First of all, I lost the draw, so I have to go first. Pete gets to go after me.

Secondly, I’m going to start with two disclaimers. The first is that you notice the slide uses my role at the School of Public Health, University of Minnesota. I’m not here as an official representative of the Department of Labor and Industry, nor does anything I’m saying represent official policy of the Department of Labor and Industry. They’re my opinions. I am totally and solely responsible for them.

The other disclaimer is that, as many of you may know, I am not in Ben Amick’s league as a researcher. On a good day, I can SAY “multi-level model” – I wouldn’t recognize it if it struck me! A correlate to that is, I’m a FAN of Ben Amick. You know, when I get my journals and I see Ben’s name, I immediately go to the article and read it. So it may be a little disingenuous to be commenting on his work; but as Pat pointed out, that’s never stopped me from having an opinion before. [Audience chuckles.]
The next thing I think I need to do is start with the profession of belief. There are circles in this country where you do have to do this, where you have to get up and say, “I hereby believe that ergonomic exposures create adversity.” I firmly believe that. I’m going to use that as a starting point for anything I have to say. That’s in the background of everything I have to say.

I think that ergonomic exposures create discomfort, dysfunction, and disability. They not only do it for workers, but for employers; and I think Ben’s shown a little bit of evidence about how employers may be experiencing adversity that they don’t expect in regards, for instance, to productivity.
And I believe this because I think there is an established consensus based on multiple studies, multiple researchers, in multiple countries, using multiple methodologies, all coming to the same general conclusion – is that ergonomic exposures create adversity.
Now on the intervention side, I also believe that some ergonomic interventions help, although I’m going to have to qualify that. If I look at the literature, my reading of the literature to date has shown that that’s at least in the short run, for some goals, in some situations. And I think that’s one of the things that Ben is addressing with his research.
The question, I think, has now become finding useful interventions for what we believe is a problem. And I think what we’re starting to do right, and what you see in Ben’s papers – we’re starting to see well-designed intervention studies that start with an explicit model of a problem, that creates explicit hypotheses about what should happen during the intervention. They use control groups. They measure relevant outcomes, and I’ll talk about that in a minute. And they use quantitative methods that none of us understand.

Control groups, I think, are exceedingly important. I want to just reiterate whatever Ben has already more eloquently said about control groups. When I look at intervention studies, being a physician, I come from a medical model, and I know that the history of medicine is littered with good ideas that seemed to work on a chosen case series of my patients – at least the ones I remember. And then, on further testing, when subjected to a control group, turned out to be not quite as wonderful as we thought they might be. So I think that we have a lot of experience in other areas of intervention to realize that control groups are important.
Secondly, relevant outcomes; a lot of the ergonomic literature to-date on intervention has been littered, I think, with studies that measure the wrong things. Symptoms can be important, but I think symptoms are a difficult issue to properly analyze.

From my friends who exercise, they tell me that at the end of a bout of exercise – you know, you often will feel exhausted, your muscles might tingle or even ache and/or feel a little shaky, and you might feel a little weak. Now, are those symptoms, or not? We tend to use the word “symptoms” for those kinds of sensations when we value them negatively, and we tend to use other words for them when we value them positively. Exercisers have all sorts of terms for those feelings that they have – endorphin rushes and things after exercise.
So I think a lot of studies have looked at symptoms, and I find that to be a systematic problem in the intervention literature today – unless those symptoms are used as proper intermediate variables, where you’re also measuring more important final variables and you’re doing that so that you can then assess the adequacy of your model.

If you think the symptoms interfere with the productivity, you have to obviously measure both the symptoms and the productivity. The productivity is your important endpoint. The symptoms measurement helps, then, to validate your underlying model that there is a health-related impact on productivity. That’s exactly what Ben, I think, has outlined – the importance of recognizing intermediate variables as intermediate and then the other variables as the important final outcomes.
Finding useful therapies – and I think finding some things that we need to start doing (and Ben has already addressed this) is longer follow-ups. You know, do these changes persist over time? Of course, again, in medicine, when you operate on someone’s cancer, the surgery is relevant and useful only if the cancer doesn’t come back. And so, again, the data that Ben alluded to at the end – we’re starting now to see intervention studies where the follow-up is long enough.

