Cyberseminar Transcript

Date: May 7, 2020

Series: QUERI Implementation Network

Session: Introduction to Cost Analysis, Illustrated with a Recent Implementation Science Example

Presenter: Christopher Miller, PhD

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Christine Kowalski: My name is Christine Kowalski and I am an Implementation Scientist and Qualitative Analyst for the Center for Evaluation and Implementation Research known as CEIR. I’d like to thank all of you for joining the session today. This is our Implementation Research Group Cyberseminar. The IRG is a learning collaborative set up to share best practices and lessons learned in implementation science. And as a group we’re always working together to advance the field of implementation science. We just keep growing and at this point we have over 500 members. This session today is part of our monthly catalog of events. And our seminars generally take place on the first Thursday of every month at noon, Eastern time. Although next month our session will be held later in the month, June 30th so please stay tuned for details about that session from me. If you have feedback about the session today please do stay on for the survey at the end. I like to read your comments. And if you have any future seminar suggestions please feel free to send those directly to me via an email. Now I’d like to thank our presenter, Dr. Chris Miller for his work in preparing for the session today. Dr. Miller is an Investigator and Clinical Psychologist for the Center for Healthcare Organization and Implementation Research or CHOIR which is located in the VA Boston Health Care System. And he is also an Assistant Professor of Psychology in the Harvard Medical School Department of Psychiatry. So we hope that you all enjoy this seminar today. And now I will turn things over to Chris.

Dr. Christopher Miller: Well thank you for that wonderful introduction. Thanks everyone. I’m excited to be talking about cost analysis here today. Hope everyone’s staying safe in the midst of the pandemic. As you can see my talk today is called Introduction to Cost Analysis, illustrated with a recent implementation science example. First of all, first and foremost I want to acknowledge my coauthors listed here. Also wanted to note that I’ve made some slight tweaks to the slides just earlier this morning that aren’t reflected in the handouts. So if you notice some slight discrepancies it doesn’t mean you have the wrong version or anything, it just means that I made some tiny little tweaks. But with that having said I’ll jump right in. I will attempt to jump right in once I can get the screen to do it, there we go.

Okay. So here’s the outline. I’ll be starting with some acknowledgments and disclaimer. And then give a little bit of background as to why to pursue cost analysis as well as some basic considerations I would think about when you’re looking to do cost analyses. I’ll then spend a fair amount of time on the example project, mainly the background for the BHIP-CCM Enhancement Project. Which I’ll be using to illustrate the cost analyses that we conducted. Specifically I’ll be talking about a type of cost analysis called cost-minimization analysis. And then I’ll finally do some summary and a wrap-up. I’m hoping to leave plenty of time for questions and discussions at the end.

So with that out of the way, I’m talking about acknowledgments and disclaimer. First want to acknowledge funding. The work that I’m going to be talking about here today was funded by the QUERI Program; mainly Behavioral Health QUERI with a PI of Mark Bauer for this particular project. We also want to acknowledge the VA Office of Mental Health and Suicide Prevention or OMHSP which funded the operational portion of this project. So we had a joint operations and research partnership with some funding for these activities coming from both sides of the divide so to speak. I also want to acknowledge in addition of the coauthors on the first slide there are many additional collaborators to this project, more broadly. Nonetheless whose work was crucial for kind of moving this forward. So I wanted to acknowledge those folks as listed here.

In terms of disclaimers I’ve got one kind of standard one you folks have probably seen before that the views I’m expressing today are my own and please don’t take this to represent the views of the VA or the U.S. government. A second disclaimer is just, I’m a relative novice at this stuff. I’ve got one conference presentation under my belt. And actually the associated manuscript for this work was just accepted last week, so it’s in press at the Journal of Medical Care. So I’m, as it says here I’m hoping to whet your appetite and I acknowledge that there are many other, much more knowledgeable people about these topics. Including a recent presentation that I believe Christine had distributed as well. And there’s relatively accessible introductory text that I used in kind of formulating this for amount of research that’s listed here. So I really am a psychologist and health services researcher who, I began to dabble in this stuff and I find it really fascinating. So I’m hoping to give a relatively good introduction to folks who may not already be steeped in the language of cost analysis.

