

Rocky Mountain Center for

RMCOEH

Occupational and Environmental Health

*Dedicated to protecting workers and their environment
through interdisciplinary education,
research, and service.*



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“Protecting workers and their environment through interdisciplinary education, research, and service.”

A Message from the Center Director



With the continued challenges presented by the COVID-19 pandemic, one thing is clear: the field of occupational and environmental health has never been more vital or more visible. During the first days of the pandemic, it quickly became clear that we were entering into a world unlike any most alive today have ever experienced, and OEH professionals were faced with a call for research, education, and service. And like so many of our colleagues across the nation, the faculty, trainees, and staff have risen to the occasion.

While working from home offices, backyards, or crowded kitchens, the RMCOEH has responded with an outpouring of research efforts. Dr. Sarang Yoon’s RECOVER project (pg. 2) is just one example of how vital occupational medicine can be to understanding the impact that COVID-19 has had on our essential worker population. Her year-long project will test a large cohort of healthcare workers, first responders, and other frontline workers to determine the rates of infections, investigate risk factors, and provide additional key information. Other work, like that of Dr. Rachael Jones, seeks to examine potential control strategies beyond personal protective equipment (PPE) (read more about her work on pgs. 3-4). Not only is this movement beyond PPE the best practice for occupational health, but work such as this will reduce the transmission risk for all respiratory-spread infectious diseases, including influenza.

Another opportunity during this pandemic has been one for service. Our faculty and staff have worked with various nonprofit organizations and industry associations to help guide business reopenings in ways that are productive and safe. Dr. Thiese and myself worked with WCF Insurance to present webinars for the Utah business community (hosted by the Salt Lake Chamber of Commerce, which has statewide members), while other faculty prepared fit-testing opportunities for long-term care facilities, offered training opportunities, and developed reopening plans that would protect the safety of workers.

Of course, during all this time, we continue to work on other opportunities to support occupational health and safety across our region and nation. Many of our faculty have spent this busy time collecting pilot data for projects such as the mental wellbeing of lawyers, the biomechanical stressors faced by first responders, or the health challenges that commercial truck drivers encounter on a daily basis (see pg. 13 for more information).

Finally, in spite of the pandemic, the academic year carries on. In the fall of 2020, we welcomed one of our largest cohorts to the RMCOEH, including two students to our newly funded Occupational Injury Prevention Research Training emphasis in Masters of Science of Occupational Health (MSOH) program. Although these students are encountering unprecedented challenges, they have responded to the challenges of virtual and hybrid classes with enthusiasm and dedication. With energy like that, I have no doubt that we will emerge from the unique struggles of 2020 into a safer, healthier world.

Kurt T. Hegmann, MD, MPH

RMCOEH Director

Dr. Paul S. Richards Endowed Chair in Occupational Safety and Health

RECOVER

RESEARCH ON THE EPIDEMIOLOGY OF SARS-COV-2 IN EMERGENCY RESPONSE AND HEALTHCARE PERSONNEL

By this point, scientists and officials have come to understand that the risk for contracting COVID-19 is significantly higher for some occupational populations, especially the healthcare workers and first responders who cannot perform their essential job duties at home. These workers are on the frontline of the pandemic, interacting with a high volume of people, many of whom may be actively contagious with SARS-CoV-2. In response to this understanding, the Centers for Disease Control contracted with Abt Associates to initiate the Research on the Epidemiology of SARS-CoV-2 in Emergency Response and Healthcare Personnel, who in turn approached several investigators at different institutions across the country to partner in this work.



Abt Associates selected Sarang Yoon, DO, MOH (see photo to the left), a clinical assistant professor in occupational medicine, to lead Utah's section of the study. Other sections include the University of Arizona, Kaiser Permanente Northwest, St. Luke's,

University of Miami, and Baylor Scott and White Health.

The RECOVER study is a year-long study following healthcare workers and first responders such as police, emergency medical technicians, and firefighters to determine the frequency of SARS-CoV-2 infection. Participants in the study perform oral/nasal swabs every week. The swabs are picked up by a courier and transferred to a CDC-designated laboratory for analysis. All results are returned to participants within 48-72 hours. Additionally, participants provide three blood

samples throughout the course of the study in order to analyze antibody levels.



This study offers an invaluable look at the occupational risk presented by SARS-CoV-2 to frontline workers. Results from the study will also allow researchers to characterize risk factors and infection features, all in service of preventing as many additional infections as they can. The study also offers an additional benefit to workers who are concerned about their risk for COVID-19, as it provides weekly test results.

The RECOVER study will soon be adding an additional component to test and monitor other essential workers, including grocery workers, transportation workers, warehouse workers, airline employees, teachers, restaurant servers, and more.

The RECOVER study is actively recruiting participants and does provide a modest financial incentive. For more information, please contact Rachel Brown, the Project Manager for the Utah section of the RECOVER study, at rachelbrown@hsc.utah.edu, or visit <https://medicine.utah.edu/rmcoeh/research/recover>.



BUILDING A UCOVER:

UNIVERSITY OF UTAH CONTAINMENT VENTILATION FOR EXPOSURE REDUCTION

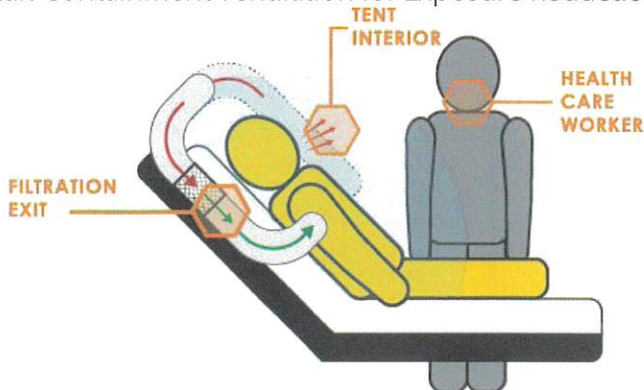
Scientists, officials, and others (including Dr. Rachael Jones—see more information about her work on pg. 15) have increasingly come to a consensus that SARS-CoV-2 is airborne, meaning that an infectious person emits respiratory aerosols (liquid or tiny particles suspended in air) simply through breathing, talking, laughing, or coughing. These respiratory aerosols can be partially controlled through the wearing of masks, but during prolonged contact, the risk of an uninfected person inhaling infectious aerosol rises. This is particularly a risk in enclosed patient care spaces. While personal protective equipment (PPE) can reduce the risk of transmission, industrial hygienists such as Dr. Rachael Jones know that PPE should be a matter



of last resort, and there is a need to replace PPE with engineering controls to limit the exposure in the first place.

