55.0% of the variance in peak knee power (R2=0.910, p<0.001). Graft type (R2=0.384, p=0.024) and RTD LSI (R2=0.763, p=0.001) were significant predictors in the model. The results of this preliminary analysis suggest that quadriiceps performed with measures of knee joint loading during unilateral squats after ACLR.

ABSTRACT #30

Effect of Preoperative Physical Therapy on Recovery Following ACL Reconstruction: A Critical Review

Ryan Kleier, John Rohrich. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Introduction: Anterior cruciate ligament (ACL) injuries are common in the physically active or sport population. ACL reconstruction (ACLR) with postoperative rehabilitation is considered the gold-standard of treatment. The goal after recovering from an ACL tear is to return individuals to their previous level of function. Preoperative physical therapy is found to play a vital role in improving patient outcome measures and function following ACLR. Purpose: This critical review analyzes how preoperative physical therapy affects patient outcomes and knee function following ACL reconstruction. Methods: A database search of Medline via PubMed was conducted using key terms such as ACL reconstruction, preoperative care, and physical therapy modalities. This search yielded 39 articles. Of the 39 articles, 3 cohort studies were chosen based upon their rigor and relevance to the clinical question. Results: All articles demonstrated significant improvement. Anterior cruciate ligament injury is a common condition in which patients received preoperative physical therapy compared to only postoperative therapy after ACLR. One cohort study evaluated the effects of preoperative physical therapy on International Knee Documentation Committee knee form scores (IKDC) and the Knee Injury and Osteoarthritis Outcome Score (KOOS). This study concluded that the preoperative phase group had significantly higher patient-reported function and higher return to sport rates than after ACLR. Another cohort study found that those who underwent preoperative physical therapy had significantly better KOOS scores in all subscales and clinically relevant differences were found in symptoms, sports, and quality of life. The final cohort study evaluated the effect of preoperative quadriceps strength on IKDC-2000 scores six months after ACLR. This study concluded that preoperative quadriceps strength is a significant predictor for IKDC-2000 after ACLR. Conclusion: From our studies we can conclude that warm-up programs focused on neuromuscular training have a protective effect when it comes to lower extremity injury rates in adolescent female athletes. Getting this knowledge into the hands of high school coaches is crucial for the health of young athletes. Implementing a neuromuscular training program as a warm-up prior to practice and competitive games can significantly decrease injury rates, keeping players in the game and off the sideline.

ABSTRACT #31

The Effect of Neuromuscular Injury Prevention Programs on Risk of Knee Injury in Adolescent Female Athletes: A Critical Review

Derek Lonowski, Jillian Lonowski, Allison Mason. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Introduction: It is known that female athletes have a 4 to 6-fold higher risk of anterior cruciate ligament injury than their male counterparts who play the same sports at similar levels. Researchers have identified several non-modifiable factors that contribute to knee injury such as anatomical, hormonal, and genetic components. Conversely, modifiable factors such as biomechanical and neuromuscular components have also been linked to knee injury. It is crucial to identify a preventive exercise program based on these principles that will decrease lower extremity injuries in the adolescent female athletic population. The purpose of this study is to examine the effectiveness of neuromuscular training programs on knee injury rates in female high school basketball players from available research. Method: A review research literature from Medline accessed via PubMed included the search terms “anterior cruciate ligament injury prevention in female adolescents”. Results: Seven articles were appraised, comparing lower extremity injury rates in adolescent female athletes that completed either a neuromuscular training program or sport specific training (control group). Results: The studies reviewed give promising evidence that neuromuscular training can be effective in reducing knee injuries in female high school athletes. The first study found that a 6-week plyometric program was effective in reducing injury rates. Subjects in the second study completed an 8-week program which included six components: warmup, stretching, strengthening, plyometrics, and agility training resulting in improvements in functional gains in injury rates. The final study showed decreased injury rates in athletes who completed an 8-week neuromuscular training program consisting of strengthening, balance, plyometrics, and agility exercises. Conclusion: From our studies we can conclude that a preventive effect when it comes to lower extremity injury rates in adolescent female athletes. Getting this knowledge into the hands of high school coaches is crucial for the health of young athletes. Implementing a neuromuscular training program as a warm-up prior to practice and competitive games can significantly decrease injury rates, keeping players in the game and off the sideline.

ABSTRACT #32

Effect of Sports Specialization on Injury Rate among Youth Athletes

Claudia Rodriguez, Erin May. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Introduction/ Purpose: Sports specialization is a growing trend among many youth athletes. While most adolescents engage in a wide variety of sports and activities, an increased number of youth are specializing in single sports year-round, and young and acute overuse injuries are on the rise. Several studies have been conducted to investigate what aspects of sports specialization, such as volume of activity, training structure, and intensity, can potentially contribute to the increasing risk of injury. The purpose of this review is to explore whether there is a significant variance between single- sport and multi-sport athletes in their rate of injury and to further explain what factors contribute to injury rates among youth athletes.

Methods: Electronic searches were conducted using the search terms, “youth athlete,” “youth sports; “adolescent;” “sports;” “multi-sport;” “single-sport;” “sports specialization” and “injury” in the MEDLINE and CINAHL databases. The initial database was screened, and after further clarifying searches, results were condensed to three articles consisting of a systematic review, a meta-analysis, and a prospective cohort study. Results: Sport-specialized athletes can develop compromised neuromuscular control adaptations during maturation which leads to an increase in acute and chronic injuries when compared to multi-sport athletes who benefit from a diversity of movements with different activities. Early sports specialization and higher degrees of specialization can result in higher rates of the development and onset of overuse injuries that lead to withdrawal from play. Conclusion: Based on the articles, we concluded that early sports specialization is related to an increased risk of injury; however, availability of research in this field is limited by retrospective studies, research methods, age group, and inconsistent definitions for sports specialization. Maturation status can play a role in an athlete’s injury risk profile, but there are currently no set recommendations on age, volume, or intensity of training with sports specialization of multi-sport activities. Further research is needed to shed more light on this growing trend, but a middle ground between training structure design and sports specialization can have beneficial effects for adolescent athletes.

ABSTRACT #33

Medical Imaging in Surgery

Alisa Hrbek. Radiography program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

The purpose for this poster is to inform readers about the quality of medical imaging and the benefits with surgery. The literature review includes a comparison of how the different medical imaging systems work and the way they are used either prior to or during surgery. Medical imaging helps diagnose patient conditions and, in some ways, treat the patient. The review will discuss main points about radiation protection between the technologist, nurses, surgeons, and all other health care professionals who are in surgical rooms being exposed to the radiation. The tools offered by the medical imaging field is what surgeons use to help guide procedures during tough cases. Medical imaging is changing today’s appearance of how trustworthy medical imaging can be and can also benefit more than harm in the process.
Epidemiomas are neoplasms of the central nervous system which arise from the ependymal cells that line the ventricular pathways of cerebrospinal fluid flow. Magnetic resonance imaging (MRI) is an essential imaging modality that can help identify and diagnose this pathology. Through the use of multiple tissue weighting variations, MRI can display anatomy in multiple views allowing radiologists to pinpoint epidymomas better. On a T1-weighted image, fluid will appear dark while fat will be bright. On a T2-weighted image, these are the opposite, so fluid appears bright while fat is dark. Epidymomas often present isointense on both T1 and T2-weighted images to their surrounding structures. However, on T2-weighted images, epidymomas can be surrounded by inflammation (fluid), causing them to be more distinguishable by a radiologist. It is the specialized imaging features of various tissue weightings that enable MRI to be versatile and efficient in diagnosing epidymomas.

