### Oral Presentations

<table>
<thead>
<tr>
<th>Location</th>
<th>First Author</th>
<th>Abstract Tile</th>
<th>Page #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roberts Amphitheater</td>
<td>Caitlin Chiles, MS-4</td>
<td>Prophylactic Antibiotic Use in Gynecologic Surgery</td>
<td>8</td>
</tr>
<tr>
<td>Roberts Amphitheater</td>
<td>Thomas Greaves, MS-4</td>
<td>Prenatal Safe Sleep Toolkit</td>
<td>9</td>
</tr>
<tr>
<td>Roberts Amphitheater</td>
<td>Luke Mueller, MS-4</td>
<td>Afirma Gene Expression Classifier as a Genomic Test to Reduce Surgical Cost</td>
<td>10</td>
</tr>
</tbody>
</table>

### Morning Abstract Posters

<table>
<thead>
<tr>
<th>Poster #</th>
<th>Location</th>
<th>First Author</th>
<th>Abstract Tile</th>
<th>Page #</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dean’s Entrance</td>
<td>Kaitlin Ditch, M.D.</td>
<td>Barriers to Enter Weight Maintenance</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>Dean’s Entrance</td>
<td>Jay Gray, B.A.</td>
<td>All-Terrain Vehicles Injury Prevention and Education</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>Dean’s Entrance</td>
<td>Roxanne Stiles, MS-4</td>
<td>Protective Equipment and Motorbikes: Does it matter?</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>Dean’s Entrance</td>
<td>Ahmad Rahal, M.D.</td>
<td>Screening for Prostate Cancer: A living systematic review</td>
<td>14</td>
</tr>
<tr>
<td>5</td>
<td>Dean’s Entrance</td>
<td>Garrett Schwab, M.D.</td>
<td>Prevention of Tick-borne Disease</td>
<td>15</td>
</tr>
<tr>
<td>6</td>
<td>Dean’s Entrance</td>
<td>Jack Brown, MUA</td>
<td>Examining Investigative Actions Conducted Regarding Groundwater Contaminants in West Wichita</td>
<td>16</td>
</tr>
<tr>
<td>7</td>
<td>Dean’s Entrance</td>
<td>Jamie LoCurto, M.A.</td>
<td>Stages of Concern and Technology Acceptance</td>
<td>17</td>
</tr>
<tr>
<td>8</td>
<td>Dean’s Entrance</td>
<td>Maggie Nielsen, MS-4</td>
<td>Examining Barriers to Prenatal Physical Activity among a Population of Physically Active and Sedentary Women in the Midwest</td>
<td>18</td>
</tr>
<tr>
<td>9</td>
<td>Dean’s Entrance</td>
<td>Sonalli Kurlekar, MPH</td>
<td>Impact of Having a Personal Physician on Colorectal Cancer Screening Uptake: A national prevalence study</td>
<td>19</td>
</tr>
<tr>
<td>10</td>
<td>Dean’s Entrance</td>
<td>Kelly Byrd, D.O.</td>
<td>Internet Information Available to Teenagers and Their Parents on Long-acting Reversible Contraception</td>
<td>20</td>
</tr>
<tr>
<td>11</td>
<td>Dean’s Entrance</td>
<td>Kenosha Hobson, M.D.</td>
<td>Evaluation of Diagnosis and Management of Febrile Infants with Urinary Tract Infection among Pediatricians</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Location</td>
<td>Name</td>
<td>Title</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>----------------</td>
<td>---------------------</td>
<td>----------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Dean's Entrance</td>
<td>Tara Neil, M.D.</td>
<td>Charting High Risk Prenatal Patients in a Resident Family Medicine Clinic</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Simulation Center</td>
<td>Dawn Boender, M.D.</td>
<td>Self-Directed Learning: Can there be too much in medical education?</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Simulation Center</td>
<td>Linh Vu, B.S.</td>
<td>Variability in Torso Kinematics in Arm-Constrained Human Rolling</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Simulation Center</td>
<td>Lauren Johnson, B.S.</td>
<td>Exploration of the Inhibitory Effects of Allicin on the Growth of Staphylococcus aureus in an In Vivo Animal Model</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Simulation Center</td>
<td>Mahdi Hassan, M.S.</td>
<td>Energy Differences in Arm-Constrained Human Rolling</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Simulation Center</td>
<td>Fawn Beckman, B.S.</td>
<td>Exploration of the Inhibitory Effects of Manuka Honey on the Growth of Staphylococcus aureus in an in vivo Animal Model</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Simulation Center</td>
<td>Aybala Ust, Ph.D.</td>
<td>Surface Functionalization’s of ZnO Nanoparticles for the Cytotoxicity of Cancer Cells</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Cottonwood</td>
<td>Nora Strong, M.S.</td>
<td>Investigation of Vitreous Carbon Foam as a Bone Graft Substitute in Critical Defects</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Cottonwood</td>
<td>Nora Strong, M.S.</td>
<td>Vitreous Carbon Foams for Orthopedic Surgeries</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Cottonwood</td>
<td>Jonathon Struemph, M.D.</td>
<td>Evaluation of Different Experience Levels of Orthopaedic Residents Effect on Polymethylmethacrylate (PMMA) Bone Cement Mechanical Properties</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Cottonwood</td>
<td>Justin Walden, M.D.</td>
<td>Intrusion Characteristics of Three Bone Cements for Tibial Component of Total Knee Arthroplasty in a Cadaveric Bone Model</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Cottonwood</td>
<td>Seth Harrer, M.D.</td>
<td>Evaluation of CIBOR PEEK Spine Interbody Fusion Device</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Cottonwood</td>
<td>Seth Harrer, M.D.</td>
<td>Retrograde Ejaculation after Anterior Lumbar Interbody Fusion with the Use of rhBMP-2</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>West Atrium</td>
<td>Stacey Kraus, MS-4</td>
<td>Do Community Baby Showers Increase Maternal Knowledge of Infant Safe Sleep Practices?</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>West Atrium</td>
<td>Daniel Nwachokor, MS-4</td>
<td>Recruitment of African Americans into a Walking Intervention Trial for Peripheral Artery Disease</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>West Atrium</td>
<td>Tamara Jacobson, M.D.</td>
<td>Urinary Incontinence in Women and Conservative Spine Care: A retrospective cohort study</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>West Atrium</td>
<td>Benjamin Klug, D.O.</td>
<td>Assessment and Promotion of Infant Safe Sleep Guidelines in an Obstetrical Office</td>
<td></td>
</tr>
<tr>
<td>Poster #</td>
<td>Location</td>
<td>First Author</td>
<td>Abstract Title</td>
<td>Page #</td>
</tr>
<tr>
<td>----------</td>
<td>----------------</td>
<td>-----------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>29</td>
<td>West Atrium</td>
<td>Christy Schunn, LSCSW</td>
<td>Does Providing Infant Caregivers with a Wearable Blanket Increase Safe Sleep Practices? A Randomized Controlled Trial</td>
<td>39</td>
</tr>
<tr>
<td>30</td>
<td>West Atrium</td>
<td>Matthew Engel, MPH</td>
<td>Safe Sleep Knowledge and Use of Provided Cribs</td>
<td>40</td>
</tr>
<tr>
<td>31</td>
<td>Meadowlark</td>
<td>Harpreet Singh, B.A.</td>
<td>Compliance with American College of Obstetricians and Gynecologists Recommendations for Papanicolaou Testing Among 21-65 Year Old Women</td>
<td>41</td>
</tr>
<tr>
<td>32</td>
<td>Meadowlark</td>
<td>David Trombold, M.S.</td>
<td>Where Radicals Roam Free: The inflammatory truth</td>
<td>42</td>
</tr>
<tr>
<td>33</td>
<td>Meadowlark</td>
<td>Janice Crowley, M.Ed.</td>
<td>Gas Chromatography: The search for fatty acid degradation</td>
<td>43</td>
</tr>
<tr>
<td>34</td>
<td>Meadowlark</td>
<td>JulieAnn Stover, M.D.</td>
<td>Additional Findings on MRI When Evaluating Invasive Lobular Carcinoma as Compared to Mammography and Ultrasound</td>
<td>44</td>
</tr>
<tr>
<td>35</td>
<td>Meadowlark</td>
<td>Travis McKenzie, D.O.</td>
<td>Implementation of Value-based Radiology</td>
<td>45</td>
</tr>
<tr>
<td>36</td>
<td>Meadowlark</td>
<td>Felecia Lee, Ph.D.</td>
<td>Injury Factors, Not BMI, are Associated with Hospital Resource Usage in a Trauma Population</td>
<td>46</td>
</tr>
<tr>
<td>37</td>
<td>Meadowlark</td>
<td>Ashley Venegas, MS-4</td>
<td>Hospital Outcomes Associated with Traumatic Farm Injuries Mechanisms in a Rural State</td>
<td>47</td>
</tr>
<tr>
<td>38</td>
<td>Meadowlark</td>
<td>Sydnei Tolefree, MS-4</td>
<td>Outcomes Following Traumatic Grain Elevator Injuries</td>
<td>48</td>
</tr>
<tr>
<td>39</td>
<td>Meadowlark</td>
<td>Logan Gibson, MS-4</td>
<td>Neonatal Seizures: Incidence, Risk Factors, and Response to Treatment</td>
<td>49</td>
</tr>
<tr>
<td>40</td>
<td>Meadowlark</td>
<td>Christopher Smith, B.S.</td>
<td>Estimated Blood Loss during Scheduled Cesarean Deliveries is Vastly Underestimated</td>
<td>50</td>
</tr>
<tr>
<td>41</td>
<td>Meadowlark</td>
<td>Annabel Mancillas, M.D.</td>
<td>Stillbirth: A Retrospective Case Review Evaluating Risk Factors and Antepartum Care at Two Local Obstetrical Clinics</td>
<td>51</td>
</tr>
<tr>
<td>42</td>
<td>Meadowlark</td>
<td>Amy Lueking, M.D.</td>
<td>Standardizing Genetic Testing for Products of Conception</td>
<td>52</td>
</tr>
</tbody>
</table>

### Afternoon Abstract Posters

<table>
<thead>
<tr>
<th>Poster #</th>
<th>Location</th>
<th>First Author</th>
<th>Abstract Title</th>
<th>Page #</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dean’s Entrance</td>
<td>Parisa Eimanzadeh, Ph.D.</td>
<td>Optimizing Nurse-staffing Strategies for an Inpatient Setting Using a Stochastic Modeling Approach</td>
<td>53</td>
</tr>
<tr>
<td>2</td>
<td>Dean’s Entrance</td>
<td>Christopher Cassidy, M.D.</td>
<td>The Better Practice of Using Single Dose Dexamethasone for Acute Asthma Exacerbation instead of 5 Days Prednisolone</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>Department</td>
<td>Author</td>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>---</td>
<td>----------------------------</td>
<td>-------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>3</td>
<td>Dean’s Entrance</td>
<td>Simran Brar, D.O.</td>
<td>Improving Compliance with the Hypoglycemia Protocol</td>
<td>55</td>
</tr>
<tr>
<td>4</td>
<td>Dean’s Entrance</td>
<td>Sabina Safder, M.D.</td>
<td>Template Manifesto</td>
<td>56</td>
</tr>
<tr>
<td>5</td>
<td>Dean’s Entrance</td>
<td>Gretchen Homan, M.D.</td>
<td>Increasing Immunizations for Children 0-18 months with Quality Improvement Techniques</td>
<td>57</td>
</tr>
<tr>
<td>6</td>
<td>Dean’s Entrance</td>
<td>Robert Badgett, M.D.</td>
<td>Teaching Statistics for QI Using Online Scenarios and Team-based Learning</td>
<td>58</td>
</tr>
<tr>
<td>7</td>
<td>Dean’s Entrance</td>
<td>Priyanka Priydarshani, B.A.</td>
<td>Injectable Hydrogel Provides Growth-permissive Environment for Human Nucleus Pulposus Cells</td>
<td>59</td>
</tr>
<tr>
<td>8</td>
<td>Dean’s Entrance</td>
<td>Dennis Burns, Ph.D.</td>
<td>Developing a Targeting System for Bacterial Membranes</td>
<td>60</td>
</tr>
<tr>
<td>9</td>
<td>Dean’s Entrance</td>
<td>Di Wu</td>
<td>Demonstration of the Precise Temperature Dependence of Prodigiosin Expression from Serratia Marcescens on our Bacterial Array System</td>
<td>61</td>
</tr>
<tr>
<td>10</td>
<td>Dean’s Entrance</td>
<td>Madhulika Srikanth, M.S.</td>
<td>Role of Electrospun Artificial Scaffolds to Induce Nerve Tissue Growth</td>
<td>62</td>
</tr>
<tr>
<td>11</td>
<td>Dean’s Entrance</td>
<td>Yongchao Li, Ph.D.</td>
<td>ARP2/3 Complex Mediates EFs-directed Migration of Neural Stem Cell-derived Oligodendrocyte Precursors</td>
<td>63</td>
</tr>
<tr>
<td>12</td>
<td>Dean’s Entrance</td>
<td>Yongchao Li, Ph.D.</td>
<td>Explore Molecular Pathway Mediating Electric Field-directed Schwann Cell Migration by Next Generation RNA Sequencing</td>
<td>64</td>
</tr>
<tr>
<td>14</td>
<td>Simulation Center</td>
<td>Sean McKnight, M.D.</td>
<td>Can we Teach Residents to Give Better Feedback to Faculty?</td>
<td>66</td>
</tr>
<tr>
<td>15</td>
<td>Simulation Center</td>
<td>Stephen Charles, Ph.D.</td>
<td>What do Medical Students Observe during an Ophthalmologic Exam?</td>
<td>67</td>
</tr>
<tr>
<td>16</td>
<td>Simulation Center</td>
<td>Stephen Charles, Ph.D.</td>
<td>A Time-independent Medical Curriculum</td>
<td>68</td>
</tr>
<tr>
<td>17</td>
<td>Simulation Center</td>
<td>Stephen Charles, Ph.D.</td>
<td>Assessment of Simulation-based Curriculum Enhancements that Engage Students in Co-designing Learning Activities</td>
<td>69</td>
</tr>
<tr>
<td>18</td>
<td>Simulation Center</td>
<td>Jeffrey Shepherd, M.D.</td>
<td>Early Outcomes of Cemented versus Cementless Total Knee Arthroplasty</td>
<td>70</td>
</tr>
<tr>
<td>19</td>
<td>Cottonwood</td>
<td>Alisha Oelka, M.D.</td>
<td>Determining and Addressing Recruitment Challenges in an Efficacy Trial in Bipolar Disorder, Depressed Phase</td>
<td>71</td>
</tr>
<tr>
<td>#</td>
<td>Institution</td>
<td>Author/Co-Author</td>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>----</td>
<td>----------------</td>
<td>---------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>20</td>
<td>Cottonwood</td>
<td>Hala Kazanchi, M.D.</td>
<td>Understanding the Pharmacodynamic and Pharmacokinetic Differences amongst Newer Generation Antipsychotics Using Lurasidone as a Point of Comparison</td>
<td>72</td>
</tr>
<tr>
<td>21</td>
<td>Cottonwood</td>
<td>Hala Kazanchi, M.D.</td>
<td>I-Pass You My Patient: Quality Improvement of Patient Handoff in Psychiatry</td>
<td>73</td>
</tr>
<tr>
<td>22</td>
<td>Cottonwood</td>
<td>Yumi Suzuki, Ph.D.</td>
<td>Human Trafficking in Small Urban and Rural Communities: Knowledge and experience among professionals in health care settings</td>
<td>74</td>
</tr>
<tr>
<td>23</td>
<td>Cottonwood</td>
<td>Stephen Amos, Ph.D.</td>
<td>The Relationship between Personality Style and Attention Deficit Hyperactivity Disorder</td>
<td>75</td>
</tr>
<tr>
<td>24</td>
<td>Cottonwood</td>
<td>Spencer Post, M.S.</td>
<td>Factors Associated with Borderline versus Definite Peripheral Artery Disease among African Americans</td>
<td>76</td>
</tr>
<tr>
<td>25</td>
<td>West Atrium</td>
<td>Negar Seyedhassantehrani, B.S.</td>
<td>Hydrogels Mediate Cell Migration for Neural Regeneration</td>
<td>77</td>
</tr>
<tr>
<td>26</td>
<td>West Atrium</td>
<td>Duyandra KC, M.S.</td>
<td>Fatigue Study of Intravascular Coronary Stents Using Finite Element Analysis</td>
<td>78</td>
</tr>
<tr>
<td>27</td>
<td>West Atrium</td>
<td>Kaitlyn Howard, B.S.</td>
<td>Spectral Analysis of Ischemic Muscle from Peripheral Artery Disease</td>
<td>79</td>
</tr>
<tr>
<td>28</td>
<td>West Atrium</td>
<td>Ryan Becker,</td>
<td>Analysis of Elemental Concentrations in Ischemic Muscle of Patients with Peripheral Artery Disease, Using Energy Dispersive X-ray Spectroscopy</td>
<td>80</td>
</tr>
<tr>
<td>29</td>
<td>West Atrium</td>
<td>Leyla Saeednia, M.S.</td>
<td>Injectable Chitosan-based Hydrogel for Breast Cancer Treatment</td>
<td>81</td>
</tr>
<tr>
<td>30</td>
<td>West Atrium</td>
<td>Abu Asaduzzaman, Ph.D.</td>
<td>Application of High-performance Pattern Recognition and Protein Binding in Cancer Treatment</td>
<td>82</td>
</tr>
<tr>
<td>31</td>
<td>Meadowlark</td>
<td>Evan Ohlman, P.A.</td>
<td>Physician Assistant Student Assessment of Body Mass Index in Children Aged 3 to 5 Years Using Visual Cues</td>
<td>83</td>
</tr>
<tr>
<td>32</td>
<td>Meadowlark</td>
<td>Cole Gillenwater, MS-3</td>
<td>Physician Oral Contraceptive Prescribing Practices</td>
<td>84</td>
</tr>
<tr>
<td>33</td>
<td>Meadowlark</td>
<td>Kyle Rowe, MS-4</td>
<td>Trends in Direct Primary Care: 2005 - 2015</td>
<td>85</td>
</tr>
<tr>
<td>34</td>
<td>Meadowlark</td>
<td>Stephanie Shields, MS-4</td>
<td>Abnormal BMI Percentile Detection in a Residency Setting</td>
<td>86</td>
</tr>
<tr>
<td>35</td>
<td>Meadowlark</td>
<td>Tracy Wineinger, MBA</td>
<td>Timeliness of Hepatitis B Vaccine Doses Received by Sedgwick County Health Department Clients &lt;18 Years Old</td>
<td>87</td>
</tr>
</tbody>
</table>
## Prescribing of Compounded and Commercially Available Bioidentical Menopausal Hormone Therapy by Obstetrician-Gynecologists and Family Medicine Physicians

### Risk Factors for Active Tuberculosis Disease in Kansas from 2004 through 2013

### Rise of Alkaline Phosphatase Activity above 800 IU/L in Appropriate for Gestational Age Premature Neonates: A retrospective study

### Natural Trend of Alkaline Phosphatase in Appropriate for Gestational Age Premature Neonates: A retrospective study

### Nasotracheal Suctioning Policies and Procedures: A survey of Leapfrog 2012 Top hospitals

### Toxicological Patterns of Youth Suicide: A retrospective descriptive review of the toxicological findings of deaths ruled suicide in Kansas youths 24 years and under from 2009-2013

### Barriers and Challenges of Optimal Trauma Care for Rural Family Physicians

### Morning Case Reports

<table>
<thead>
<tr>
<th>Poster #</th>
<th>Location</th>
<th>First Author</th>
<th>Case Report Title</th>
<th>Page #</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wichita Room</td>
<td>Travis McKenzie, DO</td>
<td>Increasing Abdominal Girth in an Asymptomatic 8 Year Old Male: Radiologic-pathologic correlation of an embryonal rhabdomyosarcoma</td>
<td>95</td>
</tr>
<tr>
<td>2</td>
<td>Wichita Room</td>
<td>Travis McKenzie, DO</td>
<td>Transradial Access for Interventional Radiology Procedures</td>
<td>96</td>
</tr>
<tr>
<td>3</td>
<td>Wichita Room</td>
<td>Travis McKenzie, DO</td>
<td>Unique Case of Segmental Spinal Dysgenesis</td>
<td>97</td>
</tr>
<tr>
<td>4</td>
<td>Wichita Room</td>
<td>Soumo De, MD</td>
<td>Extrapontine Myelinolysis of the Bilateral Branchium Pontis</td>
<td>98</td>
</tr>
<tr>
<td>5</td>
<td>Wichita Room</td>
<td>Joseph Moore, MS-4</td>
<td>Small Lymphocytic Lymphoma Presenting with Hypopituitarism</td>
<td>99</td>
</tr>
<tr>
<td>6</td>
<td>Wichita Room</td>
<td>Kaitlin Ditch, MD</td>
<td>Storm in an Unsuspecting Patient</td>
<td>100</td>
</tr>
<tr>
<td>Poster #</td>
<td>Location</td>
<td>First Author</td>
<td>Case Report Title</td>
<td>Page #</td>
</tr>
<tr>
<td>---------</td>
<td>---------------</td>
<td>---------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>7</td>
<td>Wichita Room</td>
<td>Alexandra Flynn, MD, PhD</td>
<td>Homicidality and Psychosis Associated with Over the Counter Performance Enhancing Supplements in a Past Anabolic Steroid User: A case report</td>
<td>101</td>
</tr>
<tr>
<td>8</td>
<td>Wichita Room</td>
<td>Habiba Hassouna, MD</td>
<td>Pancytopenia: A new manifestation of Mycoplasma pneumoniae</td>
<td>102</td>
</tr>
<tr>
<td>9</td>
<td>Wichita Room</td>
<td>Habiba Hassouna, MD</td>
<td>Mycobacterium chelonae Disseminated Soft Tissue Infection in a Post-Renal Transplant Patient</td>
<td>103</td>
</tr>
<tr>
<td>10</td>
<td>Wichita Room</td>
<td>Milena Armani, MD</td>
<td>Psychoeducational Psychotherapy (PEP) Adapted for Spanish Speaking Children with Mood Disorders: A case series</td>
<td>104</td>
</tr>
<tr>
<td>11</td>
<td>Wichita Room</td>
<td>Walter Kalu, MD</td>
<td>Lithium and Haloperidol Toxicity with Catatonia</td>
<td>105</td>
</tr>
<tr>
<td>12</td>
<td>Santa Fe Room</td>
<td>Biran Blick, MD</td>
<td>Ultrasound Guided Popliteal Arterial Catheter Insertion via Seldinger Technique in the Prone Position</td>
<td>106</td>
</tr>
<tr>
<td>13</td>
<td>Santa Fe Room</td>
<td>Michael Christensen, DO</td>
<td>Spinal Cord Stimulators as a Pain Management Modality for Post Guillain-Barre Syndrome Pain</td>
<td>107</td>
</tr>
<tr>
<td>14</td>
<td>Santa Fe Room</td>
<td>Aric Rastrelli, DO</td>
<td>Perioperative Management of Traumatic Bronchial Rupture: A case report</td>
<td>108</td>
</tr>
<tr>
<td>15</td>
<td>Santa Fe Room</td>
<td>Joshua Pribe, MD</td>
<td>Saddle Pulmonary Embolus in a Patient Status-Post Cesarean Section</td>
<td>109</td>
</tr>
<tr>
<td>16</td>
<td>Santa Fe Room</td>
<td>Jeffrey Stutler, MD</td>
<td>Elevated Procalcitonin in a Case of Non-Convulsive Status Epilepticus</td>
<td>110</td>
</tr>
</tbody>
</table>
**Prophylactic Antibiotic Use in Gynecologic Surgery**

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**Background:** The use of prophylactic antibiotics for hysterectomy has been demonstrated to reduce postoperative infection; however, guidelines for non-hysterectomy gynecologic surgery have been difficult to define and little is known about adherence with recommendations. This study aimed to analyze compliance with published guidelines and define areas of improvement to promote appropriate antibiotic use in order to improve patient outcomes and reduce associated health care costs.

