THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
BOARD OF SCIENTIFIC COUNSELORS (BSC)

EIGHTIETH MEETING
VIRTUAL ON ZOOM, OPEN TO THE PUBLIC
OCTOBER 4, 2022

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Summary Proceedings

The eightieth meeting of the National Institute for Occupational Safety and Health Board of Scientific Counselors (BSC) was convened on October 4, 2022 via Zoom. The BSC met in open session in accordance with the Privacy Act and the Federal Advisory Committee Act (FACA).

Attendees

LAUREN BARTON, MD - MEMBER

LOUIS A. COX, PhD - MEMBER

MARYANN D'ALESSANDRO, PhD

CRISTINA DEMIAN, MD - MEMBER

AMIA DOWNES, DrPH

KENNETH FENT, PhD

MICHAEL FOLEY - MEMBER

RUTH FRANCIS - MEMBER

JESSICA GRAHAM, PhD - MEMBER

REBECCA GUERIN, PhD

JOHN HOWARD, MD - DIRECTOR

EMILY NOVICKI

PATRICK MORRISON - MEMBER

KIMBERLY OLSZEWSKI, DNP - MEMBER

KETKI PATEL, PhD - MEMBER

TIINA REPONEN, PhD - CHAIR

ROBERT ROY, PhD - MEMBER

CHRISTY SPRING

MARIA STRICKLAND - DFO

JUDITH SU, PhD - MEMBER

Welcome and Meeting Logistics

Ms. Strickland called to order the open session of the eightieth meeting of the NIOSH BSC at 10:00 a.m. Eastern Time (ET) on Tuesday, October 4, 2022. A roll call of all BSC members confirmed that a quorum was present. The roll was also called following the break to ensure that quorum was maintained. Quorum was maintained throughout the day. No conflicts of interest were declared. Members of the public were notified that they would remain in listen only mode until the public comment period.

Announcements, Introduction, and Agenda

Dr. Reponen welcomed everyone and acknowledged Ms. Strickland as the new Designated Federal Official (DFO). She summarized the agenda of the meeting and reminded the group there are specific questions to consider for some of the presentations:

1. Director's Opening Remarks
2. Communications
3. National Firefighter Registry Subcommittee Update
4. Public Comments
5. NIOSH Evaluation Capacity Building Plan
6. Implementation Science

Director's Opening Remarks

Dr. Howard began by thanking the DFOs beginning with Emily Novicki for all the work that she's done for the Committee during her time, and welcoming Maria, our incoming DFO, and thanked her for stepping up to the new job.

He started out the discussion with the budget. It's a little more complicated than usual because we don't actually have one even though our new budget year started here on October 1st, but we at least have a continuing resolution which was passed on Friday, the 30th, and the President signed it, avoiding a government funding shutdown. The CR lasts till December 16th, which is a month and a week after the midterm elections which are on the 8th November. The old Congress will come back, see what they can accomplish in the couple of weeks that they have. All bets are off on whether they're going to be able to do anything much with new Congress, especially if the leadership changes hands, it's likely that they'll push off '23 budget until calendar year '23. So we have to wait and see.

The President proposed a flat-line budget for NIOSH. The House increased the budget by $11.5 million and the Senate actually increased it by $15.5 [million]. We're happy that both Houses of Congress seem to be interested in giving NIOSH more money, primarily in the extramural line as opposed to the intramural line,

but we are happy that our extramural programs are attracting that much support by the appropriators. So we'll see what happens as we go through time.

Some organizational changes that have been noted. Dr. Margaret Kitt, who all of you probably remember as our Deputy Director for Program, retired on October 1st and we're currently in the process of selection for a new Deputy Director for Program. In the meantime, Frank Hearl, who is our NIOSH Chief of Staff, has stepped into an acting role as Acting Deputy Director for Program and our own DFO, Maria Strickland, has stepped into the role as Acting Chief of Staff. We appreciate those two folks helping us out. The selection process we hope is completed soon but, as everybody knows, the HR process—as it is in private sector—sometimes can take a while.

Dr. Howard thanked NIOSH staff for putting together a nice summary to showcase all the interesting issues that are going on in the Institute. He drew some attention to a couple of those items.

The first item that he drew attention to is the emergency response section. We are still in a pandemic, despite the President's hopeful wish that we're not. We certainly are not in the active acceleration phase of a pandemic. We're probably more in the deceleration phase. But we're still worried about the fall and winter surge because social dynamics have changed and people are certainly acting as if the pandemic is all behind us. The problem, of course, is that the SARS Coronavirus-2, as all coronaviruses, they do provide some immunity, either from infection or from vaccination, but it's not long-lasting and we hope that folks will take up the new booster shot, which is oriented to the new Omicron subvariants, the new bivalent shot—bivalent meaning that it's made of the Alpha strain and the new Omicron strain. We hope people will take up that shot. We're seeing still 300 or 400, sometimes 500 hospital deaths that are occurring, primarily in the older age group, in the 65 and above category. We hope folks in that category clearly get the bivalent vaccine.

We also have a significant outbreak of monkeypox, which is originally a poxvirus like smallpox, cowpox. All the orthopox family are basically the same. They produce little pustules on the surface of the skin. This has been very common in Sub-Saharan Africa for a long time, and now we're seeing cases here in the United States, primarily in men who have sex with other men category, but we're seeing some bystander cases in some healthcare workers who are very close to individuals taking care of them.

Dr. Howard also noted we've seen some polio in wastewater surveillance in certain parts of New York. We certainly are watching those things.

We have emergency responses now that CDC is beginning to enter into the post-hurricane issues of Fiona in Puerto Rico and in Florida, and that brings us to the new operating division of HHS, formerly just an office, and that was the Office of the Assistant Secretary for Preparedness and Response. It is now the Administration for Strategic Preparedness and Response. The same acronym remains but it is an operating division on par with CDC, so there's more heft in HHS responding to and preparing for not only these biological issues but also the more chemical or flooding issues associated with weather conditions.

Dr. Howard then draw attention to a couple more issues; the CDC Director has started an initiative to review where CDC's performance can be improved in the response to the pandemic. The initiative is called CDC Moving Forward. You can enter that in Google and get to the website for more information. It basically is oriented to the public health mission of CDC, and we at NIOSH participate in public health response work by ensuring that the workers that are part of the response effort are as safe as they can be. We ourselves at NIOSH do not do public health work so we're a little peripheral to the major efforts that are going on with CDC; looking at how fast, how nimble CDC is in getting out new scientific findings about the pandemic; and how timely they were, how understandable the messaging was. NIOSH is participating because we're a part of CDC, but it is a little different in terms of the focus. The focus is on public health response. As some of you know, public health surveillance was a big issue in the pandemic—still is—and we live in a dual-sovereignty country, meaning we have federal sovereignty, we have state sovereignty. It really boils down to how you can get states to deliver data to a unified central federal source like CDC. There's been a lot of hiccups in that area, and CDC is very concerned about improving that system. Public health surveillance is a big focus of the initiative.

Dr. Howard then shared about several NIOSH issues.The first one is a robotics workshop which is being planned November 9th and 10th at the University of Illinois Urbana-Champaign, and this is on agricultural robotics. And some of you that may not be familiar with the fact that agriculture is probably, of all the industry sectors, the industry sector that is actually implementing robotics more than other industry sectors. And it's going to be a great workshop looking at some of those issues, so be aware of that if you're interested in that.

A second issue I wanted to mention with regard to NIOSH is a real achievement, thanks to folks at NIOSH, especially Mike Flynn. We finally got employment and job characteristics as a social determinant of health recognized by the Community Preventive Services Task Force. We've tried for many years to accomplish that, finally did it; it will help us integrate another great data source in terms of going forward.

Dr. Howard mentioned a third item, our Total Worker Health Symposium to Advance Total Worker Health coming up next week at NIH in Bethesda, and we're looking forward to both folks being in-person as well as folks who will be virtual, and we want to thank everybody for their interest in that.

Along with the Total Worker Health Program is the launch, in 2021, of the NIOSH WellBQ survey, which is a survey that folks spent quite a number of years designing a questionnaire, now certified by CDC, available on the NIOSH WellBQ web page. And this really is a partnership with many of our Total Worker Health Centers, especially the Center for Health, Work & Environment, the Total Worker Health Center of Excellence in Colorado. I think it's going to be a great survey to look at some of these larger issues, these more psychosocial/organizational issues associated with work and workers' response to that.

Dr. Howard ended by pointing members to that handout that was distributed, and saying that we're still busy despite the pandemic. It's been a challenge, as all of us know. The hybrid work environment is what we're enjoying now, where we have folks coming into laboratories clearly and to offices, and we have folks who are

still working periodically, teleworking, at home. For the federal workforce as for the private sector workforce, this hybridized organization of work is probably where we're going to see in the next couple of years, certainly until the current threat of COVID-19 has been mitigated.

Dr. Reponen thanked Dr. Howard and said it's clear that the COVID-19 is still with us even though the most urgent response is coming down, but there always seems to be new things popping up like you mentioned monkeypox and polio, so other infectious diseases, and now the hurricane emergency response is a very urgent topic right now for the devastating hurricane in Florida and Puerto Rico. She turned to the Board for any questions or comments.

Mr. Morrison had a couple of questions. One was why is the COVID vaccine not long-lasting?

Dr. Howard responded that he's not a hundred percent sure it's correct to say the vaccine isn't long-lasting. The immunity that you get from the vaccine is not long-lasting. Even, we found this out even with coronavirus, coronaviruses that cause the common cold. You can get one or two of those per year. So it may be something to do with this virus, like all viruses but especially this virus—really mutates quite rapidly. And unfortunately, if the mutation is in the receptor part of the virus, the part that is attached to your cells, and sometimes the antibodies that you have from a vaccine don't really recognize as well as they should that change in the virus. A lot of times, it's the fact that the antibodies are directed to a previous type of variant, and a new variant—or a new subvariant right now because we're seeing subvariants of Omicron—comes along and it has a few genetic changes that give it the ability to escape your antibody response so that you would get an infection. So it's probably the nature of this particular virus; the vaccines are fine, but the virus can get around any vaccine.

Mr. Morrison had another question on the hurricanes that we are dealing with, and a lot of standing water. Have we found any rise in hepatitis A with these storms, with the water, with workers working in the water, even people living in those conditions? Do you know of any, and is there any recommendation for those people living in those areas and working in those areas also?

Dr. Howard said historically we can answer that question, especially when water filtration systems, sewage systems back up and do not function. The more devastation you have, the more likely those systems get interrupted. And then, you have the enteric viruses like hepatitis, cholera, these other types of conditions that can happen. And if you're not well-protected and you are a worker who is working in cleanup or those kinds of activities, then the risk is there. So right now, in the situation in Puerto Rico and Florida especially, with lots of flooding, I'm not aware that we've seen those kinds of cases happen but the risk is there and workers in that area, as you well know certainly from the firefighter community, need to protect themselves with gloves and clothing, etc. Splashes need to be washed out, etc. I think the risk is there and we need to be aware of it.

Mr. Morrison replied that he appreciates the response and he knows during Harvey, we had that same issue and we were trying to get CDC to make that a recommendation. But it seemed like that recommendation

wasn't for the emergency responders. We want to make sure that especially for firefighters down in Florida are aware of the risks and protected.

Dr. Howard and Ms. Spring will check on the website and our Emergency Preparedness office to see further information on this topic.

Dr. Reponen then said I'm always interested about the budget and I was very happy to see that both the Senate and House suggesting increases in the budget, and of course we are eagerly waiting. Hopefully that will go through. But one thing that drew my attention, was that there's a big difference between the Senate and the House. The House has proposed $1 million increase to NORA, which I understand is both the extramural and intramural, such as investigator-initiated research. But Senate doesn't have that but instead they have $5 million increase in mining. I wonder if you can share any insights on where, how the mining came, and it's kind of quite high increase compared to the other programs in the mining sector.

Dr. Howard said I don't myself have that kind of insight. The appropriators hear from stakeholders. They don't hear from us. Our official communication with them is through the President's proposed budget. Each of these subcommittees for the budget committees, make their own decisions about what they want to propose. So I imagine the Senate Committee heard a lot of interest from the mining community about that industry.

Dr. Reponen had another question about the CDC initiative and how that's affecting NIOSH because there was a mention, for example, that there could be some organizational changes; for NIOSH, should we expect any organizational changes?

Dr. Howard said he doesn't think so. As I say, we're a bit peripheral to the major focus of CDC's Moving Forward initiative. I think we are participating in some of the cross-functional aspects, for instance human resources, science quality, laboratory safety. All of those things affect NIOSH. And I think the reorganization issue, as far as I know right now, that's been talked about is perhaps taking some laboratories that CDC has that are distributed across various centers, that do infectious disease type laboratory work, to perhaps bring them into more of a centralized area. So that may be the reorganization issues that are primary.

Dr. Barton then said I'm very interested in the NIOSH WellBQ survey and I was wondering if you had time to elaborate a little bit on that.

Dr. Howard said I'm probably not the person to elaborate on the survey because I'm the person that was just really excited that it was finally done and it was out, and people are using it. That's the really wonderful thing that I've heard. And I'm happy to get you that information, primarily through our folks in the Total Worker Health Program. They are the ones that are responsible, and happy to do that. Casey Chosewood would be the best person to get you that information. So we'll do that and get that back to you.