So with those acknowledgments and disclaimer I want to talk a little bit about why do we care? Why are we looking into this work? And the kind of baseline assumptions from which I’m working here are that you know first health care resources are limited. And that every dollar spent on a given evidence-based practice or intervention or quality improvement project is a dollar that didn’t go towards something else that could potentially have been more beneficial. It’s also worth noting that cost considerations especially the upfront costs to get something up and running are an important contributor in medical decision-making. I’m sure that there are some folks on the line who hold leadership positions in their clinics and knowing how best to use dollars. And knowing what the chances are that the initial investment which can be quite high, that is true, it’s something that’s really important to know. And it’s also worth noting that the U.S. healthcare system does appear to have some kind of structural inefficiencies in it when compared to other countries. But it’s worth noting these kind of points for why cost analysis is important. Hold whether we’re in a fee-for-service system in a capitated care system, no matter what kind of system you’re using to pay for your healthcare there are going to be decisions that boil down to deciding which of multiple interventions or improvement projects are going to be pursued. And so from that perspective cost analysis is going to be important regardless of your particular system. Although of course the details of that cost analysis may differ as we’ll discuss a little bit later on.

So in terms of basic considerations of cost analysis they’re really two basic ones that stand out to me as being kind of the biggest things to consider. One is whose money are you talking about? And in cost analysis or in common metrics speak my understanding is that this is the term perspective. So the perspective is really referring to whose money is being considered, whose costs are on the table for analysis. And a second question is, well what specific inputs and outputs are you really looking at given your perspective. So how broadly are you defining costs and what specific comparisons are being made? And I’ll talk a little bit in more detail about these things in the coming slides. But these to me are really the two biggest things to think about.

So in terms of whose money. A few different perspectives are common from my read of cost analysis. So the societal perspective is very broad. It really seems to consider all monetary inputs and all downstream effects. So you’re really looking as broadly as possible at the different costs and savings that come from any given intervention. The example I’ve listed here is that fortifying cereal grains with folic acid can have a variety of different downstream effects, right. Folic acid is a great thing just to have in peoples’ diet. It may be particularly helpful for women who are pregnant. But if you were just looking at women who were pregnant in the results from fortifying cereal grains for that population you might miss the beneficial effects for say older adults who might be in particular need of folic acid. Or populations who might be at risk of you know getting too much folic acid and potentially having negative effects from that. So my point here is not to claim to be an expert on folic acid specifically but simply to note that the societal perspective is really looking pretty much as broadly as possible at what the costs and benefits are to whatever intervention you’re considering. Another example is the health system perspective which is instead of looking at all of society it’s looking at the costs or savings to a specific system, for example, the Veterans Health Administration which is the clinical line of the VA. So for example, if you’re using the health system perspective for your cost analysis you’d be looking at things like employee time and the associated salaries for the intervention. Including whatever services are avoided or prevented because of your particular intervention. So the BHIP-CCM Enhancement Project which I’ll be presenting a little later in this talk is a good example, I hope of a cost analysis from the health system perspective. There are bunches of other perspectives as well that one can take. If you’re an employer you might be particularly interested in the cost implications for particular changes to your employee health plan. If you’re really focused on Medicare then you know you might want to look specifically at costs and savings to Medicare. And you might want to ignore the downstream effects for say private insurance companies if you make a particular change to Medicare. So the overall summary here is not to kind of sell any one of these as being necessarily better or worse than the others. But rather just to acknowledge that one of the first decisions you’ll need to make in pursuing a cost analysis is which perspective you are taking and talking about that very clearly in describing your project and presenting your results. So that’s one of the basic considerations.