**Methods:** After obtaining IRB approval, a retrospective chart review was performed on patients who underwent inpatient or outpatient gynecologic surgery at a large teaching hospital in 2013. Based on published guidelines for prophylactic antibiotics for gynecologic surgery by American College of Obstetricians and Gynecologists (ACOG) and the Surgical Care Improvement Project (SCIP), procedures were classified as “antibiotic-appropriate” or “inappropriate.” Antibiotic use was examined using logistic regression analysis.

**Results:** Of the 1740 cases eligible for inclusion, 1044 (60.0%) had antibiotics recommended per guidelines, and appropriate antibiotics were given in 1029 (98.7%) of those cases. In 696 (40.0%) cases, antibiotics were either not recommended or the guidelines are not well defined. Of the cases without indication for antibiotic use, 400 (57.5%) received prophylactic antibiotics. For all gynecology surgery cases performed during the study period, 400 (23.0%) received prophylactic antibiotics outside of recommended guidelines.

**Conclusion:** This study demonstrated that in surgical cases where antibiotics were recommended according to guidelines, compliance was high. However, in situations where antibiotics were not indicated, antibiotics were often administered unnecessarily. We recommend a change in the surgical “Time Out” process to include whether prophylactic antibiotics are indicated.

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Background: Sudden Infant Death Syndrome remains the primary cause of infant death, despite success of campaigns in reducing its incidence. The infant mortality rate in Sedgwick County, KS is higher than the national average. A Safe Sleep Toolkit was developed to increase awareness of American Academy of Pediatrics (AAP) guidelines for safe infant sleep among both providers and patients. This study sought to evaluate effectiveness of implementing the Toolkit in the prenatal setting.

Methods: At a local obstetrics practice, pregnant patients at 28- or 36-weeks’ gestation were administered surveys to assess maternal knowledge and provider discussion of the AAP safe sleep guidelines during prenatal visits. Surveys were administered to mothers before and after providers were educated and equipped with the Safe Sleep Toolkit, which facilitated appropriate counseling of safe sleep positioning, location, and environment.

Results: Fifty-six patients were surveyed pre-intervention and 55 unmatched patients were surveyed and included post-intervention. At baseline, 32.1% of mothers reported discussion of infant safe sleep at their appointment. Following the intervention, this increased significantly to 78.2%. Maternal knowledge regarding safe sleep positioning, location, and items safe for the environment significantly improved after implementation of the Toolkit.

Conclusion: This study is the first to demonstrate implementation of a Safe Sleep Toolkit in the prenatal setting may effectively improve delivery of safe sleep education to expectant mothers. The toolkit fostered an environment for discussion of safe sleep practices between obstetricians and patients, resulting in significantly increased patient knowledge of safe sleep.

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Afirma Gene Expression Classifier as a Genomic Test to Reduce Surgical Cost

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Background: Thyroid nodules are classified into six cytological categories under the Bethesda Classification System. Two of these categories, atypical of undetermined significance (AUS) and suspicious of follicular neoplasm (SFN), are further labeled as ‘indeterminate’ diagnosis. Starting in 2012, the University of Kansas School of Medicine - Wichita Endocrine Clinic used Afirma Gene Expression Classifier (AGEC) among patients with indeterminate diagnosis to evaluate the need of surgery. This cross-sectional study was designed to determine if AGEC was beneficial in managing patients with an indeterminate diagnosis.

Methods: This study included data from electronic medical records at the KU Endocrine Clinic about patients who underwent thyroid nodule fine-needle aspiration between 2004 and 2014 to answer two research questions. First, was the use of AGEC associated with a decreased proportion of patients with ‘indeterminate’ cytological diagnosis? Additionally, was implementing AGEC associated with decreased proportion of patients undergoing surgery and decreased cost? Second, was the malignancy rate diagnosed by surgery has increased after AGEC implementation compared to before AGEC implementation in patients with indeterminate diagnosis?

Results: The rate of indeterminate diagnosis between cohorts did not show a significant difference, 23.89% and 19.43% respectively. Surgical recommendation for patients with indeterminate finding was decreased to 50% from 81.5% (p=0.011). Primary cost estimate showed implementing AGEC has saved $722/patient. Malignancies diagnosed by surgery were 4.3 times higher in patients after AGEC implementation.

Conclusion: AGEC implementation appears to have lowered financial cost and decreased the number of unnecessary surgeries for patients with indeterminate diagnosis of thyroid nodules.

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Barriers to Enter Weight Maintenance

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Background: 29.9% of Kansans are overweight. The amount of weight loss maintained is closely linked to individuals’ adherence to lifestyle modification. Individuals enrolled in formal weight loss programs tend to maintain a larger weight loss than persons not enrolled. This suggests that studies are needed to focus on factors to improve long-term adherence to weight loss programs. Objective: The purpose of this study was to identify factors associated with individuals not entering the weight maintenance phase of a community-based weight loss clinic.

Methods: A list of individuals who completed a weight loss program at Via Christi Weight Management in Wichita, KS was generated. Individuals were mailed a survey which addressed demographic information and explored factors associated with not entering the weight maintenance phase. Chi-square analysis was used to identify risk factors which differed between the groups.

Results: Among the 78 responders, 64.1% (n=50) reported entering the weight maintenance phase. Responders were predominantly female (n=61; 78.2%) and white (n=73; 93.6%). Neither sex, student status, marital status, presence of children, income, employment status, nor number of hours worked were associated with the likelihood of entering weight maintenance. Participants reporting a specific reason for not entering weight maintenance most frequently reported financial (n=28; 34.6%) or time (n=10; 12.4%) constraints.

Conclusion: No single demographic variable was associated with failure to enter weight maintenance in this cohort. Poor adherence to long-term medical weight management programs is pervasive across social and demographic boundaries. Further studies are needed to explore ways to decrease perceived financial or time barriers.

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Background: Accidents involving all-terrain vehicles (ATVs) lead to a substantial amount of injuries each year. Many factors lead to increased risk of injury while riding an ATV, such as improper engine size for the age of the rider, lack of helmet use, riding with one or more passengers, and alcohol use. The focus of this evidence-based clinical literature review was to provide healthcare providers, ATV dealers, and ATV enthusiasts with education on ATV injury prevention strategies.

Methods: Electronic databases, including (but not limited to) MEDLINE, Cochrane, and CINAHL were searched for studies reflecting ATV injury prevention and education. Search terms included various combinations of All-Terrain Vehicle (ATV) injury prevention and education. The studies reviewed included meta-analyses, systematic reviews, case studies, and surveys. Articles written in English and peer reviewed were included. No limitations were identified in this search.

Results: The expected result is to increase awareness, provide education, and develop policies on ATV injury prevention, to ultimately reduce ATV related injury.

Conclusion: Research indicates that ATV anticipatory safety guidance leads to an increased awareness of safe riding practices and could lead to a decrease in overall ATV related injury. The regular presentation of this education to the ATV-riding patient population is paramount in reducing the risk of ATV related injury.

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Protective Equipment and Motorbikes: Does it matter?

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Background: Motorbikes are increasingly popular in Kansas, yet few state regulations exist related to their use. Concurrently, little is known about injuries in Kansas. This study compared outcomes between those injured at a motorbike track and those riding recreationally.

Methods: A five year, retrospective review was conducted of patients (ages 0 to 89) who presented with motorbike-related injuries at an ACS-verified level 1 trauma center. Collected data included: demographics, ICD-9-CM injury E code, initial vitals, safety equipment, hospitalization details, and discharge disposition. Comparisons were made regarding protective equipment usage.

Results: Of the 115 patients, 97.4% were Caucasian, 93.9% were male, and 64.4% were 18 to 54 years old. Over half (54.8%) were injured on a motorbike track, and 45.2% were injured in a recreational setting. One death was reported – an adult recreational rider without protective equipment. Safety equipment in both groups was helmet, followed by protective clothing, eyewear, boots, and neck protection. Significantly more track riders wore protective equipment than recreational riders (95.2% vs 46.2% respectively, p<0.0001). Among recreational riders, patients with protective equipment had shorter H-LOS (2.33 vs 3.04) and vent days (0 vs 0.11), but longer ICU stay (0.58 vs 0.36) than those without (not statistically significant). Track riders with protective equipment had longer H-LOS (3.18 vs 2.33), longer ICU (1.12 vs 0.58), and vent-days (0.6 vs 0) than the recreational riders with protective equipment (not statistically significant).

Conclusion: The trends resulted warrant further study for possible statistical significance. This limited data also warrants protective equipment policy reinforcement.

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Screening for Prostate Cancer: A living systematic review

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Background: The two major trials of screening for prostate cancer with the prostate-specific antigen (PSA) have conflicting assessments of reduction in mortality due to prostate cancer. Similarly, major guidelines give opposing recommendations.

Methods: We executed a living systematic review as described at http://openmetaanalysis.github.io/. We included the same trials reviewed by the United States Preventive Services Task Forces (USPSTF). We explored heterogeneity of results by estimating the “years of monitoring added” by screening as a function of years of coverage provided by a single PSA value and the mean number of tests in the screening and control groups (‘adherence’ and ‘contamination’, respectively). We assumed the amount of contamination based on reported rates of contamination. In addition, we considered each study site in the European Randomized study of Screening for Prostate Cancer (ERSPC) as a separate trial for the meta-analysis.

Results: Overall, there was no significant reduction in mortality due to prostate cancer from screening. However, meta-regression showed significant correlation with the estimated years of monitoring added by screening when we assumed that a single PSA test provided 3 years of monitoring. Thus, we executed a subgroup analysis based on the years of monitoring added and found significant benefit among the trials in which screening added at least four years PSA monitoring.

Conclusion: Our meta-regression study showed benefit when screening adds at least 4 years of monitoring. The dependence of the conclusions on assumptions of non-protocol screening reinforces the need for better reporting of processes in screening studies.

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Prevention of Tick-borne Disease

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Background: Tick-borne diseases in the US present a significant health risk to those who work or play outdoors. Ticks transmit at least twelve known viral, spirochetal, and bacterial diseases and one toxic condition to humans in the US. Many have significant morbidity and mortality if prompt treatment is not administered. If an individual is found to have a tick bite, it becomes vital to educate the public on proper extraction of the tick and to educate medical providers on appropriate antibiotic prophylaxis.

Methods: A comprehensive literature review was undertaken using PubMed, Google Scholar, and Medline to evaluate research in preventing tick-borne illness.

Results: Our research stressed the importance of tick bite prevention. While environmental factors can suppress overall tick populations, this intervention does not correlate to a decreased illness transmission to human hosts. Therefore, individuals must recognize exposure risk, wear protective clothing, utilize Deet containing repellants, and reapply repellants frequently.

Conclusion: It is vital for the public to know how to avoid tick bites and how to properly treat them if encountered. Additionally, further research into disease prevention through vaccination continues to become crucial in the future fight to limit tick-borne disease.

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Examining Investigative Actions Conducted Regarding Groundwater Contaminants in West Wichita

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Background: Tetrachloroethylene (PCE) is a chemical compound that is frequently used in dry cleaning. PCE is classified as volatile organic compound (VOC), and it poses a developmental, neurological, respiratory, and carcinogenic risk to humans. PCE contamination from dry cleaners occurs through leaking sewer connections, dry cleaning filter disposal practices, routine spills and leaks. Once released into the environment, solvents migrate into groundwater from the soil surface. This study sought to examine the investigative actions conducted to date in west Wichita regarding PCE and other VOC groundwater contaminants.

Methods: The research team is conducting a thorough documentation review. Multiple team members and partners are beginning to access site and contamination records regarding the contaminant source, its initial discovery, actions that have occurred, and public engagement strategies that have been used.

Results: Two dry cleaning facilities, operating under various names are contributing to the contamination. 8947 W. Central operated from the 1960s to 2008. 9334 W. Central operated from 1968-1991. The contamination was discovered in 2009 and poses potential health risks to local residents due to the absence of public water supply and reliance of residents on the use of private domestic wells for their water supply. The City of Wichita began providing public water to the area in 2013.

Conclusion: Private well water quality is not routinely monitored for toxic chemicals. This is a large public environmental health gap in our system. However, once contamination is discovered in groundwater, the public health sector acts to provide clean, safe water to residents.

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Stages of Concern and Technology Acceptance

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Background: Implementation of new technology in an acute medical setting can be difficult for hospital staff to acclimate to and adopt. Consumers of technology typically move through stages of concern during adoption. The purpose of this study was to examine the stages of concern experienced by hospital staff upon implementation of a new patient information interface.

Methods: Immediately following technology training, surgical intensive care unit staff completed the Stages of Concern questionnaire. The Stages of Concern include Self (e.g. role shifting due to technology), Task (e.g. time constraints), and Impact (e.g. concerns about patient and familial attitudes toward the technology). Follow-up surveys were collected three months following implementation of the technology. Only participants who completed both surveys were included in analysis.

Results: A total of 41 participants completed both surveys. Self-concerns (Stages 0-2) were endorsed by 63% of participants immediately following training and 49% at three month follow-up; a decrease of 14%. Task concerns (Stage 3) were endorsed by 19% of participants immediately following training and 12% at follow-up; a decrease of 7%. Impact concerns (Stages 4-6) were endorsed by 17% of participants at post training and 39% at follow-up; an increase of 22%.

Conclusion: Following implementation, staff concerns shifted from lower-level (Self) to higher level (Impact) concerns. Adoption of any new technology requires clinicians to adapt their current practices and may influence decisions regarding patient care. The ability of management to identify the primary concern of staff when developing and incorporating a new innovation may ease the transition.

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Examining Barriers to Prenatal Physical Activity among a Population of Physically Active and Sedentary Women in the Midwest

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Background: Regular exercise is a key aspect of maintaining a healthy lifestyle, even during pregnancy. This study examined perceived barriers to physical activity during pregnancy among women who engaged in regular physical activity prior to pregnancy for >90 minutes per week compared to those who completed <90 minutes of physical activity per week.

Methods: The data was obtained by conducting a single cross sectional study utilizing a telephone survey of pregnant women in Wichita, KS (N=90). Bivariate analyses were conducted using Chi-square tests to examine differences in variables for exercise frequency.

Results: Results indicate women who maintained at least 90 minutes or more per week of moderate physical activity before pregnancy were more likely to continue to exercise despite physical discomfort (p=0.03) or time commitments (p=0.02) when compared to women who had less than 90 minutes of exercise per week before pregnancy.

Conclusion: It is important to understand perceived barriers to physical activity in order to design and promote optimal exercise practices for patients. Physical discomfort and time commitments were more likely to be barriers to exercise in pregnant woman who did not exercise at least 90 minutes per week before pregnancy. These findings can help direct advances in individualized patient education regarding exercise before and during pregnancy.

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Impact of Having a Personal Physician on Colorectal Cancer Screening Uptake: A national prevalence study

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Background: Colorectal cancer (CRC) screening is widely recommended but most underused screening tool in USA. A physician’s recommendation for CRC screening has been associated with increased colon cancer screening. This study aimed to examine the factors associated with personal physician’s recommendations for maintaining up-to-date CRC screening in USA.

Methods: Secondary analysis was conducted using database from 2012 Behavioral Risk Factor Surveillance System (BRFSS). Multivariate logistic regression was conducted to assess the effect of personal physician’s recommendation for CRC screening based on patient’s sex, age, education, income level, health insurance, veteran status, marital status. P-value ≤ .05 was considered statistically significant.

Results: Of the 240,800 respondents in 2012, 73% had health coverage, 74% had personal physician, 71% were females, 61% were separated or never married, 80% were retired and 55% were unemployed respondents. 71% people reported receiving a physician’s recommendation for up-to-date CRC screening guidelines. In multivariate testing, a physician’s recommendation for CRC testing was associated with people having had at least one or multiple personal doctors, having a health coverage from older groups (age 60-75 years), who were veterans and had use of personal cell phone.

Conclusion: People having a personal physician and a health care coverage especially from older age group are maintaining up-to-date CRC screening. Patients are more likely to receive a CRC recommendation if they are females, have use of personal cell phones and are veterans. Increased efforts required to increase the health care provider directed intervention to assure increased CRC screening compliance rate in the community.

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Internet Information Available to Teenagers and their Parents on Long-acting Reversible Contraception

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Background: Leading medical societies recommend long-acting reversible contraception (LARC) as first line contraception for adolescents. LARC, including intrauterine systems and implantable contraceptives, is the safest and most effective contraception method for teenagers, with few contraindications or serious adverse effects. The internet remains a leading source on health information, however, the type and quality of information regarding LARC for teenagers is unknown. Our study assessed availability of information and consistency with recommendations.

Methods: Between December 2013 and January 2014, data were collected from querying the 3 most common search engines: Google, Microsoft/Bing, and Yahoo. Resulting websites and viable links were assessed for 15 quality criteria and 11 content themes related to LARC. These a priori themes were based on the leading medical societies’ recommendations regarding contraception in teenagers.

Results: Between December 2013 and January 2014, data were collected from querying the 3 most common search engines: Google, Microsoft/Bing, and Yahoo. Resulting websites and viable links were assessed for 15 quality criteria and 11 content themes related to LARC. These a priori themes were based on the leading medical societies’ recommendations regarding contraception in teenagers.

Conclusion: Most websites do not offer the most up to date information regarding to use of LARC, and less than 25% discuss it at all. In order to promote the most effective method of contraception to teenagers and their parents, websites should present the most accurate information regarding LARC.

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Evaluation of Diagnosis and Management of Febrile Infants with Urinary Tract Infection among Pediatricians

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Background: In 2011, the American Academy of Pediatrics (AAP) published a revision of the 1999 guideline for the diagnosis and management of febrile urinary tract infections (UTI) in infants and children aged 2 to 24 months. A significant change was removal of a previous recommendation that providers routinely obtain a voiding cystourethrogram (VCUG). AAP continues to recommend obtaining a renal and bladder ultrasound (RBUS). There was no recommendation made concerning prophylactic antibiotic use following a febrile UTI. The guideline also did not address infants under 2 months of age.

Methods: An electronic survey containing clinical vignettes of a febrile 6-month-old and 3-week-old was sent to pediatricians. Diagnostic testing and treatment decisions were assessed. Demographic data concerning type of practice, area of practice and years in practice was also obtained.

Results: Respondents were general pediatricians (70%) practicing <15 years (62%) in urban areas (85%). Preliminary data showed 64% would obtain a catheterized urine specimen on a febrile 6-month-old with no apparent source of fever. With a diagnosis of UTI, 17% would do no further evaluation, 24% would do both a RBUS and VCUG, and the remainder would do the RBUS. If the RBUS was abnormal 84% would obtain a VCUG and 55% would begin prophylactic antibiotics. For a febrile 3-week-old 87% would admit to the hospital with cultures obtained and empiric antibiotics.

Conclusion: For the diagnosis of a febrile UTI and initial imaging most physicians are consistent with the AAP guideline. The majority of respondents would begin antimicrobial prophylaxis for those with an abnormal RBUS.

