RMCOEH Director’s Message

Spring is a busy time for the faculty and students of the Rocky Mountain Center: there are papers to write, graduations to prepare for, new students and residents to interview, conferences to attend, and abstracts, posters, and presentations to refine. This time of year is particularly busy, as the RMCOEH hosts the National Occupational Research Agenda (NORA) Young/New Investigators Symposium. NORA is an opportunity for young researchers from across the US to present their study results to a wider audience, as well as an opportunity to learn about the scientific interests and accomplishments of their peers to improve occupational health and safety. The 2016 NORA conference posters, presentations, and attendees were from 13 universities across the US and a diverse array of topics was covered in the presentations and posters, everything from virtual reality as a rehabilitation tool to improving training for the Spanish-speaking dairy workforce to evaluating heat stress in foundry workers. The RMCOEH faculty and students wish to extend a special thank you to Brett Besser, MPH, CPE-OSHA, Directorate of Technical Support and Emergency, for being the opening keynote speaker, and David Rempel, MD, MPH, Program Director of Ergonomics at UC Berkeley, for his keynote presentation as the Dr. Paul S. Richards Endowed Lectureship lecturer. A special thank you also goes to the University of Utah Department of Mechanical Engineering and the School of Medicine for ensuring another great conference.

I believe that events like NORA are critical in preparing the next generation to be thoughtful and productive researchers, OSH professionals, scientists, and community partners. The RMCOEH is proud to be actively supporting and participating in the future of research that seeks to solve the problems that arise in the areas of health and wellness, safety, productivity, and fulfills the human need to remain meaningfully engaged in the worlds of business, labor, family and communities.

Kurt T. Hegmann, MD, MPH
RMCOEH Director
Dr. Paul S. Richards Endowed Chair in Occupational Safety & Health
RESEARCHER SPOTLIGHT

Dr. Darrah K. Sleeth is pioneering investigations into inhalable particles that enter into the upper airways, i.e., oral and nasal pathways. While particles that enter into and cause harm to the lungs and respiratory tract are areas of established and ongoing research, little has been done to assess particles and their health effects in the extrathoracic region. Dr. Sleeth notes in her most recently published research article that nearly one-third of nasal cancer deaths are attributed to occupational exposures. Clearly, inhalable particles need further scrutiny in order to reduce potential cases of nasal septal perforation, allergic rhinitis, and nasal cancer.

The International Organization for Standardization (ISO) has recently set sampling conventions for particles deposited in the extrathoracic region to encourage the development of relevant air samplers. Dr. Sleeth, who participates on the ISO working group responsible for these standards, is using the new ISO standards in her experiments that test the suitability of a foam insert for sampling of particle deposition in the extrathoracic region.

A full article detailing Dr. Sleeth’s research in this area has been published as an open access article by the International Journal of Environmental Research and Public Health and is available at: http://www.mdpi.com/1660-4601/13/3/292/pdf. This research is supported by a NIOSH K01 career development grant (K01/OH010188).

One might consider the work of Dr. Andrew Merryweather to fall within the range of posthumanist research, that is, investigation into those states where humans and technology interface to become more than human. Much of Dr. Merryweather’s research deals with musculoskeletal injuries and technologies that improve the lives of those with serious physical disabilities. Take for example his research publications entitled Development of a Wearable Active Lifting Assist Device or Patient Falls and Design of a Paragliding Chair for Persons with Disabilities.

Dr. Merryweather anticipates that concern over labor costs and an aging population will increase society’s need for assistive technologies. Already Dr. Merryweather and his team are engineering specially designed clothing and other items to help a young man suffering from paralysis gain freedom, mobility, and independence. Of course, such technologies can be used to help a wide range of people from the elderly to the physically challenged to those merely recovering from surgery. A natural extension of this research is to enable people to be more productive at work.
On December 17th, 2004, Dr. Royce Moser came into work, shaking snow from his boots and coat and making his typical ebullient commentary. Allison Lisk, the RMCOEH secretary, listened patiently and comfortably from her desk as she watched Dr. Moser transfer snow from himself to the floor. After he was sufficiently snow-free and after gathering a surrounding and worthy cohort of students and faculty, Moser looked directly at Allison and asked, “You do know what happened on this day back in 1903?” After a second or two, the quick-witted Allison leveled, “You retired for the first time?”