In response, Dr. Jones assembled a research team consisting of herself, Drs. Biggs and

Merryweather from the RMCOEH, Dr. Drews from Psychology, and Drs. McRae and Fassl from the Center for Medical Innovation (CMI) to create a device that would help reduce the dispersion of infectious aerosols during patient care. Funded by the Department of Defense and inspired by the National Institute for Occupational Safety and Health (NIOSH)'s design for a ventilated headboard (see image above), this research team will work over the next three years to design, develop, and test the UCOVER: University of Utah Containment Ventilation for Exposure Reduction.



UCOVER is a compact, portable ventilation system that provides local exhaust ventilation (see figure below). UCOVER is specifically designed



Center for Medical Innovation

to be deployed in a range of diverse environments, including confined areas such as aircraft, submarine, and ships. To ensure that UCOVER can be successfully used in complex medical procedures without causing stress to the patient, the device will be tested in the simulation studies at the University of Utah College of Nursing Simulation Center. Motion capture will be used to study the functional biomechanics of the simulated tasks, while user studies will evaluate the ease and comfort of use.

While many other aerosol boxes have appeared in the past year as a solution to preventing the spread of COVID-19, UCOVER is unique in that it will be designed to allow for patient care to take place in a way that is ergonomically friendly and allows for quick emergency procedures, such as the intubation of a patient. Dr. Jones and her research team hope that healthcare personnel will continue to use the UCOVER long after the COVID-19 pandemic has passed to help protect the safety of the healthcare personnel who are exposed to infectious respiratory illnesses.

EVALUATING EXHALED AEROSOLS

One of the major and ongoing challenges during the COVID-19 pandemic has been a nationwide shortage of personal protective equipment (PPE) that frontline workers use to help guard against the infection risks posed by SARS-CoV-2. N95 filtering respirators are commonly the first and most effective protective equipment used by healthcare personnel, but they continue to be in short supply today. Healthcare workers have turned to alternate respirators, including elastomeric respirators (see infographic from the Centers for Disease Control, or CDC, below).

While elastomeric respirators can be more comfortable to wear, they do release exhaled air (and potentially pathogens) through a valve. Other respirators can release pathogens as well, be that through gaps at the face seal or below a loose-fitting hood. This knowledge has sparked concern among occupational health and safety professionals, including Dr. Rachael Jones.

Dr. Jones and RMCOEH faculty Drs. Darrah Sleeth and Jeremy Biggs were awarded a CDC contract to study the effectiveness of different respirators as source

controls. They will utilize Dr. Sleeth's unique wind tunnel, which allows for aerosols to be generated and dispersed throughout a contained, controlled space. A life-size source mannequin (affectionately named "Larry" by his creators) will be positioned within the wind tunnel and will "breathe" fluorescein aerosols that will allow the research team to test the effectiveness of six models of half-mask respirators, two elastomeric respirators, two powered air-purifying respirators (PAPRs), and two surgical masks.

Following wind tunnel tests, human subjects will wear elastomeric respirators with and without valve covers. A novel air pressure sensor designed for respirators by other researchers at the University of Utah will be used in these experiments to determine if valve covers make it difficult for their users to breathe. Finally, the team will utilize quantitative microbial risk assessment to determine infection risk and help determine which respirators/masks are most effective. This information will not only help protect healthcare workers, but will provide valuable information about infection control and risk to all.

TYPES OF RESPIRATORY PROTECTION



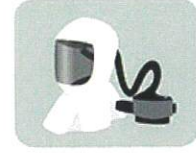
Elastomeric Half Facepiece Respirators are reusable and have replaceable cartridges or filters. They cover the nose and mouth and provide protection against gases, vapors, or particles when equipped with the appropriate cartridge or filter.



Elastomeric Full Facepiece Respirators are reusable and have replaceable canisters, cartridges, or filters. The facepiece covers the face and eyes, which offers eye protection.



Filtering Facepiece Respirators are disposable half facepiece respirators that filter out particles such as dusts, mists, and fumes. They do NOT provide protection against gases and vapors.



Powered Air-Purifying Respirators (PAPRs) have a battery-powered blower that pulls air through attached filters, canisters, or cartridges. They provide protection against gases, vapors, or particles, when equipped with the appropriate cartridge, canister, or filter. Loose-fitting PAPRs do not require fit testing and can be used with facial hair.



Supplied-Air Respirators are connected to a separate source that supplies clean compressed air through a hose. They can be lightweight and used while working for long hours in environments not immediately dangerous to life and health (IDLH).



Self-Contained Breathing Apparatus (SCBAs) are used for entry into or escape from environments considered to be IDLH. They contain their own breathing air supply and can be either open circuit or closed circuit.



Combination Respirators can be either a supplied-air/SCBA respirator or supplied-air/air-purifying respirator. The SCBA type has a self-contained air supply if primary airline fails and can be used in IDLH environments. The air-purifying type offers protection using both a supplied-air hose & an air-purifying component and cannot be used for entry into IDLH environments.

SUPPORTING WORKPLACE SAFETY



When skilled work is called for, the government has a particularly useful tool at their disposal: the Intergovernmental Personnel Act (IPA). Under an IPA, institutions such as the National Institutes of Health (NIH) and the Centers for Disease Control and Prevention (CDC) can temporarily bring in employees from outside institutions like the University of Utah. For the COVID-19 pandemic, the National Institute for Occupational Safety and Health (NIOSH) is experiencing a greatly increased need for occupational health and safety technical assistance as workplaces begin to resume on-site operations. This need far outsteps current capacities, which has led them to

recruit three RMCOEH faculty through IPA agreements: Drs. Kurt Hegmann, Matt Thiese, and Eric Wood.

These three faculty offer invaluable experience in helping encourage safe workplaces among the pandemic. They all have expertise in transportation, warehousing, and utilities, having conducted multiple studies, outreach, and service to various organizations within these industries. Drs. Hegmann, Thiese, and Wood will offer strategies to help prevent or reduce transmission between employees, maintain healthy business operations, and ensure a healthy work environment.