**ABSTRACT #34**

**The Role of MRI in Diagnosing Epideymomas**

Robert Cantril. Magnetic Resonance Imaging program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Epidymomas are neoplasms of the central nervous system which arise from the ependymal cells that line the ventricular pathways of cerebrospinal fluid flow. Magnetic resonance imaging (MRI) is an essential imaging modality that can help identify and diagnose this pathology. Through the use of multiple tissue weighting variations, MRI can display anatomy in multiple views allowing radiologists to pinpoint epidymomas better. On a T1-weighted image, fluid will appear dark while fat will be bright. On a T2-weighted image, these are the opposite, so fluid appears bright while fat is dark. Epidymomas often present isointense on both T1 and T2-weighted images to their surrounding structures. However, on T2-weighted images, epidymomas can be surrounded by inflammation (fluid), causing them to be more distinguishable by a radiologist. It is the specialized imaging features of various tissue weightings that enable MRI to be versatile and efficient in diagnosing epidymomas.

**ABSTRACT #35**

**Rest or Not to Rest? Graded Aerobic Exercise Program Compared to Rest on Time to Return to Sport in Post-Concussion Athletes: A Critical Review**

Brett Doughty, Blake Overmiller. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Introduction/Purpose: Sport-related concussions (SRC) are common in the adolescent population, and the paradigm for treatment is shifting. It was previously believed that the best intervention for this injury was cognitive and physical rest until symptoms resolved; however, emerging evidence indicates otherwise. New evidence demonstrates that sub-symptomatic aerobic exercise is safe for acute SRC, additionally, exercise is correlated with earlier symptom relief and earlier return-to-sport. Purpose: The purpose of this critical review is to evaluate the emerging evidence on the effectiveness of early subsymptomatic aerobic exercise in comparison with rest in adolescents following acute SRC.

Method: MEDLINE via PubMed, EBSCo, and Google Scholar were searched for studies that investigated vestibular rehabilitation in treating concussions. Articles that did not include key terms such as vestibular rehabilitation, concuss, and an adolescent population were excluded. A total of 119 articles, a systematic review, randomized controlled trial, and retrospective cohort study were selected for appraisal after a review of titles and abstracts was conducted for the inclusion of vestibular rehabilitation and concussion/concussion symptoms in an adolescent population.

Results: All of the selected studies supported vestibular rehabilitation as a safe and effective option to treat post-concussion symptoms. Vestibular symptoms may arise from peripheral or central vestibular impairments or the cervical spine; treatment should seek to identify the origin of symptoms and treat as needed. Two of the selected articles examined multimodal treatment including both vestibular rehabilitation and manual therapy to treat post-concussion symptoms. One of the articles emphasized individualized vestibular rehabilitation. With conclusion: Vestibular rehabilitation in conjunction with other treatments (such as manual therapy) is an effective treatment for adolescents with post-concussion symptoms and may reduce time to medical clearance to return to sport. Treatment should be individualized to address each patient’s symptoms.

**ABSTRACT #36**

**Effects of Vestibular Rehabilitation in Adolescent Concussion Management: A Critical Review**

Shane Lentz, Benjamin Skiles, Tanner Weibelhaus. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Background and Purpose: As the prevalence of concussions continues to rise in youth sports, treatment of concussions in adolescents continues to evolve. With better identification of patient symptoms, treatment can be more specific and tailored to the individual. In patients with persistent dizziness, headache pain, and postural instability, vestibular rehabilitation may provide a viable option to relieve these post-concussion symptoms. This critical review explores the effect of vestibular rehabilitation in treating sport-related concussion in an effort to decrease time to medical clearance to return to sport.

Methods: The literature databases Medline via PubMed, EBSCo, and Google Scholar were searched for studies that investigated vestibular rehabilitation in treating concussions. Articles that did not include key terms such as vestibular rehabilitation, concussion, and an adolescent population were excluded. A total of 119 articles, a systematic review, randomized controlled trial, and retrospective cohort study were selected for appraisal after a review of titles and abstracts was conducted for the inclusion of vestibular rehabilitation and concussion/concussion symptoms in an adolescent population.

Results: All of the selected studies supported vestibular rehabilitation as a safe and effective option to treat post-concussion symptoms. Vestibular symptoms may arise from peripheral or central vestibular impairments or the cervical spine; treatment should seek to identify the origin of symptoms and treat as needed. Two of the selected articles examined multimodal treatment including both vestibular rehabilitation and manual therapy to treat post-concussion symptoms. One of the articles emphasized individualized vestibular rehabilitation. With conclusion: Vestibular rehabilitation in conjunction with other treatments (such as manual therapy) is an effective treatment for adolescents with post-concussion symptoms and may reduce time to medical clearance to return to sport. Treatment should be individualized to address each patient’s symptoms.

**ABSTRACT #37**

**Effect of Body-Weight Supported Treadmill Training vs Overground Gait Training on Walking Endurance in Adults Post-Stroke: A Critical Review**

Shane Lentz, Benjamin Skiles, Tanner Weibelhaus. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Background: One of the most common goals for adults post-stroke is the recovery of independent ambulation. Over the past three decades, body-weight supported treadmill training has become a frequently used method for gait training in neurorehabilitation.

Purpose: To determine how body-weight supported treadmill training (BWSTT) compares to overground gait training in improving walking endurance.

Methods: The authors searched Medline (via PubMed) for articles related stroke, treadmill training, body-weight support walking, walking endurance, cerebral vascular accident, locomotor training. Subject characteristics were patients older than the age of 18 years, <1 year from stroke, and previous functional independence before the onset of stroke. Three randomized controlled trials were selected for inclusion to the review due to use of body-weight support treadmill training and overground gait training.

Results: Two articles found no difference between BWSTT compared to overground gait training in walking endurance. One article found that BWSTT showed a significant increase in walking endurance when compared to overground gait training in independent ambulators. Across all studies, walking endurance improved from baseline regardless of intervention strategy.

Conclusion: Further research is needed to compare BWSTT vs overground gait training. Due to the lack of conclusive evidence for superiority of one intervention over another, further research is needed to compare BWSTT vs overground gait training.

**ABSTRACT #38**

**Functional electrical stimulation is superior to ankle foot orthosis for gait improvement in patients with foot drop after stroke: a critical review**

Jian Li, Chenfan Gui. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Introduction: Gait impairments are commonly seen in patients with foot drop after stroke. Various treatments of the impairments contributing to gait deviations. Currently, the functional electrical stimulation (FES) and the ankle foot orthosis (AFO) are used to improve foot drop. Many studies have shown that FES may improve walking performance in patients with stroke by improving their gait. The purpose of our critical review was to compare the effect of the FES and AFO on gait improvement in patients with foot drop after stroke.

Methods: The systematic searches were conducted in the databases Medline (via PUBMED) and Embase. Key terms included: stroke, functional electrical stimulation, ankle foot orthosis, and gait. Thirty articles were yielded, and two randomized controlled trials (RCT) studies and one retrospective cohort study were selected for appraisal. All the selected articles compared the effect of FES and AFO on gait in patients with foot drop after stroke. The two RCT studies compared the effect of surface peroneal FES and articulated or non-articulated AFO on gait speed and other lower extremity functions in stroke patients. Both studies showed no significant difference in gait speed improvement between surface FES and AFO. One study found the surface FES can significantly improve walking endurance and stair climbing speed. The retrospective cohort study investigated the effect of implanted peroneal FES and AFO on gait adaptability and showed that the implanted FES had a higher obstacle avoidance success rate than the AFO in chronic stroke patients (≥ 6 months post-stroke). Conclusions: For patients with foot drop after stroke, the surface FES was non-inferior to the FES in improving gait speed, while the implanted FES could have a better effect on gait adaptability than the FES. However, implantable FES is a complicated and costly system that requires surgical procedures and causes more potential complications compared to AFO.

