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President's Message

Hygiene and the Re-Opening—How to Prepare for the Second Wave

Over the past 2 months, many of us took "staycations" or got out of town for a break at a campground or cottage to break up the boredom of working from the home office. Recently we have begun to relax a little, as the province moved into stage 3. Although we are all getting used to wearing "masks" in public, some people felt comfortable enough to go back to restaurants, bars and even health clubs. We all feel good that we are not south of the border where divisive politics and decisions have led to record numbers of infected people in the general community. Here, outbreaks involving long term care residents and among migrant farm workers seem to be distant memories. Even the board members of OHAO took a break from the usual flurry of communications that we send back and forth with ideas for another email blast or webinar based on the breaking COVID topic of the day.

But as more and more workplaces go back to in-person work this fall, and the new school year is right around the corner, fears of a second wave of infections may be looming. There are still no N-95 respirators available for non-healthcare workplaces, and we are wondering if we should stock up on toilet paper and hand sanitizer before another mad shortage recurs. Personal fears aside, the focus for many hygienists is on establishing or gearing up safe return to work policies.

Deciding if non-contact temperature checks are worth the cost, or what decontamination chemicals will work and yet not cause health concerns due to chemical exposures.
The online OHS world has also exploded with information—courses and webinars—to help employers implement a COVID pandemic return to on-site workplan. Although the first impulse is to go straight to the US CDC website, occupational hygiene organizations (AIHA in particular) have also stepped up free advice and whitepapers on best practices for business organizations re-opening plans (see https://www.backtoworksafely.org/ for a recent example).

If you are not overwhelmed looking at the online resources for COVID, you might also have noted that the US hygiene organizations have also stepped up online learning for other traditional hygiene issues (ACGIH in particular) to capture those hygienists who are working remotely and potentially needing points for their next re-registration or re-certification. I have been bombarded with ads for one-hour online courses covering numerous topics of general hygiene interest. Some free, but many costing roughly $100 per hour (after currency conversion). Not a bargain for points, but still the idea of attending courses one hour at a time seems like a convenient way to break up the workday where "attending" online meetings is already as normal and routine as calibrating a pump used to be.

Although this has been a good summer to spend more time with family, I am personally looking forward to getting back to a more routine work life, including regular OHAO board meetings. It's time to see how phase 3 will affect our activities, including the upcoming Symposia and PDC which will be virtual this year; assuming we stay in phase 3! The news from Europe seems to be worsening and maybe the second wave is closer than we think. A good time to ensure those return-to-work plans are being implemented properly before venturing into the office, even if only a few hours per week!

And finally, I see that the World Congress that was scheduled to be held on Toronto this October has announced a shortened and free online version is still happening, so might as well get used to virtual conferences for a while yet (See https://www.safety-2021canada.com/specialsession/)

Paul Bozek, ROH, CIH

Editor's Message

Greetings everyone! Who knew we would be releasing yet another issue in COVID-times. I hope that this issue of the Forum finds everyone safe and healthy. With gatherings being difficult to manage in the current circumstances, I have been participating in more webinars or virtual presentations, as I am sure some of you have as well. I have found the webinars presented by the WSPS particularly helpful and informative. If you know of any online IH presentations of interest, please contact Jason Boyer at the OHAO office to include it on our website and/or the Forum.

Since we are usually busy with our regular duties as hygienists, this is a great time—when things are a little bit slower, hopefully—to update our IH knowledge and to grow as safety professionals. I hope that everyone will take some time to expand their knowledge and skill sets by trying some alternative learning methods; whether they be professional webinars or just Youtube videos.

Lastly, the XXII World Congress on Safety and Health at Work has been postponed to Sept. 19-22, 2021 and will be held in Toronto, Canada. The Institute for Work and Health (IWH) and the Canadian Centre for Occupational Health and Safety (CCOHS) will be co-hosting this event. For more information, visit www.safety2021canada.com.

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OHAO Updates

Save the Dates Fall 2020:

The OHAO 2020 Fall PDC will take place on Tuesday October 20 and Wednesday, October 21, 2020 and the 2020 Fall Symposium will take place on Thursday, October 22, 2020.

