

2013 BIOM Abstracts and Poster Competition

The Bureau of International Osteopathic Medicine (BIOM) held their annual student poster competition in conjunction with the Student Osteopathic Medical Association (SOMA) during the 2013 Osteopathic Medical Conference and Exposition (OMED 2013) in Las Vegas, Nevada. All participants who submitted abstracts to the BIOM competition were invited to display their posters at the 15th annual BIOM seminar, which was held on Monday, September 30, during OMED 2013.

The competition consisted of 2 categories: (1) research projects conducted internationally and (2) broad outreach experiences. This year there were 36 abstracts submitted to the competition—19 research abstracts and 17 outreach abstracts. There were also 5 noncompetition abstracts submitted, for a total of 41 participants, which is a record number of abstract submissions for the BIOM. The winners, who were selected by BIOM members and a SOMA representative, were as follows:

Research

- **First Place:** “Fetal and Maternal Assessment in a Rural Dominican Community Utilizing Bedside Sonography” (abstract BIO1544) by Shwetha Manoharan, OMS IV, from the Edward Via College of Osteopathic Medicine–Virginia Campus (see next page)
- **Second Place:** “Relationship Between Chapman’s Reflexes and Acupuncture Meridians by Traditional Chinese Medicine Practitioners in Taiwan” (abstract BIO1536) by Cuong Huy Quach, OMS III, from the Touro University California, College of Osteopathic Medicine (see next page)

Outreach

- **First Place:** “Osteopathic Medical Leadership Training Through International Medical Outreach Trips” (abstract BIO1542) by Logan Huff, OMS III, from the Nova Southeastern University College of Osteopathic Medicine (see page e62)
- **Second Place:** “Integration of Local Youth Volunteers as an International Osteopathic Medical Education Paradigm (Jhor-Mahankal, Kathmandu District in Nepal)” (abstract BIO1556) by Kathleen K. Hua, OMS II, from the Georgia Campus–Philadelphia College of Osteopathic Medicine (see page e63)

The winners were invited to present a summary of their research during the 15th Annual International Seminar “Osteopathic Medicine in Humanitarian Care,” which was held on Monday, September 30, at OMED 2013.

The BIOM congratulates all of the winners and abstract presenters on their accomplishments. The quality of research conducted continues to improve each year. By encouraging research involvement during medical education through initiatives such as this competition, we help to ensure a future of innovative osteopathic medical research for many years to come.

Lauren A. Fetsko, OMS III

SOMA international health programs director; University of Pikeville-Kentucky College of Osteopathic Medicine

Editor’s Note: Abstracts have been edited for basic JAOA style only. The content has not been modified. Information provided reflects information that was submitted by the primary author; therefore, institutional affiliations may represent that of the primary author only. Neither the BIOM nor the JAOA assume responsibility for the abstracts’ content.

Research

BIO1544—1st Place Winner Fetal and Maternal Assessment in a Rural Dominican Community Utilizing Bedside Sonography

Shwetha Manoharan, OMS IV; Fred Rawlins, DO; Dixie Tooke-Rawlins, DO; Suporn Sukpraprut, PhD; Janella Looney, BS

Edward Via College of Osteopathic Medicine—Virginia Campus, Lewisburg

Objective and Hypotheses: The research objectives were: (1) to determine abnormal ultrasound readings requiring emergent or urgent intervention at the VCOM Veron clinic; (2) to determine the impact of bedside sonography in a remote clinic site; and (3) to develop an electronic database for ultrasound record. Our hypothesis was that the fetal assessment of BPD, FL, and FHR would be significantly different between normal and abnormal pregnancies.

Materials: This was a retrospective chart review of the ultrasound images and obstetrical reports.

Methods: This retrospective study of 423 pregnant patients included transabdominal or transvaginal ultrasound fetal assessment at a VCOM primary care facility in the DR between October 1, 2011, to March 30, 2012. Patient ultrasound images were uploaded to VCOM electronic database for analyses to supplement local diagnosis for emergent and direct intervention. A standard protocol measured Fetal Assessment of biparietal diameter (BPD), femur length (FL), and fetal heart rhythm (FHR) along with number of gestations, placenta position, and fetal presentation information.

Results: Of the 423 pregnant patients, 259 were Dominican and 166 Haitian. The age averages were 25.1 ± 8.9 for normal and 25.7 ± 6.2 for abnormal pregnancy women. Patient presentations included 5 breech, 2 twins, 182 cephalic, 58 pelvic, 99 transverse, and 6 vertex form. Placenta positions were anterior ($n=166$), fundal ($n=38$), posterior

($n=131$), and unidentified ($n=88$). Thirteen abnormal pregnancies required emergent and direct intervention. The averages of BPD, FL, and FHR among normal pregnancies were 59.2 ± 18.6 mm, 46.3 ± 16.5 mm and 146.6 ± 14.7 beats/min and among abnormal pregnancies were 64.1 ± 26.6 mm, 60.13 ± 23.3 mm, and 142.1 ± 8.16 beats/min respectively. Abnormal pregnancy patients have higher BPD by 4.89 mm ($F=2.05$, $P=.052$), higher FL by 13.84 mm ($F=1.98$, $P=.022$), and lower HR by 4.52 beats/min ($F=3.23$; $P=.057$).

Conclusion: Local physicians trained in using the bedside ultrasound model successfully identified abnormal ultrasound in pregnant patients who required emergent and direct intervention. Ultrasound training and quality assurance procedures resulted in image upload for research and optional specialist US consultation. Bedside ultrasound is a highly effective, low cost and safe diagnostic modality to enhance quality health care at the rural Veron clinic, which has application in other similar settings.

BIO1536—2nd Place Winner Relationship Between Chapman's Reflexes and Acupuncture Meridians by Traditional Chinese Medicine Practitioners in Taiwan

Cuong Huy Quach, OMS III; Madeline Tram Nguyen, DO; Janet Burns, DO; Athena Lin, PhD

Touro University California, College of Osteopathic Medicine, Vallejo

Background: Chapman's reflexes (CR) and traditional Chinese medicine (TCM) acupuncture meridian (AM) points utilize points on the body for diagnosis and treatment. Frank Chapman, DO, noted painful nodules in anterior and posterior fascia, each site correlating with specific organ pathology representing aberrant sympathetic outflow. AM points all over the body correspond to specific viscera and disease states and have been found to affect the autonomic nervous system (ANS).¹ Many points from CR and AM systems seem to relate anatomi-

cally and clinically.² There is limited evidence as to whether both systems utilize similar mechanisms of action.

Hypothesis: CR and AM point systems are clinically and spatially correlated.

Methods: Three Taiwanese TCM doctors were interviewed as part of Touro University-California's Global Health Internship program in June 2012; 2 worked in an exclusively TCM hospital. They were presented with a diagram of anterior CR points, including specific symptoms for each point location, based on *An Endocrine Interpretation of Chapman's Reflexes*.³ In each interview, the TCM doctor was given the CR diagram with descriptions of symptoms and treatment indications associated with each CR point. Each TCM doctor reported if there were AM points at the same location. For coinciding CR and AM points, each TCM doctor was asked if the CR point symptoms and/or treatment indications correlated with those of TCM. Posterior CR and AM point correlations were not obtained due to time constraints.

Results: Out of 53 anterior CR points, 36 AM points (68%) were found by at least 2 TCM doctors to be in the same location (ear, nose, throat; lung, heart, liver, spleen, gall bladder, pancreas, upper GI, small intestine). Qualitative correlations of treatment indications were similar regarding affected organ systems. All TCM doctors described that, similar to CR points, anterior AM points are used more in diagnosis and posterior AM points are used more in treatment.

Conclusion: Clinical and spatial correlations exist between anterior CR and AM points. Both systems utilize palpation of anterior points to elicit pain for diagnosis. Both use posterior points for treatment; however, TCM places needles in these points whereas finger pressure is applied to CR points. Both utilize the ANS; however, there needs to be more research on their respective mechanisms of action. Further comparisons between these systems may lead to new CR points for diagnosis and treatment.

References

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2. Kim O. Comparative analysis of the topographical locations of acupuncture points and Chapman's reflex points. 2007. Unpublished thesis submitted in partial fulfillment of the degree of Master of Osteopathy, Unitec New Zealand, New Zealand.
3. Owens C. *An Endocrine Interpretation of Chapman's Reflexes*. Indianapolis, IN: Academy for Applied Osteopathy; 1963.

BIO1495

Evaluation of the Knowledge of Chagas Disease in El Salvador Before and After an Educational Presentation

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Hypothesis: The knowledge and awareness of Chagas disease in school children in El Salvador would increase both short and long term after an educational presentation on Chagas disease.

Materials: Copies of the survey to each of the 200 subjects. Skit materials including handmade puppets and a script.

Methods: Two hundred school children, aged 6 to 20 years, from 4 different schools, were administered the same 20-question survey 3 times: before the educational performance, directly after the skit, and 2 days after the skit. Translators were provided to the children to assist with administration of the survey that was written in both Spanish and English. Students were assigned identification numbers and were given the preperformance questionnaire prior to any discussion of Chagas disease. The surveys were collected and an 10-minute educational presentation covering the information related to the survey on Chagas disease was performed by second year medical students along with Salvadorian natives acting as translators. Point-biserial correlation and the difficulty were checked as part of the

item analysis for each question of pre-, post-day 1, and post-day 2 sessions, and a McNemar test was performed with computation of the odds ratio of discordant pair for comparison between 2 different sessions. A 2-way mixed-design ANOVA was performed for comparison of mean total score changes from pre- to post-day 1 sessions among different locations. Pearson's product-moment correlation coefficient was computed to study the linear relationship of the total score in each session and age.