**ABSTRACT #39**

**Role of Physical Activity Interventions on Endurance in Children with Down Syndrome: A Critical Review**

Anh Nguyen, Casey Wisnieski. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Background: Down Syndrome (DS) is attributed to a chromosomal abnormality (trisomy 21) and is characterized by severe intellectual disability, health and developmental disorders, and musculoskeletal impairments including orthopedic and cardiovascular impairments. These impairments among others contribute to limitations in activities and participation.
in school-aged children. There is substantial research in studying the effects of strength training in children with DS, however, it is not studying the implications to improve endurance in the population. This critical review explores physical activity interventions and their effects on endurance of children with Down syndrome so that they are not limited in their activity and social interactions.

Methods: The literature database MEDLINE was searched using the key terms (Down Syndrome or Intellectual Disability) and Children and Exercise Therapy, and Physical Fitness. The initial search yielded 7 results, and articles that investigated the role of physical activity interventions on endurance in children with DS were prioritized. Review of the qualifying articles led to the appraisal of two randomized controlled trials (RCT) and one case study. All three articles selected assessed the effects of physical activity interventions on endurance in children with either DS or intellectual disability.

Results: One RCT found that while aerobic training with a rowing ergometer could be effective in improving endurance, the improvements were small and may not translate to clinically meaningful improvements. The case study concluded that an exercise program combining aerobic and strength training was valuable in achieving cardiovascular benefits. The other RCT found that using a lower extremity endurance exercise for a 20-repetition maximal contraction, followed by 24-25 minutes of cardiorespiratory endurance exercise resulted in increased patient confidence compared with 10-repetition max followed by 26-27 minutes of cardiorespiratory externally endurance. Conclusion: In order to improve the endurance and cardiorespiratory fitness of children with Down syndrome, one must implement exercises that focus on improving strength and endurance of lower limb musculature in combination with cardiorespiratory endurance training.

ABSTRACT #40
The Effects of Strength Training on Gait Speed in Children with Spastic Cerebral Palsy
Hannah Ockinga, Turner MacPhee. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Introduction: Cerebral palsy is a permanent, non-progressive movement disorder that is caused by a disturbance to the fetus or infant brain. This disorder affects postural control, balance, coordination, motor planning, and muscle strength, which can cause severe activity limitations that can be hard to do daily activities or even walk. As the child grows, he/she likely receive physical therapy intervention several times to address this activity limitation. Children with cerebral palsy often receive physical therapy because there is an increasing interest on the effects of strength training on gait mechanics. Currently, strength training is used to address muscle weaknesses and imbalances, but it is unclear whether the improvements in muscle strength translate to improved gait mechanics. The purpose of this critical review, therefore, is to examine whether strength training improves gait speed in children with spastic cerebral palsy more than traditional physical therapy consisting of passive range of motion, positioning, balance training, functional training, and neurodevelopmental treatment.

Methods: Medline (via PubMed) was searched to identify articles comparing strength-based exercise programs and traditional passive physical therapy for children with spastic cerebral palsy when attempting to improve gait speed. Studies were limited to the past 15 years of publication and involved participants under the age of 18 years, prioritized with spastic diplegic cerebral palsy. The initial search parameters yielded 61 articles, and 3 randomized control trials were selected.

Results: The studies showed that there was no statistical difference in gait speed, measured by the 10-meter walk test and three-dimensional gait analysis, in children with spastic cerebral palsy who completed a strength-based exercise program compared to traditional physical therapy program. Two studies showed some increases in muscle strength following the strengthening program, but this did not correlate to increased gait speed.

Conclusion: Strength training did not show greater improvements in gait speed compared to traditional physical therapy. Many studies stated that to improve gait speed one must work on gait training rather than strength training because play a larger role in the gait difficulties. This information can be used to help guide intervention strategies used with cerebral palsy.

ABSTRACT #41
Declined Treadmill Walking Eliminates Asymmetric Walking Pattern in Healthy Young Adults
Yuhang Zhang, Ka-Chun Siu, Jung Hung Chien. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Materials and Methods: Six conditions (walking on the level treadmill, 15% inclined treadmill, 15% declined treadmill, 15% inclined non-dominant leg, 15% inclined dominant leg) were randomly assigned to participants. A motion capture system and reflective markers were used to collect data. The markers were placed on the heel and toe of both legs to measure step length and step height. These were measured to determine if there was a change in the asymmetric walking pattern.

Results: The studies showed that there was no statistical difference in gait speed, measured by the 10-meter walk test and three-dimensional gait analysis, in children with spastic cerebral palsy who completed a strength-based exercise program compared to traditional physical therapy program. Two studies showed some increases in muscle strength following the strengthening program, but this did not correlate to increased gait speed.

Conclusion: Strength training did not show greater improvements in gait speed compared to traditional physical therapy. Many studies stated that to improve gait speed one must work on gait training rather than strength training because play a larger role in the gait difficulties. This information can be used to help guide intervention strategies used with cerebral palsy.

ABSTRACT #42
Diagnosing Spina Bifida with Ultrasound
Erika Smith. Radiography program, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Materials and Methods: Six conditions (walking on the level treadmill, 15% inclined treadmill, 15% declined treadmill, 15% inclined non-dominant leg, 15% inclined dominant leg) were randomly assigned to participants. A motion capture system and reflective markers were used to collect data. The markers were placed on the heel and toe of both legs to measure step length and step height. These were measured to determine if there was a change in the asymmetric walking pattern.

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Erika Smith. Radiography program, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

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expected that 90% of the FLUS/AUS diagnoses will lead to suspicious Afirma results.

**ABSTRACT #44**

Disparities Between Rapid On-Site and Final Cytologic Interpretation: Experience from a Large Academic Center to Highlight Diagnostic Challenges

Nisha Edwin. Cytotechnology program, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Allied Health Professions, University of Nebraska Medical Center, Satellite Site: Massachusetts General Hospital, Boston, MA

Introduction: Rapid On-Site Evaluations (ROSE) is a service provided by cytotechnologists during minor procedures and radiologic imaging to provide the clinician with a preliminary diagnosis and determination of adequate lesion sampling. Since the origination of the Fine Needle Aspiration procedure there have been new advancements in the technique to ensure adequate sampling of the lesion. In this study, ROSE were assessed for five consecutive years beginning January 2014 and ending in December 2018. Interpretations for several different body sites were assessed to determine possible disparities between the ROSE and final diagnosis.

Methods: The study included a total of 6,145 cases and utilized the following categories to determine if the case was discrepant: rapid overcall, under call, insufficient cells for accurate diagnosis or mismatch due to wrong malignancy. Results: The site with the highest rate of discrepancy was lung and in 2014 was at 2.4% and tended to decrease to a rate of 0.22% in 2018. The study received the second highest rate of discrepancy with an unsteady decrease from 1.2% to 0.4% over the five years. Of all the cases and body sites, rapid under call was the most commonly found discrepancy.