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Charting High Risk Prenatal Patients in a Resident Family Medicine Clinic

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Background: The aim of this study is to assess the obstetric risk factors and charting frequencies of key prenatal variables among a group of pregnant patients presenting at a residency family medicine program in order to identify whether the patients are high risk and whether their charts adequately document their risk status.

Methods: The presence or lack of prenatal information from randomly selected obstetric patients’ charts at a residency family medicine clinic was extracted from July 1 to September 1, 2014. Categories for extraction include general health, labs, screenings, receipt of health education and/or plan, in addition to pregnancy, social, and substance history.

Results: 97 patient charts were extracted – mean age was 26 years and 64% had a BMI >25. 31% of patients had 4 or more pregnancies. Areas that were well documented included due date (92%), allergies (91%), pregnancy history (89%), gravidity (89%), parity (87%), gestational age (84%), problem list with a plan (78%), BMI (77%), and past medical history (59%). Areas lacking documentation include genetic screening (95%), drug use (94%), ordering of antenatal testing (91%), lab record (66%), education documented in flow sheet (57%), social history (55%), and complete infection history (52%).

Conclusion: A random sample of prenatal patients revealed that a residency program sees a high risk population. Information regarding patients’ health history was sufficiently documented; however, several areas which could compromise patient care were missing in the EMR. Further studies should elucidate ways to increase documentation in the EMR among high risk patients to improve outcomes.

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Self-directed Learning: Can there be too much in medical education?

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**Background:** Self-directed learning (SDL) is a process in which individuals take initiative, with or without the help of others, in regards to their educational experience. The foundation of the KUSM-W Department of Obstetrics and Gynecology clerkship was strongly based on SDL, but the clerkship regularly experienced poor evaluations. A directed self-guided learning approach was implemented to address these issues. This study evaluates changes in student satisfaction and medical knowledge with the curriculum change using a Likert scale from zero to 10.

**Methods:** After obtaining IRB approval, all clerkship evaluations and National Board of Medical Examiners (NBME) scores were evaluated from 6/25/12 to 6/28/14. Self-reported surgical procedure logs were compared to actual procedures completed at Wesley Medical Center during the same time period.

**Results:** There were 125 students included in the analysis (n=58 for Year 1 and n=67 for Year 2). No significant difference was found between the average NBME scores before and after the curriculum change (75.7 vs 75.4, p=0.857). However, there was a significant improvement in students’ perceptions of resident teaching while on OB (6.1 vs 7.9, p=0.0071) and GYN call (5.9 vs 7.1, p=0.0108), staff exposure while on OB (5.7 vs 7.3, p=0.0175) and GYN call (4.3 vs 6.6, p=0.0038), adequacy of GYN call (5.0 vs 6.3, p=0.0552), and resident supervision while on GYN call (5.3 vs 7.3, p=0.0104).

**Conclusion:** NBME scores were not significantly changed, but medical student satisfaction improved and students evaluated residents and staff teaching more favorably with a directed self-guided learning curriculum.

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Variability in Torso Kinematics in Arm-constrained Human Rolling

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Background: Human rolling, commonly executed as turning in bed, is a fundamental activity of daily living and reduces the risk of injuries to underlying tissue. Research on human rolling has been dependent on constraining the rolling motion to decrease variability. Therefore, the objective of this study was to determine whether constraining the upper extremities would alter shoulder and pelvis kinematics when rolling from the supine to sidelying position.

Methods: A video motion capture system recorded the positions of retro-reflective markers adhered to the shoulders and torso of twelve healthy subjects as they rolled from the supine to sidelying position. Subjects performed two types of rolling movements five times each: i) arms crossed over the chest and ii) arms uncrossed and free to move naturally. Shoulder and pelvis velocities were obtained through numerical differentiation of shoulder and pelvis angles formed from the position of the respective markers.

Results: The results indicated that there was no significant change in whether the shoulder or pelvis initiated or concluded the roll when rolling with the arms crossed and uncrossed. The time to complete the roll and peak shoulder and pelvis angular velocities differed with rolling condition, but the timing at which these peaks occurred in the roll did not vary.

Conclusion: This study found that having subjects roll with their arms crossed increased the speed of rolling, yet produced no identifiable difference in the fundamental rolling movement. It supports future studies that use the arms crossed constraint to study rolling by including populations with physical limitations.

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Exploration of the Inhibitory Effects of Allicin on the Growth of Staphylococcus aureus in an In Vivo Animal Model

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Background: The antimicrobial properties of Allicin, while long known, require further investigation in order to evaluate this garlic-derived chemical as an anti-infective agent against *Staphylococcus aureus* wound infection. *S. aureus* is well adapted to live on skin as either normal flora or as a pathogen. Indeed, it is carried as normal flora by approximately one-third of all people. Thus, there is an important ongoing clinical problem with wound infection by this pathogen along with the fact that antibiotics continue to lose their effectiveness against strains. This has motivated us to explore alternative methods to deal with this common clinical problem and Allicin quickly emerged as an agent worthy of testing in a standardized wound infection model.

Methods: Using this mouse model, we plan to follow wound progression in the presence of levels of Allicin applied at the wound site, and compare that to uninfected and untreated controls. We will follow the progression of this infection in a number of ways: visually (by periodic photography of the wound site), through the quantitative determination of inflammatory cytokine gene expression by the mouse host, through the quantitative determination of virulence factor gene expression by the pathogen, and histologic staining and microscopic analysis of wound tissue.

Results: These forms of analysis will serve as the basis for determining whether Allicin is effective at controlling wound infection and, if so, to perhaps yield important clues about the mechanism by which it operates.

Conclusion: These clues may be useful in designing more effective control on wound infection in the future.

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Energy Differences in Arm-constrained Human Rolling

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**Background:** Rolling is an important developmental motor skill that not only affords comfort but also injury prevention. People who cannot roll, whether due to age or disability, are at greater risk of developing bedsores. People use different techniques to roll. For example, some people use their arms to arms to roll whereas others do not. The purpose of this study was to identify which rolling technique requires less energy.

**Methods:** For this study, data were collected from ten healthy subjects by a video-based motion capture system (Motion Analysis Corp., Santa Rosa, CA). Subjects were instructed to lie in the supine position and roll to their right into a side-lying position under two conditions, i) arms uncrossed (free to move naturally) and ii) arms crossed over the chest. Data were then imported into a simulation software (OpenSim) to calculate the centers of mass, linear, and angular velocities of the body segments. The potential and kinetic energy of the body segments were calculated to determine the energy of rolling for both techniques. A statistical analysis was performed to identify differences in energy between the two rolling conditions.

**Results:** The statistical analysis indicated that there was a significant difference ($p = 0.007$) between the energy measures for both rolling techniques. The energy was lower for rolling with the arms crossed (60.1 ± 12.1J) than with the arms uncrossed (72.6 ± 13.8J).

**Conclusion:** This information could be useful to individuals and care providers for individuals who have difficulty rolling.

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Exploration of the Inhibitory Effects of Manuka Honey on the Growth of Staphylococcus aureus in an In Vivo Animal Model

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**Background:** Due to chronic overuse of antibiotics throughout history, we are now living in an age where some infectious agents are no longer susceptible to any known antibiotic. Of particular concern to clinicians is one type of antibiotic resistant bacteria that is a contributing factor to the majority of hospital acquired surgical site infections: methicillin resistant *Staphylococcus aureus* (MRSA). One promising substance that has been shown *in vitro* to inhibit *S. aureus* is manuka honey, which is produced from nectar that originates from the shrub *Leptospermum scoparium*. This type of honey is currently used in the treatment of burns and wounds under the trade name of MEDIHONEY®, but not much is known about the role manuka honey may play in the inhibition of initial wound infection by *S. aureus*.

**Methods:** To explore this aspect we plan to use an epicutaneous mouse model of infection as outlined in a previously published study by Prabhakara et al. (Infect. Immun. 2013, 81(4): 1306). Mice will be pretreated with manuka honey or MEDIHONEY® and then challenged with *S. aureus*.

**Results:** To explore this aspect we plan to use an epicutaneous mouse model of infection as outlined in a previously published study by Prabhakara et al. (Infect. Immun. 2013, 81(4): 1306). Mice will be pretreated with manuka honey or MEDIHONEY® and then challenged with *S. aureus*.

**Conclusion:** Through this analysis we hope to not only assess the ability of manuka honey to prevent skin and soft tissue infections caused by *S. aureus* but to also gain a greater understanding of manuka honey’s mechanism of action.

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Surface Functionalization’s of ZnO Nanoparticles for the Cytotoxicity of Cancer Cells

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Background: Nanoparticles have been considered for different cancer treatments for a while because of their unique size, shape, surface area and reactivity. These materials can travel in the circulatory systems of the body, and easily penetrate into the cell membranes under internal (van der Waals, hydrophobic and electrostatic) and external (magnetic, electric and mechanical) forces. Surface functionalization’s can offer superior surface characteristics on the nanoparticles for many desired applications, and prevent them from agglomeration by adjusting the zeta potential values. This can also enable them to increase the surface area to be more effective on the cancer cells. Polymer conjugation and drug molecule attachments can be applied on the nanoparticles to enhance their abilities in biomedical fields. Zinc oxide nanoparticles are highly considered for the treatment of cancer cells and tumors, and changing surface functionality and size of ZnO nanoparticles may improve the cell-ZnO nanoparticle interactions, and cell death.

Methods: The primary objectives of the present study are to functionalize two different ZnO nanoparticles (20 nm and 100 nm) using 3-(2-aminoethylamino) propyl trimethoxysilane and albumin, and investigate the effects of size and functionalization on the cytotoxicity values of the cells (MDA - 486 breast cancer cells, and L-929 - fibroblast cells).

Results: The MTT assay results indicate that the surface functionalization, particle size and cell type could be important parameters for the cytotoxicity of the cells.

Conclusion:
Investigation of Vitreous Carbon Foam as a Bone Graft Substitute in Critical Defects

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Wichita State University¹, Via Christi Regional Medical Center²

Background: The demand for bone grafts far exceeds the supply of the gold standard treatment: autograft bone and allogeneic grafts have much lower success rates. Vitreous carbon foam (VCF) shows great potential as a bone graft substitute, with interconnected porosity mimicking cancellous bone and BMP-2 binding. We tested this material in critical sized defects in rats and sheep.

Methods: Rats: A 6mm full thickness femoral segmental defect was filled with a BMP-2 coated VCF graft stabilized by intramedullary nail. Grafts were harvested after 12 weeks, MicroCT scanned and slides prepared. Sheep: 8mm diameter drill defects were created, and filled by 18mm long implants. Groups included 80 and 100 ppi foams uncoated or coated with 100μg or 350μg of BMP-2, autograft, empty, and Infuse (350μg BMP-2 coated collagen sponge). Implants were harvested after 12 weeks and bone growth assessed by MicroCT. One-way ANOVA with post hoc testing was used for statistical analysis, with a significance level of p < 0.05.

Results: Rats: The defect was completely filled in line with both cortices. Sheep: The autografts had the highest bone volume, but the bone volume of 100 ppi with 100μg BMP-2 group was statistically equivalent to autograft, showing trabecular structure continuous with surrounding bone. This group was significantly higher than the Infuse group.

Conclusion: VCF has great potential as a bone graft substitute showing results similar to autograft, lessening the need for autograft harvest procedures and potential associated complications. VCF is an effective delivery vehicle for BMP-2, requiring a lower dosage of BMP-2, decreasing overall cost per procedure.

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Vitreous Carbon Foams for Orthopedic Surgeries

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Background: Vitreous carbon foams (VCF) morphologically resemble cancellous bone, and have excellent biocompatibility. VCFs bind BMP-2 well and support tissue ingrowth and neovascularization, and could replace the absorbable collagen sponge (ACS) used in spinal fusion InFuse kits.

Methods: VCF was compared to ACS to support growth and pre-osteoblast differentiation of C2C12 mouse myoblasts with or without BMP-2. Coated materials were rinsed for 8 days to measure BMP-2 release by ELISA and induced alkaline phosphatase (AP) using cell lysates. VCF and ACS were also implanted into rat muscle pouches to measure ectopic bone formation over 4 weeks, with bone volume determined by MicroCT and vascularization observations made histologically.

Results: VCF materials adsorptively bound BMP-2, determined by depletion of coating solution (ELISA) and increase in alkaline phosphatase (AP) induction by exposed C2C12 myoblasts. Although they bound equivalent amounts of BMP-2, passive elution over 8 days caused a 70% loss by ACS and 30% from VCF. Consistently, AP induction was greater for VCF than ACS. Similar losses from ACS sponges were seen with mechanical compression. Ectopic bone formation in rats was assessed between ACS and VCF. Additional ACS specimens were inserted into solid PEEK or VCF rings for mechanical shielding. MicroCT results showed somewhat improved bone formation with the PEEK ring and a greater improvement with VCF ring, equaling coated VCF.

Conclusion: Chemistry, scaffold porosity and morphology are important attributes for bone graft substitutes, and VCF materials are well-suited for this role. VCFs support rapid neo-vascularization even without cytokine delivery, and could replace or synergize with ACS.

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Evaluation of Different Experience Levels of Orthopaedic Residents Effect on Polymethylmethacrylate (PMMA) Bone Cement Mechanical Properties

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Background: The aim of this study was to evaluate and compare tensile and compression strength for PMMA cement mixed by intern orthopaedic residents (PGY-1) and senior orthopaedic residents (PGY-5).

Methods: Four PGY-1s and four PGY-5s and each prepared eight tensile specimens. The bone cement used was Simplex™P bone cement under vacuum mixing in a cement-delivery system. Tensile testing of the specimens was performed in an MTS Bionix servohydraulic materials testing system with loading rate of 2.54 mm/min at room temperature. The mean and standard deviation of the ultimate tensile strength (UTS) for each resident group was calculated. The compression specimens were cylinders formed with a central core to mimic a prosthetic implant. Ten samples from each resident were loaded from -50N to complete structural failure at the rate of 20 mm/min. Mean and standard deviation of the ultimate compressive strength (UCS) were calculated for each group.

Results: Both the average UTS and the tensile elastic modulus of the bone cement for the PGY-1 and PGY-5 were no statistically significant difference between the two groups. For the compression elastic modulus of the bone cement, the results for the PGY-1 and PGY-5 residents were no statistically significant difference. However, the UCS of the bone cement for the PGY-1 and PGY-5 residents was statistically significant difference between the groups.

Conclusion: Our results indicate that no special training appears to be necessary for orthopaedic residents. Rather, a basic training video demonstrating manufacturer standard procedure is all that is necessary.

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Intrusion Characteristics of Three Bone Cements for Tibial Component of Total Knee Arthroplasty in a Cadaveric Bone Model

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Background: Simplex-HV is new bone cement developed to provide adequate cement intrusion using standard finger packing technique while achieving the properties of higher viscosity, shorter mixing, and curing times than Simplex-P. The purpose of this study was to evaluate and compare the intrusion characteristics of Simplex-HV to Simplex-P and Palacos-R in cadaveric proximal tibial bone.

Methods: Eighteen fresh frozen cadaver proximal tibiae were performed with standard arthroplasty tibial cuts. Each tibia was randomly assigned to receive one of the three bone cements for use with finger packing technique. Saggital sections were prepared and analyzed using digital photography and stereoscopic micrographs to evaluate cement intrusion characteristics. The cement penetration depth was measured from the tibial bone cut surface, which did not include the cement thickness under the tibial base plate.

Results: Significant differences were detected in the bone cement penetration between the three cements. Penetration was increased using the Simplex-HV (average: 2.7mm; range: 2.0-3.0mm) compared to Simplex-P (average: 2.2mm) and Palacos-R (average: 1.8mm). These depths approximate to 3.7mm, 3.2mm, and 2.8mm of total cement penetration respectively.

Conclusion: The data suggest that high viscosity bone cement may provide good fixation of the tibial component of a TKA when using the finger packing technique.

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Evaluation of CIBOR PEEK Spine Interbody Fusion Device

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**Background:** The aims of this study were to evaluate the ability of the CIBOR PEEK spine interbody fusion device to resist motion in terms of subsidence under axial loading and rotation, and also determine surgeon feedback on the device.

**Methods:** Three different sizes of the device were investigated. Part I: implants were tested under axial compression and rotation using polyurethane foam blocks. Part II: simulated 2-legged stance using cadaveric specimen and the L5-S1 lumbar spine was used. A survey feedback form was used to investigate the surgeon feels about the implant.

**Results:** In Part I, the subsidence hysteresis under axial compression loading was found to be statistical significant difference between these three implant sizes. It was noted that the implants had migration as rotation applied, and the amount of subsidence was a factor of the axial compression loads applied. In Part II, a minor subsidence and carbon foam debris were observed when compared to each implant size. Poor contact surface of the implant with the end plates of the L5 or S1 vertebrae from the anterior view under maximum loads was observed; however, the implant seems to be stable. Each surgeon has their own subjective opinion about the CIBOR implant.

**Conclusion:** In part I, two out of the three different sizes of the device (medium and large sizes) provided appropriate rigid stabilization at the physiological loads. In Part II, neither orthopaedic surgeon was not 100% satisfied with overall performance of the implant, but felt potential improvement could be made.

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Retrograde Ejaculation after Anterior Lumbar Interbody Fusion with the Use of rhBMP-2

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Background: Retrograde ejaculation (RE) is a known complication in male patients after anterior lumbar interbody fusion (ALIF). The approach required for the ALIF procedure addressing L4-S1 can put the superior hypogastric plexus at risk leading to this post-operative complication. However, literature has also described an association between the ALIF procedure and the use of recombinant human bone morphogenetic protein (rhBMP-2) causing this same complication likely from damage to the sympathetic system.

Methods: Our hypothesis was that spine fusion procedures with the use of rhBMP-2 will increase the risk of RE complication. A researcher fully constructed a 10-question questionnaire and mailed it to 145 patients who had a surgery between 1/1/2005 and 12/31/2010.

Results: 40 patients were lost to follow-up, 3 patients deceased, 66 patients did not return the questionnaire, 10 patients refused to participate, 22 patients answered all 10 research questions giving 22% response rate. Four patients positively answered to relevant to RE question 8: “Have you experienced orgasm without ejaculation (peaked or had an orgasm without fluid exiting the end of the penis)?” A proportion and 95% confidence interval for response were 0.182 [0.021-0.343].

Conclusion: No other study to date has used the questionnaire in which we utilized to tease out this possible complication. Limitations within the study including sample size, follow-up, diagnostic criteria and comparative data do not allow us to make definitive conclusions regarding the use of rhBMP-2 and its complications, specifically RE. However, the data does point in that possible direction. The study was approved by HSC STUDY00000321 and funded by Dean’s Level I Grant.

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Do Community Baby Showers Increase Maternal Knowledge of Infant Safe Sleep Practices?

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**Background:** Community baby showers aim to provide safe sleep education and resources needed to create a safe sleep environment. The purpose of this study was to determine whether maternal knowledge about infant safe sleep practices increased following participation in the community baby shower.

**Methods:** Pregnant women and new mothers in Wichita, KS, were invited to attend the community baby shower through fliers, Facebook, television, and radio advertisements. As part of the program evaluation, participants completed pre- and post-test surveys including questions on knowledge and intentions regarding safe sleep. This study was approved by the Human Subjects Committee at University of Kansas School of Medicine-Wichita.

**Results:** The majority of the 118 mothers who participated self-identified as Hispanic (44.9%, n=53), white (28.8%, n=34), and African-American (20.3%, n=24). Most mothers reported having a high school diploma/G.E.D. or less (70.3%, n=83) and having Medicaid or no insurance (71.2%, n=84). Correct responses to knowledge questions about the ABCs (alone, back, crib) of safe sleep (p<0.001), proper infant sleep location (p=0.039), and sleep position (p<0.001) significantly increased. All participants who responded (n=110) on the post-survey correctly identified that it is safest to place an infant supine to sleep.

**Conclusion:** The community baby shower was successful in attracting mothers with demographic risk factors for infant mortality and demonstrating improved attendees’ knowledge of and intentions to follow safe sleep practices. After the baby shower, nearly all respondents intended to place their infant supine in a separate crib in the same room as the mother.

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Recruitment of African Americans into a Walking Intervention Trial for Peripheral Artery Disease

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Background: Recruitment for clinical trials of patients with peripheral artery disease (PAD) can be challenging. We explored effective recruitment strategies for an NIH funded clinical trial which focuses on African Americans with PAD.

Methods: We present recruitment strategies over an 18-month time-frame for a 12-month randomized clinical trial, in Wichita, KS, to determine the efficacy of motivational interviewing to promote walking in African Americans with PAD. Study participants had to meet the following criteria: 1) African American, 2) resting ankle-brachial index (ABI) ≤ 0.95, 3) English speaking, and 4) telephone access. Ten different recruitment methods were used and interested participants contacted us to undergo telephone screening. Using descriptive statistics, we captured the number of African Americans telephone screened and the number randomized.

Results: By June 2014, 844 participants were screened for the study. Of these, 82 were eligible and enrolled to participate. A total of 10 different methods were used to advertise the trial to potential participants (direct mailings, fliers, word of mouth, newspaper advertisements, community events, television advertisements, bus advertisements, physicians, unknown, radio advertisements, and billboards). The direct mailings were the most successful method in recruitment (405/844) and enrollment (29/82) of participants. This accounted for 35.4% of the participants enrolled.

Conclusion: The most successful recruitment strategies for a randomized clinical trial involving African Americans with PAD were mailings, word of mouth, and fliers. Recruitment within future trials of racially diverse populations with PAD should consider these approaches to achieve successful enrollment.