At this point in time it is likely that the events will take place virtually and registration will be open in the first couple of weeks of September.

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Mission Statement

To advance the profession of occupational hygiene and to serve the interests of our members by:

- sponsoring professional development and training;
- promoting public and legal recognition;
- developing partnerships with stakeholders;
- providing public education;
- fostering communication and networking.

rev. May 2010

Noisy News: Sound Levels and Workers' Perception

Alberto Behar

There is a (false) belief that the perception of the loudness of noise is related to its sound level. Definitely, there is a relation: the louder it is, its sound level is higher. However, there are also many other characteristics—some objective, some subjective—that may be even more important than the sound level. An example of the objective, is the frequency content, the temporary pattern and the repetition rate. Subjective characteristics are related to the familiarity with the noise and the expectancy of its presence.

This is the case with occupational noise. It is perceived as a "necessary evil" and, as such, people tend to accept and ignore it. Also, a given noise that is acceptable in a restaurant is not in a library. And, finally, totally unacceptable sound levels are common phenomena in sports events.

As to the issue of noise levels and how they are perceived, the divergence between both has been pointed out in many studies worldwide. Here, closer to home, two studies were recently performed by students from the School of Occupational and Public Health at Ryerson University under the direction of Prof. Chun-Yip Hon. One was conducted in indoor swimming pools, while the second was done in several meat processing facilities. Spot sound levels were measured in both studies and questionnaires were presented to individuals present during the measurements. Among other questions, participants were asked about their perception of the severity of the noise.

The first study[1] was conducted in eight indoor public swimming pools in the Greater Toronto Area. Two sound level meters (SLM) were used. One of them was located in the swimming area and the other close to the public viewing or seating areas. Depending on the pool activity LAEq was measured for a period of time varying between 1:00 and 2:30 hrs. The attendance (between public and swimmers) varied between 32 and 72. The measured LAEq ranged between 74 and 82 dBA, with maximum SLs of 102 – 122 dBAPeak.

A total of 45 persons filled the questionnaires. Of them only 4% stated that their comfort was largely affected by the noise, while 24% reported that they were not affected at all. A total of 41% of the participant were neutral with respect to the issue of noise in the facilities. The measured sound levels were obviously well below values that could be considered dangerous to hearing. However, they could be classified as annoying and interfering with speech. Regardless, the majority of the participants appeared to be unaffected.

The second study was performed in four meat processing facilities located in the Greater Toronto Area. Among other goals, the study was aimed at relating the workers' perception of the noise environment to the measured noise levels. To achieve this, several workers from each sections of the facility were interviewed, while at the same time spot noise levels were measured at locations were these workers perform normally their activities. Twenty two workers participated in the study; the range of the measured sound levels was 62 – 100 dBA, with an over-all average sound level of 84 dBA.

It was found that 6 workers in an environment with an average sound level of 88 dBA found the place very noisy. Seven workers exposed to an average of 81 dBA, were not bothered by the noise and 9 workers in an environment with at an average of 92 dBA, found their place not noisy at all. Interestingly enough, all workers agreed that the noise is an important occupational health and safety issue and that people need education/awareness regarding this subject.

The results are not surprising, since other researchers have arrived at the same conclusion that often people's perception do not coincide with measured sound levels. As in the present studies, some people may qualify relatively low levels as bothersome, while other have no problems when exposed to very high levels.

This is a serious issue, especially in a workplace environment. To be successful, a hearing conservation program has to be based upon a workforce conscious of the risk high noise levels pose to their hearing. Workers have to be conscious that their perception of the noise cannot be used as a qualifier for the severity of the agent; sound level surveys are the only means to qualify the environment.

1. Jana Lowry and Chun-Yip Hon: The public's exposure to and perception of noise in aquatic facilities: a pilot study. Environ. Health Rev. Vol. 61, Issue 4, Guelph, 2018.