Dr. Reponen confirmed her understanding is that it is available and whoever wants to use it, they can take that questionnaire and use it.

Dr. Patel thanked Dr. Howard for all those great updates. It's always good to see great work done at NIOSH. I'll start with the question on the emergency response section update that you provided, particularly on monkeypox. My question to NIOSH is particularly when we start talking about surveillance activities and particularly the challenges of collecting data on industry and occupation or work-related information for a lot of these emergency responses or infectious diseases, what is NIOSH currently doing, based on the lessons learned from previous pandemic including COVID-19, which we are still not out, to improve: number one, cross-training of other CDC areas, particularly infectious disease and emergency response in regards to incorporating work information in a lot of these surveys and things like that. And second question is: why does the NIOSH worker safety and health team always come in later than maybe the Feds as well as states and locals start already getting questions from communities and businesses on, "Hey, what's the guidance, you know, for work-specific settings, you know, while all of this is happening?" And it's always relatively later in the game that happens. So what is NIOSH doing to kind of work on that aspect?

Dr. Howard answered that we do everything possible to get industry and occupation in surveillance systems. We have tried during COVID-19 several times. The states just say, "We don't have time for that. We do not want to fill out those fields." NIOSH proposed it many times, and it wasn't even anyone at CDC that threw cold water on it. The states just said, "No, you're asking too much. We can't do that." So that's the answer to the first question. If CDC is successful at getting a truly national public health surveillance system established, that I think would be the opportunity to be able to get industry and occupation into that because the states then would be required, because CDC would have the authority to require it. Right now, they don't have that authority. The only time that they have that authority is when the Secretary imposes a public health emergency. Once that emergency is over, which probably may happen soon, then that authority evaporates. So if there's a Congressional action to create a national public health surveillance system for infectious disease outbreaks, then again that would be the time for us to be able to, hopefully, be more successful at getting industry and occupation. We certainly tried during COVID-19. We're still trying. We're happy to work with anyone who can see a solution. But I think the national solution is a little ways down the road.

Dr. Patel clarified her second question that when the EOC stands up, it's that team that always gets first activated. And the NIOSH worker safety and health team kind of get looped in quite late in the game, not just from surveillance aspects but also, in terms of providing inputs for any workplace setting-specific guidance. So they always come in later as opposed to the thing for general audience. And I've seen that happen time and again with states. I can speak for myself where we start getting questions from the community or maybe businesses and employers, and obviously the states are not going to come up with the guidance so we look up to directions from CDC and NIOSH, and there's always this lag time in that happening. And we saw that in COVID-19 but that was a different ball game all together. But then we were hoping that we learned lessons and we started to think about it. So then monkeypox hit. I remember we were still getting questions of hey, what about childcare? Hey, what about spas and gyms and a lot of these institutions where people may visit and people were constantly having questions about disinfection, while at the time, there were only more and more guidance coming about just for congregate living settings or social gatherings and not for those; now

we do have that guidance but that was weeks or months after that. So is NIOSH working to get an earlier seat at the table during these kind of large responses?

Dr. Howard said yes, first of all, we are not late to the game. We are there right away. So whenever there's an emergency response set up, we're there. That's not the issue. The issue I think is a larger one that CDC has, and that is the issue of responding as broadly as they can as early as they can. And then, they start drilling down because various stakeholder groups like schools, like residences, like employment settings, like travel, like cruise ships, like this, like—there's a bunch of those sort of, you know, subcategory type settings that start asking questions. And CDC then struggles with okay, do we partition that off? Do we partition that off? One of the downsides of doing that, of course, is that you end up sort of fractionizing a lot of the guidance and you end up, like we did in COVID-19, with about 8,000 different versions of various guidance. It becomes overwhelming. And that's one of the things that CDC was criticized for is that you had way too much guidance and it was too confusing, we could never keep track of it, etc.

We started trying to coalesce a lot of our employment-related guidance into one particular one which we did with OSHA. So I think that it's a struggle because it's not just the employment settings. And then even within employment settings, I did so many talks for just construction, for just seafood production, for just agriculture in the field, for elevator safety in office building employment. I must have done about 20-25 subsegments of the employment issue, and a lot of that guidance then had to be modified depending on the industry sector. So it is a significant issue and I think that's the delay, the lag that you're seeing is that it takes a while to get some of that specificity because you're trying to deal with the population as a whole.

Dr. Howard continued that it's a real tension. I'm not a hundred percent sure how you solve it. But it's certainly it's not us not being brought in at the earliest possible time. That's not true. We are there. Our voice is there, but it doesn't get that much sunshine right in the beginning. It takes a while. So that would be my explanation of how our participation happens, or doesn't. And I think when you see it as a stakeholder, you see it late because we've been fighting inside the institution, saying please, we need an employment-related one, we need an agriculture one, we need a construction one. And of course, for a non-occupational safety and health professional, the number of industry sectors and subsectors are dizzying to a non-safety and health person. We deal with that all the time because we partition our guidance for everything based on an industry sector.

Dr. Patel then said I'm really interested to learn more about the part where you mentioned about the occupational health equity program where they're adding the employment and job characteristics as social determinants of health. Could you further expand on what that program's role is going to be moving forward, and how that plays into some of the surveillance and prevention initiatives that NIOSH is now undertaking in its new five-year plan?

Dr. Howard said yes, great question. I think that over almost 15-20 years, NIOSH has had an occupational equity program. It was called all sorts of different names, "special populations" like 20 years ago, and various other names. But it's still a program of ours. Mike Flynn is running that program. And we have tried to

expand that now by actively having an intramural competition to try to stimulate our intramural scientists in this area of health equity. Now, clearly one could argue that equity issues have been part and parcel of occupational safety and health from the very beginning because we categorize workers by their risks in terms of vulnerability. So we've probably all been doing it for years. Now we have to call it out especially with some names.

I'm hoping that we can also expand our extramural focus so we can get specific projects that are oriented towards health equity—not that there haven't been in the past. And in fact, when you look at any of these surveillance projects, epidemiological projects, intervention projects, we're always sub-segmenting the population based on how equitable it is for that particular risk.

In safety and health, it comes as second nature. I just think we have to be a little more cognizant of how we call it out that we are doing that kind of work, and then how we can increase the funding towards it. I think that's always been an issue. We're very happy that CDC is putting an emphasis on that, and that they've recognized social determinants of health in the Community Guide, because that always was missing and we had no sort of entry point into that larger world of public health.

Dr. Howard continued that we're doing health equity across the Institute and one of the big health and safety equity issues has to do with personal protective equipment. As you know, decades ago it was all designed for White males of certain facial size. Well, that's not the American workforce, and we've got a lot of inequities in terms of that. We're having a workshop in November on that issue. Each of our parts of safety and health are trying to figure out how they can highlight the equity issues within their particular field.

Dr. Reponen had a follow up what Dr. Patel was talking about how to deliver the information about the occupational issues in these emergencies. CDC has now this Moving Forward, which the main goal is to deliver public health information and guidance to Americans in real time. Maybe that's a way to push there that—there public health and occupational health information so that NIOSH also is on the table there from the very beginning with the information.

Mr. Morrison then asked an open-ended question on fluorinated PFOS. We're seeing it out there in the field; when are we going to go to a new foam? How are we going to take the products off the market, and safely dispose of them? Could you give us an update in maybe the next meeting we have on what NIOSH is doing in the field of the PFAS.

Dr. Howard said that would be great. Christina Lawson of DFSE would probably be the best person to get to the Committee to talk about all of the PFAS issues because there is research going on in NIOSH, clearly with regard to firefighters. They are probably the people that are maximally exposed from the employment setting. From the general public health issue, it's water supply issues, and EPA has just done some advisories on that issue. NIOSH also participates in the National Toxicology Program, which has had quite a few conversations and work in NIEHS with regard to PFAS issues. So we're clearly involved. CDC, in terms of the National Center for Environmental Health, has been doing a lot of PFAS research and we are aware of that. So

it's a great topic. It's a huge topic, and one that DoD deals with, as you may know, Pat, in terms of military firefighters. It's an issue that's going to be with us for a long time. Most recently now, the controversies have been with regard to blood testing, you know, general population, and clearly whether it's a viable alternative to test workers to see their PFAS and other, PFOA and all the other congeners, in the blood, and what do those blood tests mean? The interpretation of those, EPA's trying to understand as well as other scientists. So it's a big topic and we are involved as well as other federal agencies.

Dr. D'Alessandro commented on Pat's question regarding PFAS. We did put a NIOSH Science Blog out last November, in 2021, on the state of the science with regard to PFAS and the Public Safety Sector had a focus meeting on that topic as well, and the meeting presentations are available as well, and we have a robust portfolio with regard to PPE and PFAS as well.

Dr. Reponen said next, we have a topic on NIOSH communications strategy. We have Christy Spring, who is Associate Director of Communication and Research to Practice.

Communications

Presentation

Ms. Spring thanked everyone for giving me time today to present a brief overview about many of the activities happening in NIOSH Communications. I am Christy Spring, Associate Director of the NIOSH Communication and Research to Practice Office. I have a lot packed into today's presentation to try and give you as thorough a look at communications as I could in this short time.

I'm going to start today by noting what our goals are for the Office, which are written out here in the slide but it's first to initiate and ensure continuous outreach to and involvement from partners and stakeholders. It's, next, to encourage and ensure the relevance and quality of health communication strategies, messages, and scientific information products. Also, to build and sustain health communication capacity and performance within the Institute. And also, to cultivate a modern vision for communication at the Institute. So these are the overarching goals that guide the work we do as we plan for our activities.

At NIOSH, we have many communication channels to help us disseminate information and reach our audiences. What you see here are just our major channels; there are additional ones that are not reflected on this slide. But these are our major channels we use for reaching broad audiences, and where we also see the most interactions. Many of the numbers that you see here were also included in the notes that were provided to you earlier with Dr. Howard's comments.

First, I'm going to focus a bit on the NIOSH social media channels. Go forward. So social media, as you may know, is an ever-changing platform. It provides us a unique opportunity to provide information directly to audiences instead of always relying on intermediaries to carry a message. So our goal with being on social

media is to leverage these platforms to help engage and educate audiences, and share NIOSH research and recommendations.

Ms. Spring continued a little bit of information about social media trends. According to Pew Research Center data from 2021, approximately 7 in 10 Americans use social media to connect with one another, engage with news content, share information, and entertain themselves. As more Americans have adopted social media, the actual social media user base has also grown more representative of the broader population. So when it first came about, you saw young adults as some of the earliest social media adopters. But now, usage by older adults has increased. And for many people, social media is a part of their daily routine. They're often visiting social media sites at least once a day. And the majority of people, when they're going to these social media sites, are using their mobile phones as well. That is actually important in regards to website and product development because that means anything we link to in our posts for social media really, ideally, should be optimized for being seen on a mobile device. A survey from LYFE Marketing in 2018 also found that it was approximately 91% of users access social media through their phones. And the pandemic really has only noticeably increased people's digital and online activity.

Today, we're going to focus on the main NIOSH social media accounts, which I've included links to here so later on, if you wanted to, you could go through, reach the accounts through those links. Again, there are a number of what we call subaccounts, so they might be more focused, special accounts for a particular industry, but we're just going to talk about the main NIOSH ones.

In general, users are coming to each of these platforms for specific reasons. For example, people often use Facebook when they want to connect with family and friends. Instagram, when they want to share photos or short videos, a lot of times finding funny content or fun content. LinkedIn is where we really see people wanting to network and keep up to date with industry information. And Twitter is often seen as more of kind of a news site but also still also for entertaining content. There's a good theme here; people often go to social media to sort of be entertained. Also, an interesting thing about Twitter that Pew noted was that it is actually more often used by reporters as a source of information than it is by the general public.

Ms. Spring then shared what we know about the NIOSH audiences that we have on these platforms, and then I'm going to close out the social media piece by talking a little bit about where we're going from here.

As a quick caveat, Twitter actually no longer provides in-depth audience demographics but they did back in 2019. So what we have here is information from 2019. It has probably changed a bit but it may not have changed totally from this. But our audience on Twitter is about 50/50 split men and women, with women holding a slight majority. Just over half of them have only completed a high school education. Overwhelming majority interested in science news, which makes a lot of sense if you're going to be following a scientific institute on Twitter. And just less than half of them are from the US.

We see a whole mix of engagement levels on Twitter, and it's often very dependent on the specific kinds of content we are publishing. So there's quite a bit of ebb and flow that you will see in this chart, and that really

goes with interest around particular topics, although overall we see a fairly steady level of engagement. So we always see engagement; it's just whether or not we see a bump in the engagement is often topic-dependent. From also both the pandemic to now, as Dr. Howard notes, we're—noted—we're not really in post-pandemic but sort of the sort of wind-down, we get a significant amount of attention for anything related to respirators, and that is both positive and negative attention. So when we really dive deeper into looking at the kinds of comments and retweets we're getting, or tags on Twitter, it's often a mix. We do see a significant amount of interest that's increased over the years on that particular topic.

When we look at Facebook, we're actually seeing a little bit of a different picture of who is coming to talk to us on Facebook. Majority of our followers on Facebook are mostly men in the age range between 25 and 44, pretty broad age range but men of working age. There is an interesting aspect with our Facebook account and a challenge that we are often navigating is that we receive significant interest from overseas, specifically from Malaysia. That is likely due to the fact that there is a NIOSH in Malaysia so there may be confusion between the two organizations.