Conclusions: Immunologic stains and ancillary testing procedures are often performed on the remaining slides of each FNA procedure. Additional tests help to make a case for the final diagnosis given, and are not available to pathologists and cytotechnologists while on a ROSE. For this reason, it can be determined that although ROSE are helpful in determining whether the lesion was accurately sampled and can often unveil viable preliminary diagnoses, the final diagnosis is still the most accurate and true representation of the case.

**ABSTRACT #45**

Brachytherapy and Its Use in Treating Uveal Melanomas

Katelyn Backhaus. Radiography program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Brachytherapy is an up and coming method used to treat ocular melanoma. Radiation therapy is a type of treatment that makes use of ionizing radiation to kill cancer cells and destroy normal tissue. Brachytherapy is a type of radiation therapy that delivers a high dose concentration of radiation to a small area of the body that requires it. Brachytherapy is frequently used in the treatment of ocular melanoma.

**ABSTRACT #46**

Small Cell Lung Cancer

Michaela McClellen. Radiography program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Small cell lung cancer (SCLC) is an uncommon form of lung cancer and makes up only 10-15% of the diagnoses. It is primarily caused by smoking but could be caused by other factors as well. Medical imaging is used to detect, help diagnose, and stage this form of lung cancer. In most cases, the cancer metastasizes, or spreads, to other parts of the body. This makes it difficult to cure even with multiple techniques of treatment like surgery or chemotherapy. Radiation therapy is used as a form of treatment and can be either curative or palliative care. New studies are being done to make SCLC an easier cancer to detect and treat. This literature review will explain the causes, signs and symptoms, methods of detection, staging, and treatment. It will also show the way medical imaging influences detection, staging and treatment of SCLC.

**ABSTRACT #47**

What is Osteosarcoma?

Taylor Sutton. Radiography program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

This poster reviews the background, staging process, different imaging modalities associated with diagnosis, treatment, and prognosis of osteosarcoma. It reviews the origins, symptoms, and causes seen in those diagnosed with osteosarcoma. Staging of osteosarcoma is explained using the Enneking surgical staging system. This is based on if they are high or low grade, where they are located in relation to the affected bone, and if it has metastasized or not. Diagnostic imaging is then used in the diagnosis of osteosarcoma. The most commonly used modalities include different modalities of radiographs (X-rays), magnetic resonance imaging (MRI), and computed tomography (CT). Treatment options of osteosarcoma include surgery paired with chemotherapy and/or radiation therapy. Amputation or limb-salvaging are the common surgical procedures, with the latter leading to a more favorable prognosis. Survival rates seen amongst those diagnosed with osteosarcoma depend on the staging of cancer, gender, and age, as well as many other factors.

**ABSTRACT #48**

Lung Toxicities in Patients Undergoing Total Body Irradiation

Paige Bishop, Rachel Sloup. Radiation Therapy program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Total body irradiation (TBI) is a form of radiotherapy that is often used as part of the preparative regimen for hematopoietic stem cell transplantation. TBI involves irradiation of the entire body, and in doing so it suppresses the immune system, irradiates residual cancer cells, and increases the chances of a successful transplant. With the advantages of total body irradiation there also comes several disadvantages. For patients, irradiation to the whole body raises concerns. Of these concerns, lung toxicities are one of the most major and life threatening. Radiation injuries and lung toxicities are due to the free radicals it creates and destroys normal tissue. According to an article by Chris R Kelsey, several pulmonary toxicities from today body irradiation include interstitial pneumonitis, infectious pneumonia, diffuse alveolar hemorrhage, and respiratory failure requiring ventilatory support. About 25-80% of patient undergoing today body irradiation will be diagnosed with a lung toxicity after treatment. With there being so many different protocols for total body irradiation, studies are being done to find which is most superior.

**ABSTRACT #49**

The Effects of Brachytherapy on Overall Survival While Maintaining an Acceptable Toxicity Profile

Alessandra Netticci. Radiation Therapy program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

This study aimed to assess the potential benefits of brachytherapy in terms of overall survival while maintaining an acceptable toxicity profile.

**ABSTRACT #50**

Management and Treatment Options for Advanced Stage Lung Cancers

Cory Keath, Logan Teten. Radiation Therapy program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Lung cancer is the most common malignancy worldwide and is the most common cause of oncologic death. Within the United States, it is the second most common cancer to prostate cancer in men and breast cancer in women. The 5-year relative survival for regional and distant disease is 33% and 6% respectively. Due to the severity and prevalence of the disease, treatment methods are continuously scrutinized and heavily researched to improve survival rates and reduce treatment-related toxicities. Stereotactic body radiation therapy (SBRT) use has increased because high doses are reached in only 1-5 treatments with great dose conformation. Respiratory gating and advanced immobilization such as abdominal compression devices have also shown promise in reducing both inter- and intrafraction motion. Treatment methods continue to advance and improve lung cancer survival.
ABSTRACT #51
The Advantages of MRI-based Planning for Proton Therapy Treatment
Cacey Vavra, Kathleen Johannesmeyer. Radiation Therapy program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Magnetic resonance imaging (MRI) has recently been implemented into the standard treatment practice of x-ray beam therapy (IMRT). The concept of MRI-based planning for cancer treatment is not a new method in radiation oncology. Recent studies have shown the benefits of using MRI planning for proton beam therapy, which together can become superior cancer treatment. These two expansive modalities have been collectively called MRI-guided proton beam therapy (MRPT) (1). This is beneficial because it will guide cancer treatment into a bright and healthy future.

Benefits of MRI-based planning includes superior soft tissue contrast and increased identification of anatomical structures (2). This improved visualization is vital for precise radiation treatment. The role of MRI in radiation oncology is a promising development for the future of cancer patients. Proton therapy is regarded as the superior radiation treatment for certain cancers. This modality gives optimal delivery of high doses to the tumor area with high normal tissue sparing compared to conventional radiation therapy (3). This has interested oncologists and clinical studies continue to grow.

While research is still being done to integrate MRI into the realm of proton therapy practice, and the future for MRI-based planning is bright.

ABSTRACT #52
A Retrospective Analysis of Pap Smears of Transgender Men
Sarah Johnson, Cytotechnology program, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Introduction: A current diagnostic problem in cytology is how to adequately screen Pap Smears from transgender men. Many transgender men take androgens to replace hormones, causing a lack of cell proliferation. The cells appear immature on a smear and are referred to as atrophic. As these cells are harder to diagnose, these patients have higher rates of smears that are called unsatisfactory or as a high-grade intraepithelial lesion (HSIL). The objective of this study was to gather information on the findings observed in the cytology samples of Pap Smears of transgender men.

Methods: This study retrospectively examined Pap smears from transgender male patients from Nebraska Medicine. There were twelve cases from the past three years that were analyzed for this study. The diagnoses and prior history were obtained using the CoPath laboratory computer system and recorded in a spreadsheet. It was determined that the majority of cases were diagnosed as negative or negative with atrophy (83%), some with a mention of cellularinity (16%). only one case was called as unsatisfactory and one as reactive. The slides were examined under a microscope and the observations entered into the spreadsheet.

Results: It was determined that normal atrophic cells presented singly or in sheets or groups. Many of the smears diagnosed as atrophic had a few mature cells admixed with the atrophic cells. These cells were larger than the atrophic cells and some stained eosinophilic (pink). The reactive cells had higher nuclear-to-cyttoplasmic (NC) ratios, relatively smooth nuclear borders, darker chromatin, and were more cohesive. These reactive groups were occasionally observed in slides that were not diagnosed as reactive. Conclusions: While the lower rates of unsatisfactory and HSIL cells were not consistent with current research, the types of cells observed in the smear were similar to those reported in current studies. The lack of atypical cases may be due to the small sample size of this study; however, some cases had a few reactive groups and were not diagnosed as reactive.