P²R Academy

Prevention, Preparedness and Response

Congratulations to Dr. Matthew Hughes, who recently received a notification that the National Institute of Environmental Health Sciences (NIEHS) has renewed funding for a long-standing, successful training program conducted in collaboration with the University of Texas Health Science Center at Houston. (UTHealth) The Texas-Utah Consortium for Hazardous Waste Worker Education and Training is a partnership between the RMCOEH and UTHealth that seeks to improve the health of the communities through providing health and safety training to workers who handle hazardous materials

and those who prevent or respond to large-scale disasters. Their long-term objective is "to prepare workers and communities to protect themselves, their colleagues, and their environment from exposures to potentially hazardous materials to promote the health, resiliency, and financial stability in populations that are most vulnerable to disasters." With support from Program Coordinator Ms. Rachel Brown, the Consortium offers a number of training opportunities, including outreach to underserved minorities such as Spanish-speaking workers or special sessions conducted on Native American reservations.



A LARGER WORLD

United Nations General Assembly Side Event: Pandemic Preparedness for the 21st Century

LIVE WEBINAR



Shon Tomlin
Founder / CEO
Equanimity Media



Clinton Vince
Chair of Dentons US Energy Practice,
Co-chair of Dentons Global Energy Sector,
and Co-chair of the Dentons Smart Cities
& Connected Communities Think Tank



Amb. Dr. Neil Parsan
Chairman / G4 Alliance
Sr. Advisor / Dentons



Che Marville
Sr. Advisor on Race Relations,
Human Equity & Senior Care



Darci Hall
VP & Chief Learning Officer
Providence St. Joseph Health



Dr. Matthew Hughes
Lead Advisor, Occupational &
Environmental Medicine
University of Utah Health



Tuesday Sept 29, 2020
11:00 am - 12:15 pm ET



Dr. Matthew Hughes spoke at a United Nations General Assembly Side Event: Pandemic Preparedness for the 21st Century on September 29th. Dr. Hughes presented work done by himself, Dr. Diane Johnson (head of the Continuing Education program here at the RMCOEH), and Ms. Rachel Brown on the COVID-19 curriculum and training development. Dr. Johnson was the lead instructional designer for this event, which allowed Dr. Hughes to share innovative concepts of using artificial intelligence to tailor training to individuals. This panel also discussed the importance of providing training and information to all people, including marginalized populations at risk for COVID-19.

Congratulations to Dr. Rachael Jones on her new appointment as the Chief Editor of the *Annals of Work Exposures and Health*! She will follow Dr. Noah Sexias in her leadership of the journal, which is "dedicated to presenting

advances in exposure science supporting the recognition, quantification, and control of exposures at work, and epidemiological studies on their effects on human health and well-being." The journal is published on behalf of the British Occupational Hygiene Society (BOHS) and is highly regarded in its field, with over 1000 research papers downloaded every working day. The most recent issue (published August 2020) was devoted to health and safety in the cannabis industry, a demonstration of how *Annals* seeks to provide information and research on the most pressing occupational health challenges.

The first issue that Dr. Jones will oversee will include three articles on occupational hygienists' response to COVID-19. Dr. Jones has stated that she looks forward to continuing the work done by her predecessor in increasing the impact factor, increasing representation of authors from the global south and allied disciplines, and presenting the readers of *Annals* with innovative and applied research that will support advances in professional practice.

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ANNALS OF WORK EXPOSURES AND HEALTH

Addressing the cause and control of work-related illness and injury

Volume 62 Number 2 March 2018



A vegetable farmer in Thailand using mechanical backpack units to spray pesticides. A study on differences among Thai agricultural workers' health, working conditions and pesticides use by farm type can be found on pp. 102-111.



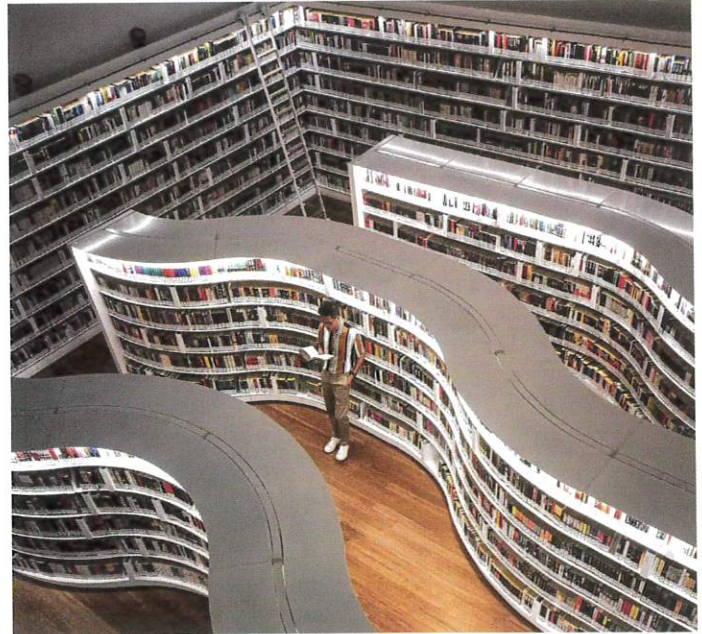
PUBLICATIONS

Even in the midst of the COVID-19 pandemic with all its attendant challenges to productivity, RMCOEH researchers still managed to write and publish many articles in peer-reviewed, scientific journals. While some of these articles provided cutting-edge explorations into the spread, transmissibility, and safety related to the pandemic, others reminded their readers that other occupational health and safety issues are still as relevant as ever.

In *Evaluating Covid-19 Injury Claims With a Focus on Workers' Compensation*, Dr. Kurt Hegmann and others investigate the difficulties related to identifying COVID-19 as an occupational illness. As the virus can be contracted at any point, and contract tracing can be difficult even in the best of circumstances, states have taken varying approaches to workplace exposure of the virus. The authors outline a number of scenarios—ranging from asymptomatic infection with no apparent side effects to severe disease and organ dysfunction—to offer guidelines as to how occupational medicine physicians should ideally conduct their assessments on affected workers.

