COMPARISON OF THE EFFECT OF MANUAL AND VENTILATOR HYPERINFLATION ON STATIC LUNG COMPLIANCE IN MECHANICALLY VENTILATED PATIENTS WITH PULMONARY ACUTE LUNG INJURY/ACUTE RESPIRATORY DISTRESS SYNDROME

PURPOSE/HYPOTHESIS:
Hyperinflation techniques have been proven to be associated with short-term beneficial effects on lung compliance, oxygenation, and airway clearance in intubated and mechanically ventilated patients, but not accepted in regular practice for treating acute lung injury/ acute respiratory distress syndrome (ALI/ARDS) patients. In addition, usage of these techniques is further controversial in pulmonary ALI/ARDS patients (ALI/ARDSp) since concept of more recruitable lung volume in patients with extrapulmonary ALI/ARDS has also been contradicted. The purpose of the study was to find a better hyperinflation technique by comparing effectiveness of manual hyperinflation (MHI) and ventilator hyperinflation (VHI) in terms of improving static lung compliance ($C_{ST}$) and oxygenation (pulse oximetric saturation/ fraction of inspired oxygen), and altering mean arterial blood pressure (MABP) and heart rate (HR) in sedated, paralyzed mechanically ventilated patients with ALI/ARDSp.

SUBJECTS:
Randomized cross-over study involving fifty four mechanically ventilated ALI/ARDSp patients.

METHODS AND MATERIALS:
Patients in age group of 45-70 years, clinically diagnosed with ALI/ ARDSp as per American – European Conference Consensus definition (1994), mechanically ventilated for less than seven days on volume control mode with PEEP $\leq 10cm H_2O$, had stable hemodynamics with heart rate = 60-100 beats/min; MABP = 70-110mm Hg were included in the study. Patients suffering with acute cardiac dysarrhythmias, undrained pneumothorax, obstructive lung disease, severe bronchospasm, head injuries, chest wall deformity, history of smoking and conditions where hyperinflation intervention is contraindicated were excluded from the study. MHI was performed with Mapleson C circuit and VHI at Siemens Servo 300A ventilator, both at peak airway pressure of 40cmH$_2$O. Each MHI set was followed by six tidal breaths to a peak airway pressure of 20cm H$_2$O. A total of six sets of six hyperinflation breaths were delivered to patients following suctioning throughout the procedure on every second set of hyperinflation breaths. Readings for $C_{ST}$ and S/F ratio were recorded before intervention (PRE), one minute after (POST-1), 30 minutes (POST-30) and 60 minutes (POST-60) after the intervention.

RESULTS:
Analysis of variance showed that there was highly significant improvement in $C_{ST}$ values with both techniques. $C_{ST}$ increased with MHI by 13.42% (p<0.01), 9.63% (p<0.01), 3.82% (p<0.01) & with VHI by 12.23 % (p<0.01), 17.18% (p<0.01) and 8.21% (p<0.01), at POST-1, POST-30, POST-60 time intervals. Highest critical difference for the $C_{ST}$ mean values was observed between PRE and POST-1 time intervals with MHI, and between PRE and POST -30 time intervals with VHI(p<0.05). At post2 interval, VHI showed a significantly higher increase in $C_{ST}$ compared to MHI using t-test (p<0.05). Analysis of variance showed that changes in S/F ratio mean values with both VHI (p >0.05) and MHI (p >0.05) were statistically non-significant. Also, the two interventions did not show any adverse changes in blood pressure and heart rate.

CONCLUSIONS:
Hyperinflation as a part of physiotherapy treatment in mechanically ventilated patients with ALI/ ARDSp can be performed with equal benefit with both techniques.

CLINICAL MERIT/SIGNIFICANCE:
MHI and VHI techniques can be used in patients with ALI/ARDS for increasing lung compliance and thereby help in early weaning from ventilator. Patients with ALI/ARDSp also have potential for lung recruitment.
TREADMILL TRAINING IN A YOUNG, PRE-AMBULATORY CHILD WITH LOW LUMBAR MYELOMENINGOCELE: A CASE STUDY

PURPOSE:
Children with myelomeningocele show delayed walking onset compared to children with typical development. Walking onset for children with low lumbar lesions usually occurs more than 2 years later than in children with typical development. This delay leads to significant decrease in bone mineralization and increased risk for fractures. In addition, children who walk later are less accomplished in their cognitive and social skills. In this case study, we evaluated whether an intensive, twice-weekly group-based treadmill program could accelerate walking onset and improve walking ability in a young child with myelomeningocele at L4/5.

CASE DESCRIPTION:
The child was a 16-month old male who presented with myelomeningocele at L4/5 with Arnold Chiari malformation and ventriculoperitoneal shunt. He attended the Supported Treadmill Exercise Program at Sacramento State-Easter Seals (STEPS), a group-based treadmill program for pre-ambulatory children with developmental delay. In STEPS, he was encouraged to walk twice per week on a mini-treadmill for 30 minutes each session for 14 weeks per semester. At program onset, he crept on hands and knees for his mobility needs. He was able to take a few steps with use of bilateral solid ankle ankle-foot orthoses when held on hands or with help for steering in a reverse walker. Solid ankle foot orthoses were worn for all upright activities.