For Instagram, we trend much more towards a female audience but again, in that worker age range of 25 to 44. Most of our audience here is in the US, and the posts that do best for us on this are really highly visual posts like infographics, something that's really short and easy to digest, and very short videos. We're talking under 30 seconds. People's attention spans on social media have only gotten shorter over time.

Ms. Spring explained that LinkedIn is a really interesting look because what we're seeing is a split of—those who are following us on LinkedIn—of very senior people and entry-level people, but fewer people in that midcareer range. So there's an area and opportunity for growth there. Our LinkedIn is a little bit lagging behind some of our other social media channels, and that's a bit about, as a result of the structure of where we are in terms of with CDC. So for a long time, it was very difficult for us to have our own page because CDC had the main page. But we just recently were able to make that transition from being a closed group on social media, which is not exactly—on LinkedIn—which is not exactly the best way to engage people, into transitioning to a public LinkedIn page. That happened in June of this year, and we are really looking forward to seeing how that shift is going to allow us to better start leveraging this channel. And we're already seeing a gain of followers every month and a very high engagement for this channel. In August, our engagement rate on this was an average of 5.2% and that, just to put that in content, compares to about 2% on our other platforms.

So how is NIOSH leveraging social media? It's a very visual medium. It is also a very noisy medium. We're often trying very hard to grab people's attention, even just for a few seconds. That said, it's not necessarily a good platform for long, in-depth pieces but instead does really well with easy-to-read, easy-to-interact-with, short communication pieces. Like I mentioned, infographics are really popular. Short, short, short videos are very, very popular. So we are using these channels to try and share resources and tools, also recognize significant events, and we have recently started working with our Human Capital Management Office to help

promote job opportunities and fellowships through these channels as well, really especially on LinkedIn because that's the channel where people are going to for that information.

Ms. Spring discussed where we're going, so the COVID pandemic over the last two years really shifted our focus in what we were doing on our social channels and what information we were putting out there. It was heavily about COVID information, heavily about amplifying messages from NPPTL about respirators and PPE, and then also supporting the response, and sharing information about COVID response for workplaces.

Now that we're coming out of that, we're able to shift our focus back a little bit more to look at the kind of content we're putting out on these channels. So what we're doing now, and since the COVID pandemic to now, we've actually been able to access new tools that give us a lot better insight into the data that we're looking at on these channels—engagement rates, what content's going well, what content isn't going well, what times of days are best to put things out, what are things that really do best for that particular channel. So we're using a lot of those tools to leverage data to help us in decision-making, collaborating with other NIOSH social media accounts as well, and looking at how we're going to chart a path forward, using these channels to meet specific communication goals. We're also working with CDC to keep ensuring that we are compliant with changing agency policies around use of social media as well as practices around social media. So I think now, post-pandemic, we're going to be able to start seeing a little bit of a shift in what we're focusing on, how we're leveraging these channels, and what it looks like moving forward.

Ms. Spring next talked about another major communication channel, the NIOSH Science Blog. The NIOSH Science Blog actually accounts for about 3% of NIOSH traffic. Pre-pandemic, it averaged about 33,000 views per month, which is still very, very good. Then the pandemic hit, and we jumped to 232,000 views per month in 2020. You probably will not be surprised; it was heavily around information related to respirators. What we have seen now in the last two years is that has started, leveled out, and we're getting now around 75,000 views a month on average, which is still a great number of views to be getting.

What are people coming to the NIOSH Science Blog for? Well, they're coming for a number of things. Over the last couple of years, they've especially looked for information around respirators. We also are getting a lot of referrals from Google search results, which is an important way to try and get people into the site is getting ranked high on search engine results. The value the blog is really bringing to us is that it's providing a unique format for this content that allows for engagement, and we are also regularly adding new content, which helps keep people interested in coming back. And on average, we're publishing about 4 to 8 blogs per month, and have published over 800 entries so far. It continues to be a really engaging and popular channel for us.

Ms. Spring next talked about our website. I'm going to talk a bit about an evaluation we did recently on that. We asked ourselves the question of when people are looking for information from NIOSH, what are they doing, how are they going about it, sort of asking, "What do you do?" Do you go to a bookmark? Do you Google the topic and see what shows up? Or do you go to the NIOSH homepage and browse about or type in the search? We wanted to know how are people getting information.

What we found out is that we have a lot of people coming to the homepage, with an average of about 50,000 views per month. However, they seem to be struggling to be finding what they needed. Some of them would come to the homepage and leave. Sometimes they would come to the homepage and try and search for the content. And sometimes they would do that and then they'd just end back up at the homepage. What this boils down to from our perspective was this doesn't seem like a great experience for people searching for information.

Ms. Spring explained that we engaged a company called Thinkspace to help us evaluate the site, see if we're really providing people with a good way to find the information, or if and where we might make improvements. We want to reduce that what we call abandonment rate, where people just sort of give up and leave, or give up and go back to their homepage. We also wanted to hopefully try and make it so that people might be a little less reliant on the search box. Like maybe there's a way we can bring the information, or at least the category of information, they're looking for a little bit more to the forefront so that they're not trying to navigate an additional set of search results.

What Thinkspace provided a very nice long report. But the big point it boils down to is that many of our visitors are really not familiar enough with our content or the organization of our content to really understand where they need to go, and so they're often struggling to get there. It's often an overwhelming and kind of confusing path that they need to take, and it was taking them more time and effort to find the information they wanted, which is also partly why we see people abandoning it.

We took the feedback from Thinkspace and tried to think through what we could effect on the website in the short term and then what we would need to work through on the long term. I will note that the NIOSH website, we are somewhat constrained in the sense that we are within the CDC web template. So there are aspects of the web template that we ourselves are not able to change, but there are other aspects of the site that we certainly do have the ability to change.

What we could easily start doing was affecting things like the jumbotron, which is that nice banner across the top of the website, and making that a little bit more interactive so we wouldn't just have a pretty picture but we'd have a pretty picture that actually allowed people to click to get more information. So if you went to our website today, you would find a picture there with—related to hurricane response, and you would click through it and be able to get information on hurricane response resources.

We also added information to sections and links. And what this does is really just kind of gives people a better idea of if they click on this link, what are they going to? What are they going to get? And that really helps people in navigating the site. It's a little change but it's something that's important. If you think about some of the sites you might go to regularly, it's helpful to know, like okay, if I click on here, am I going to get information on chemicals, am I going—like what am I going to get out of this? So it helps people understand where they're trying to navigate to and make a better decision.

Ms. Spring continued presenting a couple of other things we did such as, we adjusted some of the navigation. We took some things that were buried that were sort of common, easy things that people might often go to, and kind of moved those up, made them a little easier to find so people didn't have to scroll down. Interestingly enough, people don't usually like scrolling down websites to find information. We also took high-profile programs like the Total Worker Health Program, moved those things up in the schema. So again, not buried in the bottom, what we call "below the fold", bringing it up so it's a little bit easier for people to find because it's in a more prominent location. And even did simple things like just cleaned up the color palette which, again, it's a simple step but really an important step in not making things too distracting or overwhelming for our visitors. You can see a couple more where you can actually see where, under "More NIOSH Resources", you can see where we've included a little bit more detail on things, again to give people a sense of what they would get if they're going to go and click on something.

We're already seeing some improvements. We've only been able to do this for about the past 100 days, so this is pretty fresh that we've made these changes. Our goals were to reduce the rate of visitors exiting the site from the homepage because we wanted to try, as much as we can, to keep people from bouncing away from that. Ideally, reduce the use of the search box because that would tell us that maybe we're actually putting the information better in a place where they can easily find it and they're not having to type it into search. And then the same, trying to keep people from being in that inconvenient loop of like trying to search for something and going back to the homepage.

Ms. Spring said we're still seeing about the same kind of bounce rate of coming to the homepage and leaving, but we are seeing improvements in terms of less people needing to use the search to find information, and less people abandoning their search for information and going back to the homepage.

When we started this project, we did also talk to ourselves about what is going to be success for us. How are we going to continue to measure if this is working or not? We want to see improved links—one of the things we talked about was wanting to see improved clicks on some of those categories of topics, to see if more people were finally engaging with those. And then also, looking at the before and after implementation, which you know, luckily, because it's our website it's easy for us to pull the metrics for before and after.

We're seeing improvements in people not having to go to the search box. We're actually also seeing significant improvement in people engaging in some of these other categories of content that have been put together. So even something simple like adding a little descriptor of what you would find when you click on this, and moving things up, cleaning up the look and feel, really has increased traffic on a number of those pages. For example, we're seeing an increase in the traffic for "About NIOSH" but, significantly, we're seeing an increase in traffic for "Training Resources", "Grants & Funding", some key pages that really have really good, valuable information that were not really touched on before, and now we're starting to see more of our visitors engaging with that. And again, I would say that it's only been 100 days so we're only hoping that this will get better from here.

Ms. Spring said long term, there's more that we want to do such as implementing a global navigation schema, making it a little easier for people to navigate around the site. Fixing some logo placements and moving some other things around. But a lot of these pieces that are here are actually part of that CDC template that I had mentioned at the beginning. What we've also been doing is engaging the CDC digital team there to talk with them about kind of flexibility in that, what options might we have to effect change in these areas, and then they shared with us that they're also doing a similar usability look at their pages and their overall schema for their website. I think that we're actually really well-aligned with their digital modernization initiative and are really well-positioned because we've taken a look at this, we're feeling ready to make some of these changes, so as they start implementing these changes on the global website design, we'll be in a good position to take advantage of that and really make some of these additional, longer-term changes. Another thing that we're also doing though in the meantime is looking at some of our top visited pages and looking at opportunities to make improvements to those as well on the usability and design for those. If we have a lot of people going to them, we want them to have a good experience, get the information that they want.

Ms. Spring concluded with a little bit of information about Wikipedia. It's not necessarily what people always think of as a traditional communication channel but it's an important communication channel for us. Wikipedia is the largest general reference work ever created. There's over 262 billion page views on Wikipedia per year, and it's a site that people across the globe are actively going to for information. It is multilingual, it is free, it is online, it is written and maintained by a community of volunteers through an open collaboration and Wiki-based editing system. Editors are known as Wikipedians, and NIOSH does have its own Wikipedian-in-residence that assists us with contributing to the site. Currently, English Wikipedia contains over 6.5 million articles that average—and it averages about another 500, 500-600 new articles per day. It is an incredibly great resource for people and it can be actually a strong resource in helping to combat misinformation.

Our work within NIOSH on Wikipedia has really been focused on incorporating our research and recommendations into articles, highlighting the occupational safety and health information to meet people at the place where they're going to for information. The Did You Know is a place where they highlight new articles where it gets a little bit featured, and we've seen a lot of interaction of articles that NIOSH information has been added to or NIOSH has helped really develop that and flesh out, put into the Did You Know. So that's been incredibly valuable to us. And then we've also extended the work to include work with public health students and our own researchers to identify opportunities to make improvements to articles, adding occupational safety and health information on various topics, or identifying where there's a gap in information on a topic in an area of occupational safety and health and adding that article. You can see a little bit of that additional information included here on this slide.

Discussion

Dr. Reponen thanked Christy, and shared with the members that Christy didn't have any specific questions but opened the floor now for questions or comments. I looked at the website and I do think it's very clear and easy to navigate. It looks really great.

Mr. Morrison said that was an excellent presentation, especially the numbers. My question is about the 91% of users you said use their phone to access the website. So how important is it that the phone can be more difficult trying to access a website? How is that technology changing?

Ms. Spring said that's a great question. It's really important for us to always be thinking through. I would say actually, for NIOSH, sort of a niche that we have is that we have to kind of balance both worlds because we do have workplaces where phones are not permitted, and so we might be looking at something that they need to be able to print something out and post it. But one of the things that we are constantly looking at when we're developing communication products and developing new webpages is what is this going to look like if you shrink it down onto a phone? How easy is it going to be to navigate? How easy is it going to be to open and go through a communication—a document? People, for a long time, we had been using what they call accordions where sort of things can squish up in the website and you can push a button and it expands. It doesn't work great on phones so it's even little things of just thinking through like okay, that's not going to function well on a phone so, you know, what do we need to think about for that? So we do a lot of testing to our pages to sort of see what they look like when they shrink down. Is the image now too big? Is the content too hard to navigate? But it is constantly in our mind about what is this going to look like as people use different devices. With the balance also for our audiences, knowing that we may want to have a webpage optimized for use on a mobile device but a printable version for optimal use at a workplace where workers are not—workers, supervisors, IH, whoever they are, they're not going to be able to use their phone to get the information. They really need to have it posted up or a hard copy or something similar as well. So it's a nice balance that we have to try and meet.

Mr. Morrison thanked Christy, and asked about using the color brown on the website.

Ms. Spring said the brown unfortunately was an assigned color to our center, because CDC assigned colors at some point. A couple of things on color. For government, one thing we have to worry about is 508 compliance to make sure that if you're colorblind, you're still going to be able to differentiate between things. So that is one thing we have to keep in mind. The other thing is, yes, we want colors to be complementary and nice-looking and engaging, and just try to avoid it from being like too many colors so that people can start associating the color with the structure. So it is just those little things that you're like, you know, maybe on this page I want things to be green and purple. Except that then doesn't match with their experience with the whole rest of the site, and sort of making sure that the user, you know, it might fit what you like but is the user going to be able to make sense out of that?