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Poster Location: West Atrium  
Poster #: 27

**Urinary Incontinence in Women and Conservative Spine Care: A retrospective cohort study**

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**Background:** Urinary incontinence affects 25-50% of women in the United States. Pelvic floor exercises are a common conservative treatment for urinary incontinence; however, adherence is low because exercises are often monotonous and must be performed multiple times per day indefinitely. Conversely, lumbosacral nerve dysfunction secondary to nerve root irritation can be improved with physical therapy. The purpose of this study was to examine clinical outcomes of women with urinary incontinence treated with manual therapy and extension exercise for the lumbosacral spine including postural correction, with or without pelvic floor (PF) muscle exercise.

**Methods:** 150 patients seeking physical therapy for lumbosacral nerve root dysfunction were evaluated for symptoms of urinary incontinence. The four outcomes included: Pelvic Floor Impact Questionnaire (PFIQ-7), Pelvic Floor Distress Inventory (PFDI-20), Oswestry Disability Questionnaire (Oswestry) and Urogenital Distress Inventory (UDI-6) score. Patient’s demographic information such as age, BMI, smoking status, diabetes status, employment status and prior history of gynecology surgery, was collected to assess their effects on the four outcomes measures.

**Results:** Average age for these 150 patients was 56 (SD=15) years with the average BMI being 26.3 (SD=5.5). Average PFIQ-7 score decreased from 56.0 to 14.2 (p<0.0001), average PFDI-20 score decreased from 98.5 to 45.1 (p<0.0001), average Oswestry score decreased from 24.5 to 11.4 (p<0.0001), and average UDI-6 score decreased from 49.1 to 20.3 (p<.0001).

**Conclusion:** This study finds that treating patients for lumbosacral nerve dysfunction showed improvement in their urinary incontinence related outcomes. Patients with worse baseline symptoms experienced greater improvement in post-therapy outcomes.

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Assessment and Promotion of Infant Safe Sleep Guidelines in an Obstetrical Office

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Background: Infant safe sleep education often occurs in the hospital after delivery or during well child checks. The timing of safe sleep education is critical, as decisions regarding infant care and nursery setup begin before the child is born. However, few obstetricians engage in sleep-related anticipatory guidance. This study explores whether providing a Safe Sleep Toolkit and training increases promotion of the American Academy of Pediatrics (AAP) guidelines for infant safe sleep during obstetrical visits.

Methods: Obstetrical providers and staff at a single, group practice received training on a Safe Sleep Toolkit in April 2014. The training included information on a 4-item, parent-reported, Prenatal Safe Sleep Quiz and brief provider script to address unsafe sleep choices for infants. Providers were surveyed before and approximately one month after the training regarding knowledge of the AAP Safe Sleep Guidelines, practice of providing safe sleep education to expectant mothers and perceived barriers. Providers received a $15 incentive.

Results: All providers participated (n=11); most were male (55%) and practicing ≥20 years (55%). Providers reported significant increases in percentage of mothers with whom they discussed various specific safe sleep guidelines (82%-90% vs 8%-12%) (all p<0.001). Significant improvements in provider knowledge of most AAP guidelines were observed, including recognition of unsafe items in the crib, such as bumpers and positioners. Perceived barriers, including lack of time, did not change.

Conclusion: The Safe Sleep Toolkit may be a reliable curriculum to introduce infant safe sleep education for expectant mothers in obstetrical clinics. Follow-up of maternal safe sleep practices is needed.

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Does Providing Infant Caregivers with a Wearable Blanket Increase Safe Sleep Practices? A Randomized Controlled Trial

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Background: Loose blankets continue to be a risk for sudden infant death. This study intended to test the effectiveness of giving wearable blankets to increase safe sleep practices among caregivers at a Pediatric resident clinic.

Methods: A randomized controlled trial was conducted with caregivers of 1-month olds. Standard care included discussion with the healthcare provider with a 4-item safe sleep quiz for parents. The intervention group (IG) received a wearable blanket with a safe sleep message following their appointment. Control group (CG) members received a water bottle with no messaging. Follow-up surveys regarding infant sleep location, position and environment, and attitudes surrounding safe sleep were conducted at 2-month appointments.

Results: Follow-up was completed on 115 (76%) of participants. Only 35% of IG members could accurately recall the safe sleep message embroidered on the wearable blanket; however, IG members were more likely to report the item was helpful in reminding them to use safe sleep practices (alone, back, crib) versus CG members ($\chi^2(3)=16.00$, $p=0.001$). In addition, IG members were more likely to report the wearable blanket helped them talk with others about using safe sleep practices with their baby ($\chi^2(1)=4.09$, $p=0.04$). However, no increases in adherence to safe sleep position, location, or environment were observed.

Conclusion: Providing caregivers with wearable blankets did not improve adherence to the safe sleep guidelines. However, the wearable blankets did act as reminders and stimulated conversations regarding safe sleep. A stronger dose of safe sleep education, in addition to having a provider deliver the wearable blanket, should be evaluated.

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Safe Sleep Knowledge and Use of Provided Cribs

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**Background:** Barriers to reducing infant sleep-related death through safe sleep practices include lack of knowledge and resources, which can be mitigated by distributing cribs and education to high-risk families. No long term follow-up studies have investigated how cribs are used by these families and few examine whether knowledge is retained over time.

**Methods:** Caregivers responded to a questionnaire upon referral. Cribs were then delivered along with safe sleep education to the caregiver’s home. Approximately two months after crib delivery, caregivers were again surveyed and a home visit conducted to assess the child’s sleep environment. Questions regarding safe sleep knowledge (infant positioned on back, in crib, and not bed-sharing) were summarized and McNemar’s tests compared baseline and follow-up knowledge.

**Results:** Cribs were delivered to 75 caregivers on average 2 (SD=4) weeks after referral and home visits were conducted 13 (SD=6) weeks later. Knowledge of safe sleep practices increased significantly (p<0.05, each) at follow-up with 67 (89%) caregivers affirming back positioning, 68 (91%) addressing removing unsafe items from the sleeping area, and 42 (56%) abjuring bed sharing. At the home visit, 70 (93%) caregivers had the crib assembled and in use; further, 74 (99%) infants were reported as sleeping in a crib or bassinet, and 67 (89%) had no unsafe items in their sleeping area.

**Conclusion:** Providing cribs and education to mothers resulted in improved safe sleep knowledge and use of the crib months after these resources were provided. Few mothers obtained other cribs, and only one infant was not reported to sleep in a crib.

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Compliance with American College of Obstetricians and Gynecologists Recommendations for Papanicolaou Testing among 21 to 65 Year Old Women

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Background: The incidence of cervical cancer in the United States has decreased more than 50% in the past 30 years due to regular screening. This study aimed to identify factors associated with receiving a regular papanicolaou test (Pap test) in women 21 to 65 years of age living in the United States.

Methods: Logistic regression analysis was conducted using the 2012 BRFSS data. Survey weight and stratum were used to correct the sampling bias.

Results: Compliance with recommendations were higher if they: lived in urban or suburban areas (AOR=1.35, 95%CI 1.26 1.45, and AOR=1.32, 95% CI 1.20 1.45 for urban and suburban, respectively), were 21-30 years old (AOR=1.43 95% CI 1.21-1.68), had higher income (AOR=1.48, 95% CI 1.34 1.65 for those with income ≥ 75000), had health insurance (AOR=1.62, 95% CI 1.46, 1.79), achieved higher education level (AOR=1.39, 95% CI 1.26 1.53 for those with college degree), never smoked (AOR=1.57, 95% CI 1.44 1.71 for non-smoker), were married or a member of unmarried couple (AOR=1.28, 95% CI 1.19. 1.39), had primary care physician (AOR=2.05, 95% CI 1.84 2.28).

Conclusion: Factors associated with receiving a regular Pap test included living in urban or suburban areas, being in the 30-65 age range, having a higher income, having health care coverage, having achieved more education, were non-smoker or former smoker, were married or a member of unmarried couple, and had primary care physician. Efforts to improve adherence to regular Pap test screening could use these findings to target those vulnerable populations.

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Where Radicals Roam Free: The inflammatory truth

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Wichita Collegiate School

Background: Inflammation is known to be associated with thirty-nine auto-immune diseases. Several inflammatory messengers such as IL-6, IL-1B, and TNF alpha indicate a causative role for inflammation in the pathogenesis of the following diseases: diabetes, arthritis, heart disease, cancer and neurological disorders. The focus of this study is to determine the role of diet and exercise (environmental factors) on these diseases.

Methods: The research originated with the examination of specific inflammatory biomarkers in the chronic inflammation pathway and the role of inflammation in the development of autoimmune diseases. Approximately sixty-five articles from medical and scientific journals were thoroughly analyzed and annotated for the purpose of finding the specific role of these inflammatory biomarkers. For example, diabetic patients who were given antioxidants had reduced levels of TNF-alpha and IL-8 which are both inflammatory cytokines. This is because free radicals cause changes in transcription factors which lead to an aberrant expression of biomarkers such as TNF-alpha, IL-1, IL-6.

Results: Many pharmaceuticals are addressing symptoms of chronic inflammation related diseases. However, appropriate healthy diets and exercise can reduce the risk for diseases as well.

Conclusion: Pharmaceuticals help patients who have chronic inflammation related diseases. Certain lifestyles focused on proper nutrition and exercise may prevent these diseases or at least alleviate some of the symptoms associated with these diseases.

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**Gas Chromatography: The search for fatty acid degradation**

Janice Crowley, M.Ed., Kevin Mattar, Grace Kohn, Emma Schmaltz, Hasan Raffi, Umama Ali, Noor Farhoud, Samuel Beren

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**Background:** Chronic inflammation has been strongly associated with at least thirty-nine auto-immune diseases. Foods too high in omega-6 fatty acids, trans and saturated fats have been known to lead to inflammation.

**Methods:** Transesterification reactions were carried out with rancid and non-rancid cooking oils. These samples were injected into a gas chromatograph and their chromatograms were analyzed for differences between the rancid and non-rancid oils.

**Results:** Regular and rancid samples of methyl esters of these oils: peanut, canola, coconut, grapeseed, and vegetable revealed percentage changes in levels of saturated, unsaturated and possibly trans fats. Due to the disparity between the results of each oil, refer to Tables 1 -4 on the poster for the specific variations in each of these oils.

**Conclusion:** There is a notable difference in rancid vs. non-rancid cooking oils. Cooking with oils that are old or have been exposed to sun and heat changes the original fatty acids into more pro-inflammatory fatty acids. There is a link to inflammation from foods high in omega – 6, saturated and trans fatty acids. Refer to poster: Where Radicals Roam Free: The Inflammatory Truth. The poster shows the molecular pathways associated with these fatty acids and inflammation.

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Additional Findings on MRI When Evaluating Invasive Lobular Carcinoma as Compared to Mammography and Ultrasound

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**Background:** Over the past 10 years it has become more common for MRI to be implemented to evaluate breast masses preoperatively, but its place in clinical practice continues to be defined. A meta-analysis by Houssami, et al, examined surgical outcomes based on preoperative breast MRI and concluded that MRI reduced re-excision surgery in patients with Invasive Lobular Carcinoma (ILC). However, they also concluded that the overall patient benefit from MRI in ILC is unclear. The purpose of study is to assess if MRI identifies additional ILC as compared to mammography and ultrasound.

**Methods:** A retrospective cross-sectional chart review was performed of women with new onset of primary ILC breast cancer from 2005-2014. Information extracted included patient demographics and breast cancer characteristics. Factors that were defined as having an effect on surgical planning and local recurrence were multifocal, multicentric, and contralateral disease. Data were assessed with Fisher Exact and Mann-Whitney U tests.

**Results:** In the study period 49 patients meet criteria to be included in the study. Additional cancer was detected in 34% of patients by MRI. 76% had multifocal disease; 41% had multicentric disease; and 12% had contralateral disease. Of those with positive results mammogram detected 88% and ultrasound detected 100% of the primary ILC.

**Conclusion:** MRI detected additional malignant findings in 34% of patients with ILC, relative to mammography and ultrasound, of which 76% was multifocal disease. Thus MRI is a valuable tool for preoperative evaluation of ILC. Importantly breast imagers should have an increased awareness for multifocal disease.

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Implementation of Value-based Radiology

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Background: There has been a recent push by the radiology profession to find ways to add value to radiology services. We will discuss our initial efforts to implement value-based radiology.

Methods: Our project focused on improving reporting efficiency. The initial focus was on improving emergency department (ED) satisfaction by decreasing mean turn-around times (TAT) for finalized reports. Clear communication of goals and metrics was critical. Consistent metrics of mean TAT were provided to staff on a monthly basis to measure progress. The resident-attending interaction was modified for ED studies in an effort to streamline checkout.

Results: Initially, the mean TAT for ED studies decreased 24% (176 min to 134 min) over 7 months after communication of goals and metrics. Subsequently, the PACS user interface was also modified to accommodate an efficient workflow for reading ED studies. The resident-attending interaction was streamlined for ED studies with straightforward reports sent directly to the attending and a more formal check-out for difficult studies. Consequently, the TAT decreased an additional 48% (134 min to 64 min) over the next 5 months.

Conclusion: There is a concerted effort being made by the radiology profession to transition to value based radiology. The academic setting provides unique challenges and opportunities in this transition. Our experience demonstrates that clear goals, appropriate metrics, consistent feedback, and adaptability are crucial in implementation of value based radiology.

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Injury Factors, not BMI, are Associated with Hospital Resource Usage in a Trauma Population

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Background: Obesity is a national epidemic affecting all aspects of healthcare. Of concern, for the purpose of allocating resources appropriately, is whether obese patients utilize more resources during their hospital stay. The purpose of this study was to determine if there were differences across BMI categories in hospital resource usage measured as a multifaceted variable in a trauma population.

Methods: Retrospective trauma registry study of adult patients (aged > 18 years) admitted to a Midwestern Level I trauma center (2004-2012). Patients were stratified into three groups: non-obese (normal weight, overweight), obese, and morbidly obese. Three canonical correlation analyses were employed to determine the relationship between patient/injury characteristics (age, ISS, GCS, physiological complications) and hospital resource usage (ICU and hospital LOS, medical consults, procedures).

Results: Analysis included 9771, 71.2% were non-obese, 23.8% obese, and 5.0% morbidly obese. For patient/injury characteristics, ISS was significant for the non-obese (0.61), obese (0.37) and morbidly obese (0.3). Physiological complications were also significant for the non-obese (0.94), obese (0.70) and morbidly obese (0.74). GCS was only significant for the non-obese (-0.45). For resource usage, ICU LOS was significant for the non-obese (0.50), obese (0.56) and morbidly obese (0.35). Procedures were also significant for the non-obese (0.54), obese (0.55) and morbidly obese (0.67).

Conclusion: Associations between BMI and outcomes have been noted when assessed as independent variables. However, when resource usage was assessed as a multifaceted outcome variable, injury factors (ISS, GCS, physiological complications) rather than patient characteristics were associated with resource usage.

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Hospital Outcomes Associated with Traumatic Farm Injuries Mechanisms in a Rural State

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Background: Agricultural workers are susceptible to numerous occupational hazards. However, in a rural state the disproportionate distribution of trauma resources can affect hospital transportation times. The aim of this study was to evaluate injury severity and transportation times among workers injured in a rural setting.

Methods: A 10-year retrospective review was conducted of adult patients presenting with agricultural-related injuries at a level-1 trauma center between 1/1/2004 and 12/31/2013. Data included demographics, injury mechanism and details, transportation details, length of stay, ventilator days, and discharge disposition. Cases were grouped as either animal (AN) or non-animal (NAN).

Results: Among 150 patients, most (98%) sustained blunt injury, were male (73.3%) and with average age of 50±19 years. The majority (64.0%) were transported by ground ambulance, followed by private vehicle (25.3%), and flight (10.7%). More patients sustained NAN injuries (n=89, 59.3%) than AN (n=61, 40.7%). Regardless of group, more than half of patients had transportation times in excess of two hours (55.7% and 66.3% for AN and NAN, respectively). NAN injuries were associated with a significantly higher ISS (p value=0.04). Among patients in the NAN group, 19.1% required either rehabilitation or a skilled-nursing unit compared to 14.8% of patients with AN injuries. NAN-injured patients had significantly longer hospital, ICU, and ventilator days. The overall mortality rate was 4% (n=6).

Conclusion: Patients with NAN injuries demonstrated poorer outcomes. Regardless of the injury type, transportation mode and time were not associated with hospital outcome or disposition, despite greater than half of the population reporting prolonged transportation times.

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Outcomes Following Traumatic Grain Elevator Injuries

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Background: Grain elevator operation is associated with hazards including suffocation following entrapment, burns, crush injuries, and falls. While infrequent, these dangers often result in significant injury and death, however outcomes are underreported in literature. The purpose of this study was to compare hospital outcomes between patients who sustained traumatic injuries associated with industrial grain elevators versus those on a farm.

Methods: A retrospective review was conducted of all patients’ ages 0 to 89 presenting with grain elevator-related injuries at a Level 1 trauma center between 1/1/2003 and 12/31/2013. Data collected included: demographics, mechanism of injury, injury severity, hospitalization details, and discharge disposition. Data were summarized and comparisons made between the industrial and farm groups.

Results: All patients (n=18) in the study were male, with a mean age of 37 years. The most common mechanism of injury was falls (n=6, 33.3%), followed by machinery (n=5, 27.7%), entrapment (n=4, 22.2%), explosion (n=2, 11.1%), and crush (n=1, 5.5%). Average hospital length of stay in the farm group (7.67 ± 9.07 days) was more than double that of the industrial group (3.3 ± 3.0 days). The majority of patients (n=15, 83.3%) were discharged to home, and 2 (11.1%) were discharged to a rehabilitation facility.

Conclusion: Literature reports entrapments, though rare events are the leading cause of death related to grain elevator accidents, however we found the most common grain elevator-associated injuries were falls at industrial elevators. This suggests a greater emphasis should be placed on fall prevention in the industrial environment while maintaining machinery safety measures.

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Neonatal Seizures: Incidence, Risk Factors, and Response to Treatment

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Background: The true incidence of neonatal seizures is unknown. The reported incidence of neonatal seizures: community- 0.09%-0.5%, NICU- 8.6%, and for <29 weeks- 11.8%. Objectives: To determine: a) the incidence of seizures for infants born at WMC and infants admitted to NICU; b) risk factors for seizures for those <29 weeks; c) response to treatment.

Methods: This is a retrospective cohort study (2011 to 2013). Subjects were either term infants (within 30 days) or premature infants (before 44 weeks post-menstrual age) with seizures (clinical/EEG). Data was obtained from multiple data base records. Risk ratios (RR) were obtained using a log-log binomial regression model. Study was approved by IRB.

Results: WMC (Total Births: 18,368): Incidence of seizures was 0.9% for all births. RR was significant for BW<1,500 g (RR 13.4, 95% CI 9.1-19.8 g), ≤25 weeks (RR 40.3, 95% CI 27.4-59.4 g) and 26-28 weeks (RR 17.6, 95% CI 11.4-27.2 g). NICU (Total Admits: 2,496): Incidence of seizures was 9.09% for NICU babies, incidence in <29 weeks was 43.9%. Intra-ventricular hemorrhage (RR1.64, CI 1.09-2.46) and exposure to Pentobarbital (RR3.79, CI 2.57-5.60) were significant risk factors for seizures in infants <29 weeks. Treatment: 84% received Phenobarbital and 16% 2 or more anticonvulsants. 86% were discharged with anticonvulsants. Outcome: 10% died before discharge. Infants <29 weeks: treatment <3 months 32%, >6 months 13%. Of all survivors, 68% were followed for 1 year and 10% were on anticonvulsants.

Conclusion: The incidence of seizures in infants <29 weeks was significantly higher in our study than previously reported (p=<0.001).

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**Estimated Blood Loss during Scheduled Cesarean Deliveries is Vastly Underestimated**

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**Background:** Inaccuracies in estimating blood loss can delay the diagnosis and treatment of peripartum hemorrhage. Underestimations can lead to a delay in diagnosis and treatment and avoidable hemorrhage-related maternal mortality. This may lead to shock, disseminated intravascular coagulation, cardiopulmonary arrest and death. Over estimations can result in needless blood transfusions. The objective of this study was to compare the estimated (EBL) with calculated blood loss (cEBL) associated with scheduled Cesarean deliveries.

**Methods:** Admission and post-delivery hematocrit, EBL, and other variables were retrospectively entered into an obstetrical database between January and February 2015. cEBL was derived using a modified version of the formula used for determining pregnancy blood volume, whereby the calculated pregnancy volume was multiplied by percent blood volume lost.

**Results:** 100 subjects had complete data. cEBL was significantly different than EBL \(Z = -6.87, p < 0.05\). Blood loss estimates were generally underestimated 79% of the time \(cEBL > EBL = 0.79\). Within primary and repeat Cesarean delivery groups, there was a significant difference between cEBL and EBL; however, when comparing the two groups, there was no difference \(p > 0.05\). There was a small-moderate positive correlation between cEBL and EBL \(r = 0.39, p < 0.05\). Finally, the amount of blood loss had no effect on the degree of inaccuracy of EBL \(p > 0.05\).

**Conclusion:** The blood loss estimations during scheduled Cesarean deliveries at this rural Kansas hospital are inaccurate. By using the above mentioned formula, improvements can be made to accurately assess the volume of blood loss during scheduled Cesarean deliveries.