ABSTRACT #53
Accident Prevention in the MRI Suite
Ryan Teten. Magnetic Resonance Imaging program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Technology is rapidly advancing, especially over the past few decades. Magnetic resonance imaging (MRI) is no exception. During this time, MRI scanners have increased capabilities, more efficient, and ultimately safer for patients, yet more injuries and accidents that have occurred in MRI than ever before. Why is it that this is happening? Research has shown that it is not MRI itself that is becoming less safe, but a combination of issues that when put together create this problem. The doctors ordering these exams, technologists that perform these scans, the education technologists are receiving before being employed to scan on their institution’s systems, and the increased number of clinics where patients can have a scan done, and the extreme increase in workload that MRI has seen in recent years are all contributing factors. All of these issues can be fixed given the right training, better communication, being more attentive to the patient, and slowing down to make sure they are doing our job to the best of their capabilities.

ABSTRACT #54
The Consequences of Fluoroquinolones in the Treatment of Uncomplicated UTIs
Megan Holmes. Division of Physician Assistant Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Acute, uncomplicated urinary tract infections (UTIs) are one of the most common bacterial infections encountered in clinical practice. Recommendations from clinical guidelines and experts indicate Fluoroquinolones as antimicrobial agents to avoid for the management of uncomplicated UTIs. However, Fluoroquinolones are commonly prescribed as first-line therapy when other, more narrow spectrum antibiotics should be utilized. It is important to determine why specific antimicrobials are indicated over others for the empiric treatment of uncomplicated UTIs. The goal of this literature review is to determine if Fluoroquinolones should be used to treat uncomplicated UTIs. A systematic review, systematic review with meta-analysis, and two cohort studies were evaluated. Each study specified systemic Fluoroquinolones should be avoided due to serious adverse side effects that are potentially life-threatening or debilitating long-term. Additionally, limiting the empiric use of Fluoroquinolones minimizes patient morbidity and mortality associated with resistant UTI infections. Future directions should focus on the development of less costly, well-tolerated antibiotics that will guide cancer treatment into a bright and healthy future.

ABSTRACT #55
Use of External Female Catheter as an Alternative to Indwelling Catheters to Reduce Risk of Catheter-Associated Urinary Tract Infection
Anthony Marchio, Wayne Mathews. Division of Physician Assistant Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

The external female catheter is thought to have potential as a replacement for the indwelling catheter that will reduce catheter-associated urinary tract infections (CAUTI) and incontinence-associated dermatitis (IAD). The goals of this literature review are to collect existing evidence regarding the external female catheter and compare it to existing data regarding the best means for reducing CAUTI and the prevalence of incontinence and IAD in the inpatient setting. It is clear in the wealth of evidence that the best means for CAUTI reduction is the removal of the indwelling catheter early and therefore we may infer that the use of the external catheter may be used to reduce utilization of the indwelling catheter. Although the evidence shows a prevalence of incontinence and IAD,
there is a significant lack of evidence testing the role of the
indwelling catheter in relation to this outcome. Although
it shows promise, the randomized control trials are
needed to look at the external catheter’s direct effects on
these factors.

ABSTRACT #58
Sports Participation Improves Quality of Life in Children with Disabilities
McKenzie Dolph, Livia Dwornicki, Ariana Koch. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Introduction: Sports participation has been shown to improve quality of life (QoL) ratings for typically developing children in physical, social, and psychological domains. However, few studies have addressed the impact of sports participation on children with disabilities, in particular cerebral palsy (CP). The goal of this critical appraisal was to determine if sports participation improves quality of life in children with cerebral palsy. Method: For the critical appraisal, searches were conducted on the NCBI PubMed, Springer Protocols, and Google Scholar databases. The search terms included: Quality of Life/ Social, Cognitive/Cognition, Disability/Cerebral Palsy, Physical Activity/Sports, Children/Adolescents. Inclusion criteria were studies with adolescents under 18 years with CP. Exclusion criteria were studies published before 2010 and not available in English. The search yielded five results. One study was excluded due to the absence of measures for a diagnosis, and another because it analyzed cognition rather than QoL.

Results: The articles assessed QoL through self-reported measures, and each found a strong association between sports participation and high ratings of QoL. Another article reported a positive association between sports participation and high ratings of QoL for children with disabilities, especially physical activity for their children with disabilities, especially cerebral palsy. In summary, the findings of this critical appraisal include (i) the absence of randomized control trials on this topic and (ii) the lack of studies available focused solely on CP. In summary, the findings of this appraisal strongly support sports as a potential medium to improve quality of life for children with cerebral palsy.

ABSTRACT #59
The effect of inclination on lower extremity inter-joint coordination during treadmill walking
Jani Lu, Jung Hung Chien, Ka-Chun Siu. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Background: Inclined walking is a challenging daily task in comparison with level walking. It requires specific control from central nervous system and exhibits increases in muscle activities and alternations of joint kinematics in lower extremities. However, the knowledge of the inclination effect on inter-joint coordination is limited. Previous studies have shown the benefits of investigating inter-joint coordination in patients with Parkinson’s disease, low back pain, and hemiplegic gait. This study aimed to evaluate such coordination in healthy young adults during inclined walking.

Methods: Nineteen healthy young adults were recruited. Subjects walked at their comfortable speeds for 2 minutes in four inclined walking conditions (0%, 5%, 10%, and 15% grade). Three-dimensional kinematics data were collected at 100 Hz by an eight-camera Qualisys motion capture system. To calculate the inter-joint coordination, the phase portraits were created by plotting the specific segment’s angular position versus its angular velocity. The trajectories of these phase portraits were converted from Cartesian coordination to polar coordination to get phase angles. These phase angles were used to calculate the continuous relative phase (CRP) dynamics during a gait cycle between two segments which contained the same joint center. A mean absolute value of the ensemble CRP values (MARP) was calculated by averaging the absolute values of all points of the entire ensemble curve. Low MARP indicated that two segments approached to absolute values of all points of the entire ensemble curve.

Results: The inter-joint coordination changed to a different pattern during inclined walking.

Conclusions: Inclined walking exhibited significant changes in inter-joint coordination compared to level walking. These findings could provide a better understanding of the mechanisms underlying the coordination during changes in incline.

ABSTRACT #60
CT Lung Cancer
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Computed tomography (CT) has been a great asset to the imaging world. CT scans have been successful at diagnosing lung cancer. CT scans are more accurate. There are risks and benefits, but most physicians would say the benefits outweigh the risks. CT scans have reduced the morality rate a lung cancer. PET and CT combined can be beneficial to the patients at diagnosing, measuring, and treating the cancer. In recent years, e-cigarettes have negatively affected the lungs. The problem of e-cigarettes will only get worse and physicians are having a hard time diagnosing that issue. The purpose of this literature review is to determine if CT scans improve the findings of lung cancers.

ABSTRACT #61
Contrast-Induced Acute Kidney Injury
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Coronary and vascular intervention examinations depend on iodinated contrast media in order to perform the exam. Eventually the contrast used in these examinations will find its way into the kidneys. For a certain group of people this will cause contrast-induced acute kidney injury. Contrast-induced acute kidney injury is an unfortunate complication from these exams that can cause permanent injury to the kidneys or death. This review aims to explore the pathophysiology, risks, consequences, impact and preventative measures that have been researched and currently being developed.