Dr. Reponen said it's an excellent point then asked why are men using the Facebook more, and that might be the Malaysian thing that is interfering with your statistics there.

Ms. Spring said we do think it is and that they often apply for—try to apply for jobs through Facebook.

Dr. Patel thanked Dr. Howard and NIOSH for putting communications on the agenda because I think it was me who was pretty vocal about trying to learn more about NIOSH's communication strategies in our last meeting. So it's really helpful to know all this information. I have seen the website evolve, and I really like them but obviously I'm a nerd so that may not be generalizable to the other public that we're trying to reach.

A couple of comments or questions, especially in relation to your updates related to social media statistics. When you start talking about Instagram and I see that the age distribution, it's fairly consistent. When we start talking about education and outreach for special populations or vulnerable populations like women or younger workers or relatively older workers, I think it is a good platform, at least that we can see based on your statistics that it is trying to cover that.

Follow-up question in relation to that is what type of products are you putting out on Instagram? Are your strategies differing on what type of a product goes, or push message goes, on Instagram versus Facebook versus LinkedIn? Because the type of audience is going to differ. Also, Instagram is more about visuals and audiovisuals; these days it's more about the Reels. I don't know if that is where we as public health agencies are moving forward, but I feel like that's the catchment area to draw more attention and get your PSA out for those low-attention span audience. So if you can comment a little bit of that.

Dr. Patel continued with a question for the LinkedIn slide that you had where you start talking about your followers and it's more of the professional audience. Is your strategy in some ways different for putting the information out there in terms of what your audience is and the content?

Ms. Spring said especially on Instagram, it's all about the visual, and Reels are the new hot thing. Once we started Instagram account, what we also realized is the challenge of having an Instagram account as a business is the amount of investment that you have to put in to creating good visuals on there. We are always trying to identify opportunities where there's a really good visual, to try and leverage that on the Instagram accounts because they are what drives it. You heard me say infographic, infographic, infographic. We get high engagement numbers on that because it tells a little bit of a story without it just being sort of a stock photo. We've also been trying to move away from stock photos because people can tell they're stock photos and they just don't engage.

Reels we are starting to look into. Again, it's trying to figure out what it's going to take on our end to create a Reel and then finding as well that match between resources and topic, of what is going to be an interesting topic for a Reel. In general, on Instagram, things that we might promote would be really more tools and resources. We've also tried to use it as a platform to highlight some of our younger research staff or our female research staff, like female engineers and things like that, to demonstrate to others that might have an interest in that field or be in that field, hey, we have women scientists here that you might want to know about.

Ms. Spring expanded upon LinkedIn saying we're going to be seeing how we can engage on that platform now that we actually have a public site and we can actually engage people better than we were able to before. When we put job postings up, that's the site we put them on. They don't really work on Twitter and Instagram is a terrible place to put a job posting. But that's the site where people are going for job postings. Things that we're also trying to target towards that channel are if NIOSH is hosting a conference or a webinar, professional focus, training type information versus kind of just high-level, like hey, we've put out a press release which might go on Twitter, we might put more information about how NIOSH is looking for a new health scientist in this division, or we have summer fellowships opportunities, and then also research funding opportunities. Things where we're going to try and engage that professional audience. We've only had that group for about two, three months now—hopefully as the time goes on, we're going to see more people engaging with us on that so that we'll have a better, a larger audience which to share that information with.

Dr. Reponen thanked Christy and said we have to move on to the next topic, which is the Firefighter Registry.

National Firefighter Registry Subcommittee Update

Presentation

Dr. Reponen reminded the Board that there are three questions posed to the Committee and they are at the end of the presentation, then welcomed Dr. Fent to begin.

Dr. Fent began by saying we met with the NFR Subcommittee on September 6th and I'm going to provide an overview of what we presented to the Subcommittee.

I did want to start by just quickly mentioning the recent IARC evaluation. Back in 2010, the International Agency for Research on Cancer or IARC classified firefighting as a Group 2B possible carcinogen. Just this summer, IARC completed their reevaluation of the carcinogenicity of the occupation of firefighting, and I had the privilege of serving on the IARC working group, which reached a new consensus evaluation classifying firefighting as a Group 1 known human carcinogen based on sufficient evidence of mesothelioma and bladder cancer. The working group also found limited evidence for five other cancers, as shown here, and strong evidence of five key characteristics of carcinogens out of ten among exposed firefighters. These findings, coupled with the fact that firefighters are exposed to numerous chemical carcinogens, shift work and UV radiation, strengthens the evidence of the relationship between firefighting and cancer risks—at least for some types of cancer.

Dr. Fent said although we've learned a lot, and that's evidenced by the IARC evaluation, there are still several questions that remain. And these questions include: What is the cancer risk for volunteer firefighters? What is the cancer risk for subspecialties of the fire service including wildland firefighters? How does the cancer risk vary for different demographic groups? How does the cancer risk vary regionally across the US fire service? How prevalent are rare forms of cancer among firefighters? Recall IARC found seven cancers with

strong or limited evidence out of the 30 to 40 primary cancers that we study. How does the cancer risk change with increasing exposures, including major events? And we hear a lot about those long events that firefighters respond to and how they may contribute to cancer risk. What other occupational and non-occupational risk factors contribute to cancer? To what extent do different control interventions and workplace practices reduce the risk of cancer? And then are there other chronic illnesses that are elevated in firefighters? And to answer these questions, we really need a large and diverse cohort that we can follow over a long period of time.

So that's really where the National Firefighter Registry comes into play. Our mission is to generate detailed knowledge about cancer in the fire service through a voluntary registry that reflects our nation's diverse firefighters. And our vision is to equip the fire service and public health communities with the knowledge that they need to reduce cancer in firefighters.

Dr. Fent continued with lastly, with input and guidance from the NFR Subcommittee, we were able to come up with four key components of the Firefighter Registry. Number one, to collect self-reported information on workplace and personal characteristics through a secure web portal that I'll talk about later. Number two, to obtain records from fire departments or agencies to track trends and patterns of exposure. Number three, to link with health information databases including state cancer registries and the National Death Index, to detect both cancers and deaths. And then number four, to make de-identified data available for external researchers.

Enrolling in the NFR will be fairly straightforward. Firefighters will visit our secure web portal at nfr.cdc.gov. They will confirm their eligibility and click login.gov. Once they click login.gov, they'll be able to create an account using multifactor authentication. Most of us are familiar with that, where you would enter an email, password, and another form of authentication such as a text message sent to your mobile phone. The firefighters would then read and sign a consent form, and fill out a user profile, which should only take about five to ten minutes, and then complete the enrollment questionnaire, which will collect information on demographics, work history, health history, and lifestyle. And we think that'll take about 30 minutes. So the whole process would take about 30 to 45 minutes where younger firefighters will probably on the low end of that estimate and more veteran firefighters will be on the higher end of that estimate. This is going to be hopefully live in the next month or two.

You can think of the web portal as really the starting line in the process to better understand cancer among firefighters. The web portal allows us to collect self-reported information from firefighters, such as demographics and work history, and other information. We will also request incident records from some fire departments, and participants will have the opportunity to take follow-up surveys where we can capture longitudinal information from firefighters about their jobs and other factors.

Dr. Fent explained the next step will involve matching to state cancer registries and the National Death Index, followed by data analyses, and that will take place over the next 10+ years. And that's when we can really start to put the data to use, to find answers to some of the more difficult questions that remain, such as the

relationship between exposure and cancer, and the impact of controls and differences in cancer risk by job or specific demographic categories.

Over the last year, in addition to developing and testing the web portal, we've been busy updating the protocol, obtaining an Assurance of Confidentiality, finetuning our enrollment questionnaire, establishing relationships and keeping the fire service informed on what we're doing, and then developing communication materials. I'll go through each of these topics next.

In terms of administrative updates, the NFR Science Team has checked many things off the list. We did update our protocol, and we posted that update to the NFRS website on August 29th, and this incorporated changes to the consent form, user profile, and enrollment questionnaire. It also included updated security and compliance information, and data sharing details as reflected in the Assurance of Confidentiality. For the AoC, we include details regarding the protection of individual identifiers, as well as the sharing of de-identified data, and we obtained approval on July 25th. For the enrollment questionnaire, we've been finetuning the questionnaire to address issues that were found during beta testing, and through the development of the web portal, and we submitted a non-substantive change request to the Office of Management and Budget or OMB, and we obtained approval for that change request on July 19th, 2022.

Dr. Fent said to elevate all this hard work, it's essential that we're able to develop and foster relationships with firefighters. We've reached out to several fire departments across eight states, who have expressed interest in helping with the testing of the NFR web portal once it goes to the production site. And we've also attended or presented at numerous conferences over the last year, as shown here, including the Fire Department Instructors' Conference or FDIC, which is the largest firefighter conference in the country. We set up our very first NFR exhibit booth at this conference, as shown in the photo, and we also had a booth at Fire-Rescue International, and just last week at Firehouse Expo, and those are all very large firefighter conferences.

We just updated our website to be more user-friendly, so we encourage everybody to check it out. And this website does include two informational videos, including a two-minute video on how the NFR works. We fully recognize the importance of developing materials to promote the NFR to firefighters of all different backgrounds. So early last year, we conducted focus groups with several diverse groups of firefighters, as shown in the tables here. And these focus groups were intended to identify messages that resonated with different groups of the fire service. These focus groups resulted in some recommended messages, including: "Stand together. Join the NFR." "Answer the call. Join your brothers and sisters in a new effort to understand and reduce cancer." And "Let's leave the fire service better than we found it. Join the NFR." Images were also tested with the focus groups and this helped our communications team in collecting photos and other images for the communication products.

Here are some of our clear communication materials, which are available on our updated website. This is the NFR brochure, and we've shared this with fire department leadership across the country and had it available at some of our early conferences. This is our NFR fact sheet, it's basically frequently asked questions, and this

has been the main handout at conferences to date. The most recent NFR quarterly newsletter, which anyone can subscribe to from our website, is up to about 1,300 subscribers currently.

Dr. Fent said the ultimate goal of the NFR is to reduce cancer for firefighters, and we have a long history of working with Underwriters Laboratories' Fire Safety Research Institute. And UL FSRI manages the Fire Safety Academy, which provides free evidence-based training to firefighters, and currently has over 70,000 accounts and growing. We recently provided presentation content that contributed to an FSA course on the comprehensive cancer prevention strategies for the fire services. And this course is focused on exposure control measures available in the fire service based on the hierarchy of controls. The course also includes a module at the end about the NFR, and we believe that firefighters who are likely to take this course may also be interested in participating in the NFR. We hope to do even more with the FSA and other fire training academies across the United States.

For our rollout, the next step will be to get the web portal into production. In other words, the web portal application will be hosted at nfr.cdc.gov and will be live. This will be our soft launch, and we will continue to do testing with firefighters all over the country who decide to enroll. You can think of them as our early adopters. As I mentioned previously, we have identified eight departments from eight states that are interested in helping with this testing. Any issues they encounter will be documented and addressed in a future release.

During our soft launch, we will slowly ramp up promotion, with a big push in January, and we're doing this for a couple of reasons. Number one, January is Firefighter Cancer Awareness Month so it's important that we're aligned with the messages that are already going to be delivered to the fire service. And number two, by slowly building our promotional campaign, we can kind of attenuate the traffic to the web portal and make sure everything is running very smoothly. This also allows for organic distribution across the fire service, and gives us additional time to develop more communication materials and to coordinate with the professional organizations, advocacy groups, and trade magazines, which is all currently in progress. In the next year, we will also start identifying and reaching out to structural fire departments to participate in the targeted enrollment.

Dr. Kent said hopefully this provided a good overview of what we presented to the NFR Subcommittee and had three specific questions for the Board.

The first one is: What changes should be considered to enhance the user experience of the web portal? The feedback we got from the NFRS Committee was to consider taking steps for login.gov—and just to be clear, login.gov is managed by GSA so it's not something we actually have control over—but to take steps to reduce decision paralysis for the multifactor authentication, and this might mean reducing the number of options for multifactor authentication. There's actually six or seven different options for second authentication methods. In the consent form, the feedback was to improve readability by increasing the font size, making the font darker, reducing the size of the progress bar on the left, or adding images. And then to create job aids for specialties like wildland firefighters.

The second question: What is the best way to get this information into the hands of the fire service? The feedback we got was to support a big push in January for Firefighter Cancer Awareness Month, which we're planning. To reach out to affinity groups to reach underserved populations, which we're also in progress of doing. To consider increasing the racial and ethnic diversity of the fire service subject matter experts or subcontractors, and this was a very well-received feedback. To reach out to smaller organization/groups and have a presence at smaller conferences, and I think that we can have a lot of bang for the buck by doing that. And then leverage connections that NIOSH already has through the FACE program, and that's the Firefighters Against Cancer & Exposure program.