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Background: Known causes of stillbirth include premature rupture of membranes, congenital anomalies, pre-eclampsia, and intrauterine growth restriction. Risk factors for stillbirth include age, black or Hispanic ethnicity, history of smoking, history of stillbirth, diabetes, and hypertension. The objective of this study was to determine the stillbirth rate and descriptive factors for clinics serving the Wichita population.

Methods: After receiving IRB approval, a retrospective chart review was conducted at two local, private practice obstetrical clinics. Records were reviewed for patients that experienced a stillbirth between January 1, 2007 to December 31, 2013 using ICD-9 codes: V27.1, 656.4, 674.9, 656.43, 779.9, and 651.6. Cases with a demise before 14 weeks gestation were excluded. Demographics, maternal history, antepartum care, antepartum education, and delivery information were collected.

Results: The stillbirth rate was 4.1 per 1,000 deliveries. Among the 78 patients included in the final analysis, average maternal age was 28.2 years (SD=7.1, range=17 to 45). Most were white (n=48, 64%), never smoked (n=50, 64.9%), and had private medical insurance (n=51, 68%). Average gestational age at delivery was 27.9 weeks (SD=7.9, range=14 to 41). Among the 45 women who experienced stillbirth after 24 weeks gestation, 12 (27.9%) reported decreased fetal movement, and most did not receive education on fetal movement (n=44, 97.8%), safe sleep (n=45, 100%), or breastfeeding (n=43, 93.3%).

Conclusion: Prenatal education in regards to fetal movement, safe sleep, and breastfeeding was lacking. A locally designed intervention to detect fetal movement should be developed to reduce stillbirth.
Standardizing Genetic Testing for Products of Conception

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Background: Chromosomal abnormalities are associated with 50% of spontaneous miscarriages and approximately 6-13% of stillbirths. Cell cultures for karyotyping do not grow in about 50% of products of conception. Microarray is a genetic test that can analyze DNA from non-viable fetal tissue. This study examines whether establishing a protocol for chromosome and microarray testing on stillbirths and miscarriages increases diagnostic yield.

Methods: A retrospective chart review was conducted on cases of spontaneous abortion or fetal demise when genetic testing was requested, comparing 2 time periods (pre-protocol 3/13/2012 to 3/13/2013, and post-protocol 3/14/13 to 3/14/14). Diagnostic yield was compared by using number of “undetermined test results” in the pre- and post-protocol study periods.

Results: A total of 55 (pre) and 52 (post) patients were analyzed. Post-protocol patients were younger (31 vs. 28 years, pre and post, p=0.0076), and had earlier gestational age at demise (24.2 vs. 19.4 weeks, pre and post, p=0.0261). Karyotype was done more frequently in pre-protocol (98.2% vs. 59.6%, pre and post, p<0.0001); microarray was used more in post-protocol group (3.6% vs. 63.5%, pre and post, p<0.0001). Undetermined test results occurred more frequently in the pre-protocol group compared to post-protocol (27.3% and 0%, pre and post, p=0.0004).

Conclusion: Using a protocol of reflexing to microarray or proceeding directly with microarray gives a higher diagnostic yield in the genetic evaluation of miscarriage and stillbirth. Further research is needed to assess whether proceeding directly to microarray is cost effective in assessing for chromosomal defects as a cause of demise.

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Optimizing Nurse-staffing Strategies for an Inpatient Setting Using a Stochastic Modeling Approach

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Background: The Health Resources and Services Administration (HRSA) projects a shortage of 5900 registered nurses in the state of Kansas by 2020. Shortage of registered nurses and high cost of medical care and hospitalization have challenged healthcare managers and policy makers in achieving their primary objective of enhancing patient safety and satisfaction.

Methods: In order to address these challenges, systems engineering approaches can be employed to analyze and improve different aspects of patient care. Consistent evidence from observational studies suggests that inadequate nurse staffing in hospitals and heavy nurse workload threaten patient safety and quality of care. There are recommended nurse-to-patient ratios for different types of inpatient settings. However, patients in a hospital unit may have different acuity levels based on the severity of care needed. This may impact the staffing needs of the unit potentially rendering a fixed nurse-to-patient ratio ineffective.

Results: In this study, we minimize staffing costs while ensuring timely delivery of patient care, which is measured using metrics such as the probability of excessive delays in providing care. The proposed model can be used to develop acuity-based nurse staffing strategies for inpatient settings and identify the optimal staffing level for an inpatient unit with any given patient mix.

Conclusion: Using Queueing Theory and Discrete-event Simulation techniques, we demonstrate that under some patient-mix scenarios, fixed nurse-to-patient ratios will lead to inadequate staffing levels and also performance metrics improve as the number of nurses increases.

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The Better Practice of Using Single Dose Dexamethasone for Acute Asthma Exacerbation instead of 5 Days Prednisolone

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Background: Acute asthma exacerbation (AAE) is a significant public health issue and adherence to medical therapy is low especially in low income families. Non-inferiority of single dose dexamethasone has been demonstrated for the treatment of AAE instead of five days of prednisolone. A quality improvement project was implemented at our clinic to increase the use of single dose dexamethasone.

Methods: Education and instruction were provided to all physicians and staff related to the use of single dose dexamethasone. Reminder signs were posted in the clinic at workstations and dexamethasone was ordered from the hospital pharmacy to be stocked in the clinic. The charts of all patients having a diagnosis pertaining to asthma or wheezing (ICD-9 codes: 493.0, 493.01, 493.02, 493.1, 493.11, 493.12, 493.2, 493.22, 493.81, 493.82, 493.9, 493.91, 493.92, 496, 519.11, 786.07) were searched in the electronic medical record and the choice of steroid was tallied.

Results: Prior to education sessions in January 2015, 7 of 7 (100%) patients were given prednisolone for AAE. After the education sessions (2 week period) 8 of 11 (72.7%) patients with AAE were given dexamethasone. One was given prednisone due to her age and 2 were given prednisolone for reasons that are uncertain.

Conclusion: In this quality improvement project, knowledge of the non-inferiority of dexamethasone and access to the medication were the major barriers. These were reasonably overcome by education and providing easy access to the medication. These simple interventions eased the administration of medication and lowered the direct cost to the patient.

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Improving Compliance with the Hypoglycemia Protocol

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Background: A defined order set regarding hypoglycemia and its treatment exists at Wesley Medical Center. Data collected suggested below average compliance with adherence to the hypoglycemia protocol. The causes are multifactorial, but include a lack of adequate education, lab reporting delays, and lack of accountability on events that are potentially “near misses.”

Methods: Our goal was to improve compliance with the Wesley Medical Center Hypoglycemia Protocol. We distributed a flyer to all staff members emphasizing the importance of recognizing hypoglycemia and appropriately utilizing the current protocol on 3 Tower and 7 Tower. The current protocol was revised in CPOE to remove ambiguity.

We measured compliance based on whether or not the RN notified the physician of the critical blood glucose within 30 minutes, the blood glucose was rechecked within 15-20 min following treatment, the treatment provided was documented, if D40 (glucose gel) was given, and if the blood glucose improved. We promoted the administration of glucose gel instead of juice because the gut does not absorb well when the blood glucose is less than 60 mg/dL.

Results: The results suggested improved compliance with physician notification, appropriate utilization of the hypoglycemia protocol and documentation of interventions, increased use of glucose gel, and the improvement in blood glucose after treatment with glucose gel.

Conclusion: Our message for others is that all members of the healthcare team need to be a “champion for change” and demonstrate competence in the management of hypoglycemia so that the standard of care, compliance rates, and patient safety measures can be improved.

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Template Manifesto

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Background: The process of transitioning from the hospital to home requires careful transfer of information usually in the form of a discharge summary to ensure patient safety and prevent readmissions. Numerous studies report that discharge summaries often lack pertinent medical information. An electronic discharge summary template was created at Wesley Medical Center to ensure the information is complete when transferred. We studied the impact of this template.

Methods: Design: Retrospective cohort study. Setting: Patients discharged from community hospitals in Wichita who followed up at KU Resident/Faculty Clinics. Patients: Adults 18 y/o and older who presented for hospital follow up appointment from July, 2014 to March, 2015. Measurements: 101 discharge summaries were evaluated for completeness. To qualify as complete, discharge summary must include important labs/imaging obtained during the hospitalization along with discharge diagnosis and hospital course. Inclusion of pending labs, documentation of patient education, anticipated problems/interventions and follow up information was compared between summaries which utilized the template and ones that did not.

Results: Out of the 101 charts reviewed, 25.8% utilized the discharge summary template. Of the discharge summaries which utilized the template, 100% were complete compared to 44% of the summaries which did not utilize the template. The 74.2% of the charts not utilizing the template often lacked mentioning anticipated problems, pending labs and appropriate follow up information.

Conclusion: Creating a template which requires the hospitalist to provide specific information about patient’s hospital course is associated with more complete documentation which may facilitate patient’s safety and a smooth transition of care.

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Increasing Immunizations for Children 0-18 months with Quality Improvement Techniques

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Background: Immunizations are safe and effective. Outbreaks in preventable disease are increasing due to poor adherence with immunization schedules. When patients access health-care for any reason, immunization status evaluation could lead to disease reduction. To improve immunization rates for children 0-18 months of age in a Pediatric outpatient clinic using Plan-Do-Study-Act cycles and a multidisciplinary team of medical providers.

Methods: Participating physicians met monthly with other clinic staff to choose an improvement initiative from options identified by Children’s National Medical Center. Educational webinars and opportunity to discuss immunization practices with other clinics helped guide these meetings. Each month survey questions regarding the clinic and its immunization practices were completed along with chart audits. As strategies were implemented, feedback was discussed and further strategies developed.

Results: Initial evaluation of clinic practices revealed immunization assessment documentation was absent. New templates were developed and this, along with regular meetings and strategy sessions, led to a cultural shift among staff and providers to address a patient’s immunization status at every visit. The goal of no missed opportunities was adopted clinic-wide and ongoing training implemented to meet this objective. After 12 months of study the rate for all needed shots given increased from 39% to 95%. The up-to-date percentile increased from 84% in July 2013 to 100% in June 2014.

Conclusion: Having staff and providers document an immunization assessment led directly to providing immunizations by need and not visit type.

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Teaching Statistics for QI Using Online Scenarios and Team-based Learning

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Background: Prior to the emergence of clinical quality improvement, inferring causation from observational, uncontrolled data was a minor topic for teaching as evidence-based practice emphasized the use of data from randomized controlled trials. Now, electronic health records (EHRs) provide observational data for publication as well as examination of one’s own clinical practice. Our specific objectives were to teach: 1) inferring causation from observational data, 2) comparing and judging results from different institutions (external benchmarking).

Methods: Using collaborative, cloud-based programming, we created an online spreadsheet at https://qitools.ocpu.io/charts/www/ for creating statistical process control charts. Embedded in the tool were sample datasets based on local quality improvement (QI) projects. A mouse click executed and displayed the analyses.

Trainees were divided into teams that worked through the scenarios and accompanying discussion questions. Discussion and accountability were enhanced by using a free-text audience response system. The evaluation questions addressed the two learning objectives.

Results: We taught and evaluated 22 internal medicine residents. Overall, the proportion of correct responses increased from 75% before teaching to 90% after teaching (p < 0.000). The absolute improvement on the responses that were targets of our teaching increased from 11% to 41% after excluding one question that had a baseline rate of correct response of 96%. The session was well received.

Conclusion: We were able to increase knowledge of the interpretation of results from QI projects. Due to online deployment and collaborative platform for development, we believe this project is scalable to other institutions.

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Injectable Hydrogel Provides Growth-permissive Environment for Human Nucleus Pulposus Cells

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**Background:** Intervertebral discs within the human spine act as shock absorbers between each of the vertebrae in the spinal column. Nucleus pulposus cells (NP cells), jelly-like avascular tissue within the middle of the intervertebral disc, are the crucial component of the disc and the starting point for disc degeneration. Research into regenerating the NP cells in degenerating intervertebral discs may provide a breakthrough in treating spine disorders.

**Methods:** We fabricated and characterized collagen type II and hyaluronic acid hydrogels that was cross-linked with the ethyl-3(3-dimethylaminopropyl) carbodiimide (EDC) and N-hydroxysuccinimide crosslinker (NHS). We seeded the human nucleus pulposus (HNP) cells in the hydrogel and studied the cell proliferation, viability and gene expression of extracellular matrix. The hydrogel without the cross linker was used as the control.

**Results:** Results from live/dead assay and alamar blue assay showed cell growth and proliferation in both cross linked and cross linked hydrogel. Cell cultured in EDC cross-linked hydrogel exhibited amplified proliferations. Quantitative PCR assay demonstrated the gene expression of extracellular matrix by the cells cultured in non-cross linked gel and the cross linked gel. The results of gene expression study indicated the adaption of cells to the environment after long term cell culture in these hydrogels.

**Conclusion:** This study suggests that the type II collagen-HA hydrogel and cross linked hydrogel with EDC at low concentration are permissive matrix for the growth of HNP cells and can be potentially applied in the NP repair.

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Developing a Targeting System for Bacterial Membranes

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Background: An ammonium picket porphyrin that targets bacterial membranes has been prepared and shown to bind to phosphatidylglycerol (PG), a bacterial lipid, when the lipid was in solution, contained within synthetic membrane vesicles, or when in Gram-negative and Gram-positive bacterial membranes. The multifunctional receptor was designed to interact with both the phosphate anion portion and neutral glycerol portion of the lipid head group.

Methods: The receptor’s affinity and selectivity for binding to surfactant vesicles or lipid vesicles that contain PG within their membranes was directly measured using fluorescence correlation spectroscopy (FCS).

Results: FCS demonstrated that the picket porphyrin’s binding pocket was complementary for the lipid headgroup, since simple Coulumbic interactions alone did not induce binding. The lipid-receptor binding motif in solution was shown to mirror the binding motif of membrane-bound PG and receptor. Cell lysis assays with E. coli (Gram-negative) and Bacillus thuringensis (Gram-positive) probed with UV/Visible spectrophotometry indicated that the receptor was able to penetrate either bacterial cell wall and to bind to the bacterial inner membrane.

Conclusion: Interestingly, the receptor itself inhibits gram-negative bacterial growth in low concentrations while not being degraded or metabolized.

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Demonstration of the Precise Temperature Dependence of Prodigiosin Expression from Serratia Marcescens on our Bacterial Array System

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Background: Our goal is to explore methods of enhancing the expression of prodigiosin, a naturally occurring red pigmented, from strains of Serratia marcescens. Here, we present the development of a glass slide-based culture system. Our system allowed precise control over the production of the prodigiosin on a thin layer of semi-solid media. Prodigiosin is synthesized by Serratia marcescens when the bacteria is incubated between 23-27°C but does not appear when cultured at it optimum growth temperatures above 35-37°C.

Methods: Agar Preparation: Different concentrations of agar were prepared to obtain the optimum agar nutrient environment for culturing bacterial colonies. The concentrations made were 2%, 4%, 8%, and 16%.

Microscope Slide Preparation: Each sample was tested in quadruplets. Slides were spin-coated with agar to generate a uniform flat surface. Different spin rates were considered to determine the optimal speed for growing bacterial colonies and quality images. The spin rates used were: 200rpm, 300rpm, and 500rpm.

Cell Culture

Serratia marcescens D1 was cultured overnight on semi-solid media. One colony of cells was selected using a wooden tooth and used to start a liquid culture. Two cellular concentrations were prepared that were 10x and 100x diluted. The cells were added drop-wise to the agar coated slides

Cellular Imaging: The cells were imaged after a set time intervals of incubation. The first images were taken 60 min, 2hr, 4hr, 8hr and 24 hrs.

Results: Our result, suggests that the optimum agar concentration was solutions having 8% or greater agar. There was no noticeable difference between the 200rpm and 300rpm spin rates so only the slides that were coated at 200rpm were used. Serratia marcescens grew well on the glass article with 8% agar.

Conclusion: The 100x starting cell concentrations did yield a higher cell density on the slides than the 10x samples. When comparing the fluorescent intensities of the 10x diluted cells to the 100x. After 4hr, the 10x diluted samples had a similar cell density as the 100x diluted sample.
Role of Electrospun Artificial Scaffolds to Induce Nerve Tissue Growth

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Background: Nerve tissue damage produces a substantial decrease in quality of life and imposes a considerable burden on public health in the United States and the world. Current treatment methods are mostly preventative and suggestive, and the progress is fairly limited because of the complexity of the neural tissue system. Nerve tissue engineering is one of the most promising methods to restore nervous system back to the normal health. Astrocytes (Nerve Glial Cells) play a pivotal role in maintaining the structural health of the neurons. Astrocytes are fundamental for the control of metabolic activity in neurons, play an important role in guarding the blood-brain/blood-spinal cord barrier, assist in synapses, form a neuro vascular bridge and decrease tissue damage during injury. Pathological focus on astrocytes remains disconnected, because of a long-lasting prevalence of neuro-centric views in neurology and neuropathology. Astrocytes are involved in all types of brain pathologies from acute lesions (trauma or stroke) to chronic neurodegenerative processes (such as Alexander’s disease, Alzheimer’s disease, Parkinson’s disease, multiple sclerosis and many others), as well as psychiatric diseases. Effective scaffold design with polymer blending has vital role in the nerve tissue engineering. Four types of electrospun fibres made of polycaprolactone embedded with different carbon based nano-particles were fabricated. After performing successful toxicity tests, Astrocytes harvested from neonatal rats were cultured on these scaffolds. Immunostaining and SEM analysis confirmed successful adhesion and growth of these astrocytes on the scaffolds.

Methods: - Electrospinning process for scaffold fabrication.

- Astrocyte culture and growth on the scaffolds

Results: Successful Astrocyte growth as shown by SEM and immuno-staining analysis methods.

Conclusion: Polymer based electrospun scaffolds can be successfully used for in-vitro astrocyte culture.

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ARP2/3 Complex Mediates EFs-directed Migration of Neural Stem Cell-derived Oligodendrocyte Precursors

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Background: The loss of oligodendrocytes in a lesion of the central nervous system causes demyelination and therefore impairs axon function and survival. Transplantation of neural stem cell (NSC)-derived oligodendrocyte precursor cells (OPCs) (NSC-OPCs) results in increased oligodendrocyte formation and enhanced remyelination. The directional migration of grafted cells to the target can promote the establishment of functional reconnection and myelination in the process of neural regeneration. Endogenous electric fields (EFs) that were detected in the development of the central nervous system can regulate cell migration.

Methods: NSCs were isolated from the brains of ARPC2+/+ and ARPC2-/− mouse embryo and differentiated into OPCs. After differentiation, the cultured oligospheres were stimulated with EFs. The migration of OPCs from oligospheres were recorded using time-lapse microscopy.

Results: We found that NSC-OPCs migrated toward the cathode pole in EFs. The directedness and displacement of cathodal migration increased significantly when the EF strength increased from. However, the EF did not significantly change the cell migration speed. We also showed that the migration speed of ARPC2-/− OPCs, deficient in the actin-related proteins 2 and 3 (ARP2/3) complex, was significantly lower than that of wild type of OPCs. ARPC2-/− OPCs migrated randomly in EFs. The migration direction of NSC-OPCs can be controlled by EFs.

Conclusion: The function of ARP complex is required for the cathodal migration of NSC-OPCs in EFs. EF-guided cell migration is an effective model to understanding the intracellular signaling pathway in the regulation of cell migration directness and motility.

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Explore Molecular Pathway Mediating Electric Field-directed Schwann Cell Migration by Next Generation RNA Sequencing

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Background: In peripheral nervous systems, Schwann cells wrap around axons of motor and sensory neurons to form the myelin sheath. Schwann cells regenerate and migrate to the lesion in post-spinal cord injury and are involved in the spinal cord regeneration process. Transplantation of Schwann cells into the injured neural tissue results in enhanced spinal axonal regeneration. Effective directional migration of Schwann cells is critical in the neural regeneration process.

Methods: Schwann cell migration in EFs was recorded by time-lapse microscope. The stranded mRNA-Seq was performed using the Illumina HiSeq2500 Sequencing System. RT-q PCR validation for RNA-Seq.

Results: Schwann cells migrate anodally in an applied electric field (EF). The directedness and displacement of cathodal migration increased significantly when the strength of the EF increased. We identified 1,045 up-regulated and 1,636 down-regulated genes in control cells versus EF-stimulated cells. A Kyoto Encyclopedia of Genes and Genomes (KEGG) pathway analysis found that compared to the control group, 21 pathways are down-regulated, while 10 pathways are up-regulated. Differentially expressed genes participate in multiple cellular signaling pathways involved in the regulation of cell migration, including pathways of regulation of actin cytoskeleton, focal adhesion, and PI3K-Akt.

Conclusion: RNA sequencing is an efficient approach to systematically investigate the signaling pathways that mediate Schwann cell migration in EFs.

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Can a Two-dimensional Display of Citations Help us Use PubMed More Efficiently?

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**Background:** Identifying trials for a meta-analysis from MEDLINE has been compared to drinking water from a fire hydrant. We hypothesize that a subset of trials can be identified without the need to identify all trials about a clinical topic.

**Methods:** We developed a two-dimensional display of citations that identifies a frontier of trials for which there are no trials both more recent and in a higher impact journal. Using 10 consecutive meta-analyses from the Cochrane Collaboration, we compared the concordance of results limited to the subset of trials on the frontier to results from meta-analyses that used all trials. For half, we selected meta-analyses that contained at least one high-impact trial (defined as published in a journal with an article influence score of at least 13.1). Concordance was defined as having findings with the same direction and level of significance.

**Results:** The limited meta-analyses conducted with the frontier of trials (subset of trials) were not concordant in 4 of the 5 comparisons with meta-analysis with no high-impact trial. However, the limited meta-analysis was concordant in 4 of 5 comparisons with the meta-analyses of all trials.