ABSTRACT #62
The Overutilization of Medical Imaging Procedures
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Over the years the cost of healthcare in the United States has skyrocketed at an alarming rate, twice the general rate of inflation. Healthcare costs are becoming nonsensical for both public and private parties as a sustainable price range is becoming nearly impossible. Medical technology has made rapid advancements in recent years, these advances are one of the primary sources of the upsurge in healthcare costs and radiation exposure. These advances in technology result in influx of imaging exams and the expenditures for them. Over the past decade, imaging services have grown at about twice the rate compared to other technologies in healthcare. This expeditious growth has resulted in spending that has surpassed that of other services covered by Medicare and private insurers. While the use of advanced imaging methods such as computed tomography (CT), magnetic resonance imaging (MRI), and positron emission tomography (PET) are making diagnoses more accurate and less invasive they are also becoming overutilized resulting in increased radiation doses and increased medical bills. Aside from healthcare costs, unnecessary imaging also increases patient radiation dose as well as the average population dose resulting from medical exposures.

PROFESSIONAL PRACTICE AND EDUCATION

ABSTRACT #63
Effects of Oxygenator Change-Out Simulations on Patient Safety
Mohammed Mohamed,* Jake Shore, David Holt. Clinical Perfusion Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE.

Background: Oxygenators have been a staple of life saving cardiac surgery procedures since the 1950s. Through the use of simulation, learners are able to practice the relevant critical actions and concepts involved in safe changing of an oxygenator.

Methods: 10 students from the University of Nebraska Medical Center Clinical Perfusion Education program were recruited to participate in this study. When each student arrived, they were given a brief, narrative description of the case, information on the simulated patient’s initial presentation, learning objectives to be covered during the simulation, and a summary of critical actions to be performed by the learner. Each student participated in three timed trials to change out an oxygenator. During the first trial, the student was asked to change-out the oxygenator without the use of a written protocol and without any directions from the facilitators. Following the first trial, the facilitators discussed areas of
and large hypochromatic nuclei. Some lipophages were examined under a microscope and the observations were categorized as a 4, with greater than 25% of the macrophages staining positive. An Oil Red O stain was categorized as a 4, with greater than 25% of the macrophages staining positive. The diagnosis was narrowed down by cases that both used vape products and had a history of vaping from Nebraska Medicine. Search was conducted using CoPath, lipid pneumonia who had a history of vaping from the cytology specimens of patients diagnosed with Oil Red O, leading some authors to suggest using it as a symptomatic test, but all have lipophages testing positive for changes or foam as Case 1 but are still distinctive with Papanicolaou stain, as the lipid is more prominent in the histiocytes and stained green. Chronic inflammation was also present, and a few stripped histiocyte nuclei. Conclusion: Both cases were consistent with existing literature. Because some patients did not have complete history or were not explicitly listed as using vape products, further research ought to be conducted.

ABSTRACT #65

The Use of Phantoms in Sonography Education

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Imaging phantoms are specially designed educational tools which simulate normal anatomy and pathologies. Phantoms have been utilized in sonography education for many years. There are many benefits to using phantoms in ultrasound education. Phantoms provide sonography students with hands-on opportunities to practice exams in a controlled lab setting and without risk to patient safety. Phantoms provide the opportunity for students to practice scanning techniques and review exam protocols for these sensitive exams. Students may also use advanced phantoms to practice the techniques and scanning skills needed for needle biopsy guidance, without risk to patient safety. The use of phantoms in sonography education can lead to increased student confidence and patient satisfaction in the clinical setting. Ultrasound phantoms created by commercial vendors are costly expenses for sonography education programs. Homemade phantoms, created with household items, offer a cost-effective alternative to manufactured phantoms. This research seeks to compare the physical characteristics of homemade phantoms to commercial phantoms and to demonstrate how similar they can be. To determine the feasibility of using homemade phantoms, the study included a survey of ultrasound students at the University of Nebraska Medical Center. The survey was distributed to all ultrasound students and asked for their opinions on the use of homemade phantoms. The results of the survey showed that the students preferred the use of homemade phantoms over commercial phantoms, with 75% of the students indicating that they would like to use homemade phantoms instead of commercial phantoms. The study also demonstrated that homemade phantoms can be effectively used in sonography education.

ABSTRACT #66

Imaging Prostate Cancer

Patrick O’Donnell. Magnetic Resonance Imaging program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Prostate health is something every man should keep in mind when they are approaching their fifties, as prostate cancer is one of the more common forms of cancer found in men. Early detection is key to survival. Prostate screening usually begins in a man’s early to mid-fifties when there is often a change in specific antigen (PSA) blood test and a digital rectal exam. Ultrasound or magnetic resonance imaging (MRI) may be ordered to aid in diagnosis. MRI will be the focus of this poster. The methods used to obtain prostate images may vary between facilities or radiologists’ preferences. Body coils, endorectal coils, and endorectal coils with biopsies capabilities are discussed, including the positives and negatives to each method. MRIs may be ordered with varying methods of obtaining prostate imaging, and these methods vary in patient comfort level and image quality.

ABSTRACT #67

Improving Utilization of Telemedicine in Nebraska

Brittney Amsley, Assistant Director of Physician Assistant Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Telemedicine is a promising solution to the healthcare shortage across Nebraska. There is little research investigating specific attitudes and problems regarding the implementation of telemedicine. This research surveyed students and healthcare professionals to identify current attitudes towards telemedicine and evaluate different avenues in which telemedicine can be used for the benefit of healthcare professionals in Nebraska. To explore current views on telemedicine, researchers targeted healthcare professionals in Nebraska as the focus of this study. Methods of our study included both qualitative and quantitative data. A twenty-question anonymous survey was sent out to 107 health care professionals within the UNMC Physician Assistant preceptor list. With 76 responses collected, the 89% response rate was significant sample size to show meaningful relationships and data regarding telemedicine in Nebraska. Overall, the survey provided information on general attitudes towards telemedicine as well as the barriers that prevent healthcare professionals from using it in their practice. Telemedicine use in Nebraska has been sparse with only 40% of participants currently using it in their practice. Healthcare professionals indicated that they would like to increase the utilization of telemedicine in their organization. Collectively, respondents agreed that telemedicine is a strong adjunct to practice, improves access to new patients, improves efficiency and continuity of care, and that telemedicine fills an essential provider gap. Nearly 80% of students and providers indicated that any programs which support telemedicine education and use. The most significant barrier, which was determined by a score ranking system, was lack of reimbursement. The second most significant barrier was lack of awareness. Our findings indicate that there are suboptimal efforts and resources on telemedicine education and implementation to increase provider comfort with utilization and application in practice, and awareness of these programs need to be placed at a priority.
rehabilitation therapy staff identified as instructors believed the training was important and helped both professions have similar understanding of safe patient mobilization.

Conclusions: Perceptions of training on safe patient mobilization were largely positive in a sample of nursing and rehabilitation therapy staff in rural hospitals. Nursing staff place higher importance on training and have increased confidence when rehabilitation therapy staff provide instruction.

ABSTRACT #69
Misdiagnosing of Soft Tissue Sarcomas
Georgianna Diley. Radiography program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

The lack of information on soft tissue sarcomas is a reason that a misdiagnoses may occur. Soft tissue sarcomas may occur in any of the soft tissue of the body and present as a lump. Often this lump is misdiagnosed as a cyst or a lipoma, leaving a malignant cancer to further advance in the body. Imaging and pathology is important to fully understand what the neoplasm may be so that proper treatment for the patient may occur. Once the cancer is accurately diagnosed, treatment can start. The most common form of treatment is surgery to remove the cancer cells, but radiation therapy and chemotheraphy may be used as well. This paper will discuss what soft tissue sarcomas are, the causes, and the role of imaging in diagnosing these.