Results: The students showed retained improvement in multiple postperformance survey questions with statistical significance. In the comparison among 4 different locations of the mean total score changes from pre- to post-day 1 sessions utilizing an ANOVA, the interaction between time and the location was significant. The students at Rancho Quemado made the most improvement, and those at Candelaria made the least. The age of 13 years was found to be a threshold above which all the students had a positive increase of total score from pre- to post-day 1 sessions with the higher mean increase and less variability compared to those at or younger than 13 years.

Conclusion: It has been shown from previous studies that people living in endemic areas of Chagas disease lack the knowledge needed to prevent transmission of the disease. This study shows that a basic educational program with characters indicative of Salvadorian culture could engage students as young as 5 years. Furthermore, the research demonstrated that key pieces of information were retained for the immediate short term. Further research needs to be conducted on long-term retention of the material.

BIO1503

If They Build It, They Will Come: A Bidirectional Approach to Continuing Medical Education in Haiti

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Hypothesis: Continuing Medical Education (CME) for Haitian physicians was limited before and subsequently weakened by the 2010 earthquake. Physicians for Haiti (P4H) is a Boston-based nonprofit organization that works in conjunction with Haitian physicians to advance medical education in Haiti. P4H provides Haitian-directed creation and provision of situation-relevant CME material with a goal of increased participation by Haitian health care providers in educational activities based on the hypothesis that when provided, these materials and activities will be readily utilized by Haitian physicians.

Methods: This is a retrospective analysis of P4H's activities and interventions from January 2011 through December 2012. A formal needs assessment was performed in 2011 including more than 60 Haitian physicians. Program implementation was initiated in parallel to the needs assessment with preliminary data from our Haitian partner organizations guiding the development of educational modules, online educational case discussions, and in-person conferences and workshops. P4H also created a Visiting Professor Program and travel grants to allow for Haitian physicians to participate in international conferences with the objective of beginning a means for the bilateral exchange of ideas. All projects were monitored including the number of educational modules created, the participation in online discussions, and attendance at in-person conferences. We also evaluated recipient response and feedback in terms of satisfaction and short term knowledge acquisition.

Results: During the 2-year analysis period P4H produced 9 educational modules on subjects such as diabetes mellitus and neonatal nutrition. The number of members in our online case discussion increased by 78%, from 20 to 91 members and these participants engaged in 63 discussions. There were 19 conferences with approximately 30 attendees at each, and 2 countrywide CME conferences with 80 participants in 2011 and 145 participants in 2012, representing a 50% growth in participation. Seven visiting professors teaching courses in subjects ranging from the social determinants of health to neurology were provided to P4H partners. Travel grants for 4 Haitian residents and 3 attending physicians were provided for attendance at international health conferences.

Conclusion: The attendance and participation in the CMEs provided by P4H has increased over the 2-year analysis period, suggesting that there is the desire for formal medical education beyond the undergraduate and post-graduate level in Haiti. Future research can focus on qualitative analysis of the post-CME surveys to better address the needs Haitian physicians identify in their practice.

BIO1513

Childhood Obesity: United States of America vs Peru

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Childhood obesity in the United States is a major issue both medically and economically. Recently the incidence of childhood obesity has accelerated quite rapidly. Looking at other countries may give the United States insight into means of improving

childhood obesity. Given that Peru faces more widespread economical and lifestyle challenges as compared with the United States, it was speculated that Peruvian children would be smaller.

Groups of randomized children aged 2 through 17 years were measured from Iquitos, Peru, in a local hospital and from various Amazonian villages in a boat. Measurements included height via anthropometrics, weight and percent body fat via a scale, skin calipers of the waist, and waist and arm circumference via measuring tape. Also a survey was done for each child addressing nutrition and physical fitness.

More detailed results are pending in the next week, primarily final numbers illustrating our findings. Upon compilation of all measurement numbers, including nutritional and physical fitness numbers as recorded in the surveys, literature discussing American children statistics will be used to compare children in the 2 countries. In general, the children in Peru appeared shorter in height and with decreased weight compared to children in the United States. Current explanations for our observations include diets and physical activities of Peruvian children as compared to children in the United States, eg, lots of carbohydrates (which does not seem a huge problem due to daily energy use), more farming resulting in fresher products and increased physical activity due to lack of expansive transportation services in Peru.

To go further into childhood obesity in these 2 countries, lipid and fitness tests would help. For now, some practices from Peru to use in the United States include better monitoring of what children are eating, less fast foods and sweets and more fresh food including fruits and vegetables, as well as more physical activity (video games and other electronic devices not being the answer).

BIO1516**Presence of Toxic Elements and Ethylene Glycol in the Rio Moche River: A Cross-Sectional Study**

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Background: Water is a limited natural resource essential for life and health. The growth of industry, mining, and intensive agriculture has led to chemical contamination of the Moche River in Peru. The Moche River serves as the primary water source for many Peruvians, and it has been postulated that this water is a source of disease. Therefore, it is important to quantify the presence of toxic elements and ethylene glycol present in the river water.

Objective: This study is a cross-sectional investigation of toxic elements and ethylene glycol levels in the Moche River at 19 different locations. The project was done in collaboration with the Universidad Cesar Vallejo. We believe concrete data that shows hazardous toxins within the Moche River will lay the groundwork for the allocation of clean water to Peruvians living along the river.

Methods: The water samples were acquired on August 6, 2013, from 19 different locations that were defined by georeference, agricultural activities, mining, and small villages. At the different locations, 250 mL of water was collected from the center of the river where there was a current flow. Each sample was numbered and assigned GPS coordinates; the pH and temperature were measured and recorded for each sample. The samples were then transferred to 15-mL sterile containers and shipped to the MSU DCPAH (Diagnostic Center for Population and Ani-

mal Health) laboratory, where they were analyzed for the presence of toxic elements and ethylene glycol.

Results: Our initial analysis of the data show that samples from the Puente Constancia area harbor elevated levels of aluminum, cadmium, lead, and titanium. According to the US EPA, this is usually secondary to erosion of natural resources. Cadmium has been shown to cause kidney damage and elevated lead levels can delay physical or mental development in children. Elevated lead can also cause kidney problems and high blood pressure in adults.

Conclusion: This study demonstrates that within the Trujillo region of Peru, local inhabitants are relying on a primary water source that does not meet the US EPA standards. Our results raise 2 main questions: How can clean water be allocated to Peruvians in the Trujillo region? Are there specific disease patterns in the region due to drinking contaminated water?

BIO1518**Medical Waste Management in Central Khartoum, Sudan Public Hospitals: A Qualitative Study Utilizing a Questionnaire to Investigate the Process of Medical Waste Handling and Management**

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Hypothesis: Sudan is a developing country and it suffers from TRANSITION STATE, where it is fighting chronic diseases and infectious diseases. Most infectious diseases are preventable with simple hygiene, sanitation, and knowledge of such diseases. In my opinion there is a need for the development of a health policy that regulates practices in health care facilities in Sudan. A structured guideline and implementation of health policy are 2 essential steps to prevent the spread of infectious diseases. This study aims at improving and enhancing the quality of Waste Management Systems (WMS) in health

care-related facilities in Sudan. A complete assessment of all of the processes involved in handling waste from collection to disposal would be implemented to better understand the WMS in Sudan. Finally, a series of recommendations on how to better improve WMS in Sudan to conform to International Standards would be developed.

Methods: The most efficient method to measure the extent of WMS in Sudan is by implementing the following steps: (1) Randomly select a total of 10 hospitals to collect data from. (2) Direct visits and observation of each hospital WMS. (3) Develop a series of questions to form a survey/questionnaire about the current methods being followed for WMS in each hospital or facility. The questions would target the following areas: (a) structure of WMS committee, (b) classification of waste, (c) collection methods, (d) transportation, (e) disposal, (f) training and education of all staff involved in the WMS about hazards and risks of mishandling waste, (g) education of patients about health hazards and risks of mishandling waste, (h) septic system, (i) protective equipment gear, (j) clinical testing of all newly hired staff and patients exposed to blood and body fluids, (k) safety measures. (4) Assess and predict the implications of the current WMS in Sudan on the patient, health care providers, and the general public. (5) Develop recommendations concluded from the investigation and all data collected that aim at improving the WMS in Sudan.

Results: The improper handling of waste and classification is a serious health hazard to the public. Sudan is a developing country with most resources allocated to the government's ministry of defense and army that has been in war for the past 25 years. The government should hold parties responsible of the proper cleaning for their waste such as with the Superfund in the United States. The Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA) is a US federal law that authorized the Environmental Protection Agency to locate responsible parties and oblige them to clean.

Conclusion: For the long-term solution, there has to be both national and governmental efforts to develop a national guidance manual for waste management. Also, nonincineration technologies such as autoclaving could be invested on as an alternative to incineration and landfills for medical waste. Finally, a combination of laws, policies, and legislation must take place to support appropriate waste management and environmentally friendly practices. These laws should focus solely on the protection of the general public from the risks, hazards, and exposure to medical waste. More research should be conducted in the area of waste management in Sudan to investigate where general waste (contaminated with medical) is being transported. In addition, a more comprehensive research that covers and samples more hospitals across all of Sudan should be conducted.