Citation: Hyman, Mark H; Talmage, James B; Hegmann, Kurt T. *Journal of occupational and environmental medicine*, 2020, Vol.62(9), p.692-699. DOI: 10.1097/JOM.0000000000001950

Dr. Matt Thiese and others, including Drs. Hegmann, Murtaugh, Cheng, and Wood from RMCOEH, as well as Ms. Emilee Eden and Dr. Kola Okuyemi, Department Chair of Family and Preventive Medicine, published a number of articles on commercial truck drivers. Dr. Thiese has become an expert on the unique health challenges experienced by this occupational population in his studies over the years, and the work he published this year was no exception. In one of these articles, Dr. Thiese and his co-authors examined metabolic syndrome (risk factors that increase the risk of heart disease, stroke, and diabetes) in commercial truck drivers, finding that truck drivers were 2.7 times more likely to have metabolic syndrome than the general working population. In two other studies, Dr. Thiese and his co-authors examined cigarette smoke and other tobacco use among truck drivers, finding that truck drivers are likely to smoke tobacco if they have low social support or depression, and that many truck drivers use smoking as means to stay awake on



long work shifts.

Citations: *Metabolic Syndrome in Commercial Truck Drivers: Prevalence, Associated Factors, and Comparison With the General Population*. Robbins, R.B., Thiese, M.S., Ott, U., Wood, E.M., Effiong, A., Murtaugh, M., Kapellusch, J., Cheng, M., Hegmann, K. *Journal of occupational and environmental medicine*. Volume 62, Issue 7, 1 July 2020, Pages 453-459

Psychosocial Factors and Tobacco Use among Commercial Truck Drivers. Kagabo, R., Okuyemi, K., Eden, E., Murtaugh, M.A., Hegmann, K.T., Thiese, M.S. *Journal of Occupational and Environmental Medicine*. Volume 62, Issue 6, 1 June 2020, Pages 439-444

Truck Drivers' Cigarette Smoking and Preferred Smoking Cessation Methods. Kagabo, R., Thiese, M.S., Eden, E., Thatcher, A.C., Gonzalez, M., Okuyemi, K. *Substance Abuse: Research and Treatment*. Volume 14, 2020.

Dr. Darrah Sleeth published an article focused on the thermodynamics of indoor air pollution focusing on an unusual setting—traditional Kenyan kitchens. These kitchens are known to produce high levels of dangerous air pollutants, and most proposed mitigations are costly or difficult to implement. This study, conducted by former master's student Lauren Haggerty, tested a simple, low-cost intervention based on the thermodynamics of how polluted air and smoke move in an enclosed space.

Citation: Haggerty, L., Reischl, U., Handy, R.G., Sleeth, D.K., Adams, K., Schaefer, C. *Sustainable Cities and Society*. Volume 53, February 2020, Article number 101926.

PUBLICATIONS

Dr. Rachael Jones continues to be a prolific researcher in her explorations of SARS-CoV-2. Among other recent articles, Dr. Jones published a study examining the relative contributions of transmission routes for COVID-19 among healthcare professionals providing patient care. This study examined how viral-laden particles tend to move within hospitals, since understanding which transmission routes are the most likely to infect healthcare workers provides valuable assistance in selecting control strategies and protective equipment. In addition, Dr. Jones contributed to an article that helps establish the evidence base for airborne transmission of COVID-19 (for more information about her work, please see pg. 15 of this newsletter).

Citations: Relative contributions of transmission routes for COVID-19 among healthcare personnel providing patient care. Jones, R.M. *Journal of Occupational and Environmental Hygiene* 2020, Pages 1-8.

Aerosol transmission of SARS-CoV-2? Evidence, prevention and control. Tang, S., Mao, Y., Jones, R.M., Tan, Q., Ji, J.S., Li, N., Shen, J., Ly, Y., Pan, L., Ding, P., Wang, X., Wang, Y., MacIntyre, C.R., Shi, X. *Environmental International*. Volume 144, November 2020.

Dr. Andrew Merryweather and co-authors published work on a very different, high-stress occupation: football. In Sensitivity analysis of muscle properties and impact parameters on head injury risk in American football, the authors employed an innovative simulation study to investigate the effect of several factors related to head injury metrics, including muscle strength, posture, and muscle activation patterns. They found that posture had a much stronger effect than any other factor, which could have some very useful implications for training protocols.

Citation: Mortensen, J.D., Vasavada, A.N., Merryweather, A.S. *Journal of Biomechanics*. Volume 100, 13 February 2020, Article number 109411

Dr. Joseph Allen frequently publishes a wide variety of findings in organizational safety and industrial psychology, and 2020 has been another successful year. In one article, *To Excuse or Not to Excuse: Effect of Explanation Type and Provision on Reactions to a Workplace Behavioral Transgression*, Dr. Allen and his co-authors examined how a simple apology or excuse

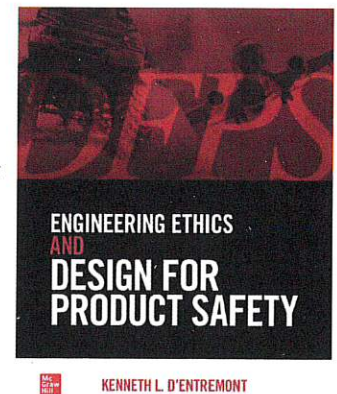
after arriving late to a meeting influenced the attitudes towards the late arrival. Their findings capture the dynamic and complex nature of interpersonal relations in the workplace, finding that it was better for a late arrival to offer an excuse, but that the distinction between excuse and apology was often unclear.

In another article, Dr. Allen and his co-authors described how findings from the longstanding Fire Service Organizational Culture of Safety (FOCUS) survey have been shared with stakeholders in the fire and rescue service. This article describes how the survey results have been communicated, offered examples of how the fire departments are using the results, and how their data training curriculum (Culture Camp) has had positive impacts on creating a safety culture in the fire service.

Citations: To Excuse or Not to Excuse: Effect of Explanation Type and Provision on Reactions to a Workplace Behavioral Transgression. Mroz, J.E., Allen, J.A. *Journal of Business and Psychology* Volume 35, Issue 2, 1 April 2020, Pages 187-201.

Moving FOCUS— The Fire Service Organizational Culture of Safety survey – From research to practice Davis, A.L., Allen, J., Shepler, L., Resick, C., Lee, J., Marinucci, R., Taylor, J.A. *Journal of Safety Research*. Volume 74, September 2020, Pages 233-247

Finally, a hearty congratulations are due to Dr. Ken d'Entremont, who published a groundbreaking textbook—*Engineering Ethics and Design for Product Safety*. This textbook represents a significant advancement for safety that moves beyond traditional understandings of occupational safety by detailing how the safety of products can be markedly enhanced in the design phase. We look forward to seeing Dr. d'Entremont's new textbook become a key part of safety in engineering programs that teach product design.