Of course it was the Wright brothers’ first flight that Dr. Moser was querying Allison about, but anyone who knows the history of the RMCOEH knows that Dr. Moser has retired more than once. With his intellect, wit, mentoring of faculty and staff, and keen managerial skills, it is difficult for the RMCOEH family to let this Harvard graduate enjoy his retirement full-time.

Before joining the University of Utah as a professor, Dr. Moser had enjoyed a career in the Air Force where his 23 years of service saw him appointed as a medical officer for NORAD, director of residency programs, and Chief of Aerospace Medicine. Dr. Moser was commander of the USAF School of Aerospace Medicine when he retired from the Air Force to begin a second career in the civilian sector. He came to the University of Utah and served as Vice Chair of the Department of Family and Preventive Medicine. Subsequently, he directed the RMCOEH for 16 years (1987-2003). In phased retirement, he continued on as RMCOEH Deputy Director. In 2011 he retired as Deputy Director, but soon returned as Professor Emeritus and continued teaching the acclaimed Management of OEHS Programs class. Dr. Moser has served his country, both as a flight surgeon in Vietnam and by playing a vital role in Air Force research and development during the Cold War and Space Race. Dr. Moser has also served science and academia by leading and developing occupational medicine programs, publishing a variety of research articles, authoring the text book on occupational programs management in 2008, and mentoring numerous faculty, staff, and students.

Recently, Dr. Moser retired for a fourth time by teaching his last class (left). Fingers crossed, we promise to let Dr. Moser retire for real this time. However, his outstanding teaching evaluations may require at least one return tour by this true legend!
Dr. Rod Handy, MBA, PhD, CIH has been approved by NIOSH as the new Rocky Mountain Center Director of Industrial Hygiene. He has also assumed the role of Director of Graduate Degree Programs in OEH. Please join us in congratulating Dr. Handy on assuming these two new positions.

Dr. Matthew S. Thiese, PhD, MSPH has been approved by NIOSH as the new Rocky Mountain Center Director of Occupational Injury Prevention Research Training. Please join us in congratulating Dr. Thiese on his new position.

It is with a wistful heart that the staff at the Rocky Mountain Center bid a reluctant farewell to Deanne Clegg. For 20 years Deanne worked with faculty and staff, first as an executive secretary and later as an administrative assistant. After her promotion to administrative assistant in 2003, Deanne was responsible for managing the Center’s financial accounts, which is no small task given there are 48 different accounts! In addition to being an expert of dollars and cents, Deanne was also a seraph of the soul who was known to offer a listening ear to fellow co-workers in times of stress. As long-time friend and co-worker Janet Torkelson said, “Deanne is fun; she’s just fun. She brings sunshine and fun and kindness everywhere she goes.” Deanne will be missed by all her RMCOEH friends.

Center Director Kurt Hegmann (left) presents an award to Deanne Clegg (center) as Deanne’s husband looks on with pride (right).
Advisory Board Spotlight: Rick Clasby

Rick Clasby, Executive Director of Utah Trucking Association, started his career with the Utah Highway Patrol and quickly climbed the professional ladder to become the Director of the Motor Carrier Division for the Utah Department of Transportation (UDOT) where he was well respected and very influential for the state of Utah. In 2012, after 20 years of government work, Rick left UDOT and began his role as the Executive Director for Utah Trucking Association. As executive director, Clasby leads a dedicated team in providing advocacy, safety education, camaraderie, and image promotion for the trucking industry across the state.

Rick lives in Pleasant Grove, Utah and enjoys cycling, anything with a motor, his profession, and especially spending time with his wife and four children.

RMCOEH Alumnus: Jim McDonald

I attended the Rocky Mountain Center from the fall of 2008 through the spring of 2010 and had a fantastic experience. I was brand new to the field of industrial hygiene, having earned my BS in wildlife resources. The education I received at the RMCOEH gave me the tools I needed to begin a career in the field with confidence. I thoroughly enjoyed the coursework, even, in hindsight, Dr. Larson’s famously difficult Toxicology course.