The second one is, I’ve presented before, it’s well what inputs and outputs? And there are a few different examples here. So for example one of the big ones is cost-benefit analysis. And the key kind of definitional point here is that cost-benefit analysis or CBA boils everything down to dollar values, right. So if it can’t be quantified in a dollar value then it’s really hard to include in a cost-benefit analysis, right. However CBA is really useful for comparing the costs versus the savings of two or more interventions, right. In contrast to cost-benefit analysis though, cost-effectiveness analysis or CEA asks what costs you have to spend in dollars in order to gain an effect or gain. For example, on live saves, lives saved excuse me. So the important distinction here is that the benefit does not need to be in dollar values. One of the really common ones is quality-adjusted life years or QALYs. So one QALY is basically one year of what we would consider kind of high-functioning or really good functioning in terms of just general adjustment. Being able to work, being able to spend time in valued activities. And smaller and smaller proportions of our QALY refers to a year of life that is lived with perhaps at a lower quality of life. Maybe more difficulties in the job, fewer social connections that kind of thing. So one can certainly do cost-effectiveness analysis to determine how much money needs to be spent to obtain a certain gain in, of QALYs or quality-adjusted life years. Another option which in our case is kind of a subset of cost-benefit analysis is cost-minimization analysis or CMA. So CMA basically accepts the assumption that two or more clinical interventions or health care structures have equivalent clinical outcomes. And then the primary question is simply to say which of these two or more interventions achieves those equivalent outcomes at the lowest cost? And again the example that I’ll be talking about we pursued from a CMA perspective.

So kind of tying this all together. I’ve talked about these two basic considerations and the overall guidance at least from where I sit is you really want to clearly specify the perspective from which your analyses will be conducted. And then really carefully describe how you’re going to be quantifying the costs and outcomes. Whether they’re benefits in dollar values, benefits in terms of QALYs, or something like that.

So with those kind of considerations out of the way I want to tell you a little bit about the example project. My goal is not to tell you everything about this, rather to give you enough context so that cost analyses that I’ll talk about later in the talk, you can kind of contextualize those. So I’ll start with the Behavioral Health Interdisciplinary Program or BHIP. This was an initiative launched within VA that is really aiming to organize general outpatient mental health clinics into teams. Originally the BHIP initiative came with suggested staffing, as it says here, of about five and a half to seven and a half multidisciplinary staff for a clinical caseload of about 1,000 Veterans. However one of the questions that came up early in the development of BHIPs is really how should we structure these teams, right. Afterall a staffing model and a suggested caseload is not necessarily enough to really design well-functioning teams. And so enter the Collaborative Chronic Care Model or CCM. Basically the CCM as it says here, an evidence-based way to structure care for chronic conditions. It dates back several decades it was originally developed in the 90s by Wagner/Van Korff and colleagues to address chronic physical health issues like diabetes. But recent review papers kind of summarizing a bunch of different RCTs really suggests that CCM’s or CCM-based care can be effectiveness for mental health conditions as well. The cost analyses that have been done to date on CCMs for mental health suggest that it is cost-saving to cost-neutral in the context of RCTs at least.

So when we talk about this being an evidence-based way to structure care for chronic conditions the CCM and its core consists of several or all of six different components or principles. So these really are principles rather than specific steps to take. And this is a bit of a VA-centered slide with referring to Veterans. But hopefully you’ll kind of see the point I’m trying to get across here. So element one is kind of sustain the leadership support and organizational support for CCM-based care for these other elements. The overall goal was more anticipatory, continuous, evidence-based, and collaborative care. And then kind of the meat of it, these additional five principles are work role redesign to support more continuous care, making sure the patients aren’t slipping through the cracks that kind of thing. Veteran or patient self-management support is really about making sure that patients have the resources and coping skills they need to work toward health outside of treatment sessions. Element four, provider decision support, is really making sure that clinicians have access to the supports and resources that they need to deliver group care. And then is there something that’s outside the clinician’s expertise that’s facilitated, they’re facilitated connections to other clinicians or other resources. Information management is really about tracking population or panel-level data on the overall set of patients being treated by a particular clinic or particular team. And element six, community linkages is really kind of acknowledging that there may be things that are helpful for patients outside of a particular medical center or health care system. So for the way that we kind of pursued this in the context of our project it was really about helping these outpatient mental health teams these BHIPs adopt care practices that are more consistent with these evidence-based principles of the CCM.