BIO1523

Cervical Cancer Screening in Iquitos, Peru

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The incidence of cervical cancer has been significantly reduced in developed countries with the introduction of the Pap smear cytological screening method. However, developing countries worldwide have attempted to implement this screening process with virtually no success. Visual inspection with acetic acid (VIA) is an alternative to cytology that has been increasingly researched over the last decade. A study published in 2005 used VIA screening in Lima, Peru. This study screened 1921 women, 132 of whom screened positive with VIA (6.9%) (Jeronimo et al, 2005). Pan American Health Organization conducted a cervical cancer screening proj-

ect in the rural region of San Martin, Peru between 2000 and 2003. 36,759 women were screened, of whom 6473 screened positive with VIA (17.6%) (Luciani and Winkler, 2006).

In August 2013, Michigan State University College of Osteopathic Medicine provided medical care to the region of Iquitos, Peru. This trip included a research component aimed at collecting data on the prevalence of cervical precancerous lesions among women in this region, a population that has been largely neglected in HPV and cervical cancer research.

Pelvic examinations were only completed on women requiring them for routine or diagnostic purposes. During the examination, a 4% solution of acetic acid was used to screen women between the ages of 25 and 50 for precancerous lesions. Two attending physicians supervised medical student researchers in the application of acetic acid to the cervix and helped interpret the results.

Being in the rural city of Iquitos, one of the poorest regions of the country, it was postulated that the prevalence of the VIA positive rates would be similar to those found in San Martin. However, the percentage was found to be much higher; 40 women were screened, 14 of whom had positive results (35%). Of these 14 women, 10 reported having no primary care physician. The high positive screening result in combination with the apparent low incidence of primary care access indicates the need for cervical cancer prevention campaigns outside of a primary care setting. With HPV being the leading cause of cervical cancer, prevention of this virus via vaccine may be a viable option. Further research into the feasibility of such a project is needed in Iquitos, as well as other regions of the country, as cervical cancer remains the number 1 cause of cancer among Peruvian women (WHO, 2010).

BIO1525

Comparing BMIs and Nutritional Status of Pediatric Populations in Contrasting Loredo Regions of Peru

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A high body mass index (BMI) is associated with a multitude of diseases, most notably insulin-dependent diabetes, cardiovascular disease, endocrine abnormalities, and premature death. The public health consequences of an emerging population of overweight and obese children burden both developing and industrialized countries worldwide. This study, performed on a medical mission trip with the Michigan State University College of Osteopathic Medicine, addressed the growing worldwide concern of an increased BMI in pediatric populations by comparing growth and development of children (ages 2-17 years) in 2 different areas within the Loredo region of Peru. Biometric measurements were assessed according to standard procedures on 170 participants between Iquitos, Loredo and the Loredo villages Iquique, Santa Rosa, and Timicuro Primera located along the Amazon River. Height was measured to the nearest 0.01 cm using a field anthropometer and weight was measured to the nearest 0.1 kg using a Tanita BC534 scale. Participants were then classified by weight and height status according to CDC standards. The majority of participants in Iquitos, Loredo (83.6%, n=82), were classified by the CDC as falling within the normal weight range, with the remainder falling into the overweight/obese categories (16.4%, n=16). Comparing that to the Loredo villages Iquique, Santa Rosa, and Timicuro Primeram, the CDC classifies 73.6% (n=53) within the normal weight range, and 26.4% (n=19) as

overweight/obese. Dietary habits were assessed by a survey identifying number of meals and relative serving amounts of macronutrients obtained per day. Overall, the data show a difference of 10 percentage points in the prevalence of overweight and obese participants between the 2 areas within the Loredo region, with a higher prevalence in Loredo villages Iquique, Santa Rosa, and Timicuro Primera. This slight difference may be the result of a greater consumption of nutrient dense foods in the Loredo villages Iquique, Santa Rosa, and Timicuro Primera. Further studies should be conducted using a larger, more diverse population within the Loredo region to investigate the differences in dietary habits and overall nutritional health status between these areas.

BIO1527

Cervical and Thoracic Vertebral Dysfunction in Peruvian Patients Presenting With Headache

Maddi Massa, OMS II; Lorenzo Lim, OMS II; Katelyn Wiseman, OMS III; Shane Sergent, DO; Anthony Agrusa, OMS II; Tiffany Abrahamian, OMS II; Mary Jo Voelpel, DO; Kayla Castellani, OMS II; Laura Kuehne, OMS II; Alec Ludwig, BS; Kayla Jelinek, OMS II; Chantal Bhan, OMS II; Gary Willyerd, DO

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Due to prevalence of headache symptoms seen by past Michigan State University College of Osteopathic Medicine (MSUCOM) medical mission groups in Peru, students from MSUCOM surveyed somatic dysfunction in Peruvian patients presenting with headache complaints. Diagnosis aimed to identify and document vertebral dysfunction in hopes of correlating these somatic dysfunction findings to symptomatology. A randomized controlled study was conducted in the medical mission clinic in Iquitos, Loreto, Peru. Rural Peruvian patients presenting with the chief complaint of headache were included in the study. Medical students utilized palpatory

skills to recognize asymmetry, restriction of motion, and tissue texture abnormalities. Diagnosis and documentation of cervical and thoracic vertebral somatic dysfunction were recorded as classic type 2 ERS or FRS, left or right, dysfunctions. Subjects (n=40) were surveyed, with 2 omitted, and OMT/OMM was administered to the dysfunctional segments after initial evaluation. Somatic dysfunction was found throughout cervical and thoracic vertebral segments (C1-T12). A total of 172 dysfunctions were documented for the 40 patients seen, with an average of 4.3 dysfunctions per patient. Incidence of dysfunction was 10.4 per cervical vertebral segment and 8.3 per thoracic vertebral segment, overall. Highest prevalence of dysfunction was found at the C3 (11.6% of dysfunctions, n=20) and T5 (10.0% of dysfunctions, n=18) vertebrae. Somatic dysfunction plays a role in multiple types of headache pain. Results of this study may aid direction of OMM treatment for future presenting headache patients, with special focus on C3 and T5 vertebral segments. As seen in the Smilowicz 2013 study, results of this research may also be correlated to visceral and somatic problems contributing to vertebral dysfunction and resulting in headache pain. Further study is needed to evaluate whether OMM treatment of these regions will successfully alleviate headache complaints.

BIO1528**Osteopathic Principles and Practice and Osteopathic Manipulative Medicine Perception in Peruvian Health Care Professionals**

Maddi Massa, OMS II; Lorenzo Lim, OMS III; Katelyn Wiseman, OMS III; Shane Sergent, DO; Ruben Kenny Briceno, MD; Mariam Teimorzadeh, OMS II; Lauren Pitters, OMS II; Kayla Jelinek, OMS II; Joseph Gorz, DO; Alec Ludwig, BS; Kayla Castellani, OMS II; Chantal Bhan, OMS II; Laura Kuehne, OMS II; Gary Willyerd, DO

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Previous Michigan State University College of Osteopathic Medicine (MSUCOM) presentations have proven to be successful at education of osteopathic principles and practice (OPP) and osteopathic manipulative medicine (OMM) in Peruvian populations. In hopes of identifying an ideal presentation type, MSUCOM students conducted 2 OPP/OMM workshops in Lima, Peru. Additional aims of the study were to educate attendants on OPP, while fostering interest and growing OMM skills in the Peruvian people. It was predicted that the Peruvian people would be accepting of OPP and willing to integrate OMM into their practice of medicine. Two presentations were given by MSUCOM students to Peruvian health care professionals. The first, conducted at Arzobispo Loayza Hospital, consisted of a half hour lecture on OPP with 2 short lecture demonstrations of OMM techniques. The second, at the Universidad Cesar Vallejo, consisted of a half hour OPP lecture, two 10 minute OMM lectures, and 3 interactive OMM workshop times. The research design was a cross-sectional, before and after survey involving open-ended questions and a set of numerical evaluation questions. A total of 106 Peruvian health care professionals were surveyed, omitting 4. Of the 40 surveyed at Loayza Hospital, 60% were interested in further OMM classes, while satisfaction with the presentation was rated on average 3.9/5 points. This was opposed to the n=62

population at Universidad Cesar Vallejo, where an 86% interest in future OMM classes, along with a 4.58/5 satisfaction in presentations, was seen. On a before and after 5-question set (with a 1-5 evaluation scale; total possible score of 25 points) that assessed learned OPP values and awareness of OMM, there was an average increase in 2.7 points and 3.1 points at Loayza Hospital and Cesar Vallejo Universidad, respectively. Overall, the Peruvian people were very receptive to OPP/OMM. There was relatively equal increase in learned osteopathic philosophy across the whole population, despite presentation style. Although these results show that interactive, hands-on OMM presentations and workshops increase satisfaction and further interest in OMM. With this information, future efforts to raise awareness of, and spread, OPP/OMM can be better facilitated to achieve maximal results.

BIO1529**Retrospective Study of Health Care Delivery and Disease Etiology of the Underserved**

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Touro University California, College of Osteopathic Medicine, Vallejo

Background: Access to medical care in underserved populations remains 1 of the greatest problems with health care today. For instance, medically and demographically underserved populations encompass rural and minority groups that often have poor continuity of care and are only treated symptomatically. The result is high health care costs associated with managing preventable, chronic diseases. One notable example is the aboriginal people in Taiwan, which is known for its universal health care system. Many of these people are farmers and breeders who are geographically isolated and are of low socioeconomic status. Health care delivery to these aboriginal populations represents a model system for the study of health care delivery to under-

served regions. The goal of this study is to help improve medical services in underserved populations and to understand health issues in these groups.

Hypothesis: By observing how health care is delivered to the region and assessing needs, it is anticipated that this system could be used as a model for other underserved communities to improve overall health. Methods Medical services, provided by the Guanshan Tzu Chi General Hospital, to the Bunun tribe, were observed during the global health internship. Patient charts were collected retrospectively to assess the distribution of disease and literature searches were performed to understand disease trends and how they relate to the culture and lifestyle of the population.