The last question we had for our Subcommittee was: How can we best build trust with departments to encourage participation in both the open enrollment and the targeted enrollment where records may be requested? And the feedback we got is that for the targeted cohort, it's important that we're explicit in how the data in the rosters and exposure records will and will not be used to address potential concerns from fire departments. You can imagine fire departments may have some concerns about sharing data with a federal agency. We also heard that it's important to work with fire departments that recently completed an ISO audits, as well as those that are accredited by the Center for Public Safety Excellence, and that's because those types of departments probably have really good recordkeeping to begin with.

Dr. Kent finished by saying we would like to hear if the NIOSH BSC has any additional feedback for the project team to consider as we approach the full implementation of the Registry.

Mr. Morrison added that this project's been going on for several years. It's been an incredible work in progress. Like anything else, it had its timeline difficulties but we're getting ready to put it out there. I just want to say thank you to Kenny and his team, so many people that worked on this. I think this is something that, into the future, people are going to look back and say that this was the right thing to do, really to study this population and do it. The Subcommittee's feedback was very helpful. I think we would have missed some of our information that we really needed to make this thing right, or to get it at least kicked off in the right direction. Partners were researchers, other organizations, firefighters, minority members of that group, and that really, really did help us and get it out there.

We're really kind of excited about kicking this off. It's going to be a soft launch and then starting in the first of the year. There's a lot of momentum going on. There's a lot of people's interest and the fire service interest. I think this is going to be successful.

That last bullet that Dr. Fent went over, which was really important for us, it's the exposure records that are important. We're going to study the rates of cancer and how that's stratified. Looking at what were they exposed to and how long were they exposed to? That's always a difficult thing to do. We found that our previous NIOSH study looked at 30,000 firefighters from three different areas. Dr. Fent is really pushing that exposure to the trust of the fire departments, and a lot of organizations are going to step up to make sure that they understand that this is, like those three slogans, this is going to make the fire service better than when we came and left.

Discussion

Dr. Reponen suggested starting with the first question and seeing if the Board has any feedback on the first. The Subcommittee had a demonstration on the web portal which we will not be able to do. I think it's kind of difficult to really give any additional feedback on this one but I just wanted to see if anybody has for the first question. I myself have used the login.gov and I used the text messaging. There was an issue when for some time I didn't have access to my US phone number, and I had to actually erase my login.gov and then start over and give another phone number. I don't know if there is a possible to have a backup, it would be really good so it's not just to rely on one authentication. If I had an email address then I could have access to my email.

Dr. Reponen moved to the second question. Are there any other recommendations on how to get this information about the existence of the survey into the hands of the fire service? How is social media used like we just heard in the previous presentations?

Dr. Fent said that's a great point. We are going to have a pretty big social media presence and we're developing content that can go on our website, and then other organizations can use that content for social media. IAFF and other organizations can kind of push it out using their channels, and then NIOSH will also push it out using our channels.

Dr. Reponen moved on to the third question on how to best build trust with departments and to encourage participation, both to the open enrollment and targeted enrollment.

Dr. Fent provided some extent by saying for the targeted enrollment, the plan is to do a random selection of structural fire departments of different sizes and different demographics. And with the targeted departments, we are interested in collecting some of those records that Pat mentioned, incident records, roster information. It's going to be critical that we build that trust with fire departments and they understand how that information is going to be used and not used. That was what we heard back from the NFRS Committee. But I do think it's going to be a hill that we have to climb and we may get a little bit of pushback from the fire service in this area.

Dr. Barton asked a question that there was an issue before about potential reluctance for the firefighters to enter their social security, their full social security number; how that was resolved, or was it resolved?

Dr. Fent responded that we decided, based on feedback from the NFRS and BSC, that we're asking for the last four digits of SSN, not the full SSN. We thought that firefighters would be more likely to provide partial SSN. It is still an optional field so some firefighters may not provide anything. But if we can at least get a partial SSN from a lot of firefighters, that will definitely help in making the data linkages with state cancer registries.

Dr. Barton said I think that's acceptable. I think that's good.

Dr. Reponen read a question from Cristina Demian. Could you work with ACOEM to promote through their members, who in turn can make fire districts aware?

Dr. Fent said that's a great suggestion. It's on our list to do more, especially with occupational physicians. But it's just kind of taken a little bit of a backseat. Once we get up and running, we will definitely explore that further. We do have a couple of occupational physicians that are part of the Subcommittee and so I think we can leverage their expertise when we pursue that.

Dr. Reponen commented that the Subcommittee did very thorough job in giving the feedback so there have just been a couple of suggestions from BSC. Thank you, Kenny and Pat, and thank you, Grace, who wasn't able to be here today, and all the Subcommittee of course, the Subcommittee members. I think this is an important milestone. So it's great to have that going live.

Dr. Reponen concluded this session and released everyone to lunch.

Ms. Strickland said we do not have any public comments, but if there are any members of the public who are on the call right now and would still like to sign up, please enter that in the chat and we can assign you a time. If not, we don't have any public comments so we will still resume at 1:00. I'll do a roll call at that time to ensure that we have quorum again, and we will pause to make sure there are no public comments before we proceed, but then we'll move forward with Dr. Amia Downes's presentation.

Public Comment

There were no public comments.

NIOSH Evaluation Capacity Building Plan Update

Presentation

Dr. Downes started by talking about the Evaluation Capacity-Building updates for 2022. We've been doing a lot and this is our second year. How we got to this point and why we started this Evaluation Capacity-Building effort, we did five program reviews starting like 2016, '17, and we got some critical feedback. And it didn't really matter which program we were reviewing, we saw some crosscutting themes from those reviews. And as we were preparing for those reviews, we did a rough evaluability assessment and saw that we had some programs that weren't really ready to go through a review using contribution analysis, which really focuses on being able to demonstrate intermediate outcomes.

We were also looking at our portfolio which was set up in a matrix way, so if we send our construction program through a review, they're probably going to pick up some MSD research as part of that review. It doesn't make sense to then turn around and review the MSD program, particularly because of the burden that places not only on the leadership of each program, but on the researchers of the program because it's taking about a year to create the evidence packages and go through this whole process. And then, of course, some of you may be familiar with the Foundations for Evidence-Based Policymaking Act. This Act really

establishes processes for the federal government to modernize its data management practices, evidence-building functions, and statistical efficiencies to inform policies.

There were really four topics we really wanted to include once we considered the feedback we got from the program reviews and our processes and the things we went through to prepare those program reviews. These are the four topics we decided to include in the ECB Plan to start with.

Dr. Downes began telling us a little bit about what we've been doing from FY21 into FY22. One of the topic areas that we've included was collecting and documenting intermediate outcomes. And this is particularly important for NIOSH because it's really challenging to demonstrate end outcomes—a reduction, for example, by 10%, 2%, whatever percent in MSDs and hearing loss, or you name the outcome we're looking at—it's just very challenging to measure, especially the way our programs are set up because they have so—the various types of research we do. We were really looking at our contribution at the intermediate outcome level. And just to remind you what an intermediate outcome is, we're really looking at the actions taken by external persons or organizations as a result of the knowledge or products generated by NIOSH or NIOSH-funded projects, programs, or grants intended to improve occupational safety and health.

One of the pieces we wanted to include in here is assessing the motivations or barriers to collecting these intermediate outcomes. And if you recall in FY21, we did a number of focus groups and interviews with various groups within NIOSH to try to find out what do they know about intermediate outcomes? Do they value it? How right now do they collect intermediate outcomes? How do they typically disseminate products and things to external folks?

Based on those focus groups and those interviews, there were really five recommendations that came back and we decided to focus on the first three in an initial effort to address through some training.

Dr. Downes continued that for the next key activity, we decided to develop educational awareness-raising materials. So I'm happy to report probably just two months ago, we awarded a contract to Zimmet Group and they're going to be creating a reference guide and several modules that are particularly focused, because of the feedback we heard during our focus groups, on research supervisors and researchers to not only how to recognize how to identify and collect and document these intermediate outcomes, but for researcher supervisors, they really hadn’t had much of a role in the program review process, weren’t seeing some of the recommendations that were coming back. However, they're the closest to these researchers so they need to be able to coach and interact, especially at project conception, with these researchers to being thinking about, who's your audience? How are you going to reach them with these projects that they're proposing?

For the researchers the same things as far as identifying and collecting and documenting, but they also need to understand what the value is in doing so or they have no reason to collect. But then we want to give them tools to be able to help plan that so as they're conceptualizing those projects, they can begin to think through, well, who am I trying to reach? What do I want them to do? And if I want them to do that, how am I going to reach them best? It kind of goes back to some of the things Christy was talking about this morning,

how do I best reach those people? If I'm trying to reach a farmer, the best way to do that is not a peer-reviewed journal article. So we have to start thinking about those things earlier in the process.

This particular recommendation is scheduled to be on hold. This really is looking at once we get the new long-term strategy for program reviews in place, then we have to look at how are we going to utilize the recommendations that we receive back as a result. And until we know what that long-term strategy is, we really can't know or start to really think about how to best implement those recommendations that we get back. This really isn't scheduled to be addressed until FY25. Even though it's sort of on hold and we're not doing anything with it at the moment, it's scheduled to be that way.

Dr. Downes continued that this next area we're really excited we're making progress in in terms of developing a long-term program review strategy. We really in FY21 started searching the literature, doing an environmental scan, and talked to program leaders that had been through some of our program reviews.

By the end of this fiscal year in FY22 we wanted to have a drafted purpose statement and objectives for doing these external reviews going forward. And we did an internal review process for that purpose statement and those objectives and have finalized that, so I'd like to share it with you.

It really comes down to two purposes and it goes back to the topic area that's sort of on hold. The first part is our primary purpose is for NIOSH to use those recommendations to improve and maintain the relevance and impact. Yes, eventually we want to be able to demonstrate that and to use those things and for folks, if we get recommendations back, if they can utilize that information or any information that we develop through our evidence packages. But first and foremost, since NIOSH is asking for the program review to improve what it's doing, NIOSH needs to be able to primarily be able to use that information first.

Secondarily, NIOSH can use the information from those external reviews to demonstrate the impact and the relevance that it has and hopefully that's helpful to other external parties as well, whether it's influencing them to make changes, informing them to be able to build on our research, whatever the case may be. We really delineated it down to a primary and a secondary purpose.

Then we came up with four objectives, the very first one being that one of the things that we learned through this process is that we have to get more staff involved in all levels of the process from planning to conducting to using, because if they're not invested in it, they have no reason to care what comes out on the other end. And we really want to get them invested. We really want to hear from them. So we really need to get more people involved in all aspects.

One of the other things that we learned is that when we have these reviews, we can't just open it up and say, "Okay, tell us how we're doing in terms of relevance and impact," and have this sort of broad charge to our panels. We really want to A) relate it back to the strategic plan, but B) ask questions based on what we want to know. If we're going to use this primarily to help us improve, what areas or what specifically do we want to improve on? So we need to be better about asking targeted questions to get the information that we really want.

Dr. Downes moved on to third, developing the evidence base and, again, this ties back to we really need those intermediate outcomes to be able to demonstrate what our impact has been. This'll be key tying back to another topic in the plan. And then the fourth, again, is assessing and prioritizing the findings and recommendations. We know we're probably still going to get a number of recommendations and we're not going to be able to implement all of them. And we also have competing priorities with Congress may be telling us to do this and other interested parties telling us to that. We have competing priorities and we might not be able to do all of them, so we have to prioritize what we're going to do. And so that's going to require some thoughtful consideration on the part of NIOSH moving forward.

Over the next two years we'll be really thinking about what is now the long-term strategy? We have a purpose statement, we have objectives; so what does this actually look like? And there are two things that we've been talking about more; one is considering and deciding upon whether we want to adopt an internal review option. As I said at the beginning, we have some programs that aren't ready to necessarily go through maybe a full review, an external review. So are there internal review options so we can maybe prepare ourselves for that fuller, external review.

The second piece is considering and deciding on whether we want to develop a learning agenda. And this ties back to the Foundations for Evidence-Based Policymaking Act. One of the pieces of that that the Office of Management and Budget has come out and said in their guidance is that there's an expectation that they would like OpDivs, bureaus, divisions to develop these learning agendas. So how does that fit into our thinking? We haven't made any final decisions yet, but that's one thing we're considering. This is still up for some debate and we have about two years to figure out how this is going to look.

Dr. Downes moved ahead slides and said this is one of the most exciting things, and I won't go too far into this because the next speaker is going to go into this in more detail. One of the things that we looked at is we heard a lot from the feedback from the reviews is you need more intervention effectiveness research. And there's this thing called dissemination and implementation or scale-up/scale-out. We think of it as translation research; the wider community was calling it something else. We did a literature search, environmental scan in FY21 and we started drafting some refined definitions, developing some supporting materials.

That was all in FY21 and we started working with one of the experts in the field, Dr. Borsika Rabin, on how we were going to refine "translation research" at NIOSH and what that really meant. I'm happy to report that in FY22 we agreed on new terminology, which is "implementation research," because it better reflects what's going on in the broader community of Dissemination and Implementation Sciences. You'll be seeing this word as opposed to "translation research" more and more from NIOSH. We'll be updating our website in the coming months as well. We've developed a draft definition for this. We've developed a NIOSH research-to-impact framework. All of this you're going to hear more about in the next presentation, so hopefully I'm just whetting your appetite for that.