Health Physics

—Column Editor—
Michael Grey, CHP, ROH
SAIC Canada

Occupational Intakes of Radionuclides

Starting in 1989 and continuing through the nineties, the International Commission on Radiological Protection published a series of reports on radiation doses to workers and members of the public (including embryos and fetuses) from intakes of radionuclides by inhalation and ingestion. The information in these reports was based on anatomical and biokinetic models that were developed in the 1980s and these reports have formed the basis of internal radiation dosimetry ever since they were published.

The first part (ICRP 130) of the new series of reports entitled 'Occupational Intakes of Radionuclides' was issued in 2015. It presents a summary of the approach used to determine the dose conversion factors, the biokinetic and anatomical models and the dosimetry calculations performed with MCNP. It is to be followed by four volumes that present the results of the dosimetry calculations for radionuclides of various elements:

- Part 2 (ICRP 134, 2016) – hydrogen (H), carbon (C), phosphorus (P), sulphur (S), calcium (Ca), iron(Fe), cobalt (Co), zinc (Zn), strontium (Sr), yttrium (Y), zirconium (Zr), niobium(Nb), molybdenum (Mo), and technetium (Tc);
- Part 3 (ICRP 137, 2017) – ruthenium (Ru), antimony (Sb), tellurium (Te), iodine (I), cesium (Cs),barium (Ba), iridium (Ir), lead (Pb), bismuth (Bi), polonium (Po), radon (Rn),radium (Ra), thorium (Th), and uranium (U);
- Part 4 (ICRP 141, 2019) – lanthanides and the remaining actinides; and
- Part 5 (expected later this year) – the remaining elements that are not often encountered in occupational settings.

These reports present a completely new set of dose conversion factors for the radionuclides encountered in occupational settings calculated from revised anatomical and biokinetic models. Work on new anatomical and biokinetic models was began around 2000 and these were largely complete a few years ago. The changes in the biokinetic models is evolutionary, they are still deterministic 'box-and-wire' models but the transfer parameters have been updated, but the changes in the anatomical models was revolutionary.

The new voxel anatomical models for adults are described in ICRP-110 (2009). They were based on MRI images of volunteers that were then adjusted to agree with the anatomical and physiological parameters described in ICRP 89 (Basic Anatomical and Physiological Data for Use in Radiological Protection Reference Values). These models are a dramatic improvement over the previous models, but they still suffer from some deficiencies. One of the most important of these is the size of the voxel:

- 6 mm by 2.08 mm by 2.08 mm (34 mm3) for the adult male model; and
- 5 mm by 1.76 mm by 1.76 mm (18 mm3) for the adult female model.

This size results in some incongruities, particularly for small organs and tissues. For example, the voxel that contains the cornea of the eye is large enough that it is exposed to the external environment which means that the model predicts unrealistically large doses to the eye from low energy beta radiation which would actually be absorbed by the overlying tissues (these have to be corrected manually).

The changes to the physiologically-based biokinetic models are generally less dramatic but there are some changes to increase realism and the transfer coefficients describing the flow of radionuclides between compartments, that have been updated. These models describe the distribution of radionuclides between physiologically compartments and the excretion of the radionuclides in urine, feces and other excretions, which is the basis for the interpretation of bioassay measurements.
MCNP, a Monte Carlo (stochastic) radiation transport code is used to calculate the energy deposited in various organs and tissues following the decay of radionuclides retained in the body following inhalation or ingestion.

The first three of the new set of reports are available for download from the ICRP website (www.icrp.org) and the others will become available in time (ICRP reports become available for free download two years after their publication). On August 24, 2020, the ICRP announced that the complete data sets are also available for download. The new dose conversion factors for equivalent dose to organs

Fungal Exposure I: Quantitative Guidelines

E.A. Sullivan, PhD, CIH, ROH, CChem

Quantitative fungal exposure guidelines are either absolute (numerical composite totals or levels of individual species) or relative (comparing contemporaneous indoor and outdoor levels).[1] Guidelines frequently reflect early investigators' attempts at categorization. Fungal air sampling data have been applied to categorize 'safe', 'acceptable', 'normal' or 'non-complaint' indoor air.