The faculty is top notch and provides an environment of professional learning and discussion that is ideal, in my opinion. They are always open for discussion and debate on any issue and encourage critical thought. In the rare event that differences in opinion cannot be solved intellectually, Dr. Pahler is always willing to take it to the racquetball court and prove his point on the hardwood!

The other key component of my time at RMCOEH that made it a positive experience for me were the other students. While I cannot speak for all of the students who are going, or have gone through the program, I can say unequivocally that those present in my time could not have been better. From the group projects and classroom discussions to the time playing disc golf, you could have not asked for a more intelligent, supportive, and fun group of people. All whom I have spoken to since our time at the RMCOEH have gone on to establish themselves in very successful careers.

After graduation I chose to return home to Idaho and began work at the Advanced Test Reactor (ATR) Complex at the Idaho National Laboratory (INL), where I still work today. At the INL, I have found another extremely challenging and rewarding environment among top professionals in a variety of technical fields. I could not be happier with the choices I made both in attending the Rocky Mountain Center and establishing my career at the INL.

Jim McDonald, CIH
Industrial Hygiene, Advanced Test Reactor Complex
Continuing Education Classes

The Rocky Mountain Center for Occupational and Environmental Health provides a variety of courses for the continuing education and training of occupational and environmental health professionals. Course instructors are picked for their expertise and depth of knowledge. Below is a sampling of courses offered for 2016:

May Courses
• OSHA 510/500/502 Occupational Safety and Health Standards for the Construction Industry
• OSHA 7225 Safer Chemicals
• OSHA 3115 Fall Protection
• Asbestos Projector Designer Refresher/Contractor-Supervisor Refresher/Inspector-Management Planner Refresher

June Courses
• OSHA 503/511/501 Occupational Safety and Health Standards for General Industry
• Asbestos Inspector Training
• 8-hr & 40 Hour HAZWOPER
• DOT Hazardous Material Transportation Training and Refresher

July Courses
• Disaster Preparedness Symposium (NIEHS)
• Lead Safety for Renovation, Repair & Painting (LRRP) Training
• OSHA 502/510/500 Occupational Safety and Health for the Construction Industry
• Asbestos Projector Design. Refresher/Contractor-Supervisor Refresher/Inspector-Manag. Planner Refresher

August Courses
• OSHA 503/511/501 Occupational Safety and Health Standards for General Industry
• Comprehensive Review of Industrial Hygiene
• Pulmonary Function Testing
• CAOHC Approved Occupational Hearing Conservation & Refresher

September Courses
• OSHA 502/510/500 Occupational Safety and Health for the Construction Industry
• Asbestos Contractor-Supervisor Refresher/Inspector-Management Planner Refresher

October Courses
• Hazardous Communication Workshop – Comp with the new HCS 2012
• OSHA 503/511/501 Occupational Safety and Health Standards for General Industry
• 33rd Annual Utah Conference on Safety and Industrial Hygiene
• Asbestos Contractor/Supervisor Training

November Courses
• OSHA 502/510/500 Occupational Safety and Health for the Construction Industry
• Lead Safety for Renovation, Repair & Painting (LRRP) Training Course

December
• Asbestos Inspector/Management Planner Training
• OSHA 503/511/501 Occupational Safety and Health Standards for General Industry

For additional information on Continuing Education classes, including distance learning courses, please visit the Continuing Education section of the RMCOEH website: http://medicine.utah.edu/rmcoeh
Research Highlight

This RMCOEH Newsletter features the most recently published research article of Dr. Andrew Merryweather. The article entitled, “Effects of bed height on the biomechanics of hospital bed entry and egress,” was published in the December 2015 issue of the journal *Work*.

A reported 12.1% - 77.6% of all falls in hospitals occur at the bedside and 1/3 of these falls result in injury. Beds with lower height have been developed to increase safety and reduce the risk of a fall, however, the biomechanical characteristics of ingress and egress into these lower beds have not been addressed. In addition, an increasingly large aging population will have decreased muscle strength, making ingress and egress even more of a pressing issue.