Results: Through a program called the Integrated Delivery System (IDS), a physician and nurse travel over 1000 m in elevation to different clinics in the region and visit patients in their own homes in order to provide health care. Many of the patients treated often present with chronic disease that is poorly controlled, leading to a greater number of visits and increased use of resources to manage the condition. Although they are of low socioeconomic status, the Bunun tribe has a surprisingly high prevalence (29.2%) of hypertension and gout (21.7%), 2 diseases that are commonly seen in urban populations. However, the etiology of these 2 diseases differs from that in more urban populations due to factors that include genetic susceptibilities and a unique diet. In addition, there is a high prevalence (58.4%) of acute URI in the population that may be attributed to an occupational exposure that is characteristic to the population.

Conclusion: IDS enables greater medical care to a remote population. There are opportunities to focus health care delivery and reduce spending in this group. A greater emphasis on preventive services, especially to the younger members who are a large portion of the population, would be effective in reducing the incidence of diseases. In summary, this study identifies the strengths and areas for improve-

ment of IDS in health delivery to the underserved. A characteristic health profile of the Bunun population is also revealed.

BIO1533

Delineating Sites and Contributing Factors of *Schistosoma mansoni* Transmission in Kanga, Tanzania

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An epidemiological study identifying factors contributing to the transmission of parasitic infection with *Schistosoma mansoni* has never been attempted in the village of Kanga, Tanzania, which lies on the southeastern coast of Lake Victoria. This project sought to delineate exact areas of transmission that perpetuated the infective cycle of schistosomiasis in Kanga in order to localize intervention efforts to help circumvent this cycle. Methods used included a survey answered by 242 Kanga residents in which their demographic information, locations in which they reside, wash their clothes, work, use the restroom, and play, as well as their infectious status (ie, positive or negative) with respect to schistosomiasis was recorded. The locations were recorded on maps of the village during the survey and ArcGIS software was used afterwards in order to assess spatial distributions of survey responders' answers; close attention was paid to those who were positive. Over 75% of positively infected survey respondents labeled their site for domestic and hygienic purposes inside of Lake Victoria (within 10 m of the shore), especially the fishermen who represented the predominant occupation in the area. Interventions are intended to be aimed at building public docks and restrooms on the shoreline adjacent to the most common responses of schistosomiasis positive individuals. This study was reviewed and approved by the Touro University California IRB (approval code M-0513).

BIO1537**Study of Factors Contributing to Adherence and Nonadherence to Treatment in HIV-Positive Patients in Shirati, Tanzania**

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Hypothesis: Nonadherence to medications is widespread among patients with chronic diseases. The total number of patients enrolled at the HIV clinic at Shirati hospital is estimated to be 4000, while the number of lost-to-follow-ups is 400. The purpose of the study is to identify the reasons for non-adherence to ARV medications for patients diagnosed with HIV as well as to understand the principle reason for compliance in those who regularly attend.

Methods: A cross-sectional survey (10-item questionnaire) was administered to HIV-positive patients attending outpatient services at the hospital. Local translators were utilized in transcribing the patients' knowledge, attitude, and practice of adherence in regards to their diagnosis. To limit response variation, the survey was administered in a multiple-choice format. The data regarding lost-to-follow-up patients was obtained through local staff utilizing previously collected data. A patient was considered noncompliant if they missed 1 set of medication. The data obtained were then analyzed by univariate analysis and 2-tailed test.

Results: Our preliminary analysis of the data compares adherent (n=97) with nonadherent (n=23) patients in regards to age, gender, distance, and date of diagnosis. Among the 23 nonadherent individuals, the most common reason for not returning to the clinic was disbelief of diagnosis (n=13), followed by stigma (n=6), distance (n=2), and family obligations (n=2). Of the 97 adherent individuals, the primary reason for returning was the desire to

improve their health (n=73), or for family (n=26).

Conclusion: The principal factor associated with nonadherence appears to be patient's disbelief of diagnosis while the primary factor for adherence was the desire to improve health. We discuss the major reasons for disbelief. Improving adherence will not only require a more extensive education on the technicality of the disease, but also will have to address the comprehensive consequences: the effects on lifestyle, family, and emotional health. We hope to utilize these findings to apply an intervention to decrease the number of lost-to-follow-ups as well as to prevent a decrease in the number of adherent patients.

BIO1539**Evaluating Longitudinal Efficacy of a Community-Based Schistosomiasis Diagnosis/Treatment Program in Northwestern Tanzania**

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Hypothesis: Schistosomiasis is a parasitic disease that occurs through exposure to infected water sources. Residents of the Rorya District in Northwestern Tanzania are at risk since they live near Lake Victoria and often engage in aquatic activities for occupational and recreational use. In 2005, Touro University in California (TUCA) began developing a program to diagnose, treat, and educate locals in the Rorya District, and has continued to the present. This year's project was reviewed and approved by the TUCA IRB (approval code M-0513). This study aims to assess the longitudinal efficacy of this intervention from cross-sectional studies conducted since 2009. Effectiveness will be mea-

sured by analyzing trends of (1) number visiting the clinics, (2) incidence of schistosomiasis, (3) number treated, given positive infection status, (4) change of incidence patterns with treatment, and (5) number who returned to the clinic. We hypothesize that clinic participation will increase, incidence of schistosomiasis infection will decrease, amount of those treated given a positive test will increase, the incidence patterns with treatment will decrease, and amount returning to the clinic will increase.

Methods: Univariate analysis and 2-tailed *t* tests will be performed to calculate the number of patients seen from 2009-2013 to assess any increase in utilization of services. Incidence of those who test positive for schistosomiasis will also be determined and analyzed to assess for a downward trend. Those who test positive will undergo a subanalysis to assess the number actually treated. Similarly, those who have previously utilized the services will be subanalyzed to determine the percent-change of incidence patterns over the years.

Results: Preliminary data analysis reveals that from 2012 to 2013, incidence of schistosomiasis infection has declined (from 44.35% to 39.30%). Total number of clinic visitors has decreased from 814 to 722. Percentage of clinic visitors with a previous stool test has also decreased (19.43% to 11.57%). More data from 2009-2011 are currently undergoing analysis and will be incorporated to illustrate overall incidence trends from 2009-2013.

Conclusions: These preliminary results show community-based intervention to be effective in decreasing incidence of schistosomiasis infection within the Rorya District. With adequate outreach, such programs can contribute to the decrease in prevalence of endemic schistosomiasis.

BIO1550

Analysis of Growth Z-scores as a Prognostic Factor for Anemic Children in Rural Vietnam

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Background: Nutritional anemia is a highly prevalent public health issue affecting 3.5 billion people in developing countries, a majority of which are children. Worldwide, iron deficiency anemia is the most common with as high as 70% of children affected in several parts of Asia, including Vietnam. It has significant consequences on a child's health, causing serious developmental delays and even premature death. Therefore, early detection and treatment of iron deficiency anemia is crucial for a child's well-being.

Hypothesis: There are few overt symptoms through which iron deficiency anemia can be detected. In this study we investigated the correlation between anemia and malnutrition as indicated by growth z scores. If valid, z scores would provide a cost-effective method to screen for anemia in developing countries.

Methods: We performed this study in the rural community of Van An. We used a standard HemoCue Hemoglobin photometer to measure hemoglobin levels for 125 children. Each patient's height and weight were measured to calculate the z score using the World Health Organization's growth chart data. Ferrous sulfate was given as treatment for patients whose hemoglobin levels were less than or equal to 10.9. Mebendazole was provided as treatment for parasitic infections that may contribute to poor iron absorption. Each child and their guardian were educated on a well-balanced nutrition and diet.

Results: We tested the hemoglobin levels for 125 patients ranging from 1 to 16 years of age; 54 patients had a hemoglobin level less than or equal to 10.9 and thus 43% were positive for anemia. Of

those that were anemic, 36 were 1-5 years of age, 14 were 6-10 years of age and 4 were 11-16 years of age. The z score breakdown was: +1: 8 points; 0: 14 points; -1: 11 points; -2: 19 points; -3: 2 points. The z score was found to have no predictive value for anemia.

Conclusion: Contrary to our assumption, the growth z score is a poor indicator for anemia in children. However, we discovered an interesting relationship between age and anemia that would require further investigation in the future. The most important developmental growth occurs during years 1-5; therefore, necessary interventions must be made to reduce iron deficiency anemia in these children.

BIO1547

Delivery and Evaluation of a First Aid Course in the River Kit Region of South Sudan

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Hypothesis: Decades of conflict have rendered South Sudan a country without developed infrastructure and sufficient medical resources. Fewer than 250 physicians currently practice in the country, the majority of whom are located in large urban cities. With 83% of the population living in rural towns, most of the population is left without access to adequate health care. Traumatic injury is 1 of the leading causes of death in South Sudan; survivors of such injuries are often plagued with chronic pain and disfiguring wounds. First aid training directly addresses the management of traumatic injuries and improves outcomes in a medical emergency. This study investigates whether a 3-day first aid training program can increase rural community members' first aid knowledge.

Methods: Forty-six community members from the River Kit Region of South Sudan were enrolled in

the study. The River Kit Region was chosen as a representative rural town of South Sudan. It is a small, predominantly farming community located 2 hours from the capital Juba. Participants were given a 20-question medical knowledge questionnaire before and after they received a 3-day training course in basic first aid. Instructors from Stonehearth Open Learning Opportunities, an international, wilderness first responder school, taught the course. Medical students administered pre- and posttraining questionnaires to the enrolled students. For illiterate study participants, the questions were given verbally in English, Arabic, or Acholi. Pre- and posttest results were compared to determine if participants' medical knowledge improved.