Okay so we take the BHIP Enhancement Project, excuse me you take BHIP-based care and you build it around the Collaborative Care Model and you get the BHIP-CCM Enhancement Project. So this was a hybrid type two implementation effectiveness trial. We did it as a stepped wedge at nine sites, nine BHIPs; three sites in each of three waves. We used implementation facilitation. I think many on this call are familiar with this but it involves an internal facilitator who kind of knows the teams in question, knows the local medical centers really well. And an external facilitator who has knowledge of the CCM, in this case, in kind of facilitation principles. We used a workbook called the BHIP-CCM Enhancement Guide to help the BHIP teams walk through their clinical processes. And at step kind of determine the extent to which their care processes were already aligned with the CCM principles. And if not what changes they could make to kind of be better aligned with those principles. For people who want more detail on this our protocol paper is in Implementation Science. The primary outcomes paper came out last year in JAMA Network Open. And the primary outcomes that we found and reported among other things that we looked at. That implementation facilitation at these nine sites was associated with improved team functioning especially kind of role clarity within the team, as well as team members’ ability and willingness to put team goals ahead of or least coequal with individual treatment goals. We did find a robust drop in hospitalizations. And improved health status specifically for patients with three or more mental health diagnoses. We did not find statistically significant improvements in health status for Veterans treated by these teams who had fewer mental health diagnoses. Although we did think that the reduced hospitalizations are quite striking.

So it’s really at this point that our kind of cost analyses came into focus. Because one of the questions was, okay well we achieved reduced hospitalizations however implementation facilitation you know can be costly. It takes clinician time on the parts of the BHIP teams, it certainly takes internal and external facilitation time. So were we able to counterbalance those facilitation costs by reducing hospitalizations? So it’s kind of the core question we were pursuing for these analyses. So we understood as I kind of eluded to briefly before, a cost-minimization analyses from the health system perspective. So again this assumes broadly equivalent clinical outcomes across conditions. And therefore we’re focusing on the relative costs to the health system. That is to VA or VHA, Veterans Health Administration for adopting CCM-based care.

So how did we tabulate costs? Well when we started with kind of looking at the costs for the internal and external facilitators for the one-year of implementation facilitation that we used. We also looked at the costs for inpatient and outpatient visits within VA for the year in which we undertook facilitation versus a previous year. We anchored our sample to the start of facilitation which basically means the patients whose costs we were considering were those who were engaged in care with the teams in question when we started facilitation. And the comparison condition was that we looked at patients treated in other outpatient general mental health clinics at those same hospitals during the same timeframe. We’ll occasionally use the terminology non-CCM-enhanced teams. So it’s worth noting that you know this is not a randomized control trial in the sense that we did not randomly assign patients to either CCM-based care or the non-CCM-enhanced teams elsewhere in the medical center. Our randomization in this case came in the context of our stepped wedge where the teams that were enrolled in our CCM enhancement were randomized to start time. So that is a weakness that we’ll acknowledge in limitations. But I just wanted to kind of make that clear upfront. We nonetheless really did think that this was a reasonable comparison condition given that these were other patients again treated in similar clinics at the same hospitals during the same timeframe.

So moving forward from here, where did we get these data? And I apologize for periodically sipping here, I hope it’s not too distracting. But in terms of the internal facilitator costs we estimated upfront and we asked for the commitment from the medical center that each internal facilitator, one for each of the nine teams with whom we worked contribute four hours a week or 10% full-time equivalent time to helping with this BHIP-CCM Enhancement Project. When possible we actually got people’s direct data in terms of what salaries they collected. However where we couldn’t get those data we used the amount of time that people had worked in VA, their disciplinary background, and their geographic area to get what we think were reasonably precise estimates of how much it would cost the medical center for that 10% FTE dedicated to this project. For the external facilitators, Dr. Bo Kim actually led some really nice basically time-estimation analyses. We basically did some thin slice time-motion tracking of the external facilitator’s time dedicated to the project. We’d initially estimated about 10% FTE per site for this. However we found that it was closer to 7% time or about 2.6 hours per week per site that the external facilitators contributed to this. We again got direct salary data and the fringe data for the external facilitators. And so these two things together really gave us kind of a picture for the facilitation year what the overall costs were for the internal and external facilitators. The only additional contribution here, oh sorry let me go back before this. We also did estimate the time taken for a site visit that we undertook for the external facilitators to visit each site at the beginning. And I’ll get to that a little bit later on. In terms of the outpatient and inpatient costs, in terms of clinical encounters as well as days spent on the inpatient unit we used the VA medical record, CDW or the Corporate Data Warehouse to get those data. Again for the patients who were considered a part of the team’s panel when we started our facilitation. And our cost estimates we basically used estimates from HERC, the Health Economics Resource Center. They have tables of estimated costs if these services have been delivered and reimbursed by Medicare. So these aren’t the exact costs to VA of things like one outpatient psychotherapy encounter or one day spent on an inpatient unit. But we think that they’re relatively reasonable estimates. And I apologize if you hear my daughter screaming in the background as well.