ABSTRACT #70
Ultrasound-Guided Needle-Based Procedures
Hannah Jasa. Radiography program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

The use of ultrasound across the medical field is one that is becoming increasingly diversified, especially in equivalence with needle-based procedures. As a result, the procedures offered with ultrasound continually evolves, from diagnostic to therapeutic and several facets in between. Specific needle-based procedures involving ultrasound currently include: needle biopsies, aspirations, sports medicine and orthopedics, and various endoscopic and interventional exams. With ultrasound frequently utilized, more and more individuals receive training on how to properly and effectively use the equipment, learn the fundamentals of ultrasound, and understand precisely what is being evaluated.

ABSTRACT #71
Anxiety Associated with Medical Imaging and Coping Mechanisms
Gabriella Marco. Radiography program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Anxiety associated with medical imaging is a huge issue that can be solved with effective coping mechanisms. The purpose of this poster is to explore what anxiety is and how it can have a negative impact on medical imaging procedures. There are many factors that contribute to medical anxiety, and research shows that a vast majority of patients experience anxiety for many different reasons. Some of those reasons include parent-child separation, unknown diagnosis, claustrophobia, and symptoms. In response to anxiety associated with medical imaging, there are a variety of coping mechanism to help provide the radiologists with quality images. Some of the coping mechanisms include medications, proper communication about the exam, and virtual reality to help minimize anxiety.

ABSTRACT #72
Application of Contrast-Enhanced Ultrasound in Modern Diagnostic Imaging
Monica Meier. Radiography program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

This poster will examine various aspects of contrast-enhanced ultrasound and its clinical application in modern diagnostic imaging. Contrast-enhanced ultrasound is a relatively new diagnostic imaging method, which functions by means of a unique microbubble composition. This review will focus on a handful of the most relevant contrast-enhanced ultrasound protocols and the implementation of these protocols into routine clinical practice. Contrast-enhanced ultrasound may be used alone or in conjunction with other contrast-enhanced imaging modalities like computed tomography and magnetic resonance imaging. As contrast-enhanced ultrasound continues to gain acceptance nationwide, clinical analysis will assist in the understanding of its overall efficacy.

ABSTRACT #73
Evolving with New Information to Improve Medical Imaging
Skyler Monico. Radiography program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Shielding has been a part of radiology for a long time, but as time goes on new information is put out there and adaptations must be put into place. The objective of this exhibit is to demonstrate the new information put out there by the American Association of Physicists in Medicine and how this information effects radiology. As stated in the AAPM shielding provides little to no benefit to the patient and in some circumstances increases the absorbed dose of the patient. Adapting to this new information policies and procedures must be changed in order to provide the best quality care. It’s going to be tough for most technologists who have been working in this field for quite some time, but this concept will seem foreign to most. Overcoming these growing pains to maintain a dose as low as reasonably achievable is what is needed to grow as professionals.

Although it may seem counterproductive due to old procedures and policies that are still in place the more this information is spread to the general public the more likely it is to put into place. Although patient shielding should not be discontinued, individuals who work around radiation should still practice using lead aprons and thyroid shields to keep their occupational dose at a minimum. My methodology for most of my information comes from the AAPM statements on shielding and how it should change for the better. All other sources and images came from google scholar to have more credible information for this information exhibit. Research supporting these claims came directly for the AAPM. In conclusion patient shielding should not be continued or in order for radiology to grow as a profession. Personal shielding should still practice shielding to remain an adequate dose. Overcoming these old ways of practice is going to be hard, but the end result is for the better.

ABSTRACT #74
Rapid Prototyping from Image Acquisition to Three-Dimensional Model
Hayley Schanou. Radiography program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Historically, surgeons have relied on cross-sectional imaging modalities such as computed tomography (CT) and magnetic resonance imaging (MRI) to plan surgical cases in advance. In select cases, these images tend to render insufficient visualization of the whole tumor and its margins. Rapid prototyping is a process utilizing emerging technology to generate a physical three-dimensional model of a tumor including its margins. The rapid prototyping process includes three steps: image acquisition, image post-processing, and three-dimensional printing. The prototypes are produced from CT and MRI imaging data— the foundation of this technology. The potential applications of rapid prototyping are surgical training, surgical simulations, and patient education. While this technology has not yet been widely established within the surgical community, it is suggested to be advantageous for several clinical applications.

ABSTRACT #75
Effectiveness of Gonadal Shielding
Cierra Wynn. Radiography program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

The purpose of this poster is to examine gonadal shielding effectiveness and whether researchers think this practice should be discontinued or improved. Gonadal shielding was introduced to reduce patient exposure and decrease hereditary risks. Recent studies found that gonadal shields are often increasing dosages or not being used at all. In addition, no hereditary effects of x-ray radiation have been found in humans since the introduction of using gonadal shields. Based on this information, the American Association of Physicists in Medicine (AAPM) and many others have decided that no-shielding practices should be put in place. Some researchers believe gonadal shielding can be improved with education or by making modifications to the traditional practice. Regardless of the way it is done, the amount of patient overexposure due to gonadal shielding needs to be reduced.

WOMEN’S HEALTH
ABSTRACT #76
10-Year Retrospective Correlation of the SurePath™ and the ThinPrep Smears at University of California Davis Medical Center
Irina Atkins, Jia Kang, Stanley Seko, Don York, Rosa Lopez, Alaa Afify. Cytotechnology program, College of Allied Health Professions, University of Nebraska Medical Center, Satellite Site: University of California Davis Health System, Sacramento, CA

Introduction: The SurePath and ThinPrep methods of preparing cytological sample for evaluation have replaced traditional conventional smears. The SP and TP use automated technology to accelerate the process and improve the quality of the samples. Both methods are approved by the FDA and help in diagnosis of gynecological
Inconclusive categories. Carle Foundation Hospital's LIS The information was entered into a spreadsheet where it on the case to see if a biopsy was performed within six months. If so, they were also a fair number of cases with no follow up. These results indicate that utilizing the LSIL-H diagnosis may be confusing for clinicians to determine the appropriate follow up procedure. Given this, we suggest trying to classify lesions into either LSIL or HSIL categories and refrain from using LSIL-H.

ABSTRACT #77

Low Grade Intraepithelial Lesion, cannot exclude High Grade Intraepithelial Lesion in a Pap Test – What’s Next? Emily Ehhardt, Morgan Romine. Cytotechnology program, College of Allied Health Professions, University of Nebraska Medical Center, Satellite Site: Carle Foundation Hospital, Urbana, IL

Introduction: Bethesda uses two distinct categories for low grade intraepithelial lesion (LSIL) and high grade intraepithelial lesion (HSIL) in a Pap test. This study discusses using a third category not implemented by Bethesda termed “LSIL, cannot exclude HSIL (LSIL-H)” when apparent LSIL cells are present, but showing some features of HSIL as well, just not enough to push up to the diagnosis. We correlated pap test cases diagnosed as LSIL-H with biopsies to determine the follow up plan and the final diagnosis.