Results: Of the 46 participants who completed the training, 7 were removed from analysis for not completing the questionnaire. Of the remaining 39 participants, when comparing their pre- and posttest knowledge, there was a significant increase in knowledge gained from the 3-day training course, $t(38)=3.94, P<.001, d=0.75$.

Conclusion: This investigation into the effect of a 3-day training course on rural community members demonstrates that a basic first aid course can significantly increase participants' first aid knowledge. The study results support expanding this program into other rural towns in South Sudan to increase medical knowledge related to traumatic injuries and help prevent a leading cause of death in South Sudan.

BIO1554

Study of Traumatology Zheng-Fu, a Traditional Chinese Medicine Modality, in Comparison to Osteopathic HVLA

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Background: Traditional Chinese medicine (TCM) is an ancient group of treatment modalities. Central to TCM is the concept of life-energy (Qi) and its circulation throughout the body along pathways called “meridians.” Traumatology Zheng-Fu (TZF) is a scarcely studied TCM modality that releases meridian restrictions with an articulatory thrust through a restricted joint. TZF is similar to osteopathy’s high-velocity, low-amplitude (HVLA) technique, which releases articular restrictions with similar types of thrusts. The objective of this study is to compare and contrast various TZF techniques with osteopathic manipulative treatment (OMT) equivalents.

Hypothesis: The insights gained from this study will allow for OMT practitioners to better understand TZF, and may lead to new research in this TCM modality.

Methods: Data of 9 TZF techniques as performed by Dr Yu-Chang Huang were collected by video and direct observation at a TCM Hospital in Taipei, Taiwan, as part of Touro University California’s Global Health Program in June 2013. The techniques studied were compared to HVLA techniques as described in the updated 2008 edition of *The Kimberly Manual* (TKM) and referenced by their technique number.

Results: The TZF lumbar region technique was very similar to the OMT direct, lateral recumbent technique (TKM 4421.11E). For the thoracic region, there were 3 TZF techniques, the first was similar to the 2-handed supine HVLA (TKM

4311.11G), with an added thrust to the lumbar spine. The second technique was similar to a knee-localization supine HVLA (TKM 4311.11A). The third technique was similar to a T1-T3 prone HVLA (TKM 4341.11E). The cervical region had a seated gapping thrust, which upon review with TKM and OMT faculty, revealed no identifiable corollary. The TZF pelvic region technique was similar to the supine leg tug (TKM 4529.11A). The TZF upper extremity technique was similar to a seated articulation of the acromioclavicular joint (TKM 4721.11A), with an added superior translational thrust of the glenohumeral joint. One of the lower extremity TZF thrusts was similar to a supine HVLA of the femur (TKM 4611.11C), minus the muscle energy. The other was similar to a prone HVLA of the talotibial joint (TKM 4641.11C), but with a superior gapping vector.

Conclusion: Describing TZF in terms of HVLA highlights the fascinatingly high level of congruency between the two. This study reports the first comparison between TZF and HVLA and helps lay the foundation for future studies.

Outreach

BIO1542—1st Place Winner Osteopathic Medical Leadership Training Through International Medical Outreach Trips

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Introduction: The development of leaders in Osteopathic Global Medicine is imperative to the future success of the profession. While osteopathic medical schools provide a foundation from which students can progress into competent physicians, many curricula lack sufficient opportunities for students to assume leadership roles. It behooves medi-

cal schools to develop and implement programs for students where leadership skills can be developed and nurtured. Such opportunities can be made available with international medical outreach trips.

Methods: Nova Southeastern University College of Osteopathic Medicine (NSU-COM) has a rich history in global medical outreach. In December 2012, the student-run NSU-COM International Medical Outreach Club launched its inaugural 16-day trip to Ben Tre Province, Vietnam. For this experience, 1 student leader is chosen to work closely with faculty and local partners in trip planning and execution. In the planning stages, the leader was charged with recruiting students and preceptors, deliver informational sessions, medications and supply inventory, itemization, and packaging for transport. During the execution phase, the leader served as the primary point of contact between students, preceptors, the foreign aid organization, and administrative faculty stateside and was responsible for compiling reports to the Vietnamese department of labor officials. The leader also coordinated the administration of a musculoskeletal research study. The survey was administered during triage/intake under the guidance of a team member working in conjunction with a Vietnamese translator.

Results: More than 1800 patients were treated by our team during the 14-day outreach. The trip presented a complex array of human resource and logistical issues that needed to be coordinated in a precise manner to ensure successful delivery of patient care. The added responsibility placed on the student leader, under the guidance of experienced faculty, allowed for an unparalleled leadership learning experience. The planning, execution, and debriefing took several months, allowing for development and refinement of leadership and interpersonal skills, as well as reflection on the how future experiences can be improved.

Conclusions: Medical outreach trips afford students the opportunity to make a positive impact on the medically underserved while simultaneously

developing their clinical acumen. In addition, the planning and implementation of complex logistics, administrating a research project, and managing people in an unfamiliar environment serves as an excellent leadership development prospect. To raise awareness and foster discourse in the development of future osteopathic leaders, medical faculty should examine the availability, design, and success of leadership opportunities in global outreach programs provided through medical school programming. After coordinating the numerous details associated with the medical outreach trip, student leaders may be prepared to handle future leadership roles in osteopathic medical practice and administration.

BIO1556—2nd Place Winner

Integration of Local Youth Volunteers as an International Osteopathic Medical Education Paradigm (Jhor-Mahankal, Kathmandu District in Nepal)

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Objective: Maximize international osteopathic medical education, patient care, and long-term impact abroad by integrating local youth volunteers in meeting mission objectives in Kathmandu, Nepal.

Methods: Five osteopathic medical students from Georgia Campus—Philadelphia College of Osteopathic Medicine (GA-PCOM) joined forces with Lions Club of Nepal, Patan Hospital physicians, and local health care workers to sponsor a free clinic in Jhor Mahankal village. Ten bilingual Nepali youth members also participated on-site for the entirety of the mission, working alongside GA-PCOM students to help overcome language barriers, drive more efficient clinic operations, and fulfill Lions Club volunteer requirements. Additionally, the volunteers helped GA-PCOM students in providing more

culturally-sensitive care by explaining common, rural Nepalese attitudes towards modern medicine. The female volunteers were especially crucial in acquiring female patient cooperation, particularly since gynecological health issues are still considered taboo. GA-PCOM students therefore worked intimately with both Nepali volunteers and physicians to more effectively conduct patient interviews, record research data, and manage clinic budget. The medical students also taught the volunteers basic clinical skills, which enabled volunteers to gain more hands-on, clinical experience and greater awareness of health care challenges unique to Nepal.

Results: Youth integration into medical mission work ultimately gave GA-PCOM students meaningful teaching responsibilities that further reinforced clinical competency, medical professionalism, and a positive learning environment. Volunteers were taught how to take vital signs and record patient medical history, which enabled volunteers to become even greater assets. Likewise, GA-PCOM students mentored volunteers in medical career challenges and rewards as well as encouraged volunteers to take action in relieving Nepal's health care disparities. Over the course of 2 weeks, the medical team provided health care and therapeutics at no cost to 650 patients from Jhor and neighboring villages. The volunteers' deepened interest in medicine and outreach efforts was demonstrated by their continued involvement in off-site projects, such as health checkups at a remote nursing home and hygiene initiatives at a village grade school. Volunteers also attended GA-PCOM's final paper presentation before Lions Club, Nepal Austria Friendship Association, and several Nepalese political representatives; the presentation covered pertinent clinical trends and findings, which culminated into active discussion of how to continue clinic efforts and better address preventable diseases. Furthermore, 3 of the 10 volunteers proceeded to sit for their baccalaureate examinations, intending to pursue health care professions.

Conclusion: Integration of local youth volunteers as a medical translators and cultural experts can add a novel teaching dimension to international osteopathic medical education, while also promoting more culturally sensitive care. Through this paradigm, medical students can dually function as apprentices and educators for physicians and volunteers, respectively, which optimize collateral learning and leadership. Likewise, youth empowerment holds various implications for long-term impact, including continued commitment to service and increased motivations to pursue health care careers. Partnerships with local youth generated immediate outcomes on-site and instituted a platform for progress in osteopathic medical education abroad.

BIO1262

Identifying Global Health Disparity While Training Future Osteopathic Physicians for Multidisciplinary International

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Currently the curriculums of many osteopathic medical schools lack a research component. At the same time international medical missions prove to be extremely short term in their disease prevention. To bridge this gap, the Michigan State University College of Osteopathic Medicine (MSUCOM) medical mission to Peru transformed into a mutually beneficial model. The purposes of this study are 2-fold: (1) to suggest a model with research integrated into international medical missions and (2) to direct research with sustainable impacts.

The research component was added to the MSUCOM elective in 2009. Over the past 3 academic

years, more than 65 students have been introduced to research. The model was constructed using synergistic team based learning. With MSUCOM faculty oversight, the elective is student organized with research objectives and leaders chosen each year. In addition, a general research rotation is provided while in Peru to all students interested in exploring a research experience. Learning outcomes were assessed using exit interviews, measuring trends and consequences of research, and anecdotal evidence.

Subjective measures of participants in research concluded that attitudes toward this model are positive, with the number of those interested and applying for positions increasing each year, including numerous repeat participants. Additional outcomes show an increase in the pursuit of research outside of this elective.