OUTCOMES:
The toddler participated in STEPS for 22 sessions in fall of 2014, for 22 sessions in spring of 2015 and for 19 sessions in fall of 2015. Data was collected at beginning and end of each of the three 14-week STEPS semesters. Gross Motor Function Measure Dimension D and E (GMFM D/E) were used to assess gross motor skills, the timed 10 meter walk test (10MWT) to assess walking speed and the Functional Mobility Scale (FMS) to assess walking independence.

Walking speed and duration on the treadmill were recorded for each biweekly session. He walked an average of 30.05 minutes per session at an average speed of 0.23 meter/second (m/s) in fall 2014, progressing to 0.27 m/s by fall 2015. The boy improved GMFM D/E and FMS scores at each measurement. He reached independent walking onset at 29 months. Overground walking speed improved from 0.21m/s with reverse walker at program onset (16 months old) to 0.68 m/s independently at end of program (32 months old).

CONCLUSION:
A 16-month old with myelomeningocele at L4/5, who participated in biweekly, intensive, group-based treadmill walking for 3 consecutive semesters, showed improvement in gross motor function, walking speed and walking independence. Independent walking onset occurred earlier than anticipated compared to children with the same diagnosis. The boy had no fractures or adverse reactions during his participation in the treadmill program. Although bone mineral density was not measured, existing literature has shown increased bone mineralization after treadmill training in this population.

CLINICAL MERIT/SIGNIFICANCE:
A bi-weekly, intensive treadmill training program led to improved gross motor skills, improved walking speed and accelerated walking onset in a pre-ambulatory child with low lumbar myelomeningocele. Similar protocols might be beneficial for young children with this diagnosis.
PATIENTS PRESENTING TO RURAL, AMBULATORY CARE CLINIC IN PANAMA FOR PHYSICAL THERAPIST SERVICES

PURPOSE/HYPOTHESIS:
Physical therapy has been an integral part of Samuel Merritt University’s interprofessional global health clinic, with five short-term medical trips completed over a three-year period. This temporary clinic is located in a rural community and primarily treats indigenous Panamanian people in an ambulatory clinic setting located at a primary school in Batata, Panama. The clinic is staffed by volunteers including nurses, nurse practitioners, physician assistants, physical therapists, occupational therapists, pharmacists, and students. Data analysis of patient demographics and physical therapy interactions were needed to address issues related to sustainability and to better prepare rehabilitation participants on future trips to this rural community. This study’s aim was to describe patients seen by physical therapists in a rural, short-term global health medical clinic and gather data for future medical service trips to improve descriptions of common patient presentations, describe the utilization of physical therapy supplies distributed to patients, and identify potential physical therapy-specific health education needs.

SUBJECTS:
One hundred twenty-five patients were seen by physical therapy services over three days of clinic.

METHODS AND MATERIALS:
During the three day interprofessional clinic, data was collected on patient demographics which included age, sex, primary complaint(s), interventions, and equipment provided to patients by physical therapists and physical therapy students.

RESULTS:
Two physical therapists and three physical therapy students examined 125 patients representing 18.7% of the total 670 patients seen by the interprofessional team. Patient ages ranged from five to 86 years (mean=39.89 years±21.57), with the majority being female (56%). The majority had musculoskeletal complaints (55.9%), distributed between lower quarter (26.6%), upper quarter (18.4%), and spine (10.9%). Additionally, all primary body systems appropriate to physical therapist intervention were represented including neuromuscular (1.9%), integumentary (2.7%), and cardiopulmonary (0.4%). Direct interventions were provided to 82% of patients referred to physical therapy after completion of their physical therapy examination, with soft tissue mobilization (36.8%) and stretching exercises (27.2%) being the most common. Equipment frequently distributed by physical therapists and students included Biofreeze® (56.8%), Ace wraps (25.6%), and tennis balls for self-mobilization (13.6%).

CONCLUSIONS:
Physical therapy can be successfully integrated into global health primary care ambulatory clinics. For this clinic, while musculoskeletal impairments were most common, all primary systems were represented. Patients seen covered a wide range of the lifespan. Because of the ambulatory nature of the clinic, patients in this region presenting to the clinic did not have significant impairments in strength or endurance.