**Conclusion:** We propose that when the frontier contains high impact trials, a meta-analysis limited to trials on the frontier will usually, but not always, agree in direction and level of significance with a meta-analysis of all trials. However, this proposed heuristic needs validation.

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Can we Teach Residents to Give Better Feedback to Faculty?

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Background: While much attention has been paid to faculty providing feedback to learners, limited information is available on the process of residents providing feedback to faculty. Most residents provide feedback through written evaluations which often do not provide useful information. The only published study identifying verbal feedback from residents used chief residents to summarize consensus feedback. To truly achieve a “culture of feedback” all learners should be comfortable in providing verbal feedback as part of a mutually-beneficial process.

Methods: The study consisted of four steps. Step one involved psychiatry residents (n=6) attending a one hour training session on providing quality feedback. Secondly, residents completed a videotaped session in which they portrayed a “troubled resident” and were given feedback by a faculty member, after which the roles were reversed and the resident provided feedback to the faculty member regarding his/her performance. Both resident and faculty member reviewed the tape with an experienced faculty expert. Finally, the residents debriefed their experiences in a focus group format. Residents completed pre and post encounter surveys along with one and three month surveys.

Results: Pre-assessment surveys showed residents were not comfortable providing feedback and had not received any formal training on giving feedback. Preliminary results show that residents felt the exercise was beneficial and provided skills applicable to learning.

Conclusion: Our novel approach allowed residents to participate in a didactic lecture on giving feedback and to use the skills learned in a practical standardized encounter.
What do Medical Students Observe during an Ophthalmologic Exam?

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**Background:** Students in medical education have become used to practicing physical exam skills on Standardized Patients (SPs). Most SPs at the University of Kansas present with normal ophthalmologic findings. This situation has resulted with students spending little time using the ophthalmoscope during a HEENT physical exam. The purpose of this study is to determine what students actually see when using an ophthalmoscope.

**Methods:** Thirty-one second-year medical students examined a SP using the ophthalmoscope. After the SP examination, the students were given the opportunity to use an eye simulator to gain additional practice using the ophthalmoscope. Students were divided into two groups to examine the left or right eye. Sixteen students observed the left eye and fifteen observed the right eye. Every student was asked by a faculty member to describe what they were able to see. If they observed something abnormal, the student was then asked to provide a diagnosis.

**Results:** Of the thirty-one second-year medical students that participated in this project, 48.4% identified seeing blood vessels, 29.0% cotton wool spots, and 29.0% optic disk. Fourteen students were unable to identify abnormal findings and could not make a diagnosis. Only five students (16.1%) correctly identified the diagnosis. Qualitative data indicated students were uncomfortable shining the light for extended periods in the SP’s eyes and they felt more confident after using the simulator.

**Conclusion:** When using only SPs, it is difficult to determine what the students observe. The eye simulator allows faculty members to identify student observations and help improve their physical exam skills.

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A Time-independent Medical Curriculum

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Background: LCME accreditation standards and the Carnegie Foundation report Educating Physicians are driving medical schools to explore new curricular models. A significant challenge is how to move beyond time-limited curricula.

Methods: We piloted key aspects of a curricular model using clinical cases in a problem-based learning format, flipping the classroom, using live patients and no live lectures. Students identify their own learning issues for each case guided by a faculty-created set of learning objectives (LOs). Tests and quizzes track progress formatively but do not contribute to grades or class ranking. Class ranking derives from the number of overall LOs mastered by each student and can control progress in a time-independent manner.

Results: The pilot included seven medical students. All completed the required LOs. In addition they completed two sets of optional LOs. Based on current grading practices all students would have ranked equally; based on mastery of LOs there was a distinct ranking of students. Focus group results indicate students will strive to accomplish optional LOs that can be used to inspire excellence. Initially, three students were skeptical of the curriculum. After the pilot all students agreed that the curriculum is a viable alternative to the current curriculum, and that it will better prepare them for clerkships and clinical practice.

Conclusion: The results suggest the proposed curriculum can be effective. It may not be optimal for all students. LOs can effectively guide student effort, while students establish more granular learning issues for each case. The model provides a framework consistent with a time-independent curriculum.

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Assessment of Simulation-based Curriculum Enhancements that Engage Students in Co-designing Learning Activities

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**Background:** High fidelity manikin-based simulation activities were used to enhance learning modules for year 1 medical students. The modules were designed to actively engage learners in planning and conducting simulation-based learning activities for their peers. The purpose of this study was to assess impact of simulation-based enhancements to medical curriculum that actively engage learners in co-designing learning activities.

**Methods:** Students were divided into two teams where they designed and implemented shock related scenarios using a faculty created template and selected appropriate lab values, X-rays, and EKGs. Perceptions were gathered during debriefings and an evaluation of the session four weeks later. A follow up survey and a focus group session were conducted six months later.

**Results:** Students scored the session as 4.71/5; and the desire to experience this type of learning as 4.72/5. The previous year, without student engagement, students rated the session 3.83/5 for value and repeated learning strategy. One student said, “My classmates and I came away from this session with a much better understanding of concepts from lecture having applied them in a clinical setting.” Focus group comments included, “I didn’t know the information super well but then I went home and went through the material because I was like, holy cow, I could have killed someone today. I learned the material really well and it stuck with me through the test and still today.”

**Conclusion:** Feedback from students indicated that the high fidelity sessions were valuable and demonstrated retention of material six months later.

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Early Outcomes of Cemented versus Cementless Total Knee Arthroplasty

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Background: The specific aim of this study was to assess the potential difference of functional outcomes in the early post-operative period between the cemented and cementless Total knee arthroplasty (TKA) using the Knee Society Score (KSS) and range of motion (ROM).

Methods: 164 knees that had undergone TKA by a single surgeon at a single institution between 2007 and 2010 were reviewed. Three different TKA prosthetic designs (cruciate retaining (CR), posterior stabilized (PS) and complete stabilized (CS)) were included. Data collection included patient demographics, pre- and post-operative ROM and KSS at each visit (1.5, 3, and 12 months). Two separate KSS scores were assigned: functional score and clinical score.

Results: 67 knees underwent cemented TKA and 97 knees underwent cementless TKA. No significant difference was recognized in either age or BMI for these two TKA groups. The cementless group showed a significant early ROM improvement after 1.5 months post-operative (p<0.05), while the cemented group showed ROM improvement only after 3 months post-operative. No significant deference was detected in terms of KSS between the cemented and cementless TKA groups at each measured time period. Both groups showed marked KSS improvement (cemented: 135%, cementless: 125%) after 1.5 months post-operative and the KSS seemed to be stabilized after 3 months post-operative for both groups.

Conclusion: This study demonstrated that there was a significant early ROM improvement for the cementless TKA group compared to the cemented TKA group, but no statistical significant difference was noted in KSS in the early post-operative period.

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Determining and Addressing Recruitment Challenges in an Efficacy Trial in Bipolar Disorder, Depressed Phase

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Background: Based on the work of Hoertel and colleagues, we estimated 1 out 300 individuals in the general population would be eligible for a usual efficacy trial in bipolar disorder (BD) (type 1 and 2). This poster presents how recruitment challenges were managed.

Methods: Multiple recruitment approaches were used. Initially, the trial had a two-by-two design with two active agents and two matched placebos, and was conducted at three sites. Management included: continuous review and assessment of the recruitment approaches being used, examining which criteria were restricting recruitment and modifying those, and performing an interim analysis at the mid-way point.

Results: One patient for every two patients screened face-to-face were excluded, a rate consistent with the Hoertel findings. No recruitment effort was clearly superior to the others. Although the original time allotted for study recruitment was 22 months, the duration was increased to 40 months. Cost per participant nearly doubled from $5,000 /subject to $9,100 /subject. The criteria were modified to include BD NOS and to increase the upper age limit from 55 to 65. Midway analysis showed group separation in terms of the main outcome measures, but not yet achieving statistical significance. A power calculation indicated the number needed to achieve statistical separation could be accrued by reducing the number of groups from 4 to 2.

Conclusion: Ongoing study management can address one of the most common problems encountered in psychiatric clinical trials, namely slower than expected enrollment, without compromising the integrity of the study.

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Understanding the Pharmacodynamic and Pharmacokinetic Differences amongst Newer Generation Antipsychotics Using Lurasidone as a Point of Comparison

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Background: Optimal drug selection for a patient requires the prescriber understand how members of the same therapeutic class differ pharmacologically. Prescribers should also know what is required from an efficacy standpoint for drug approval by the U.S. Food and Drug Administration (FDA). This poster addresses both of these issues. First, it reviews the pharmacology of the 10 most recently marketed antipsychotics and two earlier prototypic antipsychotics, clozapine and haloperidol. Second, it presents a comprehensive analysis of lurasidone to demonstrate the FDA efficacy requirements for drug approval.

Methods: The pharmacodynamic and pharmacokinetic parameters for each drug were obtained from the drug development summary submitted by each respective manufacturer to the FDA as part of the approval process. An exhaustive literature search was conducted including contacting Sunovion to obtain all of the efficacy trials done with lurasidone.

Results: The dissimilarities in the receptor binding affinities and pharmacokinetics amongst these drugs are presented in tabular form. The pharmacokinetic differences include: their half-lives and metabolism including whether or not they undergo oxidative drug metabolism (phase 1) or simply conjugation reactions (phase 2). For those undergoing phase 1 metabolism, there are differences in terms of which cytochrome P450 and/or other drug metabolizing enzymes mediate their biotransformation. There were 9 of efficacy trials done with lurasidone which are summarized emphasizing key differences in design and results.

Conclusion: The information summarized in this poster is relevant to optimal drug selection.

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I-Pass You My Patient: Quality Improvement of Patient Handoff in Psychiatry

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**Background:** With the 2011 advent of duty hour restrictions by the ACGME came increased frequency of patient handoffs, increasing the potential for jeopardizing patient care. As such, the ACGME now requires all training programs to educate residents in patient handoff (PHO) and to monitor their progress in this area. The ACGME has created the Clinical Learning Environment Review Program (CLER) which offers “guidance for creating optimal clinical learning environments in 6 different learning areas”, one of which is Care Transitions. Because this new requirement was officially introduced only in January 2014, there is no formal training curriculum for psychiatry residents.

**Methods:** A PHO task force was created and a literature search focused on different PHO techniques was conducted. The task force recommended the IPASS technique as most suitable for our services. IPASS was accepted by the residents and faculty after their feedback was incorporated. An IPASS training workshop was developed, residents were trained, and their compliance with IPASS was monitored by the task force.

**Results:** The task force, residents and faculty will reevaluate the implemented PHO process, make necessary adjustments and finalize PHO before July 1st, 2015. Incoming PGY-1 residents will be trained in the finalized PHO. Their competency in PHO will be tested in a standardized patient laboratory prior to promotion to indirect supervision.

**Conclusion:** Improve and standardize the PHO process across services within the program, incorporate CLER (Care Transitions) into PHO, develop a PHO training module for current and incoming residents will optimize patient care.

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Human Trafficking in Small Urban and Rural Communities: Knowledge and experience among professionals in health care settings

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Background: This study used a survey of both providers and non-providers in health care settings in small urban and rural communities to assess the baseline knowledge of human trafficking and their experience with such situations. Results suggest a considerable gap between their knowledge and experience with potential trafficking situations. We call for urgent training of health care professionals in small urban and rural communities.

Methods: A survey was developed to assess health care professionals' awareness of human trafficking in the communities they serve and past experience with such situations. After pretesting on a small sample of medical students, an invitation to the survey was sent to 10,639 professionals in the regional health care system. The findings are based on 3,431 professionals who responded to the survey.

Results: Human trafficking appears to be apparent to health care professionals in this sample and that specific knowledge that would help them identify and offer assistance to victims is limited. Approximately 15% of this sample reported to have encountered minors and adults involved in commercial sexual exploitation. A third of the respondents reported to have seen patients matching one or more descriptions/symptoms that indicate trafficking victims.

Conclusion: Only a fraction of health care professionals in this sample had participated in training on human trafficking since they started their current role, but more than half of the respondents indicated the need for training. Health care professionals in small urban and rural communities may benefit from expedited training on identifying and treating patients who exhibit signs of trafficking.

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The Relationship between Personality Style and Attention Deficit Hyperactivity Disorder

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Background: This study was to identify possible personality correlates of children with a diagnosis of Attention Deficit Hyperactive Disorder (ADHD). The Jungian Personality Type dimensions primarily considered were (1) Sensing vs. Intuiting, and (2) Judging vs. Perceiving. A Sensing child is more likely to be very present centered, not thinking about the future and very anchored in reality. A Perceiving child is curious, spontaneous, flexible, and resists order and structure. Clinical observations have suggested the children with ADHD seem more likely to exhibit Sensing and Perceiving traits in their personal orientation to the world, but this has not been validated.

Methods: Children attending KUSM-W Pediatric clinic, with a current diagnosis of ADHD were eligible to participate. Each enrolled child was administered a computerized Murphy-Meisgeier Type Indicator, a personality inventory that measures Jungian Type for children. Basic demographics were also collected. Frequencies of 4-Factor personality types were generated. Binomial tests were performed comparing accepted population rates for both Perceiving and Sensing personality components. This study was IRB approved.

Results: A total of 117 children enrolled in the study. Participants were predominantly male (78%) with an average age of 10.2 years. Observed rates for the Perceiving trait (44%) were not statistically different from the expected average. Rates of the Sensing trait (72%) were significantly higher than the expected average.

Conclusion: There may be some personality types occasioned with the diagnosis of ADHD. This could be useful in establishing/normalizing treatment regimens and approaches to more significantly assist these children and their families.

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Factors Associated with Borderline versus Definite Peripheral Artery Disease among African Americans

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**Background:** Peripheral artery disease (PAD), defined as atherosclerosis of the abdominal aorta and arteries of the lower extremities, is a common disease affecting 20-30% of adults > 50 years of age, or up to 12 million Americans. Prior studies have focused on defining risk factors for PAD but less is known about factors associated with PAD versus borderline disease among African Americans. We sought to determine those factors associated with definite versus borderline disease among African Americans.

**Methods:** For the bivariate analysis, we used chi-square and t-tests for categorical and continuous variables, respectively. For the multivariate model, we used generalized linear modeling with the dependent variable of ABI < 0.9. Independent variables considered for each model included laboratory results, leg symptom subtypes of intermittent claudication or atypical leg symptoms versus asymptomatic disease, medical history (categorical variables), and dietary habits.

**Results:** Among 107 African Americans enrolled, 75% women, the mean age of the cohort is 64 (sd 12). Within the cohort, 92 (86%) have hypertension, 38 (36%) have diabetes mellitus, 26 (24%) are current smokers, 59 (55%) have hyperlipidemia, 58 (54%) are past smokers, and 44 (38%) have osteoarthritis. Factors significantly associated with definite versus borderline PAD were consumption of bad fats 5 or more times per week adjusted OR 3.97 (95% CI 1.16, 13.65) and systolic blood pressure adjusted OR 1.06 (95% CI 1.01, 1.10).

**Conclusion:** Factors associated with definite versus borderline PAD among African Americans included diets high in bad fats and systolic blood pressure.

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Hydrogels Mediate Cell Migration for Neural Regeneration

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Background: Spinal cord injury is a significant health problem. Biomaterial hydrogels are promising scaffolds that can support neural cell migration and conduct axonal regeneration for the injured spinal cord. Since natural material based hydrogels are biocompatible and biodegradable, they can provide a permissive and efficient environment for transplanted stem cells and a carrier for the delivery of therapeutic molecules into the animal body.

Methods: In this study, collagen type I hydrogel and fibrin hydrogel were fabricated and evaluated for neural cell growth and migration. The collagen hydrogel was cross linked with polyethylene glycol (PEG) and fibrin/fibronectin (FB/FN) was modified by incorporation of aprotinin, which is a protease inhibitor.

Results: We showed that PEG crosslinking can strengthen the collagen hydrogel and incorporation of aprotinin in the fibrin gel can prevent fibrin gel from degradation caused the cellular enzyme. We showed that astrocytes can grow and proliferate in the gels and PEG-collagen hydrogeland FB/FN and PEG and aprotinin in the hydrogel were not toxic to the cells.

Conclusion: In summary, the study demonstrated that chemically modified hydrogels of extracellular matrix proteins are suitable scaffolds to mediate neural cell growth and they can be potentially used as implantable materials to promote neural regeneration. In the future studies, the specific extracellular matrix gene expression for the cells that grown in the hydrogel will be investigated.

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Fatigue Study of Intravascular Coronary Stents Using Finite Element Analysis

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Background: Intravascular coronary stent are subjected to cyclic loads when placed in vivo. Once in a coronary artery, stents are loaded with systolic and diastolic pulse pressures.

Methods: The purposes of this research was to study impact of cyclic load on various stent geometries and parametrically design a coronary stent that will provide comparable fatigue life to commercially available stent designs. SolidWorks design software was used to create three-dimensional geometries of the stents as well as parametrically design a stent. Abaqus finite element analysis software was used to simulate in-vivo artery conditions, to crimp the stent models, deploy them within the artery and analyze the stent fatigue.

Results: The stent along with artery was successfully modeled. Cyclic loads were applied and fatigue life was studied.

Conclusion: The research is still in progress.

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Spectral Analysis of Ischemic Muscle from Peripheral Artery Disease

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Background: Peripheral artery disease (PAD), a manifestation of systemic atherosclerosis (fat, plaque deposition and hardening of arterial walls), affects approximately 8 million lives in the United States. The classic symptom of PAD is intermittent claudication (IC), defined as walking-induced calf pain and gait dysfunction relieved by rest. At the level of the skeletal muscle, ischemic injury is manifested as a gradual and characteristic degradation of muscle histology. In this study, we evaluated the hypothesis that Fourier Transform Infrared (FTIR) spectroscopy of human biopsy samples (gastrocnemius muscle) can be used to identify biochemical alterations and characterize severity of muscle damage.

Methods: FTIR spectral profiles were collected from muscle biopsies of the gastrocnemius from 13 patients consisting of 4 controls, 5 claudicating patients, and 4 critical limb ischemia (CLI) patients. Statistical analysis of the data included an analysis of variance, and partial least squares regression to identify significant differences in spectral peaks and correlate them with clinical diagnosis.

Results: When comparing spectral peaks between controls, claudicants, and CLI patients, significant differences (p<.05) were found in the fingerprint region at spectral peaks between wavenumbers 1200-1250 cm⁻¹. These spectral peaks have been attributed to alterations in protein content, lipids, and DNA or phospholipid groups.

Conclusion: FTIR spectroscopy was able to identify unique biochemical signatures of diseased PAD skeletal muscle. These signatures can discriminate control from PAD muscle and correlate with the clinical presentation of the PAD patient. FTIR spectroscopy provides novel spectral biomarkers that may complement existing diagnosis and treatment monitoring methods for PAD.

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Analysis of Elemental Concentrations in Ischemic Muscle of Patients with Peripheral Artery Disease, Using Energy Dispersive X-ray Spectroscopy

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Background: Peripheral Artery Disease (PAD), defined as atherosclerotic blockages of the arteries supplying blood to the lower extremities, becomes more common with age and produces a considerable public health burden. PAD produces a progressive accumulation of ischemic injury to the muscles cells, nerves, skin and subcutaneous tissues of the leg. At the level of the skeletal muscle cell, this injury includes altered metabolic processes, damaged organelles, and compromised bioenergetics. In this study, we evaluated the hypothesis that differences in muscle elemental composition correlate with clinical diagnosis and may be used to characterize severity of muscle damage. The objective of this study was to compare elemental composition including sodium, potassium, calcium, magnesium and sulfur in myofibers of gastrocnemius biopsies from control subjects and PAD patients at different stages of disease.

Methods: We evaluated gastrocnemius biopsies from three subjects including one control (person without PAD), one claudicating patient (ABI<0.9) and one critical limb ischemia patient (ABI<0.4). Using a scanning electron microscope and energy dispersive X-ray spectroscopy (EDS), differences in elemental concentrations between control and PAD muscle samples were quantified. In total, 15 myofibers were analyzed, 5 from each tissue specimen.

Results: A statistical analysis of variance revealed significant differences in elemental concentrations for sodium (p=0.0001), potassium (p=0.0094), calcium (p=0.003), magnesium (p=0.001) and sulfur (p=0.004) among control, claudicating and critical limb ischemic muscle samples.

Conclusion: Scanning electron microscopy and EDS were able to characterize changes to the elemental concentration in PAD muscle, which correlated with clinical diagnosis of PAD.

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Injectable Chitosan-based Hydrogel for Breast Cancer Treatment

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**Background:** Recently, numerous numbers of researches have been devoted to the targeted drug delivery systems especially for the cancer treatment. Development of novel multifunctional drug delivery carriers has been the subject of various studies in medical and biological fields, as well as engineering fields. Among different types of materials investigated for drug delivery applications, polymeric hydrogels have shown promising properties make them desirable for different biomedical applications including drug delivery as well as tissue engineering and medical devices. In-situ forming hydrogels can be injected into the body as a fluid and form gel within the body tissue through physical or chemical crosslinking. One of the main advantages of using injectable hydrogels is that they do not require medical surgeries for the replacement. The controlled release of the therapeutic drugs reduces the dose of the required drug compared to the conventional injection methods, and reduces the side effects of the therapeutic drug. Various types of natural and synthetic polymers can form hydrogels through crosslinking with various cross-linker.