To date, our research has produced a number of clinical findings which are used to aid our sustainable models. In effect, this has improved health care delivery and has even garnered international attention for osteopathic medicine. Prior to 2011, Peru was a country that did not acknowledge DO licensure. But today, the work of MSUCOM is recognized with assisting the recognition of osteopathic medicine in Peru with full practicing rights. More so, we are now partnering with 4 universities, including a medical school in Peru, to help advance our research initiatives. Our efforts included investigations into the epidemiological causes and clinical correlations of the diseases we were observing in our clinic. By investigating disease, we are working to aid in prevention and working towards a sustainable mission.

BIO1485

Dermatological Diagnoses in Treasure Beach, Jamaica: An Osteopathic Medical Mission Trip

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Background: Since 2007, The Hillsborough County Osteopathic Medical Society (HCOMS) has traveled to Treasure Beach, Jamaica, as part of a medical mission trip. In this setting, both osteopathic physicians and students treat local citizens by setting up a local health and wellness clinic in their small town. Students work alongside physicians, conducting physical examinations, treating dermatological issues, and providing OMM treatment. As this area of Jamaica does not have any nearby health care facilities, this clinic not only provides health care for many individuals, but it also offers basic preventative health education. For individuals who have ongoing concerns or problems beyond what the clinic can treat, HCOMS physicians work with Jamaican doctors for follow-up. Over the duration, the HCOMS has brought 117 medical personnel to the clinic (including physicians, students, nurses, premed, and aides), donated \$27,000 in medical supplies, and treated 1400 patients. In 2013, Dr Robert Norman (dermatology), Dr David Weiland (internal medicine), and Dr James Vogler (obstetrics-gynecology), participated in this mission trip and treated 264 patients. The focus of my study is on the dermatological conditions found in this small community.

Methods: I participated in the HCOMS Jamaica medical mission trip in 2013 through International Medical Society of the Lake Erie College of Osteopathic Medicine in Bradenton, Florida, and had the opportunity to work alongside Dr Norman in his area of the clinic. Dr Norman kept records of all of the clinic patients he treated, their diagnoses, and biopsies (if taken). After returning to Florida, Dr

Norman passed the biopsies on to Dr William Eng, Director of Laboratory Research at Dr Norman's private practice in Tampa, Florida, for pathological analysis. Once the diagnoses were made, I collated the results to obtain the statistics on the most common dermatological conditions in this area of Jamaica.

Results: Of the 264 patients treated in the clinic this year, 108 met with Dr Norman. Thirty-nine of these patients had biopsies taken, while the remaining 69 did not. The most common diseases noted in the general population of patients included diabetes, hypertension, obesity, dental, asthma, and musculoskeletal abnormalities, and many of the patients had these comorbidities along with their dermatologic problems. In the biopsied specimens, the most common conditions found were skin tags (11), basal cell carcinomas (10), seborrheic keratosis (6), and verruca vulgaris (6). In the remaining patients, the most common conditions were acne (27), tinea (21), eczema (10), and folliculitis (4). In addition, patients also presented with rarer conditions such as mycoses fungoides (1) and a questionable biopsied lymph node (1).

Conclusion: With over 40% of Treasure Beach Clinic patients seeking dermatological medical treatment, this service proves to be vital to this area.

BIO1486

Osteopathic Hands in Different Lands

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Background: January 2013 marked the 3-year anniversary of the Haiti earthquake. The 7.0 magnitude quake that rocked Haiti on January 12, 2010, was the biggest urban disaster in modern history, killing more than 200,000 people. Global health priorities shifted from infectious to chronic diseases, with an increasing burden of musculoskeletal conditions in Haiti. Rescue, medical, and relief work-

ers from around the globe poured into Haiti hours after the earthquake struck. Many Haitians crossed the border into Jimani, Dominican Republic, seeking refuge. This is the site where the LMU-DCOM medical outreach trip took place. Musculoskeletal conditions are a major cause of disability and are likely to become an even more neglected problem for millions of people around the world. As longevity increases, the need for cost-effective interventions for individuals with these issues is urgent, especially in developing countries. Our goal is to create an osteopathic medical presence in global health care by using our hands and medical knowledge to alleviate this burden.

Methods: Through the medical outreach, we traveled to various small villages between the Haitian and Dominican Republic border. In our clinics, we provided medical care to all ages. History and physicals were performed on each patient to ensure that we provided the correct treatments. Common types of examinations, procedures, and treatments offered were pregnancy ultrasounds, incision and drainage of abscesses, treatment for infections, counseling, and cerumen disimpaction. Osteopathic manipulative treatment was provided frequently due to the vast majority of patients who labored on farms and presented with chronic back and leg pain. Providing guidance were physicians in different fields and translators. Nonmedical volunteers were also on hand to keep each clinic organized and efficient. Medical supplies including medicine and vitamins were donated to the program and purchased while in the Dominican Republic.

Results and Conclusion: Many of the patients had to travel far to obtain medical care, and because they had to work to support their families, they often decided against seeking care. Due to this, a lot of them had chronic conditions that they had to deal with, often without any medications for pain, hypertension or infections. They often relied on the fact that our group would come twice a year to take care of their health needs. We showed them that we cared simply

by touching them and providing OMT to help their bodies intrinsic healing abilities. In using our hands and minds to treat patients, we were continuing traditions rooted at the very core of what osteopathic medicine means. Musculoskeletal issues and its burden on peoples' quality of life can be decreased immensely if more osteopathic students and doctors would stretch their hands into different lands.

BIO1489

Dermatology: A Tanzanian Perspective

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Background: Some would argue that certain areas of medicine in the United States have begun to rely heavily on diagnostic tests and procedures in order to guide the diagnosis and management of their patients. Recent advances in medicine have afforded physicians the opportunity to further evaluate their patients' needs via imaging and laboratory studies. These advances are certainly beneficial and have transformed modern medicine, but as an osteopathic physician I think it is important to not lose sight of what patient care really means. A holistic approach should remind us to initially rely on our clinical impressions. My time working in a clinic in Tanzania, Africa, reminded me of a true holistic approach to medicine. After this experience, I wanted to evaluate the challenges, as well as benefits, of health care in that area vs in the United States.

Methods: Through Work the World organization, I was able to set up a 4-week rotation in Tanzania, Africa, during my fourth year of medical school. My time was spent in a small dermatology clinic on the hospital campus. My role in patient care included evaluating patients and coming up with a differential based solely on my clinical assessment.

Results and Conclusion: Patient care at the dermatology clinic in Muhimbili National Hospital was focused on what was discovered in speaking with

and evaluating the patient directly. Much fewer patients were seen per day because so much time was devoted to each individual. Resources were lacking in that imaging studies, biopsies, and laboratory draws were rarely done. I was told that 1 biopsy could take weeks or even months to return. To some, the lack of resources could be seen as an extreme disadvantage to patients. In my discussions with the individuals being seen at the clinic, it was apparent that they were satisfied to be receiving the direct attention of a physician. They felt well cared for because the physician spent so much time with them. In the case of this clinic, and many others in areas such as this, it was important for the physician to use their clinical tools to find a solution for their patient mostly because follow up was not always an option. Some families traveled miles by foot in order to be seen by a doctor. The diseases seen in the clinic in Tanzania were far more progressed than what is usually seen in the United States, because medical care is not always easily and readily available. During my time there I was able to see far progressed conditions such as pemphigus foliaceus, pellagra, lichen amyloidosis, Sézary syndrome, and HIV skin manifestations.

BIO1492

Linear Nevus Sebaceous Syndrome: A Nicaraguan Limited Resource Case Presentation

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A 10-year-old Nicaraguan male presents with facial mass, seizures with visual hallucination auras, and distinctive linear sebaceous nevi to a medical mission in Chacraseca, Nicaragua. After raising appropriate resources a magnetic resonance imaging (MRI) was obtained. With physical examination findings, patient history and MRI results a diagno-

sis of Linear Nevus Sebaceous Syndrome (LNSS) was given. This heterogeneous syndrome has a wide spectrum of symptoms and complications including vascular, central nervous syndrome, and metabolic abnormalities. In a poor community village with limited resources appropriate treatment was considered at this time to be phenobarbital to control seizures. The patient, E.S., is currently being treated by telemedicine and a local traveling general practitioner. This case does not completely fit with symptoms typically seen with LNSS. There is an absence of mental retardation or ocular abnormalities. With threat of occult abnormalities the question remains whether further treatment is warranted for this asymptomatic child and if excision of the facial mass is possible for cosmetic and medical reasons. Review of current literature reveals various theories, including disruptions in the mTOR and Wnt molecular pathways, as the cause of LNSS symptoms. Further research is needed to understand LNSS and the effect it has on the human body.

BIO1493
Serving Taiwan’s Remote Mountain Regions and Beyond

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Background: Taiwan is often cited as a nation that successfully provides health care to all of its citizens through its National Health Insurance (NHI) program. However, urbanization—in combination with an aging population, low birth rate, and many other factors—has created a health care vacuum in Taiwan’s rural areas. The counties along the eastern/southern borders have fewer medical facilities and health care workers. The remote mountains in these counties are usually inhabited by the indigenous populations, and their medical isolation arguably increases their morbidity and mortality. Taiwan Root Medical Peace Corps (TRMPC) is a private non-

profit organization that was established in 1995 with the goal of helping to address the medical needs of this population. The objectives for this experience were to assess TRMPC’s role in relation to the NHI and to explore the details of TRMPC operations.

Hypothesis: TRMPC complements the NHI by regularly bringing mobile clinics to Taiwan’s remote mountain regions. The organizational structure is self-sufficient, which allows them to continue their complimentary services.