SCIENTIFIC/CLINICAL MERIT/SIGNIFICANCE:
These findings can be used to formulate potential community health education interventions, monitor neuromusculoskeletal health in this Panamanian community, ensure an adequate and sustainable supply chain for physical therapy equipment, and better prepare future student and professional participants for short term medical service trips to the rural communities in this region.
Educational Program Description

THE DEVELOPMENT OF EARLY PROFESSIONAL IDENTITY, USING MULTIPLE LONG-TERM MENTORING STRATEGIES TO MEET A PROGRAM-SPECIFIC MODEL

PURPOSE/HYPOTHESIS:
The American Board of Physical Therapy Residency and Fellowship Education stresses the vital role mentoring plays in developing an advanced clinician. Per its guidelines1, effective mentoring utilizes self-reflection in and on action, professional integrity and systems-based learning.2 This theoretical framework is not used with pre-clinician/physical therapy student. However, this model, applied in a different context, has value for the pre-clinician. Cruess stresses that the professional identity formation (PIF) process shapes individuals into advanced clinicians in the medical doctoring profession, and, as with physical therapy, strong PIF leads to better entry-level professionals. Further, it is more likely that the entry-level program, (not advanced fellowships), will face challenges relative to transforming the lay person into a professional. Focusing on the process of identity formation doesn’t negate current teaching of professionalism and professional behaviors, but it may not sufficiently assess or address the process by which members of the lay public transform themselves into skilled therapists. Each entry-level program has individual obstacles and therefore, successful means, creating a tailored PIF process that assure the best possible future professional. Based on the literature peer mentoring is an effective way to enhance PIF.3 The first phase purpose, of this study, was to assessment student perceptions of peer mentoring and their value in suiting the needs of our doctoral students.

SUBJECTS:
A purposeful sample, across three cohorts, enrolled in the entry-level DPT program, voluntarily attended focus group sessions during spring 2016.

METHODS AND MATERIALS:
Qualitative data coding is ongoing, based on Strauss’s outlined approach using Ground Theory analysis. Five, one-hour recorded focus group sessions were conducted by faculty, using pre-determined identity domains (curricular, clinical, professional, and personal). Specific questions sought to identify examples of existing peer-mentoring encountered and their value per students’ perception. Recorded group sessions were coded across cohorts, then combined for emerging themes.

RESULTS:
Forty-two participants from three student-cohorts were interviewed over five sessions. The sample yielded an average age of 26±4 years. Male comprised 45% of the sample and females 55%. Forty-five percent cited value in receiving informal clinical peer-mentoring and 67% received informal coursework peer-mentoring.

CONCLUSIONS:
Preliminary emerging themes suggest students overwhelmingly favor peer mentoring and that it should be incorporated into the doctoral program at Fresno State. Important to strong PIF is mentoring by a preferred natural selection with multiple mentoring opportunities. Peer mentoring needs did, however, vary by cohort and will need long-term analysis. Student perceptions, support domains inspired by self-reflection in and on action, professional integrity and systems-based learning as a primary mechanism for developing identity formation and as a way to mitigate obstacles to PIF. Additional phases will include implementation of a formalized peer mentoring program and cyclical analyses of program outcome data to understand long-term effectiveness of peer-mentoring in the development of our physical therapy students’ PIF.

SCIENTIFIC/CLINICAL MERIT/SIGNIFICANCE:
The development of a program specific mentoring model that mirror’s advanced mentoring may be critical in strong PIF for the pre-clinician/physical therapy student.
THE EFFECTIVENESS OF GRATITUDE ACTIVITIES ON MEASURES OF HAPPINESS, SATISFACTION WITH LIFE, AND AFFECT IN HEALTHY ADULTS: AN EVIDENCE BASED REVIEW AND META-ANALYSIS

PURPOSE/HYPOTHESIS:
Activities that increase mental wellbeing are shown to have profound positive effects on physical health including improved immune function, higher pain tolerance, improved cardiovascular and respiratory function, slower disease progression and increased longevity. In physical therapy there is a lack of incorporation of the psychological component of the biopsychosocial model, making treatment less effective. Activities that cultivate gratitude are one type of intervention that may influence mental wellbeing and address the psychological component of the model. The purpose of this meta-analysis was to systematically review the literature and answer the following question: Are gratitude activities effective at increasing happiness, satisfaction with life and affect in healthy adults?

SUBJECTS:
1491 healthy subjects ranging from age 18-90 with no diagnosis of a mental illness were included in the fifteen experiments.

METHODS/MATERIALS:
Searches were performed in PubMed, CINAHL, PsychInfo and PEDro databases. Data for happiness, satisfaction with life and affect were extracted and a meta-analysis was performed with pooled effect sizes for within and between-groups with 95% confidence intervals and tests for heterogeneity.

RESULTS:
A total of fifteen experiments were included: fourteen RCTs and one group pre-post test. There was a statistically significant increase in happiness, affect and satisfaction with life for within and between-group analysis.

CONCLUSIONS:
Gratitude activities are effective at increasing happiness (between group ES 0.27, within group ES 0.28), satisfaction with life (between group ES 0.36, within group 0.28) and affect (between group ES 0.51, within group ES 0.44) in healthy adults.

CLINICAL MERITS:
Gratitude activities are a simple and inexpensive way of addressing mental wellbeing. Interventions that increase an individual's mental wellbeing have profound positive effects on their physical health. Physical therapists should consider the use of gratitude activities as one option to address the psychological component of the biopsychosocial model in order to improve the effectiveness of treatment.