Dr. Downes said we also developed a 7 Ps intervention table. For those of you who have heard of the 7 Ps of marketing—the price, the people, the promotion—basically it's very similar to that except there are 7 Ps

related to intervention: product, policy, procedure. And we've taken NIOSH projects and basically shown where products have been produced out of that, policies have eventually been formed with the support of things that have resulted from particular NIOSH projects. And you can see it kind of happen over time. And we've made a table out of this and it reflects all different types of science, whether it be intervention science, basic and ideologic science. And so it's very neat and you can kind of see yourself in it regardless of what type of science you do.

Dr. Downes said the next piece of this is by the end of FY23 we're going to seek some DLO feedback and finalize the definitions of some of these supporting materials. We're actually working on scheduling sessions with some folks in the DLOs to get that. We have a workgroup which I think we have every DLO represented except for two, and hopefully those folks on our workgroup can serve as our champions as we go back and seek this feedback from their various divisions. We're really excited about this and, again, this is just the tip of the iceberg. I'm going to let Rebecca tell you a lot more about this area.

Dr. Downes thanked the people at NIOSH that have been involved in Year 2 of the implementation of this, and also our external SME, Dr. Borsika Rabin, who's continued to be engaged with us throughout the last two years of implementation.

Discussion

Dr. Reponen thanked Dr. Downes and asked about the plan attached to our material and it says it's Version 3.0, so I think this is updated from what we saw last year. Could you maybe summarize on what was changed from the last year to this plan?

Dr. Downes responded the only changes were we changed the terminology from "translation research" to "implementation research," and then we updated the wording to reflect what has been done to date versus what has not been—the past tense versus present tense. Other than that, we've stayed as it was from the year prior.

Dr. Reponen noticed there were five topic areas and now there are four topic areas. Were some of these merged together?

Dr. Downes said last year one of the changes that we made that we mentioned to the Board was dropping a topic about communicating evaluation findings and intermediate outcomes. That was dropped last year because when we hit COVID, we had so many of our health communicators engaged in the response that we didn’t have what we needed to really work on that. We made the decision to drop that particular topic from the plan. However, we made a commitment to work on things that we could as we kept going. There was one activity in there that we're still trying to move forward around impact sheets. That one activity we're still trying to move forward but, because there's such a high need for health communicators during all these responses, that’s one area that we've had a little trouble moving forward that we thought as we can do it, we will, but we don’t want to commit ourselves to doing it at this time.

Dr. Patel then asked could you please redefine what's the time period for what you consider intermediate outcomes for as part of your evaluation process?

Dr. Downes said we don't have a time period for intermediate outcomes. Most of those things, just given the time it takes to get, for example, an output out and reach the population we're trying to reach, depending on the project, it could take months but more likely it could potentially take years before somebody gets it and actually makes a change because of it.

Dr. Patel responded the reason I asked that question is because when you did the evaluation, I'm assuming the methodology is the same for all NIOSH program areas, whether it's research, whether it's surveillance, or whether it's education, outreach, and campaigns like that. And so therefore your outcome time period is going to vary a lot. Especially when it comes to translation and looking at that outcome and impact of what your generated. Next, when you start talking about refinement of translation research, these are all intramural research projects?

Dr. Downes answered that the implementation research is extramural as well. I think we've started talking about in particular with our agriculture centers because we've really made a push with this ECB Plan to get them involved with logic modeling. We've tried to better explain even what we meant by "translation research" in the latest call for the RFA for them. But as far as the extramural side goes, we'll probably start using that term as well.

Mr. Morrison said great presentation. I don't know if I'm more excited about your work because I think it is exciting. But I am very excited about your energy into this project. I think it brings it full force and I really do believe that. There are a lot of struggles from research and really getting into those intervention populations that it's supposed to work, there's been a huge gap. We see that in the fire service where we have a lot of knowledge, we have a lot of research, but how does that move into that population? I'm hoping this really hits across the research spectrum with a lot of people out there taking a look at this and realizing how important it is on that implementation side. I just want to say job well done.

Dr. Downes responded I think you're really going to like Rebecca's presentation, then, because the implementation part of this has been a huge part of the ECB and I really think it's going to help us with evaluation moving forward. Teaming up with her and the r2p folks has been fantastic. I think at some point—we're trying to work on this internally and I think we at first tried to think about how do we communicate with external groups about getting them? They might not even think about if I adopted this, I should tell NIOSH because NIOSH can use this information.

We need to do some education there, some awareness-raising there that would be great if they could tell us. Because of the Paperwork Reduction Act and having to get Office of Management and Budget clearance to do surveys and interviews, it's just sort of a nightmare and very challenging to do. And if we could have people sort of voluntarily tell us things that we're able to use, that's going to make not only us being able to

make improvements where we need to, but being able to demonstrate to others just the impact that we're having, that would be phenomenal.

I think that'll eventually be a next step. First, we have to do some things internally, but I would ask and encourage you all, if there are things that, as you're working through that you're using from NIOSH, if you could tell us about it, that would be great.

Dr. Reponen said to Dr. Downes you had this long-term program review strategy and you mentioned that NIOSH is considering to adopting internal review options. Would that be in addition to the external, or would it be like first you do internal and then immediately after that, external?

Dr. Downes said we've actually talked about doing both, having an internal option only, having an external option only, and then having we do the internal and then followed by the external piece. We have various options and some of those options include using the Board to help us do those reviews. There are various options. We want to make it sustainable and we also want to make it not so intense that it takes quite so much time. But we do want to start looking at some of these programs that haven't been ready for a large or an external review. Because there are reasons for that and so we have to start looking at the reasons why that is and chipping away at those.

Dr. Reponen acknowledged that the reviews will take time. In academia, we have some reviews going on all the time, and certain entities doing review this time and next year is another one, so both internal and external. But I think they do help, so I think I would encourage doing some internal reviews too.

Scoring on the Evaluation Capacity Building Plan Progress

Dr. Reponen asked about the two-page summary for Dr. Downes to walk through to be thinking through scoring. It's a very nice summary on what was done and what is planned to be done, so that I think will help us to look at the progress.

Dr. Downes mentioned that we don’t have anything necessarily due for the collection and documentation of intermediate outcomes topic this year. By the end of next year, we hope to have all of the modules completed for training for researchers and research supervisors. We just awarded that contract and it's actually supposed to be completed by the end of March, all those modules and the reference guide. That is in progress, so we are within the timeline there to develop those educational materials.

As I mentioned, the implementation of program review recommendations, the next topic, nothing else is scheduled to go on with that particular topic until FY25 because we have to wait for the long-term overview or the long-term strategy for evaluation to be developed before we can really make any recommendations there. So it's not that we're behind, but just nothing's going to happen until FY25.

Then the third topic with the long-term strategy, the two things we committed to this year, the developing the purpose statement and the objectives, we did complete those. So now we'll actually move on to developing the long-term strategy and what that looks like. I just presented the two caveats that we are

thinking about as we go into developing that about the internal option and the learning agenda and how that might play into what the long-term strategy looks like.

And then the last piece, that's not due until FY23, but we are on schedule. The last piece that we have to do to complete this one is going to the divisions, labs, and offices and getting their feedback to make any further refinements. We're going to do the definition and the supporting materials. And so we'll actually be starting those listening sessions later this month.

Dr. Reponen confirmed that if looking at this in a big-picture, there was really only one aspect here that was supposed to be completed this year, which was to finalize the purpose statement and objectives. Then in the other ones, what you are saying that you are on schedule in being able to complete them in Fiscal Year 23. So at this point, do any members have questions about this summary before we pull up the scoring sheet?

Ms. Strickland pulled up the score sheet to remind members as we wrote in our email and as Dr. Reponen went over at the beginning of our meeting, this is in response to a Government Performance and Results Act measure. This score will be used as a part of that, in response to that measure. You can do a half-score, you could do 4.5, 3.5, or you can use a whole score as well. After you discuss what you would like to score the progress of the plan, then we will ask for someone to make a motion to propose a score, and then we will need someone to second that motion. At that point I will call for a vote and do a roll call vote and ask each of you in turn to say "Yes," meaning you are voting for the motion that has been put to the subcommittee, or "No," meaning you are voting against the motion that has been put to the subcommittee. You can also abstain, meaning that you're not voting on the motion. A simple majority of those voting determines the outcome. The difference of majority of the subcommittee, meaning eight 'yes' votes are needed to pass a motion, or a majority of those present.

Dr. Patel made a motion with the score of 4 based on what was presented today.

Dr. Graham seconded the motion.

Dr. Patel said based on what the information Dr. Downes presented on the Evaluation Capacity-Building Plan and the summary sheet that we reviewed, there was only one goal about the plan and objectives that needed to be achieved by the end of Fiscal Year 2022, so which has been achieved as we saw on the summary sheet. There were a few other items also that are currently in the pipeline which tells us that all the other items for the future fiscal years are currently on track given that they won't be delayed based on the current timeline that was projected for each of those items, whether it was translation or whether it was just doing internal or external reviews and so forth. The reason that I am not yet voting for 5 is because there's always a little bit room for improvement, so that's why I would stick with the 4.

Dr. Cox commented that it seems to me the agenda is not terribly ambitious in terms of deliverables-per-unit time. I wonder whether it would be possible to go considerably quicker. I think the enthusiasm and goals are absolutely admirable. I would love to see quicker progress. And perhaps without understanding in detail what

the obstacles are, I would have expected that perhaps it would have been possible to make quicker progress. So I actually had a 3 in mind, but I can live with a 4.

Dr. Reponen responded reminding that we are not necessarily criticizing the plan. We can give comments on the plan, but here we are scoring the progress that is made with the plan on how it's presented right now. I think we can probably put that in the notes that I think there are a lot of little things coming up in Year 3 that need to be accomplished and they've actually started working on those already in Year 2.

Ms. Strickland said since the discussion has concluded let's go ahead and move on to the vote. As a reminder, I will call each of your name and you can say "Yes," meaning you are voting for the motion that has been put to the subcommittee of proceeding with the score of 4, or you can say "No," meaning you are against the motion that has been put to the subcommittee, or you may abstain, so you are not voting on the motion.

After the vote, there was one abstaining vote and 11 votes of "yes". It was accepted as the final score of 4.

Dr. Reponen then introduced Dr. Rebecca Guerin, who is the Chief of Social Science and Translation Branch. Keep in mind that there are three specific questions to the Board

The first one is: are the proposed activities and actionable? And then second one: are there other efforts or activities to consider? And then third: how do they define success—or she's asking, how do we define success?

Implementation Science

Dr. Guerin hoped that Dr. Downes generated enough excitement for this presentation. I'm personally very excited about this area. Implementation science is something that I use in my research every day and I've been really excited to bring this into NIOSH and get some advocates for moving this work forward, so excited to talk to you just briefly today about this.

This is an overview of my presentation. I'll talk a little bit about the research-to-practice gap in public health. Then implementation science research: what is it, why does it matter, why do we care? Then we'll talk about implementation science research efforts at NIOSH. And then I'll have the opportunity to talk to you about future direction.

Very briefly, what is implementation science and why does it matter? We've all heard about the evidence-to-practice gap and on this slide, it's defined as "The difference between what we know from the best available research evidence and what actually happens in current practice." So according to the National Institutes of Health, or NIH, billions of US tax dollars are spent each year on research and hundreds of billions are spent on the delivery of health, healthcare, and public health intervention in clinical and community settings. However, relatively little is spent on research on the downstream end of the research continuum focusing on how to move more relevant research into sustained practice.

The leaky pipeline that hinders the transfer of scientific knowledge into practice is depicted on this slide and it's characterized by the 17 years it takes to turn just 14% of original research to the benefit of program recipient. Closing the gap between basic research and population health is a complex challenge and an absolutely necessary one to ensure that all people, including workers, benefit from substantial investments in science and public health.

On the slide shown we have an example of the translational pipeline that depicts the stages of moving science from bench to bedside. And you've probably heard that expression before. So T0 translation, or translational stage T0, focuses on the pre-intervention or scientific discovery phase. The T1 phase emphasizes internal validity or efficacy. T2 translation involves effectiveness research. T3 translational research continues to assess effectiveness, but it may focus on how to make an effective intervention work in diverse, multilevel settings how it can be adapted to fit various context and resource constraints such as in large-versus-small workplaces.

Finally, T4 translational research is focused on developing the most generalizable knowledge about the positive and sustained health and safety outcomes at the population level. So T3 and T4 translation are also referred to as dissemination and implementation science research. And more and better integration of implementation science across the translational continuum has been called for not only in our field, but in the broader field of implementation science. And what this means is thinking about from the very beginning, at the project inception, about how the intervention is going to affect our end user and is it going to meet their needs to be able to advance public health goals.

Dr. Guerin continued that implementation research, really asks related questions and answers them as well, but the focus is a little bit different. For example, an efficacy trial might ask a question like, does this intervention work under optimal, highly controlled conditions? Whereas effectiveness research might ask the question does this intervention work under real-world conditions? In contrast, implementation research asks when, where, how, with whom, under what circumstances, so in what context and why does this intervention work?

There are a lot of important considerations when designing and using implementation science research methods. But I just want to talk about a few of them, including context. Context is really considered queen in the field of implementation science. And what do I mean when is ay "context"? Well, it can be defined as a set of characteristics and circumstances that consist of active and unique factors within which the implementation of an intervention is embedded.