Methods: In June 2013, Touro University California medical students participated as volunteers in TRMPC’s mission to Kaohsiung and Pingtung (areas in southern and southeastern Taiwan, respectively). Data were collected by direct observation and interviews.

Results: TRMPC visited communities that lack medical personnel and facilities. These populations required access to private vehicles and a minimum travel time of 30 minutes each way to reach a medical facility and utilize their NHI. TRMPC is dependent on volunteers to offer services without a charge. Medical volunteers offer health evaluation and education, pharmaceutical distribution, laboratory testing, and dental care. The support staff consisted of 2 paid administrators who coordinated the trip, nonmedical volunteers who distributed donated goods, and kitchen staff volunteers who prepared meals for the TRMPC volunteers. The last team was composed of drivers who volunteered vehicles to transport volunteers through winding roads to reach the remote territories.

Conclusion: TRMPC complements the NHI by consistently bringing mobile clinics to the underserved populations in Taiwan’s isolated mountain regions. The cooperative efforts of different volunteers allow TRMPC to continue to function as a sustainable organization. TRMPC’s effective model is worth observing and emulating.

BIO1517**Assessing, Observing, and Treating Medical Problems in 3 Dominican Republic Villages of Limited or Absent Medical Care**

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Background: The island of Hispaniola houses 2 very poverty-stricken countries: Haiti and the Dominican Republic. In these countries, preventative medical care is rare or completely absent. In the Dominican Republic, a country whose primary export is sugar, lives villages of sugar cane workers and their families, completely transparent to the government and the companies who own the villages. The places lack running water, working electricity, and constant or consistent health care. In many of these villages, the closest medical facility is an hour-walk away at best, which is almost an impossible task for any sick or injured person to complete. In a state like this, simple medical problems seen in the United States are anything but simple, but rather are left untreated for months or years at a time. To observe and assess the quality of life and health problems of the underserved in the cane villages, we traveled to 3 villages and had 3 days of clinic to see as many patients as we could while documenting gender, age, vital signs, and reason for the visit.

Methods: In collaboration with UP-KYCOM, 33 students participated in a week long medical and service mission to the Dominican Republic. We provided primary care services, minor surgeries, and pharmaceutical access to the populations of 3 small villages: Batey Nueve, Batey Cinco, and Batey Cuchillo. Vital signs were taken and an antiparasitic was given to each patient at the beginning of the visit. Students took a patient, or patient family, and subsequently managed the entire examination. When students were finished and had established

a list of reasonable differential diagnoses, they presented the case to a physician for their input and recommended medications. Exact gender breakdowns and diagnoses are still being totaled.

Results and Conclusion: Regardless of language barriers, the patients gave boundless gratitude for the services we provided. With close to 900 patients being seen, women and children constituted as the highest demographic, with the 3 highest diagnoses being UTI's/yeast infections, Gripe (a Spanish word used for a range of upper respiratory illnesses), and hypertension. These results indicated that better medical education is needed to teach personal hygiene and overall personal health and lifestyle management. Additionally, better access for health care is needed for men as dictated by the low number of male patients, most likely due to their long days working in the fields, which severely limits the time they have to access a clinic if they need one. Lastly we recommend further research surrounding the understanding of Gripe amongst locals and outside care-takers, what all is entailed in Gripe, and what exactly the patients are indicating when expressing that they have Gripe. A better understanding will give a more thorough diagnosis for the patient and hopefully a more effective treatment modality and thus outcome.

BIO1541**Jamaica: No Problem?**

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The July 6-14, 2013, mission trip marked the 20th year of Caribbean American Medical Education Organization (CAMEO) service to Buff Bay, Portland, and Jamaica. The Buff Bay team was led by Dr David Keen, MD, from Tallahassee, Florida. The team included 3 osteopathic medical students from GA-PCOM. At each site, patients met with a physician for their basic health care needs. A total of 505

patients were screened and treated by doctors and medical students at 8 clinic sites in 4 days. Medical missions are a source of temporary stability in medically underserved communities around the world. Major aspects of the Jamaican health care system would need to be reformed to ensure that these same patients had access to follow-up care, preventive screenings, and low cost pharmaceuticals. Prior to 2013, osteopathic physicians were unable to practice in Jamaica; however some DOs were approved to go on mission trips, as long as they were working with MDs. As of 2013, there is 1 US-trained DO who is granted degree recognition and full practice rights in Jamaica. Many of the needs of the Jamaican Health Care System could be met if more physicians, particularly international DOs, were able to become accredited and obtain practice rights in Jamaica.

BIO1546
**Comparing Standards of Care
 Between the United States and Rural
 Nicaragua**

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Introduction/Hypothesis: Diagnostic work-up and treatment given for common chief complaints may be different from one country to another. This became apparent while on an international medical service trip to El Crucero, Nicaragua. As medical students, this was an important learning experience on which we became familiar with the different cultural acceptances and beliefs that need to be taken into account when practicing Western medicine in a foreign clinic. We were interested in looking at the differences in factors contributing to standards of care in rural Nicaragua and the United States. To assess this, we compared the diagnosis and treatment of 2 chief complaints, dysuria and dry cough. Our hope is to promote awareness of the factors that contribute to differences in international care.

Methods: Retrospective analysis of patient presentations encountered while at a rural clinic in El Crucero, Nicaragua. We reviewed the diagnostic workup and treatment protocol that was followed in Nicaragua and compared this with the standard of care in the United States.

Results: In the case of dysuria in a 35-year-old woman, the diagnostic work-up and treatment was similar between rural Nicaragua and the United States. On the contrary, in the case of dry cough presenting in a child younger than 10 years, the methods of diagnosis and treatment were different.

Conclusion: The diagnosis and treatment of a urinary tract infection (UTI) can be similar among various clinical settings. Dipstick analysis of a urine specimen is the basis of diagnosis for the majority of UTI cases. Standard treatment in both the United States and Nicaragua consists of a 3-5 day dosage of antibiotic. A number of factors contribute to the equality of care achieved in both locations. Diagnostic supplies are inexpensive, easily obtainable, and are user friendly. A short-course antibiotic treatment fully alleviates infection and does not require follow up, making this acute illness easily diagnosed and treated in even the most remote settings that lack advanced resources. On the other hand, there are some clinical presentations we encountered in Nicaragua in which the diagnostic procedures and treatment course were very different from the standard of care in the United States. In Nicaragua, a child presenting with dry cough and an unremarkable lung examination did not undergo further diagnostics such as spirometry and chest radiograph, as is the standard in the United States. Without confirmative diagnosis, the children were given a short-course steroid therapy and mucolytic, assuming a reactive airway disorder. In the United States, treatment varies for this chief complaint depending on the results of the diagnostic testing. Some of the factors affecting the differences among diagnosis and treatment are access to diagnostic equipment and medicine, cost of prescriptions, and precedence set forth by local physicians.

BIO1548**Access to Health Care in Sololá, Guatemala**

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Hypothesis: The goal of many medical outreach trips, including those of Rocky Vista University's Global Medicine Department, is to provide health care to those in need and who might not otherwise receive care. The aim of this investigation was to determine the level of access to health care in the Sololá region of Guatemala.

Methods: A survey was developed and approved by RVU's IRB in order to assess access to health care of patients who came to Rocky Vista University's Global Medicine outreach clinic sites in Sololá and surrounding rural communities of Concepcion and San Antonio Palopo, Guatemala, in the spring 2013. The survey was administered orally by a translator in Spanish. The survey included basic demographic questions, as well as direct questions regarding the most recent past medical experience: time since medical visit, type of provider, time traveled, setting, if it was part of a medical mission, cost, and if they were presenting for the same chief complaint on the day of the survey.

Results: 155 Guatemalan patients volunteered to participate by answering the survey questionnaire. 62% of patients had seen a health care provider within the previous 3 months, 12% in the last 3-6 months, 9% in the last 6-12 months, 7% between 1 and 3 years, and 10% more than 3 years. 23% of the patients reported that at their last visit they had seen a physician, 28% a nurse, 48% a community health care worker, and 1% by a native healer. 84% of respondents traveled less than 30 minutes to seek health care, 13% less than 1 hour, 2% 1-2 hours, and 1% more than 2 hours. 7% of patients reported that their most recent health care visit was at a clinic,

61% a health center, 17% a hospital, 3% a school or church, and 12% a community center. Only 6% of the health care previously provided was by a medical mission, and only 8% of patients were charged a fee. 64% of respondents presented to the RVU Global Medicine mission site for the same health issue as the previous visit to a health care provider.

Discussion: The key results of this investigation were that of a sample of patients in Guatemala, approximately three-fourths had received health care within the previous 6 months. Almost all of the patients had access to free health care within an hour of their home. Interestingly, almost half of the patients reported that their health care was provided by a community health care worker. Because these findings showed that two-thirds of the patients were presenting to the RVU medical mission clinic with the same chief complaint, it may be speculated that they were seeking a second opinion of a physician or additional consult for the same problem that they had already seen the community health care worker. These results lead to the conclusion that, while the majority of Guatemalans in the region of Sololá have relatively easy access to free health care provided by community health care workers near their homes, there exists a need for care provided by physicians.

BIO1549**Benefits of Cultural Immersion in International Medical Relief—Sacred Valley, Peru**

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Background: In Peru many rural Andean families lack the access to preventative health care. This is due to socioeconomic issues including monetary, transportation, traditional and language barriers. In Peru most people speak Spanish, but in the rural Sacred Valley, many of the inhabitants speak Que-

chua, which has been carried down from Inca civilizations. The Andean (descendants of Inca culture) community practice traditions different from those that the Spanish brought when South America was colonized. This language and lifestyle discrepancy can be a barrier for many local physicians and international physicians to provide medical services.