In terms of the analytic plan. How did we actually get at our CMA for this? Well within concert with our health economist who was really helpful, Dr. Kevin Griffith, we calculated simple DID calculations or differences-in-differences. So what we’re looking at is for the CCM-enhanced teams and the non-CCM-enhanced teams how did the costs for the facilitation year compare to the costs for these same patients in the previous year. And crucially we compared the changes in costs between the CCM-enhanced and non-CCM-enhanced teams. So it’s differences-in-differences because we’re looking at differences in cost from the prior year to the facilitation year but looking at the differences in those costs between the two types of teams. I hope that’s clear. We also did some Monte Carlo simulations for sensitivity analyses. So basically what this involved was running 10,000 different simulations where we randomly varied the facilitation costs up or down by 15%. And the inpatient/outpatient costs by plus or minus 95% of the DID confidence intervals. So what we ended up getting was a spread of, hey these are maybe what our base case cost savings might be. But what if our facilitation costs are a little bit higher than what we estimated? Or what if our inpatient costs were a little bit more expensive than we would have rise estimated? So you’ll see we get a nice spread of different scores for this.

So in terms of our results, our base case cost estimates you can see here that internal facilitation was between 12 and $13,000 per site for the facilitation year. External facilitation was close to 12,000 per site. And then we have a couple of different costs for the site visit. The external facilitators traveled as well as, because the site visit involved a half a day of the whole team working with the internal and external facilitators, we estimated $2,000 for taking those clinicians time offline for that site visit. And so we estimated that, kind of just taking this all together it costs about $28,000 to implement CCM-based care for a given outpatient mental health team or BHIP.

So when it comes to service utilization and cost changes again all of this stuff is in comparison to the patients in the non-CCM-enhanced teams. So when they look at outpatient mental health visits we find that CCM-based care costs an extra $50 per patient. We didn’t see any significant change in outpatient physical health visits. The big savings as you might expect really came from inpatient mental health stays. As I mentioned part of our primary outcomes paper noted that we had a robust drop in hospitalizations for the patients in the CCM-enhanced teams. It actually outstripped the reduction in hospitalizations for the non-CCM-enhanced teams hence the savings. We did see a change in inpatient physical health stays here for patients in the CCM-enhanced teams however even though it looked like it was about $40 per patient it’s worth pointing out that there’s really wide confidence intervals for this. This actually wasn’t a statistically significant increase in costs for inpatient physical health stays. And then when you tie this together at the total service utilization and the totals including facilitation times we found that we were saving about $38 per patient which came out to a savings of somewhere around $26,000 in total for a typical team that has about 1,000 patients in the total caseload but about 700 patients that we were looking at anchored at the start of the facilitation time. I put an asterisk here because some of these estimates change a little bit depending on how exactly you account for the stage whether you would include everything in the model or just the stuff that’s statistically significant. But the overall takeaway here is that this initial investment of about $28,000 to facilitate CCM implementation resulted in kind of a return on investment that more than paid itself back. And actually ended up close to $26,000 in savings at the end of, by the end of the facilitation year.

So here the results from Monte Carlo simulations. You can see the dotted line here is the cost, the average cost per patient for the non-CCM-enhanced teams. Including both inpatient and outpatient stays. You can see that in about half of the iterations, about half of the simulations CCM-based care is likely cost-saving. An additional 42% it’s likely cost-neutral that is plus or minus two percent of health care costs for mental health. And that you have a few iterations where it looks like CCM-based care might be more costly. So for example if it turned out that we were chronically underestimating how much time the internal facilitators had to spend or chronically overestimating how much savings we got from the reduced inpatient stays then it might actually be that CCM-based care is more costly. But that seems unlikely given the overall spread.

So the conclusions we have for this. As I mentioned before CCM implementation in BHIPs costs about $28,000 per team. What this resulted in was a modest increase in outpatient mental health costs. It was more than counterbalanced by the drop in inpatient mental health costs during the facilitation year. When you look at this all together we found savings about 1.7 to one, so for every dollar spent on CCM implementation we saved about $1.70 compared to the non-CCM-enhanced teams. In the simulation as I mentioned before in about half of the iterations this was significantly cost-saving and most of the remaining iterations it was likely cost-neutral.