**Methods:** Chitosan is a natural polysaccharide showed great biodegradability, biocompatibility which make it a suitable biomaterial for drug delivery systems. In this study, 1-ethyl-3-(3-dimethylaminopropyl)-Carbodiimide (EDC) was used as the cross-linker to form an injectable chitosan/EDC hydrogels a potential in-situ drug delivery system. The crosslinking behavior was characterized using Fourier Transform Infrared Spectroscopy (FTIR) and Scanning Electron Microscope (SEM).

**Results:** The FTIR and SEM results confirmed the crosslinking of chitosan and EDC. A porous morphology was observed in SEM images.

**Conclusion:** The results suggested that the chitosan/EDC hydrogel is a promising injectable drug delivery system and can be considered in the future cancer treatments.

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Application of High-performance Pattern Recognition and Protein Binding in Cancer Treatment

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Background: By year 2030, cancer is expected to become the number one cause of death in the United States, exceeding heart disease. Many U.S. government and other agencies including the National Cancer Institute (NCI) are providing funds to develop applicable solutions for detection and treatment of cancer. Computer-aided diagnosis (CAD) systems have become essential for cancer treatment. As cancer detection requires extremely large amount of data to be processed, most CAD systems are not capable of generating accurate diagnosis faster.

Methods: In this work, pattern recognition algorithms through image processing are applied to help find the most accurate diagnosis for any input magnetic resonance imaging (MRI)-type images by performing “most likely” matching of the inputs. Also, protein binding technique is utilized in addition to analyzing the conventional practices to help determine the exact dose of the correct drugs to treat cancer.

Results: The solutions developed through this research will be of great benefit for healthcare and information technology (IT) industries. The proposed work has great potential to save lives in the U.S. and other countries. Research outcomes of this project can be applied to prevent and control many other deadly diseases including Ebola.

Conclusion: We, experts in high performance computing, have been collaborating with Dr. M.F. Islam (Oncology Specialist at the University of Pittsburgh Medical Center), Dr. S. Anant (Associate Director of Cancer Prevention and Control, University of Kansas Cancer Center), and Dr. M.J. Uddin (Research Assistant Professor of Biochemistry at Vanderbilt University School of Medicine) to develop effective solutions for cancer treatment.

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Physician Assistant Student Assessment of Body Mass Index in Children Aged 3 to 5 Years Using Visual Cues

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Background: Greater than one out of three pediatric and adolescent patients are overweight. Overweight five-year-olds are four times more likely to become overweight or obese in adulthood when compared to normal weight children. Waiting until a later age may inhibit clinicians from timely identification, diagnosis, and treatment of overweight or obese pediatric patients. Early identification of an overweight status has been found to lead to improved management of obesity. Some clinicians are not consistently assessing body mass index (BMI) in pediatric patients and instead relying solely on visual cues.

Methods: Current Physician Assistant (PA) students and recent PA program graduates completed an online survey to accurately categorize Body Mass Index (BMI) for by visually assessing pictures of children aged 3 to 5 years.

Results: Child 1 (obese 3 year old boy): no respondents (0%) accurately categorized with visual assessment alone; and 10% categorized accurately when height and weight data were provided. Child 2 (healthy weight 4 year old girl): 81.6% accurately categorized with visual assessment alone; 54% categorized accurately when height and weight data provided. Child 3 (overweight 4 year old girl): 6% categorized accurately with visual assessment alone; 15% categorized accurately with height and weight data provided.

Conclusion: Training in BMI assessment may lead to early recognition of the pediatric patient’s weight status, which can be advantageous in beginning interventions to prevent future health concerns.

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Physician Oral Contraceptive Prescribing Practices

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Background: Kansas passed SB 62 in July 2012 which allows physicians to refuse prescribing birth control without legal repercussions. Previous research has not examined the potential mismatch between physicians’ practice policies for prescribing oral contraceptives (OC) and patient requests for contraception. This study aims to assess practice policies and current procedures for OC prescribing among family physicians in Kansas.

Methods: A convenience sample of family physicians completed an electronic survey by the Family Medicine Research and Data Information Office (FM RADIO). The survey asked physicians’ OC prescribing practices, practice hiring practices based on OC prescribing, practice’s policy regarding prescribing OC, and physician demographics. All analyses were descriptive.

Results: 42 of 75 physicians responded (response rate=56%). 95% (n=40) of physicians prescribe OC and 5% (n=2) do not prescribe OC. Among prescribers, 92% work in a practice where all of the physicians prescribe OC and 8% work in a practice where some of the physicians do not prescribe OC. 79% of physicians indicated their practice would hire a physician who did not prescribe OC. All physicians reported their practice does not have a written policy regarding prescribing OC; however, 7% have an unwritten OC prescribing policy.

Conclusion: These findings indicate that patients may end up with physicians who are not able to meet their request for OC. Patients should have clear information about practices’ and physicians’ OC prescribing habits prior to appointments.

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Trends in Direct Primary Care: 2005 - 2015

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**Background:** Direct primary care (DPC), a fee for membership model, is an evolving innovative primary care delivery model. Exploring alternate methods such as DPC is necessary to reach multiple goals of Healthy People 2020 including enhanced supply, access, and utilization of primary care. Little is known about current membership fees, insurance billing status, and patient panel size in DPC practices. We conducted a survey of DPC practices to compare such demographic and financial data to previous estimates.

**Methods:** An electronic survey was sent to DPC practices (n=65) requesting location, membership fees, projected patient panel size, insurance billing status, training, and other demographic and financial indicators. Data were aggregated, reported anonymously, and compared to two prior characterizations of DPC practices done in 2005.

**Results:** Thirty-eight of 65 practices responded (59%). Eighty-eight percent (88%) of practices reported annual individual adult membership rates between $500 and $1,499, decreased from 2005 where 81% reported greater than a $1,500 annual fee. The proportion of practices who submit bills to insurance decreased from 75% to 11%. Fifty-six percent (56%) of practices reported projected patient panel size to be greater than 600, increased from 40% in 2005. Family medicine physicians represented 87% of respondents, markedly different from 2005 when 62%-77% of DPC respondents were general internal medicine physicians.

**Conclusion:** Most DPC practices no longer submit to insurance, and are family medicine trained. Compared with previous sampling, DPC practices report decreased membership fees and increased projected panel size. These trends may signify the DPC movement’s desire to grow in application and scope.
Abnormal BMI Percentile Detection in a Residency Setting

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Background: USPSTF recognized weight screening and recognition of overweight and obese children as a level B recommendation. Delaying recognition and treatment is detrimental to patients and families, leads to increased health cost. It is not recommended to rely on visual cues to detect an abnormal BMI percentile as it is often missed. Detecting the percentage of missed overweight and obese patients in a residency setting is first step in improving detection and treatment.

Methods: We reviewed 100 charts seen over two weeks in Via Christi Pediatric Clinic in Wichita, Kansas. We excluded “no show” patients as well as those outside of our age range. Task force recommends screening ages 6-18, this is age range, and patients with BMI %tile above 85th not given diagnosis of overweight or obesity counted as a miss

Results: 54 patients were overweight or obese (over 85th percentile) 59.2% were undiagnosed (32 of the 54 did not have the ICD9 code in their diagnoses)

Conclusion: There is room for improvement in detection and treatment of abnormal childhood BMI percentiles at the Via Christi Pediatric clinic residency setting, one suggested QI project is a change to the electronic charting which flags an abnormal BMI percentile and brings it to the attention of the resident and the attending. Further study once this is implemented is necessary to assess the improvement of detection.

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Timeliness of Hepatitis B Vaccine Doses Received by Sedgwick County Health Department Clients <18 Years Old

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Background: Worldwide, infection with the hepatitis B virus (HBV) is the most common viral disease with approximately half the total liver cancer deaths in 2010 resultant of HBV infection. Healthy People 2020 listed an objective that 90% of children age 19 months to 35 months received at least three doses of the hepatitis B (Hep-B) vaccine. Little is known about following the recommended hepatitis B vaccine schedule in a local health department in a Midwestern rural state.

Methods: Data were from patients who received at least one Hep-B shot at the Sedgwick County Health Department (SCHD) in Wichita, KS. Chi-square analyses were conducted to identify the association between receiving all three vaccines on time and demographic variables.

Results: From January 2012 to May 2014, the SCHD administered Hep-B vaccine to 2,031 clients equally distributed between male (50.5%) and female (49.5%). The three major races of the sample size included Caucasians (67.7%), African Americans (20.7%), and Asian Americans (7.5%). The majority of the sample size resided in Sedgwick County (97.9%). In total, 1.8% of the sample size received all three of their Hep-B shots on time, and 79.2% had at least one Hep-B shot that was not on time and the other 19% missing information on their Hep-B vaccination record.

Conclusion: The three dose Hep-B vaccination on time completion rate for SCHD clients was low and likely due to the specific client population at SCHD. Further analyses of SCHD data can identify methods to increase the on-time vaccination rate.

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Prescribing of Compounded and Commercially Available Bioidentical Menopausal Hormone Therapy by Obstetrician-Gynecologists and Family Medicine Physicians

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Background: Menopausal hormone therapy (MHT) can be achieved through compounded bioidentical, FDA-approved bioidentical, or conventional prescriptions. This study describes the prescribing practices of obstetrician-gynecologists (OBs) and family medicine physicians (FPs), and their agreement with American Congress of Obstetricians and Gynecologists (ACOG) recommendations.

Methods: After receiving IRB approval, an introductory email was sent to Kansas OB and FP physicians identified through the Kansas State Board of Healing Arts. An online survey link was embedded in that email.

Results: The response rate was 11.1% (N=150). In the past year, 84.5% (n=125 of 148) of respondents prescribed conventional MHT, 83.0% (n= 122 of 147) prescribed FDA-approved bioidentical MHT, and 58.9% (n= 86 of 146) prescribed compounded bioidentical MHT. The majority of respondents agreed with 10 statements by ACOG regarding MHT (range 53-97%). OBs were more likely than FPs to agree that “saliva levels are not biologically meaningful” (p=0.0066), “patients should be counseled that conventional MHT is more appropriate than compounded preparations” (p=0.0106), and “bioidentical hormone therapy is a marketing term” (p=0.0226). Factors in prescribing practices included patient preference (55.6%, n=75 of 135), efficacy (73.5%, n=100 of 136), risks (64.0%, n=85 of 133), and tolerability (64.4%, n=87 of 135).

Conclusion: There is a wide degree of variation in prescribing practices for MHT. While many FPs and OBs agree with ACOG statements on MHT, 15% or more disagree or strongly disagree with 7 of 10 statements. Further study would be helpful in understanding the factors which drive these practice patterns.

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Risk Factors for Active Tuberculosis Disease in Kansas from 2004 through 2013

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Background: Though the incidence of tuberculosis (TB) in Kansas remained relatively low (average 1.9 cases per 100,000 population between 2004 and 2013), a significant difference may exist between US- and foreign-born populations. This study examined the differences in incidence of TB by various factors including gender, race, ethnicity, US- vs. foreign-born population, and world region of origin.

Methods: Data were extracted from the Kansas TB Surveillance database from 2004 to 2013. Logistic regression analysis was conducted to assess the differences in TB rates among factors. TB rates among foreign-born persons were also calculated and stratified by world region of origin.

Results: Among the 544 TB cases reported from 2004 to 2013, 63% (n=343) were foreign-born. The average incidence of TB cases per 100,000 persons were 1.2 and 16.2 for US- and foreign-born populations (p<0.0001); 1.4, 6.8, and 22.6 for Caucasian, African-American and Asian-American, respectively (p<0.0001); 6.3 and 1.5 for Hispanic and non-Hispanic, respectively (p<0.0001). Age and gender were not associated with the incidence of TB. Foreign-born TB cases were most likely to be persons diagnosed in the first five years of Kansas residence originating from Asia (35%) or Africa (7%).

Conclusion: Significant disparities in the incidence of TB exist among US- and foreign-born populations, racial groups, and by ethnicity. Among the foreign-born cases, more than one-third of cases originated from Asia.

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Rise of Alkaline Phosphatase Activity above 800 IU/L in Appropriate for Gestational Age Premature Neonates: A retrospective study

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Background: In 2014, the American Academy of Pediatrics developed guidelines for screening preterm infant serum alkaline phosphatase activity (APA) at 4-6 weeks using levels of ≥800 IU/L to predict metabolic bone disease. We wanted to describe the time course of infants who crossed this threshold.

Methods: Demographics and weekly APA levels were abstracted for infants with birth weights appropriate for gestational age whose levels rose ≥800 IU/L. Infants were born at Wesley Medical Center between 24 and 34 weeks gestation from 2005 to 2012. Scatter plots were selected to display trends in APA by chronological age (CA) and post-menstrual age (PMA). APA levels were also assessed against population-based 90th percentiles established in a previous study. Two Institutional Review Boards approved this study.

Results: Infants with APA ≥800 IU/L (n=39) were predominantly white (62%) and female (54%), with a mean birth weight of 902 grams (SD=367, range 446-2130) and mean gestational age of 26 weeks at birth (SD=2, range 24-32). Fifty percent exceeded the 800 IU/L threshold by day 19 (CA) and day 209 (PMA) and 90% did so by day 50 (CA) and day 241 (PMA). We noted 50% of this subgroup crossed the population-based 90th percentile by 15 days (CA) and 202 days (PMA); 90% by 27 days (CA) and 221 days (PMA).

Conclusion: APA ≥800 IU/L can occur prior to the recommended screening period. A screening threshold based upon a time sensitive 90th percentile would allow infants to be recognized earlier. The benefits of earlier intervention would need to be tested.

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Natural Trend of Alkaline Phosphatase in Appropriate for Gestational Age Premature Neonates: A retrospective study

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Background: Serum alkaline phosphatase activity (APA) is used to predict development of metabolic bone disease although its natural course is not well described. Our objective was to describe the trend of APA in appropriate for gestational age (AGA) preterm infants.

Methods: APA values were collected from 1310 AGA infants between 24 and 34 weeks gestation admitted to Wesley (January 2005-December 2012). Exclusion criteria were death/transfer, necrotizing enterocolitis, gastrointestinal perforation, direct hyperbilirubinemia, steroid therapy, multiple gestation, and congenital infections/malformations. Comparisons between gender, race, birth weight and gestational age were analyzed using chi-square and Student's t-test. Time series plots of APA trends were produced. Cumulative area plots displayed maximum APA and APA ≥ 800 IU/L based on chronological (CA) and post-menstrual age (PMA). Two Institutional Review Boards approved the study.

Results: Of infants, 3% had APA ≥800 IU/L. Infants with APA ≥800 IU/L were more likely to have lower birth weight. Biphasic rise in APA was noted following day 56 CA and 244 PMA. Of infants, 50% reached maximum APA day 7 CA and 233 PMA; 90% reached maximum on day 28 CA and 247 PMA. Among infants whose APA ≥800 IU/L, 50% did so by day 19 CA and day 209 PMA; 90% did so by day 50 CA and day 241 PMA.

Conclusion: The finding of APA levels above 800 IU/L is rare and inversely related to birth weight. Late elevation may reflect severe comorbidities and prolonged stay. Earlier screening may permit targeted interventions to improve bone health.

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Background: Nasotracheal suctioning (NTS) has long been used for removal of accumulated saliva and other foreign material from the trachea and nasopharynx that cannot be removed by less invasive procedures. Despite the potential hazards concerning NTS, our literature review revealed a wide variation in airway suctioning policies and practices among nurses and respiratory therapists both within and across hospitals.

Methods: This is a cross-sectional, descriptive survey study. Medical, nursing, and respiratory therapy directors of combined single ICUs, surgical ICUs, medical ICUs and neuro ICUs at the 67 top performing urban hospitals identified by Leapfrog in 2012 were asked to participate.

Results: The overall response rate was 37.6%, with institutional response rate of 86.3%. By institution, 56.1% reported having a policy for NTS, 10.5% responded no, 5.3% didn’t know, and 28.1% are unknown. Of the institutions who reported “yes” to having a policy, 71.9% have contraindications listed on their policies.

Respondents report adverse events associated with NTS at 16%. Only 9.4% of respondents state that compliance with the hospital’s NTS policy is “required and tracked”, with 40.6% being “required but not tracked or documented.” Knowledge, skills, risks associated with, evaluation and performance were ensured by peer-to-peer evaluations.

Conclusion: Over half of the responding institutions had policies for NTS, and not many of these policies are being tracked to ensure safe practices. Much of the education and performance is implemented through peer-to-peer evaluations. It can be concluded that there is much room for improvement across the country to ensure safe practice of NTS.

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Toxicological Patterns of Youth Suicide: A retrospective descriptive review of the toxicological findings of deaths ruled suicide in Kansas youths 24 years and under from 2009-2013

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**Background:** Understanding the characteristics of lethal means and circumstances surrounding completed youth suicides is a first step to developing and subsequently implementing interventions to prevent future suicide completions.

**Methods:** To this end, all toxicology data from deaths ruled suicide by the Kansas coroner from 2009-2013 were retrospectively identified and toxicology data entered into a database constructed with EPI-Info. Demographics, cause of death, and types of drugs ingested (including levels if recorded) were extracted and analyzed.

**Results:** The majority of the decedents were males, with the majority of decedents between the ages of 18-24. The most common cause of death was found to be via firearm, followed by hanging. Toxicological data was analyzed in all cases, with the majority having positive findings. Percentages of those found to have antidepressants, as well as alcohol, cannabis, opiates, methamphetamines, and other drugs of abuse were calculated.

**Conclusion:** With evidence of illicit substance and alcohol use present in successful suicide completions, targeting their treatment by means of improved community resources for youths with the aim to reduce the risk of suicidal behaviors would seem a reasonable point of first intervention. In terms of future directions regarding expanded analysis of these data, it would be helpful to determine if these individuals received psychiatric or substance abuse treatment, with hopes of identifying a potentially useful early point of suicide intervention.

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Barriers and Challenges of Optimal Trauma Care for Rural Family Physicians

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Background: Family physicians often staff emergency departments in rural hospitals. Patients are often transported to referral centers because they require treatment beyond the scope of the local hospital. Coordination of appropriate transfers requires planning and communication between staff at both the sending and receiving facilities, for patient care and performance improvement. Lack of information or disconnects in communication may contribute to inappropriate and unsafe transfers. The purpose of this study was to explore the needs of rural family physicians who staff emergency departments in rural areas, specifically to determine their needs and obstacles.

Methods: Focus group included rural family physicians, recruited from the Family Medicine Winter Symposium, December 5, 2014. Participation was voluntary. Demographic information was collected via survey prior to the focus group session, which was audiotaped. Research team members read the transcription, identified themes, and grouped the findings into categories for analysis.

Results: Participants identified successful (pre-hospital notification, systems, reviews, relationships) and unsuccessful (communication consistency, post-discharge information) practices. Participants also described patterns of trauma typically observed within their rural community as well as barriers to optimal care, and concerns specific to pediatric and geriatric care.

Conclusion: The information gleaned from this study provided a platform and starting discussion for areas of improvement for rural trauma programs. Identified were processes that could be improved and, in turn, improve communication and patient care for both referring and receiving facilities.

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Increasing Abdominal Girth in an Asymptomatic 8 Year Old Male: Radiologic-pathologic correlation of an embryonal rhabdomyosarcoma

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Case Report

**Background:** The patient is an 8 year old male with increasing abdominal girth that was first noticed 1 month prior to presentation. The patient is otherwise asymptomatic, healthy, and moderately active. On clinical exam, a large bulging mass was noted in the epigastric region.

**Description:** The mass was evaluated using Contrast CT. The mass filled the entire abdominal cavity displacing the bowel; however, it appeared well-circumscribed without any evidence of invasion. There was no renal or adrenal mass. The vascular supply appeared to arise from the external iliac artery. The patient was taken to surgery for exploration and resection. The mass was able to be shelled out of the abdominal cavity and had a single vascular stalk extending from the left lower quadrant. Pathology demonstrated an embryonal rhabdomyosarcoma and staging of T3N0M0 was given. The patient had a mild ileus post-operatively. Chemotherapy (Mesna/cyclophosphamide/Dactinomycin/Vincristine) was commenced and he was discharged from the hospital 13 days later.

**Conclusion:** This unique case provides radiologic-pathologic correlation of a large abdominal mass in an asymptomatic pediatric patient which was proven to be embryonal rhabdomyosarcoma. For demonstration purposes, this image rich presentation will include cross-sectional imaging, pathology slides, and images of the gross specimen.

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Transradial Access for Interventional Radiology Procedures

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Case Report

Background: Transradial access is an efficient way to perform some interventional radiology procedures. The radial artery is easily accessible and easily compressible. Knowledge of this technique can be an important tool for residents, fellows, and practicing interventionalists.

Description: Transradial access can be performed under palpation or using ultrasound guidance. A pictorial review of the technique will be reviewed. The Allen’s test, which is crucial for patient selection, will also be reviewed.

A pictorial review for setting up and performing transradial access will be provided. Specific procedures which are amenable to transradial access will be explored and case based examples of transradial approach will be shown. The advantages and disadvantages of using transradial access will also be discussed.

Conclusion: Transradial access offers many distinct advantages for interventional radiology procedures. Transradial access is widely accepted as an efficacious and safe technique for coronary and other arterial interventions. However, this access site has been utilized less frequently in the setting of interventional radiology.

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Unique Case of Segmental Spinal Dysgenesis

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Case Report

Background: Premature African-American male born at 28 weeks gestation to mother with history of substance abuse. Neurologic findings include spastic paraparesis with increased deep tendon reflex. Physical exam and imaging uncovers segmental spinal dysgenesis in the upper lumbar spine. He also has multiple medical problems associated to prematurity including chronic lung disease and necrotizing enterocolitis which did not make him a surgical candidate. This provides a unique case of a 13 year follow-up without surgical intervention.