Methods: LSIL-H pap test results reported out between January 2017 and December 2018 were checked to see if “cannot exclude high grade” was commented along with the final diagnosis. If “cannot exclude high grade” was commented, further investigation was done on the case to see if a biopsy was performed within six months and if so, what the diagnosis of the biopsy was. The information was entered into a spreadsheet where it was separated into LSIL, HSIL, No Follow Up, Negative for Intraepithelial Lesion and Malignancy (NILM), and Inconclusive categories. Carle Foundation Hospital’s LIS system, Soft Path, was used to search for the needed subjects.

Results: 921 total LSIL pap test reports were checked for LSIL-H diagnosis. Out of the 921, 96 (10%) were diagnosed as LSIL-H. When those LSIL-H cases were further checked to see if follow up occurred with a biopsy within the next six months, 24 (25%) came back as HSIL and 24 (25%) came back as HSIL, 26 (27%) of them had no follow up, 9 (9%) showed NILM, and 1 (1%) was diagnosed inconclusive.

Conclusions: In conclusion, the majority of the LSIL-H cases (35%) were diagnosed as LSIL determined by biopsy results, however, HSIL was still used more than we expected (46%). LSIL and HSIL were also a fair number of cases with no follow up. These results indicate that utilizing the LSIL-H diagnosis may be confusing for clinicians to determine the appropriate follow up procedure. Given this, we suggest trying to classify lesions into either LSIL or HSIL categories and refrain from using LSIL-H.

ABSTRACT #78

Investigating correlations between HPV cytology, results and surgical pathology results in cervical biopsies Cassidy Jones, Christi Lincoln. Cytotechnology program, College of Allied Health Professions, University of Nebraska Medical Center, Satellite Site: ProPath, Dallas, TX

Introduction: With the introduction of HPV testing as an adjunctive test for precancer and cancer of the uterine cervix it is necessary to study its accuracy along these lines. While much research has been performed on the accuracy of these tests, the efficiency of these tests is not known for the specific population of those served by ProPath laboratory. The purpose of this study is to determine the efficiency of HPV testing and Pap screening.

Methods: A search was conducted on the ProPath database to find cervical cases with a Pap, HPV testing and a biopsy from 9/27/19 to 12/27/19. The exclusion criteria were any case with a biopsy that was not a cervical biopsy (such as endometrial cases, skin biopsies and colon biopsies). After excluding relevant cases the population size was 1114. Cases were then categorized by positive and negatives in each of the three categories and further divided into specific diagnosis. Atypical squamous cells of undetermined significance (ASCUS) or higher was considered as a positive pap result.

Results: The accuracy of HPV testing and Pap screening were analyzed by comparing the results to the biopsy results. Pap screening had a higher detection rate (44.9%) than HPV testing (38.5%). However, Pap screening had a higher missed detection rate (13.4%) than HPV testing (10%). When both HPV and Pap test were positive the detection rate rose to 46.6%. When both were negative the missed detection rate dropped to 4.2%.

Conclusion: A positive Pap result is more indicative of true HPV changes than a positive HPV test while a negative HPV test is a better predictor of a negative biopsy than a negative Pap. Using both tests in conjunction yields the best results with both the highest detection rate and lowest missed detection rate. Therefore, it is recommended to continue to use both tests at ProPath.
Effects of Amount of Provider Knowledge of Modern Natural Family Planning Methods (NFP) and Corresponding Recommendation Rates to Patients
Kiley Reecy. College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Modern Natural Family Planning (NFP) methods have been utilized for decades both as a means of pregnancy prevention and child spacing. Until recently, the efficacy of such methods has been largely underestimated by the medical and scientific communities. This general underestimation has resulted in the minimal education of these methods for all types of health care providers both in practice and during professional training. This, in turn, has led to less provider confidence when discussing accurate knowledge about NFP. Most do not even present it during patient encounters as a recommendation for family planning. The goal of this research was to investigate an increase in provider education, and a corresponding increase in knowledge, would lead to an increase in recommendation rates to patients. Research available currently suggests that when educational avenues were provided, providers felt more confident and competent in the material, both of which ultimately led to more recommendations during patient encounters overall. This general conclusion indicates that continued research investigating this correlation is needed. It also showcases the essential need to create educational guidelines for NFP and to implement them throughout all avenues of health care education.

Methods: Data are preliminary results from postmenopausal women who completed a clinical trial and were randomized to 12 months of: 1) control (supplementary calcium and vitamin D only (CaD)), 2) 150 mg monthly oral Risedronate+CaD, or 3) bone-loading (high-impact weight bearing and resistance training) exercise+CaD. BMD of the total hip and lumbar spine and trabecular bone score (TBS) of the lumbar spine were assessed at baseline and 12 months using dual energy x-ray absorptiometry (DXA). One-way ANOVA models were used to determine differential treatment effects for the three outcome measures. Women who lost weight during the 12 month period, regardless of adherence to the assigned intervention, were included in the analysis.

Results: In total, sixty of 141 women who completed the study lost any amount of weight during the 12 month trial (n=18-23/group). Average age was 55±3 years with 82% Caucasian and average BMI at baseline 26.4±4 kg/m2 with those in each treatment group losing a similar, modest amount of weight (mean change: -1.6±1.3 kg; -2.4±2.0%). For those who lost weight, treatment effects were not observed for total hip BMD or TBS for any group; however, by 12 months, lumbar spine BMD increased in the Risedronate group (0.032±0.042 g/cm2) in comparison to both bone-loading exercise (-0.004±0.042 g/cm2) and control (-0.001±0.025 g/cm2) groups (p<0.01). Conclusion: Risedronate treatment over 12 months increases lumbar spine BMD among those experiencing similar, modest weight loss. Neither exercise or supplementation alone (CaD) was effective at increasing spine BMD, and no intervention affected total hip BMD or bone microarchitecture, as measured by TBS, in this study sample.

The Effect of Exercise or Bisphosphonate Use on Bone Density and Microarchitecture among Postmenopausal Women with Low Bone Mass Experiencing Modest Weight Loss
Kristen Beavers, Nancy Waltman, Kevin Kupzyk, Joan M. Lappe, Laura Flores, Lauren Fasth, Laura Bilek. Division of Physical Therapy Education, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Purpose: Current clinical guidelines state that osteopenia can be treated either with lifestyle (i.e., exercise and nutrition) or pharmacotherapy, however, this recommendation is based on low-quality evidence. Data informing treatment modality choice is particularly needed for older women with low bone mass who are also losing weight, as weight loss exaggerates age-related bone loss. The purpose of this analysis is to begin to explore the effect of a bone loading exercise program or bisphosphonate use on bone mineral density (BMD) and bone microarchitecture among postmenopausal women with low bone mass who are also losing weight.

Breast Tissue and Affects with Different Imaging Modalities
Ileana Gonzalez. Radiography program, Department of Medical Imaging and Therapeutic Sciences, College of Allied Health Professions, University of Nebraska Medical Center, Omaha, NE

Breast density is one of a key factor leading to false-positives findings in mammography. With multiple imaging modalities being improved and developed, there is a greater chance to lowering false positives for all genders. In this poster, there is an explanation of how dense breasts are developed, how dense breast can lead to false positives, and how each modality have advantages to viewing the breast more in depth. An overview will be provided regarding the development of dense tissue and what types of factors can contribute to such development. Additionally, there will be an overview on how grading system works for placing the breast in what are called BI-RADS to figure the extent of density in the breast. Finally, there will be a brief explanation on how different imaging techniques can either improve results of imaging the breast or have a similarity to the use of mammography. This poster is to give knowledge that each imaging modality can either help radiologist figure out breast composition and to detect cancerous tissue sooner than later, as well as giving the public a general idea of how.