Context is dynamic, it's multilevel. It cuts across economic, political, social, and temporal domain, and factors at the system, organization or worksite and individual level can serve as both facilitators and barriers to the implementation of OSH interventions and workplaces. Adaptation in implementation science research is considered inevitable and even desirable to meet the local needs and constraints of program providers and recipients. Some questions relevant to adaptability are what are the core elements of the occupational safety and health intervention? In other words, what are the things that cannot change, and what are the things

that can and need to change in order for that intervention to be more adapted and more appropriate for that local context?

Dr. Guerin stated that representative reach and equity, we've been talking about this a lot lately at NIOSH and at our agency, and these are really important areas of focus in the field of implementation science research as well, and the focus of them reaching broader segments of the population and those most in need. So some questions relevant to this are, of the eligible workers who are targeted by the intervention, who participated? And more importantly sometimes, who didn't and why? What recruitment efforts could be made for more equity and inclusion? Does the intervention advance or support occupational health equity? Are program outcomes equitable and does the program unintentionally enhance occupational safety and health disparities?

In terms of relevance, do partners find effort a high priority, feasible, acceptable, and appropriate strategy? In terms of generalizability and scalability, what efforts are made to ensure the intervention can be scaled to other settings and delivered by other staff? And finally, in terms of sustainability, what are the startup and sustainability resources and costs in the setting and what will folks need to consider if they're bringing this intervention into their workplace? What adaptations will need to be made to support the continued use of the program and scale up to other systems and settings?

Dr. Guerin then highlighted and talked a little bit about implementation science research at NIOSH. I talked about pipeline issues and leaky pipeline in public health. Well, in occupational safety and health there are numerous gaps in bringing occupational health and safety research into the same practice to benefit workers and communities. And someone commented on that earlier in this meeting. For example, according to research from Lucas and colleagues, only 17 percent of US fishing safety research has been adopted in workplaces to benefit workers. And reasons for these gaps are numerous, including the complexity and diversity of many US workplaces, and difficulty accessing many worksites and workers, as well as the lack of fit of interventions with the local context.

Occupational safety and health leaders have thus called for more adapted, innovative, and transdisciplinary research. And this includes approaches that speed the translation for addressing multilevel and interconnected challenges of a rapidly changing global economy and workforce and global public health crises such as the COVID-19 pandemic. The field of implementation science provides a toolkit of existing models, methods, and theories, as well as measures to address complex future of work challenges.

There's nothing new here. The need to enhance the rigor, theory use, partner engagement, and to increase the uptake of occupational safety and health interventions has been a longstanding topic of interest and concern in the occupational safety and health community and at NIOSH going back in this timeline to the Intervention Effectiveness Research Conference in 1994, the first and second decade with the National Occupational Research Agenda, or NORA, and the NIOSH Research to Practice, or r2p, initiative which was stood up in 2004. A 2009 report by the National Academies of Science and an external evaluation from 2013 articulated the need to advance strategies to translate research findings and theoretical knowledge to

implementable practices or technologies in the workplace. The Translation Research Program, which I now lead at NIOSH, was established in 2016 and in 2019 efforts began coordinated with the NIOSH Evaluation Capacity-Building Plan to refine the vision for and expand the reach of the NIOSH research translation program.

Again, we've heard this all before. Peer-reviewed panels have noted and NIOSH programs have made substantial contributions to the body of knowledge on worker safety and health. However, more evidence is needed that the knowledge generated has widespread uptake and positive impact for relevant user groups. One review panel stated in their recent report that a focus on research that enhances the adoption and sustainment of NIOSH interventions in the future may help the Institute better protect worker safety and health.

Dr. Guerin said we've been working very hard over the past couple of years to advance these goals and learning activities. And I did want to just give you a little bit more information on some of the activities of our workgroup. And this is not comprehensive, but just from highlights of our work.

As Amia mentioned, up to this point you may have noticed that I've been using the terminology and the terms "implementation research" and "translation research" somewhat interchangeably. But part of the efforts of our group has been to bring clarity around the use of this terminology. And to that end, we conducted an environmental scan to see what other government agencies active in research on a downstream end of the continuum are doing and what terminology they're using to address and talk about these efforts. We also conducted key informant interviews with 23 NIOSH staff across the Institute from a variety of leadership, management, and research positions, and with federal external NIOSH collaborators to understand gaps in and opportunities to expand implementation science research at NIOSH.

Dr. Guerin then shared some of our key findings: Other government agencies active in translational activities—and NIH is the leader in this space—use the language of mainstream implementation science. NIOSH is unique in using the term "translation research" to describe these efforts. Going forward, we suggest there is utility in NIOSH adopting more universal terminology and definitions so that NIOSH researchers and practitioners can find implementation research resources and tools, as well as so that implementation researchers from multidisciplinary fields know what we have to offer as NIOSH scientists in this area. And other external partners, including the NIOSH Total Worker Health centers, are already adopting the language of the implementation science field.

As Amia mentioned, we've been working in our workgroup to draft a definition for NIOSH of implementation research. I'm not going to read the entire definition to you, which is quite detailed, but please do reach out to me or we can disseminate it after this meeting if you're interested. But I did want to highlight some of the key points from our definition.

Implementation research studies the processes by which promising interventions are disseminated, adopted, implemented, sustained, and scaled equitably in real-world settings such as workplaces. It uses models,

methods, and measures to systematically identify, develop, evaluate, and refine strategies to support these research and implementation processes. It applies to all workplaces and all worksites, as well as all workers, with a particular focus on those who are disproportionately affected by occupational safety and health risk and hazard. This definition focuses on the science of implementation, how it's actually done in a systematic way to create generalizable knowledge about what works, for whom, how, in what setting, to improve the safety, health, and wellbeing of workers, and how these efforts importantly are sustained over time.

Amia also briefly alluded to our model. As I mentioned, implementation research aims to generate generalizable knowledge about the processes of taking a promising or evidence-based intervention into sustained practice. But what do we mean by "intervention"? Brown and colleagues have conceived of evidence-based interventions in public health being broadly defined as the 7 Ps, which our workgroup has adapted, swapping out the pills in Brown's model for people and partnerships, and including PPE in the product.

This is just a snapshot of our model shown. Some general considerations of this model include the diversity of evidence and Ps at NIOSH; that the Ps interact with each other and are developed in a nonlinear manner. So for example, a regulation could be an impetus for a NIOSH practice, procedure, or program, or it could be the result of one of these; that evidence development in the context of occupational safety and health evolves over time and it's multidisciplinary. It's challenging to determine, what was the first discovery, when it happened, and who made it? And finally, the political, societal and regulatory context is important in shaping what's being addressed in our field and how.

Dr. Guerin shared the figure from one of my recently published manuscripts in *Safety Science*. And it illustrates the steps involved in moving a promising occupational safety and health intervention from the discovery phase to sustained practice or impact. This is similar to the model that I showed you earlier, but this one has been tailored for use by occupational and for occupational safety and health researchers.

Again, as with the previous model, dissemination and implementation research occurs in the T3 and T4 phases, included in the red rectangle. But for positive impact to be achieved, it's important to plan for implementation, dissemination, and sustainability from the outset and to engage partners on an ongoing basis across all stages of the research. An important note is that the stages in this model are recursive and iterative, so information at a later stage informs research at earlier stages and, depending on the outcomes at any given time points, it may be necessary to go back to an earlier stage.

That brings us to our NIOSH research-for-impact framework. This is in development in our workgroup. It's shown on the slide and provides an illustration of the interaction of research activities at NIOSH. So central to this impact framework are the diverse partners with whom we collaborate in the benefit-sharing of our research. Surrounding partners and beneficiaries and interwoven throughout the research lifecycle is research to practice. As the fundamental guiding principle, r2p drives how we do what's done with science at NIOSH, integrating knowledge generation and knowledge transfer with the strategic and deliberate focus on partnerships, relevance, and impact. The framework indicates the iterative nature of the types of research

prioritized at NIOSH and interventions developed through basic and intervention research and informed through surveillance can be the subject of implementation research.

As mentioned previously, implementation research is intended to generate generalizable knowledge but, in some cases, it may relate to specific knowledge-generation about a specific NIOSH process or product. And finally, these efforts are circumscribed by concerns about achieving equitable and sustained impact. How these are measured and operationalized is an ongoing topic of discussion and friendly debate in our workgroup.

Dr. Guerin asked where does implementation research fit in at NIOSH? Well, it can involve, as I mentioned previously, conducting T3 implementation studies using, for example, implementation science, theories, models, and frameworks to inform the selection of strategies, and the assessment of implementation. So there's an example on this slide from Tinc and colleagues who used a popular implementation science framework to gain an understanding of the barriers and facilitators to farmers' uptake of ROPS, whose survey is conducted with the National ROPS Rebate Program participants.

Perhaps more of a common approach at NIOSH will be to integrate implementation research-related concepts and constructs throughout all stages of the NIOSH research process. And just to be clear, many at NIOSH are doing this already, but we want to promote methods and approaches for streamlining the capture of those research impacts systematically across the Institute. And this is something that’s very important for the efforts that Amia is undertaking and NIOSH is undertaking with the ECB.

What does this look like? Some examples of integrating implementation research across the various types of NIOSH research include conducting basic research using an equity perspective to design PPE that accounts for a wider range of body shapes and sizes. Develop the intervention protocols that minimize the impact of our research on our partners and that generates meaningful and actionable outcomes for them. And aligning the method used for collecting surveillance data with the needs and preferences of our end users. And that is by no means an exhaustive list and we're working in our workgroup to develop a lot of these types of examples to make this very relevant to different types of research areas and researchers within NIOSH and outside as well.

Dr. Guerin said the good news is that you don’t have to be an implementation or a social scientist to use implementation science techniques to demonstrate the impacts of our science. The implementation research workgroup is developing pragmatic, easy-to-use tools for every NIOSH researcher to integrate the implementation research and health equity perspective into our research activities. For example, implementation research-related questions like those on this slide adopted from the commonly used RE-AIM—or Reach, Effectiveness, Adoption, Implementation, and Maintenance framework—could be integrated into a concept proposal for new research activity.

Dr. Guerin showed an example of adopting an implementation science model for use by occupational safety and health researchers. The Practical, Robust Implementation and Sustainability Model, also known as

PRISM, has wide applicability for addressing occupational safety and health challenges through consideration of multilevel contextual factors, including characteristics of the programs, the organization, and individual recipients, and considerations of the implementation and sustainability infrastructure and external environment.

Dr. Guerin explained I'm using this model in one of my intervention studies. It's a training intervention study, a very large one in the Miami-Dade public school systems, where we have adopted the OSHA 10-hour training for use in Career and Technical Education programs within that school district. And we used this model to design our data collection instruments and strategies so that we're sure that we're informing all levels of the intervention that are relevant so that we can track our outcomes over time and we know where the gaps are and where the challenges are. And this will help inform future scale-up and scale-out of this program to other school districts that might be interested.

There are several steps and activities planned over the next year and a half—and then beyond, of course—to keep this vision moving forward and key among them will be identifying implementation-related models and tools that can be tailored to occupational safety and health for use by our researchers. We'll also be conducting listening sessions, as Amia mentioned, with the NIOSH divisions, labs, and offices to raise awareness about the efforts of our workgroup and to better understand how we can integrate implementation research concepts into existing practices such as concepts or NORA proposals or just-in-time funding proposals.

Dr. Guerin said we'd also like to identify some promising interventions that could be taken to scale using implementation research methods or that could integrate an implementation research perspective at the design or conception phase. And finally, for this work to be maintained, we want to learn how we can build internal capacity in the area of implementation science research at NIOSH. Some other efforts of our group will be to officially rename the program to the Implementation Research Program, as Amia had mentioned as well, and to update our website and material.

She then asked questions to the Board: Are these proposed activities to advance implementation science research at NIOSH clear and actionable? What are we missing? And perhaps most importantly, how do we define and measure the success of these activities and efforts?

I just wanted to thank you very much for your time today and point you to some additional resources in case you were interested. This is the literature review that we published that Amia mentioned previously, and then we have a couple of other articles that we've produced and have forthcoming book chapter in what I call the blue book. It's a textbook in dissemination and implementation research on using these methods at worksites and in workplaces.

Discussion

Dr. Reponen asked that NIOSH specifically has used the research-to-practice and I thought that that's the same as translation research. So can you clarify and reiterate now how's the "research-to-practice", then you

also had "research-to-impact" term, and then there's "implementation science." And how are these related and how are they different?

Dr. Guerin began by explaining she thinks about implementation science and these methods in this research is really about creating generalizable knowledge about what works for moving intervention from the development stage, all the way along the research continuum, into sustained practice. It's scientific method around how you do that. And it may apply to a specific case or a specific product or a specific intervention, but the goal is really about creating the generalizable knowledge. And we're trying to integrate it along all parts of the continuum so that you're thinking about at the very design stage of any intervention—whether it's basic research, intervention research, as a surveillance activity—who are my end users? How are they going to use this? Is this going to be appropriate to their needs and interests? And is there a plan for moving this forward even if I'm not the scientist who might be the person to do that downstream research? So that's how I see implementation research.

For me, r2p is very much kind of the driving force of how we think about our sciences at NIOSH; that we should be including and engaging our stakeholders that we need to build these multilevel and multisectoral partnerships in order to advance our science. It's really kind of at the core and the heart of the principles that are driving our work. But again, to me, implementation science is really, again, the science around how you do r2p.