AWARDS & ACCOLADES



Royce Moser, Jr. MD, MPH, Emeritus Professor and former Center Director of the RMCOEH, has been honored with the Louis H. Bauer Founders Award, the highest award given by the Aerospace Medical Association, given for a significant contribution to aerospace medicine. Dr. Moser is perhaps best known for his 1969 seminal article on Spatial Disorientation as a Factor in Accidents. Spatial disorientation, especially in hazy dusk/dawn settings with poor visual land-horizon cues, poses a significant risk to pilot safety. Dr. Moser's work contributed to the decision by the Department of Defense and the Defense Safety Oversight Council (DSOC) to install automated ground collision avoidance technology systems in all advanced fighter aircraft, saving both lives and billions of dollars.

The Ergonomics and Safety program directed by Dr. Andrew Merryweather was commissioned by the College of Engineering to form an interdepartmental committee to address an education and training need related to systems and industrial engineering. Dr. Merryweather successfully authored a proposal to obtain financial support from the Utah Office of Higher Education for this program. These new funds (\$500k annually) will provide resources to hire new faculty (some of whom will directly support the E&S program) and promote additional collaborations with industry partners. This program will also provide greater opportunities for students for internships and employment upon graduation.



Congratulations to Dr. Dallas Shi (second-year occupational medicine resident) for her acceptance into the CDC's Epidemic Intelligence Service (EIS) 2-year experiential service fellowship! The EIS is dedicated to protecting the public health of Americans and the global community. EIS officers train under seasoned mentors to "investigate, identify the cause, rapidly implement control measures, and collect evidence to recommend preventive actions." Dr. Shi's internship will focus primarily on hands-on assignments that will allow her to apply epidemiologic skills, act as a ready-responder to the CDC's Emergency Operations Center, collaborate with experts across and within the CDC, and more.

The OM Program (Eric Wood, MD, MPH, Director) has implemented a robust Health and Well-being program for the resident trainees and faculty. Three training electives for Health and Well-Being are offered through the program, including the recent addition of an elective in Culinary Medicine. The residency has appointed a resident well-being champion annually to promote and coordinate resident-led well-being activities with the support of faculty mentors. Activities are held on a bi-monthly basis with goals to foster group morale, encourage healthy lifestyle choices, provide a forum for faculty and residents to share ideas on encouragement for well-being, and to provide an academic foundation for the science and practice of Health and Well-being.



We would also like to extend congratulations to all RMCOEH faculty, students, and staff for their hard work in continuing under the many challenges of the COVID-19 pandemic! Those at the RMCOEH have demonstrated extraordinary resilience and resourcefulness in their actions, even in the face of technological challenges, barriers to gathering, and more.

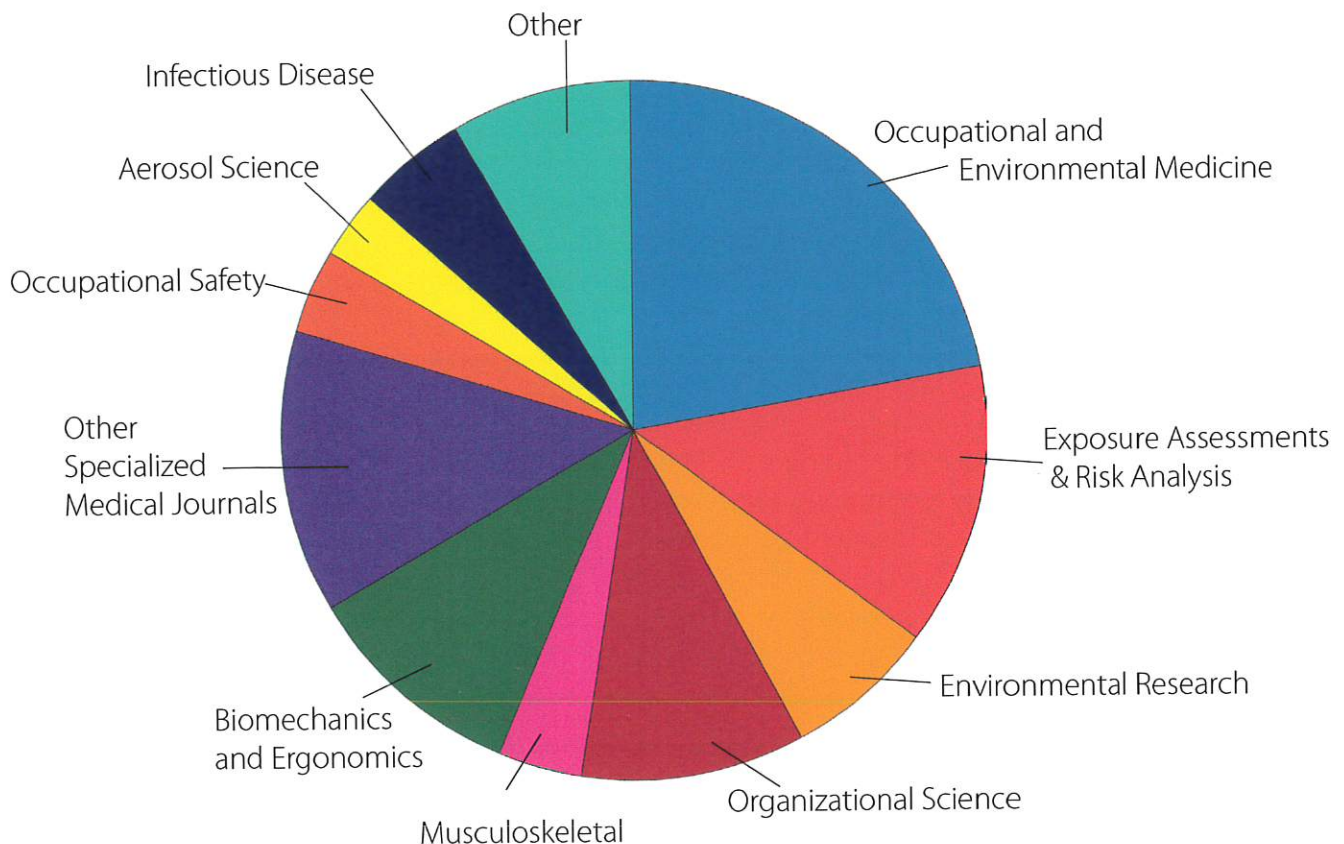
THE IMPACT OF RESEARCH

The faculty, trainees, and staff at the RMCOEH produce numerous publications each year in many facets of occupational and environmental health ranging from studies of work-related musculoskeletal pain, environmental exposures faced by different occupational populations, the safety of high-stress and demanding jobs, and more. But despite all the work that goes into producing a single article—collecting and analyzing data, reviewing literature, drafting, editing, formatting, creating figures and tables, working with editors—that life of that research doesn't end at publication.