So some limitations and caveats. Some of which I’ve already previewed. First as I mentioned before CMA assumes equal clinical outcomes between the two arms being compared. But we didn’t have outcome data specifically for the comparison or non-CCM-enhanced teams. However the fact that we had a robust drop in hospitalizations that outstripped those of the non-CCM-enhanced teams for the CCM-enhanced teams suggests to me that it’s likely that the care is at least comparable. And it’s worth noting that if CCM-based care in our study was actually superior then that would mean we’re actually getting better care at lower cost with the CCM enhancement. We can’t know this for sure because again we didn’t collect data on the non-CCM-enhanced teams but certainly it would be consistent with the previous literature and the drop in hospitalizations that this is at least a possibility. It’s also worth noting that we were unable to account for costs outside of VHA. For example, if CCM-based BHIP care just made Veterans get so frustrated with VA care that they went and got care outside of the VA instead that would actually be a bad outcome but would look like a good outcome from our health system perspective look at costs. However we did some sensitivity analyses and we determined that over 90% of the sample continued to get services within VHA during the facilitation year. So it seems really unlikely that care outside of VA would change our primary findings here.

Likewise worth pointing out that physical health visits were not statistically significant in part due to the large variance. And therefore we didn’t include them in the cost simulations. However my understanding is that this is standard practice for these types of analyses. Just because we don’t want to overburden the model with things that have high variance and aren’t statistically significant. But of course if it was the case that CCM-based care led to a big increase in physical health visits well I think that’s unlikely. It certainly is a possibility that could throw off our cost estimates. And finally, perhaps most importantly not so much a limitation of our analyses necessarily but a fundamental limitation to this kind of approach is that these findings would only kind of translate to real savings in systems where you can actually turn those reduced inpatient costs into money or into services elsewhere, right. So if you’re in a fee-for-service system in which reduced inpatient utilization means that you’re losing out on money rather than reducing costs that would completely flip our findings, right. If one of your business models is that you make money on inpatient stays that you would otherwise be losing outpatient. In CCM-based care is actually going to reduce your revenue. Similarly though if you’re in a system with mandated inpatient service capacity or a system where you get reduced inpatient hospitalizations but you can’t close units or otherwise redirect inpatient staff to delivering outpatient care. Or where making that transition is going to be infeasible or super expensive then it would be almost impossible to realize savings from this kind of approach, right. So this I think is one of the limitations of cost analysis more broadly is that being able to actually realize those cost savings may require other steps. But certainly one of the things we take away from this is that if we were able to shift large portions of this system to more CCM consistent care and then had a robust drop in the need for inpatient mental health hospitalizations you could therefore redirect resources from inpatient to outpatient. If we can do that reasonably well we might expect to see overall reduced costs in the long run. Although of course I’ve got a bunch of assumptions and extrapolating in there and probably some questionable assumption is a part of that. So I just want to make sure that we’re clear that this is a limitation to this kind of work.

But just kind of in terms of summary and wrap-up we are hopeful, I’m hopeful that I’ve gotten across that cost analysis can help determine the best use of limited health care dollars. And again I want to acknowledge that accounting for the upfront cost, the implementation costs may be particularly important because getting interventions up and running may be a key consideration for health system leaders when they’re looking at costs.

Again if you’re going to undertake this kind of work it’s really important to specify their perspective from which you’re running your analyses. And be really, really clear on what costs you’re looking at and what costs are off-limits. Whose dollars are you considering and why is really important. And of course partnering with a health economist or multiple health economists is really helpful. Again I didn’t run the analyses specifically that I talked about here and so our partnering with Dr. Griffith was really crucial for getting this done. So with that in mind, I’ll acknowledge that there is a separate HERC Cyberseminar series on cost-effectiveness in health. And that if you’re interested in being connected to that you can email cybersminar@va.gov. And again if you have the slides I’m pretty sure even the version of the slides that’s available while slightly different from the ones I’m presenting do have this same email address on there.

So having said that I will stop here and thank you for your time and attention. Again hope everyone is staying safe in the midst of this pandemic. But I’m happy to entertain questions but thank you for listening.

Moderator: Thank you, Dr. Miller. So we have several questions lined up here. Our first question and this is in regards to your data tracking.