Methods: I volunteered with Maximo Nivel, a program that provides volunteers to the medically underserved areas of Cuzco and Sacred Valley. I volunteered with a group of local physicians, medical students, and nurses to provide health care. While I have the ability to speak Spanish, I had very small command of the Quechua language. Through history taking and working with a translator I was able to learn important words to help me communicate with my patients. I also lived in a rural area with an Andean family through an Immersion program sponsored through Maximo Nivel. This opportunity gave me insight into the daily lives of the rural Andean community, which allowed me to better relate and understand my patients.

Results: A major part of osteopathic medicine is to provide holistic care to patients. With this principle in mind, it is important when providing outreach to a community that we learn about the social and traditional aspects of the people we seek to help. Through living in the community and volunteering at local clinics I learned about the local perception of Western medicine, misconceptions among the community about medical treatments, as well as local remedies. I was able to learn about the local diet, education, and lifestyles that have an impact on a person's health during my stay with the host family. With this knowledge I was better able to understand my patients' concerns while also educating them about preventive health measures.

Conclusion: By living and experiencing the daily lives of our patients, we are able to better understand their needs and therefore better devise treatment plans. Learning from your patients allows you to better understand and treat their health problems.

Patients that you treat abroad might have different health statuses due to different environmental factors. By educating yourself about their culture, language and traditions you will be able to better help the people you strive to serve.

BIO1552

Utilizing Interactive Methods to Promote Health Education in School-Aged Children in the Morazán District of El Salvador

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According to the American Academy of Pediatrics, health promotion is an important component of education programs for children in primary and secondary schools. This mode of education increases health knowledge, creates positive attitudes toward healthy practices, and most importantly, promotes lifelong healthy behavior. With this model in mind, a group of 8 medical students traveled to rural El Salvador as a part of the New York Institute of Technology's Center for Global Health Certificate program with the goal of providing health education to school aged children. The group focused on oral hygiene, hand washing, and education and prevention of Chagas disease. The medical students visited 4 schools throughout the Morazán region and employed various interactive methods to engage the children in health education. A large mouth and toothbrush model was employed to demonstrate correct teeth brushing habits, while the children simultaneously participated in 2 minutes of guided teeth brushing using donated toothbrushes and toothpaste. Correct hand washing technique was taught using glitter to represent germs, and showing the difference between washing hands with and without soap. The exercise

was made enjoyable by singing the alphabet while hand washing to guarantee adequate time for germ removal. The medical students also created a puppet show to inform about the transmission, symptoms, and treatment of Chagas disease as well as the importance of using bed nets as a preventative measure. The children were receptive to the planned activities, and were enthusiastic in sharing their new knowledge with teachers and medical students. The group utilized native translators to overcome language barriers and to facilitate communication. In the future, a greater supply of donated materials would allow for more student participation, as well as the ability to expand the program to additional schools within the area. Ideally, a greater number of schools, a larger proportion of the community, and additional materials would be incorporated to reach a larger audience for greater impact in the future. The NYIT Center for Global Health strongly believes that this was an effective method to promote healthy practices, and would advocate for a greater utilization of health education during early childhood throughout El Salvador and other developing countries. These methods could be effectively expanded to the education of many other diseases and health-related topics.

BIO1558

Research as a Vital Learning Experience for Osteopathic Medical Students During International Outreach Trips

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Background: International medical outreach is an important and unique opportunity for medical students. While performing a vital service to the medically underserved, it is also an opportunity to expand medical knowledge and to be immersed in a different culture. However, an often overlooked aspect that can be incorporated into these trips is

research. Little published research exists regarding the health status of people in remote, rural areas of the world. Patients' lifestyles and living conditions may be quite different from those seen in more developed nations; often there is a different set of pathology. Musculoskeletal classification is important because physical labor is the principle employment, and dysfunction can result in a significant decrease in productivity, yields and income.

Methods: Through Nova Southeastern University College of Osteopathic Medicine's 2-week outreach trip to Ben Tre Province, Vietnam, we traveled to remote villages, set up clinics and provided care for nearly 2000 patients. Along with the traditional medical outreach trip endeavors, we also conduct survey research. For our study, we collected data using a pen-and paper format designed to classify acute and chronic musculoskeletal dysfunctions. The survey, translated into Vietnamese, contained items regarding demographics, general health, frequency of doctor visits, and acute and chronic pain. Trained local translators working under our supervision helped us overcome some of the cultural and language barriers. In addition to collecting data on musculoskeletal disorders, we logged and categorized other diagnosis.

Results: Being in villages, instead of in a doctor's office, we experienced our patients' culture and lifestyle first-hand. This helped us understand the patient-centered approach. However, it was difficult knowing we could not provide long-term care. This gave us a new appreciation for research; if we do not understand the problems we cannot develop a longer-lasting solution. International medical outreach is already an amazing experience, but adding the component of research into these trips can give it a whole new element. We gained the valuable experience working with human subjects, following the scientific method, processing data and developing meaningful conclusions. The data helped us understand the types of pain experienced by the people in the region and suggested an opportunity for the use

for osteopathic principles and procedures. Future outreach trips can benefit from this information, perhaps by developing an OMT station to their clinic. Research can help us learn from previous experiences of others and build toward more effective care. As more trips conduct research, data from different global regions can be compared. We feel that inclusion of research into our medical outreach is worthwhile to help us understand problems that are amenable to treatment.

BIO1559

Crossing Language Barriers and Bettering Medical Treatment Through the Application of Humanistic Medicine

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Often, due solely to language barriers, non-English-speaking patients (NESPs) require more time to conduct a proper patient history, physical examination, osteopathic manipulation and give counseling. In the primary care setting proper communication is essential to the doctor-patient relationship and therefore work needs to be done to provide quality care while understanding patient concerns. Not tailoring visits to meet the emotional needs of the patient can make the patient feel neglected, form a negative view of physicians and lead to decreased follow-up visits. A proposed social movement in the field of medicine to combat such issues is known as humanistic medicine; defined as a medicine that is rooted in a common concern for fellow humans, for their emotions, their suffering, and their peace of mind. I proposed that through the utilization of humanistic medicine I could cross language barriers, increase the speed with which I saw patients and provide quality health care. From May 31 to June 9, 2013, I traveled with DOCARE International's Guatemala trip, headed by Dr Paul McHugh. Clinic locations and days were scouted in advance to ad-

dress local needs. Clinic supplies and pharmaceuticals were purchased and/or donated in the United States, and transported to the clinic sites. Through the application of humanistic medicine, I found that I could indirectly glean health information while playfully interacting with adolescents or holding a sleeping infant; concurrently I would take the history of adult family members' present illness. As a result, I was able to examine multiple patients near simultaneously, while showing great care for both family members and fostering trust in the medical establishment. In primary care, the practice of humanistic medicine can cross language barriers, increase patient throughput, and lead to a stronger doctor-patient relationship.

BIO1560

Oral Health Knowledge and Status Among Children in Honduras

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Context: Poor health status is prevalent among children in Honduras, which is recognized as 1 of the poorest countries in the Western Hemisphere. Poor nutrition has been speculated to be closely related to poor oral health outcomes among children. To better understand the children's general knowledge of oral health and assess oral hygiene a multiple sites study was conducted in schools located within close proximity to Tegucigalpa, Honduras.

Methods: Data were collected and analyzed from 2 children's centers in Honduras. Children, aged 5 to 19 years completed the IRB approved protocol at the James Moody Adams (JMA) Clinic (n=53) and the Jovenes Orphanage for Street Children (JO) (n=43). A preliminary assessment was administered before a preventative health presentation to determine subjects' prior knowledge of oral hygiene. An oral examination and general health examination

were conducted in a triage station. A short, 20-minute interactive oral hygiene educational session was presented to children in groups (n=10-15). Post-assessment oral hygiene surveys were administered. Data were statistically analyzed to determine improvements in knowledge and assess oral hygiene.

Outcome Measures: Recorded for each participant were numbers of decayed and filled teeth, general health measures, and children's responses to: (1) What type of motion should you brush your teeth in?; (2) Is it important to brush your tongue? (3) How often should you brush your teeth? (4) Which of the following are good for your teeth? (5) Why is the condition of my teeth an important part of my oral health?

Results: The percent of children with the correct responses to survey questions were: JMA site, question 1, pretest 5.66%, posttest 18.87%; question 2, pretest 90.5%, posttest 84.7%; question 3, pretest 77.3%, posttest 75.5%; question 4, pretest 88.7%, posttest 83%; question 5, pretest 96.2%, posttest 96.2%. The average number of decayed teeth was 2.9 (min=0, max=9) and of filled teeth was 0.08 (min=0, max=4). JO site, question 1, pretest

48.8%, posttest 68.7%; question 2, pretest 100%, posttest 100%; question 3, pretest 93%, posttest 93%; question 4, pretest 95.3%, posttest 97.7%; question 5, pretest 97.7%, posttest 95.4%. The average number of decayed teeth was 0.7 (min=0, max=5) and filled teeth was 0.6 (min=0, max=6). The children in the orphanage had fewer decayed and filled teeth than the mountain children ($P<.001$ and $P<.0001$, respectively).

Conclusion: The most improvement in oral health knowledge in both locations was noted in response to "What type of motion should you brush your teeth in?" The children in the orphanage had a better initial understanding of oral hygiene than the children in the remote, mountain community and improved oral health with fewer decayed and missing teeth than the children in a remote mountain area of Honduras. Further study will assist the design of intervention programs to continue to assist with oral hygiene and oral health education to improve oral health and general health in children in schools in more remote regions of the country.

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