Every article put out by our researchers goes on to have a multifaceted impact in the world by helping to shape and inform other research, providing key support for real-world advice, guidelines, regulations, and recommendations, and more. With the help of some key metrics, we can begin to see how much impact the research produced by the RMCOEH has to offer.

Where is research from the RMCOEH published?

There are several journals that publish high-quality, highly relevant research in occupational and environmental health, including *Journal of Occupational and Environment Medicine (JOEM)*, *Journal of Occupational and Environmental Hygiene (JOEH)*, *Annals of Work Exposures and Health (formerly known as Annals of Occupational Hygiene)*. However, research at the RMCOEH is published in a wide variety of journals. The pie chart breaks down some of the most common areas in which research at the RMCOEH is published.



How does research have an impact?

The most immediate and direct impact of published research can be seen through the number of other articles that cite that research. Citation numbers signal not only that the work has been read, but that it has influenced or shaped other research. The impact of research can also be seen in how it supports the development of policy, regulations, or changes implemented in day to day life. Follow the life of 3 articles on the next page to see what kind of impact research can have.

Consensus criteria for screening commercial drivers for obstructive sleep apnea: Evidence of efficacy.

Characterization of indoor air contaminants in a randomly selected set of commercial nail salons in Salt Lake County, Utah, USA

The Strain Index (SI) and Threshold Limit Value (TLV) for Hand Activity Level (HAL): Risk of carpal tunnel syndrome (CTS) in a prospective cohort

James B Talmage, Toney B Hudson, Kurt T Hegmann, Matthew S Thiese

VM. Alaves, D.K. Sleeth, M.S. Thiese, R.R. Larson

A. Garg, J. Kapellusch, K. Hegmann, J. Wertsch, A. Merryweather, G. Deckow-Schaefer, E.K. Malloy

Journal of Occupational and Environmental Medicine
2008 Mar;50(3):324-9. doi: 10.1097/JOM.0b013e3181617ab8.

International Journal of Environmental Health Research
2013;23(5):419-33. doi: 10.1080/09603123.2012.755152.

Ergonomics
2013 June;(56):1:98-111. doi:10.1177/0018720813493115.

In 2008, the article is published in *Journal of Occupational and Environmental Medicine* (Volume 50, Issue 3). It examines new consensus criteria for screening commercial drivers.

In 2013, the article is published in *International Journal of Health Research*. The study measured commercial nail salons in Salt Lake for Volatile Organic Compounds (VOC).

The article, which analyzes key data from a cohort of 536 workers, is published in 2012. It offers insight into useful metrics for estimating exposure to biomechanical stressors.

Between 2009-2010, the article is cited 11 times in journals such as *Sleep & Safety, Sleep, Occupational and Environmental Medicine*, and in two books.

In 2015, an article in *The American Journal of Maternal/Child Nursing* cites this publication in an investigation of formaldehyde exposure during pregnancy.

A year later, another article by Bonfiglioli et. al has similar findings in a cohort study. In addition, the findings by Garg et al. are used to examine workplace risk factors.

The article is cited 30 times between 2012-2014. In 2013, a commuter train is derailed, killing 4 and injuring more than 60-- an accident attributed to sleep apnea.

Between 2016-2017, this article is cited 6 times as research interest into exposures at nail salons grows. Concern about exposure during pregnancy continues.

Three years after publication, this article has been cited a total of 35 times. Citing articles have focused on industries ranging from cheese processing to computer use.

2015-2017 sees 16 more citations of this article. Drs. Thiese and Hegmann return to the topic yet again for another publication in *JOEM*.

A similar methodology is used to study VOC sources and exposures in Michigan in 2019. Researchers increasingly focus on racial inequity in nail salons.

The authors revisit their findings in 2016 to study lateral and medial epicondylitis. Later on, they begin to incorporate associations with cardiovascular disease risk factors.

The American Academy of Sleep Medicine Sleep and Transportation Safety Awareness Task Force cites this article in recommendations for proposed rulemaking.

Several news articles cite this article in 2019, including one widely distributed article that compares working at a nail salon to working at a garage/refinery.

After the Strain Index is revised, this article continues to be key. The authors of this article find that the Revised Strain Index offers a considerable improvement.

The article is cited another 12 times between 2018-2020 as concerns about driver sleep disorders continue. Sleep apnea screening is linked to cost savings.

The past three years have seen 17 additional citations of this article in total in studies conducted in Colorado to New York to Boston to the East Coast overall.

As of 2020, this article has been cited 60 times. Continued investigation into carpal tunnel offers insights into risk factors and associations with other disorders.

PROGRAM UPDATES

This August, we welcomed one of our largest cohorts of PhD, MOH, MS, and MSOH trainees that we have ever seen. Although everything about orientation was virtual, our new and returning trainees quickly adapted to this new normal of life at the RMCOEH.

A New OEH Programs Graduate Director

In summer 2020, Dr. Rachael Jones passed the torch of OEH Graduate Programs Director to Dr. Joe Allen, who has been working with Graduate Advisor Jesslyn Popwell to ensure that all trainees have all the information and support that they need. Dr. Allen and Ms. Popwell have widened the practice of holding a student forum to include trainees from each program, which they hope will increase communication between students of different disciplines. They are looking forward to a busy recruitment season forthcoming in the spring!



Making Connections Online

To help counter the isolation that can be felt from working at home, Ms. Popwell has been regularly meeting with trainees to discuss their program experience. In addition, regular meetings of student associations—the American Industrial Hygiene Association student chapter and the American Society of Safety Professionals student chapter—have continued, with many students registering for both organizations. Ms. Popwell has also been hosting virtual student gatherings that allow students to mingle and talk on their own terms.