Description: Imaging Findings: Dysmorphic L2-L4 vertebrae with focal kyphosis. The spinal cord is noted to be tethered. The kyphosis and spinal stenosis increased in severity on follow-up imaging. This demonstrates the progressive nature of the kyphosis and spinal canal dysmorphology.

Management/Treatment: Early recognition and surgical management may prevent spinal instability and progressive motor function loss. MRI is critical for surgical planning. Additional surgical and medical management may be required for associated abnormalities.

Conclusion: Segmental spinal dysgenesis is a rare congenital abnormality with dysmorphic vertebrae in the thoracic or lumbar spine. The proposed mechanism is abnormal gastrulation during notochord development in the third gestational week. MRI is considered gold standard and provides additional information regarding the spinal cord. This case demonstrates the progressive nature if untreated. Early surgical intervention is recommended to prevent progression to lower extremity paresis and spinal instability.

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Extrapontine Myelinolysis of the Bilateral Branchium Pontis

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Case Report

Background: Bilateral middle cerebellar peduncle abnormalities are nonspecific and have several different etiologies. Two clinically different cases are presented of bilateral brachium pontis lesions in the setting of extrapontine myelinolysis which usually occurs during rapid correction of hyponatremia (greater than 10 mmol/L/day) resulting in relative hypertonicity of the cells and myelinolysis. Extrapontine myelinolysis can also be seen with osmotic stress in the context of underlying disease such as cirrhosis, alcoholism, electrolyte disorders.

Description: Patient 1: 59 yo male with history of alcohol abuse admitted for sepsis and empyema. He improved in the ICU over 3 weeks but had persistent confusion which was initially attributed to Wernicke’s encephalopathy. Initial sodium was 119 mmol/dL. The sodium rose to 137 mmol/L on day 3 and 154 mmol/L on day 11. Peak sodium was 165 mmol/L on day 19 before it trended to normal range.

Patient 2: 72 yo male with diabetes and hepatitis C related cirrhosis presented with altered mental status. CT head was negative. Initial blood glucose was 30 mg/dL, and after glucagon, it was 67 mg/dL. After intravenous dextrose in the hospital, it was 57-300 mg/dL. The sodium ranged between 136-143 mmol/dL. He later became unresponsive and EEG did not indicate seizure activity. In both patients, a MRI brain demonstrated T2 signal and diffusion restriction in the bilateral brachial pontis.

Conclusion: Extrapontine myelinolysis may present with brachium pontis lesions and should be considered in the differential for patients at risk for osmotic stress by rapid correction of hyponatremia and severe electrolyte imbalances.

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Small Lymphocytic Lymphoma Presenting with Hypopituitarism

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Case Report

Background: Small lymphocytic lymphoma/chronic lymphocytic leukemia (SLL/CLL) presents primarily with lymphadenopathy, constitutional symptoms and/or abnormal CBC. Central nervous system (CNS) involvement with SLL/CLL is rare. We describe a patient with SLL/CLL presenting with hypopituitarism due to sellar involvement.

Description: A 71-year-old Caucasian male presented with fatigue, cold intolerance and decreased alertness. The physical exam was unremarkable, including normal visual fields. Lab studies showed secondary hypothyroidism. Additional studies showed low testosterone and cortisol level. MRI of the brain revealed a 1.1 x 1.8 x 1.1 cm enhancing suprasellar mass. Transsphenoidal resection revealed SLL/CLL. Bone marrow biopsy revealed stage IVA SLL/CLL. Tertiary institution referral resulted in a recommendation for radiation to the pituitary, which was well tolerated with the exception of transient visual symptoms. The patient is monitored with serial MRIs, with systemic therapy reserved for disease progression.

Conclusion: Treatment of CNS lymphoma is challenging due to difficulties of medications crossing the blood-brain barrier. Therapeutic challenges in this patient included a low mitotic rate and low CD20 expression. Concerns about radiation therapy included the close proximity of the optic chiasm with potential visual loss and the risk of permanent panhypopituitarism. The most sensitive hormone is growth hormone, with dysfunction seen after 20 Gy. Anterior pituitary hormones are more radiosensitive at doses of 30 Gy or higher. This patient was successfully treated with radiation therapy using a dose of 24 Gy, having achieved complete resolution of the pituitary tumor. This patient represents only the fourth such case described of SLL/CLL manifesting as hypopituitarism.

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Storm in an Unsuspecting Patient

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University of Kansas School of Medicine-Wichita

Case Report

**Background:** Thyroid storm is an accentuation of thyrotoxicosis that occurs primarily in patients with untreated Graves’ disease. It is characterized by symptoms of severe hypermetabolism and fever. Although rare, thyroid storm has a mortality rate of 20 to 50%.

**Description:** A 28-year-old female with asthma presented with upper respiratory symptoms and chest pain. Temperature was 100.2°F; pulse was 159 bpm. She had bilateral wheezing, decreased air entry, and increased expiratory phase. Supraventricular tachycardia did not respond to adenosine. Cardizem drip was initiated and synchronized cardioversion was performed without success. She developed respiratory failure and was intubated. Labs revealed leukocytosis, lactic acidosis, and normal urinalysis. Imaging was normal. Sputum culture revealed Oxacillin sensitive staphylococcus aureus. Nasopharyngeal swab revealed coronavirus. She was treated for asthma exacerbation and community acquired pneumonia. On hospital day four, she was extubated. She was stuporous, tachycardic, febrile, and had elevated LFTs. Thyroid function tests revealed low TSH, elevated total T3, elevated free T4, and elevated Thyroid Stimulating Immunoglobulin. She was diagnosed with thyroid storm with a Wartofsky score of 80. She was treated with methimazole, propranolol, hydrocortisone, and SSKI. She improved dramatically and discharged home.

**Conclusion:** The Burch-Wartofsky Score is a clinical tool that can confirm the diagnosis of thyroid storm with a score of 45 or greater. Although rare, its high mortality suggests that it should be considered in the differential diagnosis of the critically ill patient with hyperpyrexia and tachycardia. Thyroid function tests should be obtained in these patients.

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Homicidality and Psychosis Associated with Over-the-Counter Performance Enhancing Supplements in a Past Anabolic Steroid User: A case report

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Case Report

Background: "Mr. T." is a 30-year-old male admitted with homicidality, command hallucinations to kill a man, and “vivid visions” of homicide. Past psychiatric history included polysubstance dependence in full remission; medical and family histories were non-contributory. Patient was not taking prescription medications.

Description: Physical exam showed a “bodybuilder” musculature and acne. On mental status examination, he was alert, disorganized, paranoid, endorsed hallucinations and preoccupation with sex and muscles. Laboratory tests, CT scan of the head, vital signs were unremarkable. Olanzapine was started for homicidality and psychosis, which fully resolved. This allowed collection of extended history: patient is a recreational bodybuilder who completed 7 "cycles" of anabolic steroids (AS) plus human growth hormone and over the counter supplements (OTC) for muscle growth. Patient discontinued this regimen due to cost, gynecomastia and a lump under his nipple. Next, he began use of OTC performance enhancing supplements (PES) containing Dendrobium extract and L-Dopa. Homicidality and psychosis started after PES initiation. He was diagnosed with Substance Induced Psychotic Disorder, Anabolic Steroid Use Disorder per the Diagnostic and Statistical Manual of Mental Disorders-5.

Conclusion: Literature search revealed 5 reported cases of homicidality on AS, none on PES. Importantly, in 2014 FDA found CrazeTM, (Dendrobium alkaloids mix) is adulterated with N, α-diethyl-phenylethylamine, a methamphetamine analog. Clinicians should be aware: 1) use of AS and PES is likely underreported, and 2) OTC are not tested by the FDA for safety; may be adulterated and associated with a variety of medical and psychiatric presentations during use or withdrawal.

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Pancytopenia: A new manifestation of Mycoplasma pneumoniae

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Case Report

Background: *Mycoplasma pneumoniae* was initially identified in 1944 as an organism causing atypical pneumonia in young adults with a self-limited course characterized by cough, headache, and fatigue. Extrapulmonary manifestations carry poor prognosis. Described hematological manifestations include hemolytic anemia, thrombocytopenic purpura, and disseminated intravascular coagulation. We hereby present the first documented adult case of *Mycoplasma pneumoniae* presenting with pancytopenia.

Description: A 23-year-old previously healthy Asian female presented with a ten-day history of diarrhea and high-grade fever. Laboratory findings included white blood cell count (WBC) of 1.1K/µL, hemoglobin of 9.2 g/dl and a platelet count 100 K/µL. A bone marrow aspirate and flow cytometry ruled out malignancy. Her chest x-ray showed bilateral infiltrates. *Mycoplasma pneumoniae* immunoglobulins (IgG and IgM) were positive suggestive of a recent infection (IgG: 40,218 and IgM: 1.23). She was treated with a five-day course of azithromycin and clinically improved with resolution of symptoms, infiltrates, and pancytopenia.

Conclusion: *Mycoplasma pneumoniae* infections traditionally involve the respiratory tract. To our knowledge, a similar case of M. pneumonia infection presenting with neutropenia, thrombocytopenia was described in a child in Taiwan, but none in adults. The underlying mechanism of extra-pulmonary manifestations and, in particular, bone marrow suppression is not well defined. Many reports of *Mycoplasma* extra-pulmonary infections come from the southeast region, and our patient is of Chinese origin. Proposed ethnic differences may account for variable manifestations. This case alerts the clinician to the possibility of *M. pneumonia* infection in the setting of acute bone marrow suppression especially in patients of Asian descent.

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Mycobacterium chelonae Disseminated Soft Tissue Infection in a Post-renal Transplant Patient

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Case Report

Background: M. chelonae is a rapidly growing non-tuberculous mycobacteria classified in 1992 as its own species. M. chelonae infection is mostly manifested in disseminated and localized skin and soft tissue infections in immunocompromised patients. It can also infect immunocompetent individuals following various surgical interventions. It is a rare cause of human infection that makes it hard to diagnose and treat. It is usually resistant to anti-tuberculous agents.

Description: We hereby present a 71 year old female with polycystic kidney disease status-post cadaveric renal transplant 12 years prior to presentation, with no previous history of graft rejection. She is maintained on prednisone 5 mg daily and cyclosporine 50 mg twice a day. She presented with right index swelling, pain and erythema of several weeks duration and new onset erythema overlying the right ankle. She underwent debridement of the right index finger and cultures revealed Mycobacterium chelonae sensitive to Azithromycin, Tobramycin and Amikacin. The patient was started on oral Azithromycin 500 mg daily. Her cyclosporine dose was decreased to 25 mg twice a day. Her lesions are slowly improving with decreasing swelling and erythema.

Conclusion: A high index of suspicion is needed in immunocompromised patients, specifically renal transplant patients presenting with subacute onset skin or soft tissue infections not responding to standard antimicrobial therapy, as potential pathogens include atypical mycobacteria. Treatment is usually a combination of surgical debridement, antimicrobial therapy with Tobramycin, Clarithromycin, or Amikacin for a period of at least 12 weeks, and decreasing immunosuppression. Susceptibility testing is crucial to help guide appropriate therapy.

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Psychoeducational Psychotherapy (PEP) Adapted for Spanish Speaking Children with Mood Disorders: A case series

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Case Report

**Background:** Behavioral and cognitive-behavioral interventions have shown promise in the treatment of Latino youth. However, the limited availability of Spanish therapy options limits the delivery of and research on interventions for the large number of Latino children and families who have minimal proficiency in English.

Childhood mood disorders are associated with significant psychosocial impairment; high degree of mental health utilization; and suicidality. Psychosocial interventions play an important role in promoting medication compliance, teaching skills to decrease relapse, and improving psychosocial functioning. Currently, Psychoeducational Psychotherapy (PEP) is the only psychotherapy shown to be efficacious for preadolescent children with mood disorders.

**Description:** In an initial study we translated PEP treatment materials into Spanish and reviewed them for cultural appropriateness. This pilot study aimed to establish the feasibility of the Spanish PEP intervention with 4 families of children age 8-12 with mood disorders. Parent and child participants completed diagnostic interviews and mood rating scales at baseline. After the 20 session treatment, they completed mood rating scales and satisfaction surveys. The families rated the material as culturally appropriate and overall satisfaction with the treatment was high. All participants showed improvement on depressive and manic symptoms after the intervention.

**Conclusion:** The results suggest that PEP in Spanish is a potentially beneficial treatment with no identifiable harmful outcomes and further research is warranted.

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Lithium and Haloperidol Toxicity with Catatonia

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Case Report

Background: Patient is a 33-year-old male with long history of Bipolar Disorder, stable on Lithium and Clonazepam. He was hospitalized for exacerbation of mania and delirium.

Description: To achieve remission in previous admission, olanzapine was added to lithium and Clonazepam. Patient was discharged to outpatient treatment, where olanzapine was exchanged for haloperidol. This led to development of EPS (cog-wheeling and akathisia). Outpatient provider discontinued haloperidol and his status worsened. He became disoriented, forgetful and was unable to follow instructions. He endorsed auditory hallucination of God telling him that his death will prevent rapture. His physical examination showed bilateral hand tremor, gait instability, stereotypical movement. EKG showed sinus tachycardia, drug screen detected Cannabis. Other diagnostic tests were unremarkable. He was diagnosed with lithium and haloperidol induced Delirium based on fluctuation of symptoms of disorientation and memory impairment and physical signs of lithium toxicity. Lithium was discontinued, clonazepam was changed to lorazepam and olanzapine was started for psychosis. After Delirium resolved, patient continued to endorse psychotic symptoms and stereotypic movements. Diagnosis updated to mania with catatonia, olanzapine was increased and six ECT treatments were added to his treatment. After resolution of catatonia and psychosis, he was discharged to partial day hospital. Valproate sodium was started and titrated to the therapeutic level. After patient returned to his baseline functionality the dose of olanzapine was decreased without destabilization of the patient.

Conclusion: Clinicians should know: 1. lithium toxicity can develop with non-toxic lithium levels, 2. neurocognitive symptoms of lithium toxicity, 3. symptoms and treatment for catatonia.

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Ultrasound Guided Popliteal Arterial Catheter Insertion via Seldinger Technique in the Prone Position

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Case Report

Background: Traditionally, arterial catheter placement commonly utilizes the radial, brachial, and femoral arteries. We present a case of a prone, suboccipital craniotomy with arms tucked in which loss of radial arterial catheter function necessitated urgent placement of a catheter in the popliteal artery using Seldinger technique under ultrasound guidance.

Description: A 40-year-old man presented with progressively worsening balance problems, headaches, and fatigue for the past 3-4 months. CT scan of the head revealed a very large posterior fossa mass with severe brainstem compression, requiring resection. Preoperatively, a 20 gauge radial arterial catheter was successfully placed. During the procedure, the arterial line waveform diminished and no blood could be withdrawn from the indwelling catheter. Attempts to use non-invasive blood pressure readings failed due to the hemodynamic effects of surgery near the brainstem. Given the patient’s positioning, the popliteal fossa was the only option as it was easily visualized and remote from the surgical site. A 20 gauge needle was placed into the artery and a spring-wire guide was placed. The catheter was secured in place and connected to a pressure transducer with confirmation of an appropriate arterial waveform. The popliteal arterial catheter was kept in place for the duration of the procedure and later discontinued in the neurocritical care unit.

Conclusion: There may be times when creative thinking is required to re-establish needed hemodynamic monitoring. While uneventful in this report, it is unknown what risks, if any, are encountered with cannulation and catheterization of the popliteal artery that aren’t experienced at other arterial sites.

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Spinal Cord Stimulators as a Pain Management Modality for Post Guillain-Barre Syndrome Pain

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Case Report

Background: Guillain-Barre Syndrome (GBS) is a self-limited autoimmune disorder in which humoral and cellular immune responses will cross react to affect Schwann cell or axonal membranes to cause rapidly evolving weakness and possible sensory loss. Currently, post-GBS pain is typically controlled pharmacologically. Spinal cord stimulation (SCS) implants are a modality currently used to treat chronic pain and spasticity.

Description: A 61 year-old male presented for a chronic pain consult because of pain started after a hospital admission for an acute episode of GBS. During the admission, the patient began to have severe pain in bilateral arms and shoulders. Upon discharge, the patient was placed on Acetaminophen, Neurontin, Demerol, and Hydrocodone for pain management. Prior to the pain consultation, the patient had seen a primary care provider and neurology specialist because of persistent pain and weakness in bilateral wrists and hands. The patient was determined to be a candidate for a SCS implant. Significant pain improvement was noted 7 weeks after the trial electrode placement. Permanent SCS electrodes were then placed. At four month as well as two-year follow up, the pain was still well controlled with the supplementation of occasional Hydrocodone along with Pregabalin.

Conclusion: Although there are no other case reports or known studies similar to our case, a SCS should be a pain management modality considered for chronic pain in this patient population when pharmacological treatments have failed. Although the SCS didn’t completely eliminate the need for any type of pharmacological intervention, it did provide significant relief for our patient.

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Perioperative Management of Traumatic Bronchial Rupture: A case report

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Case Report

Background: Up to 25% of trauma deaths in the US are attributable to thoracic trauma [1]. Although relatively rare, traumatic tracheobronchial injury (TBI) is associated with an 80% pre-hospital mortality rate, and it is diagnosed in 0.3-2% of patients with thoracic trauma presenting to the emergency department.

Description: A previously healthy 20 year-old male arrived via EMS from an outside hospital as a level II trauma after a motorcycle accident. Upon arrival, he was awake and talking, with a left thoracostomy tube in place. FAST exam revealed intraperitoneal fluid so he was taken emergently to the OR for exploratory laparotomy. Intraoperative initiation of mechanical ventilation unmasked a large air leak. Intraoperative bronchoscopy confirmed defects in the left superior and inferior lobar bronchi, after consultation with cardiothoracic surgery, the decision was made to defer repair. An endobronchial blocker was placed isolating the left lung which improved ventilation. The patient was taken to the ICU with a single lumen tube and endobronchial blocker in place. Maintenance of adequate tidal volume proved difficult. Therefore, on postoperative day 1, the single lumen tube and endobronchial blocker were exchanged for a left double lumen tube, allowing for consistently adequate tidal volumes until definitive surgical repair was performed on postoperative day 5.

Conclusion: When confronted with a thoracic trauma, anesthesiologists should (1) have a high index of suspicion for this rare but serious injury, (2) look for clues to this diagnosis, and (3) have appropriate equipment immediately available for temporization until definitive treatment can be accomplished.

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Saddle Pulmonary Embolus in a Patient Status-Post Cesarean Section

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Case Report

Background: We present a case of transient hypoxemia and hypotension during cesarean section (CS), which prompts a review of guidelines for thrombophilia testing in pregnant women with multiple circumstantial risk factors for pulmonary embolism. These risk factors primarily include immobility, age, surgery, and obesity.

Description: A 38-year-old G6P5 105 Kg female presented for a scheduled repeat CS at 37 weeks’ gestation. Her medical history was significant for a uterine rupture during her most recent pregnancy and preeclampsia in the current pregnancy. She had been on light activity/bed rest for the past two months. A CSE was placed at the L3–4 interspace with a T4 level of anesthesia. Upon delivery, the patient reported shortness of breath accompanied by a brief hypotensive and hypoxic episode which was corrected with 100% oxygen and vasopressor boluses. A computed tomographic angiogram of the chest revealed a large saddle pulmonary embolus. Treatment began immediately using a catheter-directed intra-arterial injection of tissue plasminogen activator. She developed a large pelvic hematoma requiring multiple blood transfusions. An IVC filter was placed and the heparin was discontinued. Ten days later, Doppler showed a nearly occlusive common femoral vein thrombosis. The patient was found to have factor V Leiden. It was recommended that she be maintained on warfarin for life.

Conclusion: This case highlights the importance of clinical vigilance, risk stratification and meticulous perioperative preparation in pregnant patients with multiple risk factors for pulmonary embolus. We propose a possible algorithm change to include stricter criteria for women who should be tested preoperatively.

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Elevated Procalcitonin in a Case of Non-Convulsive Status Epilepticus

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Case Report

Background: Procalcitonin (PCT) has been widely studied as a biomarker of infection and sepsis, with utility in the early diagnosis of these entities and possibly as a guide for antibiotic therapy in critically ill patient populations. This case describes an incidence of PCT elevation in a patient hospitalized for stroke that subsequently declined into status epilepticus without evidence of underlying infectious process.

Description: A 61-year-old male with a history of ischemic stroke with residual left sided weakness and tremors presented to the hospital after having acute onset of slurred speech and worsening left sided weakness. This patient received tPA and a Computed Tomography scan was negative for intracranial hemorrhage. He was then admitted to the neuro-critical care unit. Subsequent MRI showed ischemia throughout the distribution of the right middle cerebral artery with concern for embolic phenomenon. On hospital day 5, the patient acutely deteriorated, with new onset fever of 101.6, leukocytosis, tachypnea, and tachycardia. He also required BiPAP to maintain oxygen saturation and had a 3 minute period where he was unresponsive. Patient’s blood, sputum, and urine cultures were obtained. A PCT level was also drawn. He was found to have a PCT level of approximately 60ng/ml (normal 0-0.09ng/ml), all cultures were negative. An EEG showed that the patient was in non-convulsive status epilepticus.

Conclusion: This case of extreme PCT elevation in the presence of non-convulsive status epilepticus, but without evidence of infection further illustrates that PCT must be interpreted carefully within the entire clinical picture.

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