Ms. Spring continued that I think that when we have been meeting and talking about this throughout, the way we've really been thinking about it is that NIOSH has for a long time really pushed for the research-to-practice effort, wanting to make sure that our research actually is brought into workplaces to make them safer and healthier for workers. And what Rebecca's team is really doing is helping bring science and tools to help us further that effort. So research-to-practice is sort of an overall guiding principle for how we conduct our work at NIOSH, and really what Rebecca's doing is helping to up that ante even more by giving us science-based tools and tactics and resources and ways of thinking about it to help really further our work in that area.

Dr. Reponen responded that science is a very important word there, not just to say "implementation research" but "implementation science research".

Dr. Guerin said we found this when we did the 23 key informant interviews across the Institute with our external partners of needing to explain what's the difference between translation research and implementation science research and implementation research and r2p? And so we're really trying to clarify our vision. Let me just say, in the broader world of implementation science, there is this kind of confusion around terminology. Different countries use different terms to talk about the same things or use the same terms to talk about different things. So it is very complex. But we want to be very clear and specific, first of all, about what we're doing and how this aligns with what other government agencies are doing in the space and how this aligns with the broader field of implementation science.

I'd really like to know if hearing this presentation there is still confusion about what we're trying to do, concerns about what we're trying to do, and then any of the other questions. I mean I think a challenge we have of defining the success of our program and of our efforts is how do we know that we did what we thought we wanted to do and what is the timeframe for that? Because it's very challenging, so any advice you could provide, I would love to hear your thoughts.

Mr. Morrison asked how do we define success? When you've been working on this, can I turn it around to you, how would you define success from what you have built, what you are going to pass on? And I'm hoping a lot of government agencies will pick up on this too, because I've got a lot of things going on. You guys did a great job kind of explaining to somebody that it has to take it in small pieces here. But how does your group define success? How would you take, going back and knowing that you hit the mark, that this is definition where you should be going on your project?

Dr. Guerin said I think about this a lot. I'm a data person and I'm a measurement person, so I'm always thinking about these types of questions. For me what would success look like? I have sort of my immediate mid-term or intermediate and then long-term goals. I mean what I would like to see is that across NIOSH, both in our internal and external portfolio, that the implementation-related research questions are considered at all stages of the research. And I don't think everyone should be a social scientist, let's be very clear about that, or an implementation scientist. But I think there are questions that are relevant to any kind of research that should be considered in designing any kind of intervention. So it's a lot of questions about who are our end users? How are they going to use this? What are the costs? What are the burdens of this? Do we have something that could be adapted and what is that adaptation process going to look like?

Even if you are not the researcher doing that kind of downstream research, thinking about and designing that in from the very beginning. And so to me that would be success if we would see that kind of broadly across the portfolio is these types of questions being asked and answered from the very beginning. And, again, it's going to look different depending on the type of research you're doing. In our wheel, you know, if you're doing surveillance or even surveillance activities which might be different from surveillance research, it's going to be quite different. So it's not a one-size-fits-all. But to me that would really be success.

Dr. Guerin continued that I think long term at the end of the logic model what I would love to see is that we can really show how our research is being moved into practice, how the workers and the workplaces are using our interventions, how employers are using them, more importantly, and bringing them in. Are they adhering to our guideline? Are they using the interventions the way that we had designed them and intended them? Are they adapting them? Are evidence-based interventions being scaled out to other settings where they might be appropriate?

I think this would be sort of the longer-term impact for sure and that could be certainly challenging in terms of the timeframe and looking. But I don't think this is unachievable. And I know these are areas—like you were saying, other government agencies are very much struggling with these same questions and we've been in touch with others and talking about this, including within CDC. So a lot of agencies are struggling with

these questions right now. But I think we've made great strides. I'm really excited about the direction we're going in. And I think what we can do is achievable. What we are proposing is achievable.

Mr. Morrison said I deal a lot with the FEMA grants, research grants, and we're doing a lot of work on that. And I can't tell you how many research projects are sitting on a shelf that they address the area, but the implementation, the behavioral change for us in the fire service we have one of the highest rates of cancer, how can we move that? How do we implement that? So for us to put this up front into research guidelines, I think this could really help us. Because we get really frustrated when somebody has a great project and they say, "But are we going to implement it? Is it going to be implemented?" It might have helped you, but it didn't help the population and that's what the research should be about: did it make a difference? If it didn't make a difference, then we could do the research of just knowledge based and say, "Okay, this is what we need." So I really applaud this.

Dr. Guerin said that's exactly the crux of the work that we're trying to do is how do we design interventions to get them into the hands of the people that are going to benefit from them? And what does that process look like scientifically? And how can we learn generalizable lessons from that that apply to other sectors, other populations? And most importantly in this is, at its core, health equity concerns. Are we reaching those that are most at risk?

Dr. Reponen said we touched on the second and the third question. The first one: are the proposed activities clear and actionable? She then asked, do you have clear intermediate outcomes in your work plan?

Dr. Guerin said this is something that we're thinking about within the context of the broader ECB. I think the way that I would answer that is the goal of our work is to be able to show the intermediate outcomes across the entire NIOSH portfolio. And this was a way to scientifically capture a lot of those intermediate outcomes. So within the work of our group itself, we have intermediate outcomes but I think really the focus of our work is how do we systematically capture those intermediate outcomes across the NIOSH research portfolio? And then those can be reported to Amia and to her group to really show the impact of our science along the way and not just have to wait until the end of a project or until a lot is passed or the morbidity and mortality rates decline. So I think that's what's so exciting about the potential of the science.

Dr. Guerin asked the second question again: Are there other efforts or activities that we should consider to advance implementation research at NIOSH? Are we missing anything? And certainly we have areas to expand, I think, and would love to hear if you have any input on that. And one thing I will say before anyone offers a comment, we have been talking to other government agencies and asking them kind of how are they promoting this work within their institutes? What kind of research are they funding along these lines? How are they talking about this? How are they engaging their stakeholders?

I think some of the challenges are to convince some scientists that this isn't some whole other area of science that I have to learn and now I have to become an expert in it. And that's just a huge expectation and so how to overcome even those barriers to sort of acceptance and understanding within our research community.

And I think, again, these are questions that most researchers are asking anyway. And we see a lot of this activity going on within NIOSH and outside of NIOSH and the idea of like how can we capture this more systematically, again, to show those intermediate outcomes and the impact of our work? The point of that was the need to engage with likeminded partners or agencies to learn more and learn from them and maybe leverage their work to advance our work more quickly.

Mr. Morrison suggested putting it in some of the notice of funding, some of the grant notices, actually build it right into the proposal process that basically when you're reviewing a grant that you actually see it in the plan, you actually see it in the implementation. It would give us a better shot at getting this into the field.

Dr. Guerin said that is something that we've been trying to do, at least in the case of the agency centers, some of this into the actual request for proposal.

Dr. Reponen asked if you have been with the extramural centers? You have listening sessions with NIOSH divisions and capture findings, but you could also interview the extramural centers, the directors of the centers or the outreach people there.

Dr. Guerin said yes, we have done that. And I have a number of presentations coming up to the various centers and I'm talking to the Total Worker Health Centers. I'm presenting there next week. And we did do some key informant interviews with some of the center directors in our initial work to just look at kind of how they're active in the space of implement science research. But I think absolutely we need to circle back to that. We kind of wanted to talk to our internal stakeholders first and make sure NIOSH as an Institute we're on the same page and then we'll be expanding that vision outward. But I think it's absolutely necessary to get broad input and buy-in into this area, so thank you.

Dr. Reponen read a comment from Dr. Patel I echo the enthusiasm for r2p and implementation. How do you plan to evaluate, assess, track the implementation of research in the real world—in other words, by employers and workers? Maybe this is a bit premature, but worth thinking about. I think this comment specifically aligns with interventions or implementation of research for special populations or high-risk industries and occupations. How do you plan to evaluate, assess, and track the implementation of research in real-world?

Dr. Guerin said I think that's really what's exciting about the field of implementation science, that there are a lot of, first of all, models. I showed a couple of them in my presentation. There are currently about 150 different model theories and frameworks that you can use in designing the implementation piece of an intervention. There are validated measures out there that you can use. There are a number of other tools. And that's something that we're looking at to customize for use by our NIOSH researchers as I had mentioned.

All of these tools from the field are what we can use. And I'm actually using them currently in my own research, some tools to track sort of the outcomes of our res—first of all, to design the research, to monitor the impacts of our research as we go along and then also, at the end, to be able to evaluate our success.

We're looking at both effectiveness outcomes of our research. So did we change perceptions, behaviors, attitudes, et cetera—we have a bunch of outcomes there—but then also the implementation outcomes? Who did this work for? How did it work? What were the barriers to implementing the program? What were the costs? What were the opportunity costs, so what did the school do and not do when they were doing our intervention?

And then, of course, we have a lot of systems issue. Just when we started our data collection the first time, the COVID pandemic hit. Just when we started our data collection the second time, Hurricane Ian hit. So you can see there are these real-world challenges that come in. But all of those need to be considered in terms of how an intervention is implemented in the real world. What are the costs? What are the barriers? What are the facilitators? Who are the key champions? That's something else that we're looking at. Who are those cheerleaders—in the school district in our case—saying, "We need this. We need our kids to be safe and healthy. We need this program. We want it." And they're the ones that are going to keep it going, as I say, once the researchers leave the building.

There are a lot of tools for tracking the research. I think the question you might be asking, Dr. Patel, which gets more challenging is how do you monitor the sustainability of that intervention once you've implemented it? Again, once the researchers leave the building, once the research funding has gone away from that effort. And that's a much bigger challenge that the entire field of implementation science and really public health is struggling with. So I can't say that I have the answers to that, but certainly thinking about it. And, again, that's something you can design for in the beginning is thinking about how is this going to be sustained over time? Is it cost-prohibitive? Does it require too much external expertise? And all of those types of considerations would be factored in early to the type of intervention that you're designing so that it's appropriate for your context.

Dr. Reponen said things don't work in the real world how they work in the lab, so that's why it is important to do the implementation science research.

Dr. Guerin concluded that there aren't pandemics and hurricanes in the lab. It's been quite a challenge working in the schools, but we've learned a lot from those activities as well.

Summary and Wrap-Up, Future Agenda Items, Meeting Dates, Closing Remarks

Dr. Reponen summarized that we had very lively discussion. We had about five topics and gave feedback to the presenters and did the scoring, so I think we did our duty today.

She then asked for future agenda items. Pat was suggesting PFAS. Are there any other potential agenda items that would be suggested from the Board? Last time there was a suggested topic about relating to aging workforce. There was also a topic suggested by Jessica Graham relating to evolution of the NIOSH hazardous

drug list. And then also topic related to small package delivery section, the workers who are delivering small packages.

Ms. Strickland said these are great suggestions and we'll take all of them and speak to potential presenters. Ketki Patel added two more suggestions in the box for potential future. She wrote "Emerging industries and gig economy or mental health" as two more suggestions.

Dr. Pieretti asked if we we going to have another virtual meeting or is it expected to have that live?

Ms. Strickland said we have started discussing that already. I know the desire of many would be for it to be in person. It's not determined yet. We're going to have to wait and see and see where we stand in the spring. Though it's certainly on the table to have it in person again, and as we get closer, we will make sure everyone is aware of whether it will be in person or a hybrid or a virtual meeting again.

Dr. Reponen said it would be very nice to be in person because I've been now three years in this commitment and all of my meetings have been virtual. I think before we depart, I would like to say thank you for the service for the outgoing members. We have got a big turnaround coming up this year. We have six people rotating out as their terms are coming to an end by the end of this year. And first I would like to give special acknowledgement to Grace Lemasters and Pat Morrison. They did double duty. They were the co-chairs of the Firefighter Registry Subcommittee and then also part of the Board of Scientific Counselors. Then we have four other members who are outgoing: Tony Cox, Cristina Demian, Jessica Graham, and Judith Su. So thank you very much for your service in this commitment. And also last but not least, many thanks to Emily Novicki who has been the federal designated officer, so now it's the transition to Maria this year.

The meeting adjourned.

Glossary

ACOEM	American College of Occupational and Environmental Medicine
BSC	Board of Scientific Counselors
CDC	United States Centers for Disease Control and Prevention
DFSE	Division of Field Studies and Engineering
ECB	Evaluation Capacity-Building Plan
EOC	Emergency Operations Center
FACA	Federal Advisory Committee Act
FEMA	Federal Emergency Management Agency
FRN	Federal Register Notice
FSA	Fire Safety Academy
IARC	International Agency for Research on Cancer
IAFF	International Association of Fire Fighters
NIOSH	National Institute for Occupational Safety and Health
NPPTL	National Personal Protective Technology Laboratory
OMB	Office of Management and Budget
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment

Certification Statement

I hereby certify that, to the best of my knowledge and ability, the foregoing minutes of the October 4, 2022, meeting of the NIOSH Board of Scientific Counselors, CDC are accurate and complete.

Tiina Reponen

Digitally signed by Tiina Reponen
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Date: 2022.12.19 15:03:45 -05'00'

Tiina Reponen, PhD

Chair, NIOSH Board of Scientific Counselors