Dr. Christopher Miller: Mm-hmm.

Moderator: Can you please recommend a paper on thin slice time-motion tracking?

Dr. Christopher Miller: Sure. I’m going to try to think the best way, maybe Christine I can follow-up and send that to you for distribution?

Christine Kowalski: Yeah, that’ll be fine. I can do that, thank you.

Dr. Christopher Miller: Okay. Let me just, give me a second. Combining high-tech and low-tech of course I have my computer up and I’m literally writing down notes. So I will send that over. Again Dr. Bo Kim is the one who led that.

Moderator: All right.

Dr. Christopher Miller: And just one other thing I will note just for context so in case it helps in addition to sending along the paper. Just that basically what we did is that we tracked all external facilitator time for two weeks during early facilitation, two weeks during mid-facilitation, and two weeks during late facilitation. We extrapolated from those two-week slices to the rest of those periods with early facilitation being months one, two, three, mid-facilitation being months three through six. And late facilitation being months six through 12. We also tracked all of the time we spent during the pre-site visit kind of assessment process. And so combining those things together is where we got our overall estimates of time spent. But again I will connect this group to the paper for those who are interested in more detail.

Moderator: All right. Thank you. Our next question is, can you explain who at our facility or VISN would be a good contact to help with looking at cost analysis for an improvement project?

Dr. Christopher Miller: I think that’s a great question. I think it depends on your facility in particular. In our case we got connected to Dr. Griffith through PEPReC the, I’m not sure exactly what the acronym stands for but it’s something about policy-based research. In terms of connecting with somebody at your institution I think a lot of it would depend on the center which you have academic affiliations and whether there might be somebody in a school of public health who could do this kind of research. I mean in our case I think this is a great partnership because we got some help running analyses and health economists got publications and presentations based on our work. But I think a lot of it just depends on where you are and what academic resources you might have at your disposal. But it may be worth reaching out to people at PERC or PEPReC as well if you’re VA. I hope that’s helpful. If there are other questions I’m afraid somebody might be on mute?

Moderator: Sorry about that. Sorry about that. Could you talk about the software you use to conduct the Monte Carlo simulation?

Dr. Christopher Miller: I’m afraid I cannot. Because that was something that was under Dr. Griffiths’ bailiwick.

Moderator: Okay. Moving on. Can you elaborate on if you asked internal facilitators if they offer more or less support than they were recommended to offer?

Dr. Christopher Miller: That’s a great question. You know we didn’t. I think based on just our, so it’s worth noting that Dr. Bauer, Dr. Kim, and myself served as the external facilitators for this project. I will say that you know the interactions that we, we had very consistent interactions with them in our role as external facilitators. And I do think that the four hours per week is relatively accurate. I will say that that is the amount that medical centers agreed to officially dedicate to this work on the partner internal facilitators. And we certainly didn’t have internal facilitators pushing back saying look I’m spending more time on this than I really am able to. But having said that, because we didn’t want to burden them with additional data collection that’s really disconnected from their own duties we kind of accepted the premise of the four hour per week estimate was accurate. However it’s worth noting that one of the beauties of the Montel Carlo simulation is that because we kind of varied the things up and down we hopefully have at least a little bit of cushioning against potentially underestimating or overestimating the amount of time that they were spending.

Moderator: Right. This one, do you have thoughts on what are the pluses and minuses of separating the various perspectives versus trying to integrate multiple perspectives into one assessment?

Dr. Christopher Miller: Yeah, was into one assessment the last part of that?

Moderator: Yes, it was.