A New MSOH Program Emphasis Funded

Last October, Dr. Matt Thiese submitted an amendment to our Education and Resource Center (ERC) grant from the National Institute for Occupational Safety and Health (NIOSH) to add a new master's-level program: the Occupational Injury Prevention Research Training Program (OIPRT). Although we have had this program for doctoral students for some time, this additional funding from NIOSH allows us to offer funding for master's students specifically focused on preventing occupational injury. We welcomed our first MSOH-OIPRT trainees this fall, Ted Medina and Chapman Cox. Chapman became interested in the program through his work on the RMCOEH's Research Team.



Journal Club Continues

Although we can no longer safely hold large gatherings in person, our Journal Club continues apace! Our Journal Club is an opportunity for trainees, faculty, and staff across the RMCOEH to gather and discuss published scientific articles relevant to occupational health and safety, occupational medicine, industrial hygiene, ergonomics and safety, and occupational injury prevention. Trainees generally present between 1-2 times a year, depending on their program, and are always encouraged to attend. Journal Club is an invaluable part of the RMCOEH experience that offers trainees a chance to discuss material with their peers, hone critical appraisal skills, learn about other fields, and talk with faculty.



NORA Symposium Moved Online

Under the direction of Dr. Andrew Merryweather, our National Occupational Research Agenda (NORA) Young/New Investigators Symposium was held online in April 2020. This movement to a virtual platform allowed over 100 participants from 9 institutions and industry to present their research.



SPOTLIGHT: STUDENT RESEARCH

Graduate Student Pilot Projects

Three of our graduate trainees (and their mentors) were awarded funding from the RMCOEH's Pilot Project Research Training (PPRT), directed by Dr. Maureen Murtaugh, PPRT director. Ms. Lindsay Scholl, a second-year master's student in industrial hygiene was awarded funding from a project entitled "Mental Health and Law School Students," which allowed Ms. Scholl and her faculty mentors, Drs. Thiese and Allen, to enroll 244 first-year law students from 3 different law schools in the Western U.S.

Ms. Keely Latham, Ph.D. trainee, also received PPRT funding for "Coccidioides presence, knowledge, and control measures in the Utah construction industry," a project intended to measure the knowledge that construction workers in Salt Lake City and St. George areas have of Coccidioidomycosis (i.e., Valley Fever) and to determine what control measures these workers use (if any) to avoid contracting this disease. Ms. Latham will work under the mentorship of Dr. Rachael Jones.

Finally, Mr. Uchenna Ogbonnaya, along with his faculty mentor Dr. Matt Thiese, will embark on an ambitious study of first responders entitled "A Comprehensive Look at First Responders Occupational Job Tasks." During this project, Mr. Ogbonnaya will use a mixed-methods approach to 1) determine the most stressful tasks encountered by first responders, 2) quantify psychosocial factors, and 3) measure the biomechanical stressors related to those stressful job tasks.

Successful Defenses

One of the OIPRT Program's most recent graduates, Dr. Onwuka Okorie (Doctoral Chair Matthew Thiese, Ph.D., MSPH, OIPRT Director), successfully defended his work related to Truck Driver Cardiovascular, Nutrition and Workers Compensation claims. Dr. Okorie found that exercise habits and the percentage of calories were worst among those with obstructive sleep apnea, smokers, and those with higher cardiovascular disease risk. He also found significant relationships between cardiovascular disease risk and worker's compensation claims among 44,010 truck drivers. The impact among those with elevated systolic blood pressure was 98%



increased. There were additional risks accorded to a history of heart problems, diastolic blood pressure, age, female sex, higher body mass index, and longer tenure.

Dr. Andria Thatcher (OIPRT Program) successfully defended her dissertation evaluating the Biomechanical and Psychosocial Stressors in the Trucking industry and their relationship with Low Back Pain. She found increased low back compressive forces with certain tasks, which were associated with low back pain. These suggest modifiable risks.

Work in Progress

Along with Ms. Scholl's work on the mental health of law students, two of our MSOH-Industrial Hygiene students are readying to defend this fall. Ms. Amy Loftis is preparing a literature review on airborne transmission of COVID-19 and the characterization of particles associated with the production of live music (i.e., singing, woodwinds, and brass instruments). She is working with Dr. Darrah Sleeth to gather information on this novel and relevant topic.

Mr. Alex Watts is working on a project measuring power density near 5G towers (5th Generation Wiring Systems used to improve wireless communication technology). He will measure actual levels of frequencies of these towers to determine if these towers are emitting at or below the regulatory limits.

Other students are busy at work preparing for research, conducting literature reviews, and working with their committees to begin their work. We look forward to seeing their progress!

PICTURES OF THE TIMES



Dr. Michael Good, Senior Vice President and Dean of the University of Utah School of Medicine exchanges an elbow bump with Dallas Bradford, Board Chair of WCF Board of Directors during the Dr. Paul S. Richards Safe Workplace Scholarship Program.

Dr. Kurt Hegmann speaks during RMCOEH's virtual commencement held over Zoom on Friday, May 15th. Thanks to all who joined us to see our students off during this difficult time!



Dr. Matt Thiese speaks with Kathryn Clark, Senior Vice President of Safety and Health and Chief Risk Officer for WCF Insurance during a webinar hosted by the Salt Lake City Chamber of Commerce.

GRAND ROUNDS: AIRBORNE TRANSMISSION OF SARS-COV-2



BIOLOGICAL PLAUSIBILITY OF AEROSOL TRANSMISSION FOR SARS-COV-2 AND CONTROL STRATEGIES

RACHAEL M. JONES, PHD, CIH
DEPARTMENT OF FAMILY AND PREVENTIVE MEDICINE
ROCKY MOUNTAIN CENTER FOR OCCUPATIONAL AND ENVIRONMENTAL HEALTH



On October 1, 2020, Dr. Rachael Jones presented at the Fall RMCOEH Grand Rounds on "Biological Plausibility of Aerosol Transmission for SARS-CoV-2 and Control Strategies." Dr. Jones's research on infection transmission has been critical in determining transmission routes of SARS-CoV-2 and the subsequent understanding of control strategies to protect worker health, especially in the healthcare field. While during the onset of the epidemic, researchers focused primarily on droplet (large liquid drops emitted by coughs and sneezing that quickly fall to the ground) and fomite transmission (contact with surfaces that were contaminated with said droplets), scientists have increasingly come to a consensus that smaller respiratory particles that are airborne also have a substantial contribution to the spread of COVID-19.