Safe implies an acceptable level of risk. Adverse health effects might not be absent; multiple allergic and respiratory effects have been consistently associated with evident dampness or mould but the 'evidence for [causality] is still weak'.[2a] Indeed, 'conventional quantitative measurement of fungi or other microbiologic exposures, such as counts of culturable airborne fungi have shown less consistent associations with health effects than have qualitative assessments of visible dampness or water damage, visible mold, or mold odor'.[2a] Overall, 'current evidence does not support measuring specific indoor microbiologic factors to guide health-protective actions'[2a] and 'unhealthy levels of indoor [dampness and mold] cannot be defined using available microbiological measurements'.[2b]

Professional organizations concur; The US Institute of Medicine of the National Academies considers that there is insufficient information available 'on which to base quantitative recommendations for…the "safe" level of exposure to dampness-related agents [or to] confidently quantify the overall magnitude of risk from exposure in damp indoor environments';[3]

ACGIH 'does not support any existing numerical criteria for interpreting data on biological agents from source or air samples in non-manufacturing environments';[4a]

Health Canada discarded its 1993[5a] numerical guideline in 2007, noting that 'In the absence of exposure limits, results from tests for the presence of fungi in air cannot be used to assess risks to the health of building occupants'.[5b]

Normal and natural conditions might, by definition, imply 'acceptable' but do not guarantee complaint-free environments. Also, fungal levels in non-complaint buildings might not necessarily accord with guideline criteria of indoor/outdoor comparisons because 'normal' biological loads in individual buildings can be influenced the 'age, types of building materials and general upkeep of the structures'.[6] Professional judgment is critical: elevated, 'atypical' levels occupy an indeterminate range between 'normal' and unacceptable. Dampness or mould can increase fungal airborne concentrations indoors but the linkage between 'elevated' levels and health outcomes remains uncertain. AIHA reflects informed professional opinion in recognizing that although 'there will be mold exposures associated with water intrusion, mold may or may not be the primary cause of any health effect(s) that may be experienced by [building] occupants'.[7]

Relative refers to a comparison of indoor and outdoor fungal distributions in assessing the significance of fungal levels in buildings.[4b] This frequently cited comparison envisages lower fungal levels indoors than outdoors. Without indoor amplification, indoor and outdoor population distributions identified to the species level are anticipated to be similar;[1,4b] the rationale for requiring species identification appears to be that because species can have differing potential to cause human disease, identification only to the genus level would diminish the relevance of mould diversity.

Perhaps the distinction is less significant for concentrations typically found indoors. If indoor species were different from those outdoors yet had comparable health effects, application of the 'species rule' might seem moot. Incidentally, spore-trap analysis – rather than culturability – remains the commonest method for identification and

enumeration. Some numerical criteria[8,9] incorporate ad hoc combinations of indoor and outdoor values, speciation and selective concessions to statistics.

Knowledge of outdoor levels can provide useful details regarding infiltration; however, depending on the extent of acceptance of professional judgment and recommended quantitative clearance criteria,[10] opinions differ as to whether outdoor samples are necessary. Limiting the necessity of outdoor samples as references – owing to geographical, seasonal and temporal variability, short-term sampling durations or the impractically large sample sizes required to apply statistics – would undermine the general applicability for indoor/outdoor comparisons.

An alternative to comparing contemporaneous indoor/outdoor concentrations in differentiating clean from mouldy buildings, is referencing indoor measurements to existing databases.[11,12] Categorization of large databases involves statistics and assessing fungal air sampling data necessarily implies some degree of probabilistic miscategorization depending on the confidence interval selected. Any quantitative categorization capable of producing false positives signifying failure of fungal remediations – stigmatizing premises as 'contaminated' although professionally cleaned to rigorous procedural criteria – could face challenge.

Existing quantitative 'rules' contain numerous caveats limiting their general applicability: fungal contaminants lack well-established etiologies, dose-response relationships and sampling/analytical methodologies. Philosophically conjectural beliefs warrant circumspection. In the legal hierarchy, guidelines are advisory but are sometimes arbitrarily applied as de facto regulatory. Consensual principles must guide interpretation.

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