This pilot study compared lower extremity joint torques and angles during hospital bed entry and egress at two different bed heights (low bed at 38 cm from floor to top of the mattress and 58 cm from the floor to the top of the mattress for the high bed). Twelve adults over the age of 55 with a range of strength and mobility issues were recruited from an in-patient hospital stay, a long-term care residence, and a nursing home. Each participant completed one trial for each randomly selected bed height. A trial consisted of moving from a chair 10ft away to the bed, bed ingress (stand-to-sit motion), specific-in-bed movements, bed egress (sit-to-stand), and returning to the chair.

Participant posture was assessed through video analysis. The posture in the images was analyzed with University of Michigan’s 3D Static Strength Prediction Program (3DSSPP), which has the ability to provide percent strength capability and joint torque for each joint required by the task. The model “provides detailed force, torque, balance and population strength capability values as a function of posture” (Merryweather, 2016).

The results showed that for the low bed height, hip torque for ingress was significantly higher and the torque increased in relation to decreasing bed height; however, the flexion angles for the hip, knee, and ankle were significantly smaller. See Table 1 on the next page for the joint torques for both bed ingress and egress. The lack of a notable difference in knee and ankle torques was the result of a compensation strategy that participants used to shift the center of mass forward. Torque data for both bed heights was similar, however, 50% of the participants could not rise from the low bed without assistance and 4 of the 12 participants needed assistance even with the regular bed height.

The low bed height induced smaller hip angles, but for both ingress and egress the torso was positioned more over the knees and ankles, which could lead to instability. The findings from this study suggest potential issues with lowered bed heights for patients with diminished muscle strength and balance difficulties. Providing guidelines for healthcare providers as to the optimal bed height for this high fall-risk population is needed. The development of better
Research Highlight Continued

Biomechanical models that improve patient safety and reduce falls during hospital ingress and egress will only become more important as the number of elderly patients continues to increase.

Table 1
Comparison of Required Joint Torques during Bed Entry (N = 12) and Egress (N = 6)

<table>
<thead>
<tr>
<th></th>
<th>38cm bed height</th>
<th>58cm bed height</th>
<th>95% CI of the difference (N·m)</th>
<th>Paired difference (N·m)</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bed Ingress</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ankle</td>
<td>42.8 ± 28.1</td>
<td>45.3 ± 24.9</td>
<td>-18.8-13.9</td>
<td>-0.33</td>
<td>11</td>
<td>0.75</td>
</tr>
<tr>
<td>Knee</td>
<td>59.4 ± 6.2</td>
<td>60.3 ± 7.1</td>
<td>-14.1-12.3</td>
<td>-0.15</td>
<td>11</td>
<td>0.89</td>
</tr>
<tr>
<td>Hip</td>
<td>58.3 ± 14.7</td>
<td>43.8 ± 13.2</td>
<td>3.1-26.0</td>
<td>2.79</td>
<td>11</td>
<td>0.017</td>
</tr>
<tr>
<td>Bed Egress</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ankle</td>
<td>23.6 ± 12.7</td>
<td>21.2 ± 12.5</td>
<td>-7.7-12.6</td>
<td>0.62</td>
<td>5</td>
<td>0.56</td>
</tr>
<tr>
<td>Knee</td>
<td>45.9 ± 19.7</td>
<td>41.5 ± 7.7</td>
<td>-16.7-25.6</td>
<td>0.54</td>
<td>5</td>
<td>0.61</td>
</tr>
<tr>
<td>Hip</td>
<td>48.2 ± 19.0</td>
<td>27.5 ± 8.1</td>
<td>2.5-38.8</td>
<td>2.93</td>
<td>5</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Future Research

In addition to analyzing the biomechanics of movement to reduce the potential for injury, Dr. Merryweather’s work is also deeply involved in the research and development of equipment and instruments. The equipment and instruments that result from his research fill two main functions: 1) increasing mobility for those dealing with a previous physical injury and 2) reducing the chance that injuries will occur in the first place. Dr. Merryweather is part of an interdisciplinary research team (mechanical engineering, electrical engineering, biology and healthcare) currently developing a football helmet that would use air bladders to cushion a player’s head. In addition to these protective air bladders, the helmet would have an electrical radar that would give a 200-millisecond warning to the player that an impact was imminent. The warning time would not give the players enough time to get out of the way, but enough time (2/10 of a second) to prepare.