Another important reason, though, to do longer follow-ups is, some of the events of importance to us like having an injury that needs treatment – dysfunction – or having an injury that takes you away from work – disability – are relatively low probability events in any one work group. Now there are lots of work-related musculoskeletal disorders out there, but the rate of occurrence in most work groups is rather low. So if we’re going to see an effect of these interventions on these rarer outcomes of importance, then we have to watch long enough to be able to develop statistically reliable data.
The thing I haven’t seen – and I’m going to leave this one for Ben to explain to me why we don’t need to do it later – is, we’re not seeing placebos. And placebos, I think, would be an interesting addition to the design of intervention studies in ergonomics, because placebos are another way of challenging the underlying model of change.

I think to a certain extent, Ben’s training only group starts to address the issue of placebo effect. We have a study here, which looked at controls with nothing versus people who got training, which some people think is a useful intervention, and then we have training plus a technological intervention – and we – now starting to tease about placebo effects, and I think that’s really important.
I think that’s important because, though I believe ergonomic exposures create adversity, I think we still wrestle with the problem of how much exposure, for how long, and in what ways does it create adversity?
And in the realm that I’ve worked mostly with – as an end user of the knowledge, as opposed to a producer of the knowledge, participating in things like Ergonomics Task Force of the Department of Labor and Industry – this has come back to hurt us because we don’t yet fully understand dose response relationships and underlying pathophysiologic mechanisms. And there are, in fact, some good arguments that maybe we can’t ever understand these things.

I think these are important issues that need to be addressed, and why? Well, let me tell you two things I’ve learned from my teenagers. One is that Socrates was right – all knowledge is innate – because I’ve never told them anything without them telling me that they already knew it. [Audience chuckles.]
The other thing I learned is that the real question that we always have to answer after we’ve presented somebody with a piece of knowledge is this one – so what?
And “so what” I think connects to the issue that I’d like to spend the rest of my time talking about, which is the social issue – and I’m hoping that Pete will pick this up, too – which is, given all this knowledge, how do we mitigate the ergonomic adversity that we have identified in our epidemiological data and that we see improving in our intervention studies? How do we go about, as a society, mitigating that adversity?

And currently, there are two generic schools of thought out there, and I’ve tried to give them each a nonjudgmental label. One is enlightened self-interest, and the other I’m going to call enforced best practices.

Now in the occupational safety and health profession, we have tended to look towards enforced best practices as the way to improve worker health. We have standards against asbestos exposure, we have standards on lead exposure, etc. We create an expectation of what the exposure should be and then we create expectations of how that should be managed and how workers should be protected from those things.
In the area of ergonomics, I think primarily because we don’t have the dose response relationship information – the underlying pathophysiologic information that we need – the enforced best practices approach has come under a lot of fire by people who would substitute an enlightened self-interest approach and, you know, to try to characterize this with justice – stick with me.

At the Ergonomics Task Force – and Pete, tell me if I’m wrong – we heard from a lot of people who said that, “You know, ergonomics may work. And if it does, employers will use it because it’s to their benefit, and the employers who don’t will lose in the marketplace and will go out of business.” So you don’t have to tell anybody to do ergonomics.
Now I’ve already talked a little bit about what I think is the regulatory challenge. Without dose response information, without an underlying pathophysiologic mechanism, we have a lot of troubles identifying, who should we tell that they need to do something? And what do we tell them that they have to change? And how do we tell them that they should fix it?

An example comes, I think, from the Washington state ergonomics rule, which met its untimely demise a few months ago. And again, to try and characterize it with justice, there were elements of that standard that said, “If I spend two hours with my arm in this position, that’s a job that you’ve got to evaluate and potentially fix. But if I only keep my arm up here for 119 minutes instead of 120 minutes, then I don’t have to look at that job.”

The immediate response of those who want to claim that ergonomics does NOT create adversity is to say, “Show me the data that 120 minutes creates a problem, and 119 minutes does not.” And that’s what we do not have, as of yet.
The Social Issue

The failings of enlightenment...

- not every one is from Minnesota
- some starve before the food arrives

It doesn’t mean, though, that I’m a fan of the enlightened self-interest approach. I think there are two significant problems. The first one I’ve characterized as, “Not everyone is from Minnesota.” It also might be characterized as, “Why does anybody still smoke? Why do some people still believe the earth is flat?” Enlightenment never includes everyone, and even when people know what they’re supposed to do, they don’t always do it correctly.

And market places are not perfect. Even if the market place will eventually eliminate those companies who have so little concern for their workers, it may take a long time – and that gets to my second point, which is that ‘some starve before the food arrives.’ What do we do about the workers who are exposed to ergonomic risk and suffer adversity while we’re waiting for their employer to either become enlightened, or to lose in the marketplace and go out of business?

And, as any good commentator, I have all the questions and none of the answers – which we now look to Ben for.

Thank you.