Dr. Jones previously explored this question in her article, "Relative contributions of transmission routes for COVID-19 among healthcare personnel providing patient care." (available in *Journal of Occupational and Environmental Hygiene*; doi: 10.1080/15459624.2020.1784427). In fact, a scientific brief recently released by the CDC on potential airborne transmission cited another recent article by Dr. Jones and her fellow authors, "Aerosols transmission of SARS-CoV-2? Evidence, prevention, and control" (available in *Environment International*; doi: 10.1016/j.

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envint.2020.106039).

During her Grand Rounds talk, Dr. Jones presented on noteworthy publications and research that have helped advance the question of how to prevent and reduce SARS-CoV-2 transmission, including her own. Dr. Jones also described her continuing work to characterize airborne particles of SARS-CoV-2, which include a grant application to the National Institute of Allergy and Infectious Disease (NIAID) with Dr. Kerry Kelly (Department of Chemical Engineering), as well as other work on projects funded by the Centers for Disease Control (see pg. 4) and Department of Defense (see pg. 3). Dr. Jones explained the three criteria for biological plausibility for airborne transmission: the source (aerosol generation), the viability in the environment, and the receptor (access to target tissue).

Dr. Jones also noted that local exhaust ventilation has considerable promise as a control strategy, especially among healthcare workers, a topic that she is exploring in her own research. Work such as Dr. Jones' offers a glimpse at a future where occupational health and safety professionals can develop control strategies that go beyond personal protective equipment, and ensure that our essential workers work in safer and healthier environments. Advances in science due to COVID-19 are thought to be highly applicable in the future to control of other respiratory-spread infections.

CONTINUING EDUCATION & COVID-19

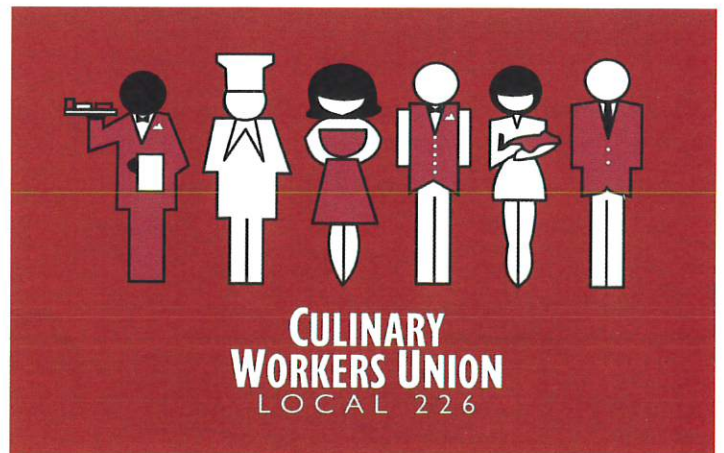
RMCOEH's Continuing Education (CE) program has been at the forefront of developing responsive, adaptive, and virtual training, both for general occupational health and safety courses as well as specialized training designed to protect as many workers as possible from the virus. Beginning in March, Dr. Diane Johnson, the Director of CE, developed and hosted a COVID-19 Information for Employers Course that was distributed both in Utah and nationwide. Over 500 people took that course, which provided easy-to-understand and consistently updated information on the virus. As best practices evolved, CE continued both to update the course and offer new educational endeavors.



FULCRUM
LABS



Helping Utah Manufacturers Grow and Thrive



To do this important work, the CE program partnered with a local Utah-based company, Fulcrum Labs, to provide Adaptive 3.0 Training. This AI-powered training uses adaptive learning, predictive analytics, and measurable performance outcomes. CE leveraged this partnership in several courses, including three courses designed specifically for Utah's manufacturing industry (sponsored by Utah Industry Recovery Alliance, or UIRA). As Utah began easing COVID-19 restrictions, business owners turned to these courses, which included "Business Safety and Success During the COVID-19 Pandemic," "COVID-19 OSHA Record-Keeping Requirements," and "Workplace Safety Modifications During the COVID-19 Pandemic". These were distributed to over 12,000 manufacturers. Outreach expanded the use of these courses beyond Utah's borders.

For businesses in Nevada, CE developed two COVID-19 industry response training courses for the foodservice and hospitality industries hit hard by COVID-19, especially in Las Vegas. One course was targeted at owners, managers, and operators. The other was targeted at employees, particularly those who are most vulnerable and who may not be aware of the protections afforded them under HIPAA, EEOC, ADA, and FFCRA. These courses have been made available to all of the nearly 7,000 members of the Las Vegas Chamber of Commerce and offered to the Culinary Workers Union Local 226 for their nearly 60,000 members in Las Vegas and Reno, NV.

NEW & FORTHCOMING FROM CE



Mountain West
OSHA Education Center

Our CE program successfully piloted a synchronous-remote course delivery methodology for the first time, which Occupational Safety and Health Administration (OSHA) subsequently approved for use by all 37 OSHA Training Institute Education Centers across the US. To implement this change, our CE program provided direct training on how to deploy synchronous remote classes to 22 (out of a total of 37) OSHA training centers in the U.S.

Despite restrictions that prevented many from attending training, CE—including its Mountain West OSHA Center—trained 3,287 professionals through 200 courses for 35,261 person-hours.

CE will leverage their online training experience to host the 37th Annual Utah Virtual Conference on Safety and Industrial Hygiene on October 14-16th. The conference allows industrial hygiene professionals to earn CEUs and ABIH CM points without traveling, and includes sessions on topics as varied and diverse as the following:

- Whistleblower Protections
- Risky Behaviors & the Casinos of the Human Mind
- Electrical Safety
- Smart Respirators Pulling Respirator Technology into the 21st Century
- OSHA & Ototoxicity
- Medical Marijuana & Implications in the Workplace
- Risk Communication

... and more!

The conference will also feature two prominent keynote speakers.

Tim Page-Bottorff, CIT, CSP, a certified safety professional with over 20 years of occupational health, safety, and environmental experience.

Angela Dunn, MD, MPH, the Utah State Epidemiologist who has become a familiar face to many Utahns during the COVID-19 epidemic.

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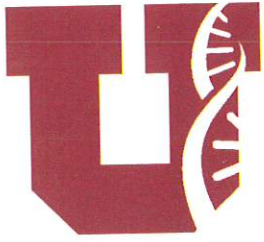
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THURSDAY 10/15/20	CONFERENCE DAY 1
FRIDAY 10/16/20	CONFERENCE DAY 2

<https://medicine.utah.edu/rmcoeh/continuing-education/upcoming-conferences.php>



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