The picture to the right shows an interior view of the helmet currently in development.
Awards and Accolades

Congratulations to Dr. Melissa Cheng for being one of the University of Utah Vice President’s Clinical and Translational Research Scholars (VPCAT) Mentoring Program 2014-2015 graduates. The 2-year VPCAT program prepares graduates for the preparation and submission of grants, biostatistics, study design and collection of pilot data skills to that ensure a future as a successful clinical and translational researcher. Dr. Cheng joins a growing body of scientists dedicated to turning around the trend of specialists who no longer conduct clinical research. The RMCOEH faculty and staff are proud to have a VPCAT and are looking forward to Dr. Cheng’s future scientific contributions.

From left to right: Catherine Loc-Carrillo, PhD; Melissa Cheng, MD; Giavonnie Lewis, MD; and Sujee Jeyapalina, PhD.

Scholarship Awards: The Jessica Hanford Scholarship

Each year for the last 5 years the Jessica Hanford Scholarship has been awarded to the RMCOEH resident or IH student that submits the best poem. The scholarship was established to encourage residents to engage with the humanities and the more artistic side of science. For 2016, the following recipients were selected: German Ellsworth for “My Back Hurts!”, Charles Prezzia for “Once upon a MICU Dreary”, and Andrew Phillips for “ROAD to Happiness.”

This year represents the final payout for the Jessica Hanford Scholarship. The RMCOEH faculty, this year and all the previous years’ applicants wish to thank Dr. Hanford for her financial support of the Rocky Mountain Center residents and for reminding us that innovation, creativity, discovery, and discipline are the traits that science and art have always shared.

Principles for the Development of a Complete Mind:
Study the science of art.
Study the art of science.
Develop your senses--especially learn how to see.
Realize that everything connects to everything else.
~Leonardo da Vinci
Events and Happenings

On January 26, 2016 the RMCOEH participated in the University of Utah Future Health Professionals Event for local high school students. This event, supported by the School of Medicine Office of Inclusion and Outreach and the Health Science Center Office of Equity and Inclusion, consisted of an afternoon of targeted workshops to educate 9-12 graders from around the Salt Lake Valley on various health professions.

The Occupational Health workshop was led by RMCOEH Industrial Hygiene faculty Darrah Sleeth and Rod Handy, as well as MSOH students Clint Holm and Zak Arnold and PhD student Joemy Ramsey. In addition to describing OHS careers, participants were able to put on respirators and get into Level A hazardous materials clothing. Clint and Zak demonstrated the infrared camera and discussed its utility for assessing heat strain and Dr. Handy demonstrated how the portable X-ray Fluorescence (XRF) instrument can quickly and easily quantify the amount of metals in everyday materials, for example, wall paint.

Overall, approximately 20 students attended the occupational health and safety workshops and the feedback was very positive. Many students said they would consider a career in occupational health and safety even though they may not have heard of the field before this event.

Grants and Future Research

The University of Utah has been awarded funding from NIOSH for a study to pool Low Back Pain cohort study results from research performed at the University of Utah, University of Wisconsin-Milwaukee, Ohio State University and NIOSH. University of Utah faculty involved are Drs. Merryweather, Thiese and Hegmann. The UWM data also include data from Texas A&M University. Workers were employed in the US states of AR, IL, OH, TX, UT, and WI. The original studies were conducted between 2004 and 2012. Several publications have already been produced, including results showing approximately a doubling of risk of low back pain with higher lifting requirements.

By pooling the results across the studies, the research team hopes to better define the utility of the Revised NIOSH Lifting Equations and safe vs. hazardous lifting, as well as other exposures. There are psychosocial measures that are also common to the studies and these will be analyzed.

We look forward to keeping you, our readers, apprised of the findings as they occur!
Something to Consider

Please consider supporting the Rocky Mountain Center for Occupational & Environmental Health (RMCOEH) by making a scholarship or other donation today! You can give to our general scholarship fund, or to one of the three specific scholarship funds: The Jeff Lee Memorial Fund, the Dr. Richard E. Johns Endowed Scholarship, and the Royce Moser Jr. and Lois H. Moser Endowed Scholarship.

Your financial support is tax deductible and helps ensure the future of qualified OSH professionals.

For questions about giving to the RMCOEH or to mail a gift, contact:
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