Dr. Christopher Miller: Okay, sorry my audio kicked out there. Yeah so I have a few different thoughts on that and I’ll just give a couple of them not wanting to go off on what might be a tangent. But I think that their, one-way of framing this question is well what are the pros and cons of taking up broader perspective? And I think that there are, there’s both a conceptual and a practical reason to want to limit your perspective to something relatively specific. I think that the conceptual question is you know in our case, right if we were to try to look at say costs to outside of VA. Like those may be important costs from a societal perspective. For example, if people are you know using their employee health plans more than VHA or less than VHA that might be important. But ultimately the decisions being made about VA care have to really be based on you know, at least in part on VA’s bottom line right. Because VA may be deciding where to put their limited health care dollars. So conceptually there’s something to be said I think for focusing specifically on the people whose money is most important that specific decisions being made. Having said that of course there are other pressures that might say look the broader you can look the better you can have a picture of what real costs are going to be. What real cost implications is this going to have for society? But there’s also a practical consideration that would suggest caution before going to the societal perspective. Mainly that the farther you go into the societal perspective the more and more tenuous your estimates are going to get. So for example in this case, let’s say we wanted to look at the societal perspective. Well that would mean that we’d have to look at not just the time that you know VA staff are spending on these clinical appointments but also the costs of the time that our Veterans are taking either to attend outpatient visits or to do inpatient stays, right. As much as we’d like to avoid those. So, but in order to get at that we’d have to look at okay well which of our Veterans are working and what are their salaries. You have to find a way to estimate the lost wages for peoples participating in outpatient/inpatient mental health care. But this is like a late-night infomercial but wait there’s more. We also might want to account for travel costs, right. If a Veteran is traveling an hour each way to get to a one-hour psychotherapy appointment then we need to not only account for the work their missing to attend the appointment, we also have to account for the working their missing to travel. So we need to estimate people’s salaries, estimate what percentage of them are working, and also estimate their travel time. But now we’re in the midst of a pandemic where a lot of people are getting their mental health services virtually. So we have to knock off the travel costs if we think that people are getting virtual care. And you can see just as I’m talking through this that it gets, your estimates get more and more tenuous. Your error bars get larger and larger. And you’re getting further and further from the reality in the sense of estimates that are really anchored in reality. So for those practical reasons the societal perspective or broadening your perspective, it just gets harder and harder and more and more data sources you’re trying to integrate. So I hope that’s helpful.

Moderator: Right. Would you anticipate costs to facilitate program would decrease over time?

Dr. Christopher Miller: Yeah. Actually part of what we’re going to be doing I think for this next iteration of Behavioral Health QUERI is looking more formerly at sustainment both in terms of sustainment of clinical effects, sustainment of kind of facilitation or implementation outcomes, and sustainment of cost savings. We actually just have a paper that is under review right now that really finds that whatever hospitalization reductions we saw during the facilitation year the [inaudible 45:30] between the CCM-enhanced and non-CCM-enhanced teams seem to be convergent. And so from that perspective the facilitation costs for say two years after implementation go down to zero because you know the facilitators are no longer involved in CCM-enhancement. On the other hand it looks like the hospitalization savings are also going down. Maybe not all the way to zero but possibly to near zero. And so I do think that looking at kind of, you want to be careful not to extrapolate from the time period where you’re looking at costs to future costs or savings. But I think it is an open question, something that I hope to have more data on three or four years from now as we’re, once we’re fully engaged in the next integration of Behavioral Health QUERI.

Moderator: Okay. Next one is, from a finance and accounting perspective it seems like your analysis is based on estimates and not comparison with actual costs. If there are not comparisons between budgeted and actual costs it is difficult to discern undesirable variations across settings and what are the sources cost drivers of variations within BHIP cause and/or specific implementation strategies, QI activities, micro crossing in economic evaluation terminology. As a learning health system how are we to learn about specific efforts conducted by IF/EF personnel to improve care or not, this high-level post hoc perspective. Given the dynamic and changing nature of costs in health care it seems like the analysis is dated for decision-makers by the time it is completed. How can economic evaluation of implementation strategies be improved, be more rapid, and relevant to decision-makers?

Dr. Christopher Miller: Yeah, I think those are good questions and they’re certainly, this question is uncovering some of the limitations here in the work that we’re doing. I think there are a few pieces to that. Certainly one is, you’re absolutely right that this is post hoc analysis but we’re certainly looking at what we were doing for the next iteration we’re hoping to do the cost analysis more in real-time. I think a lot of it also comes down to how willing are you to accept the estimates for the various different costs. So for the internal and external facilitators I think we’re reasonably clear on kind of how much money you’ve really, it took. Or at least how much time could’ve been spent on other activities but was spent on this instead. I do think that getting better estimates of how the health system values the different outcomes in question would help. So for instance in this case we were doing cost-minimization analysis which means we were only looking at outcomes in terms of dollar values, right. We’re attempting to boil down well Medicare would have reimbursed an inpatient stay X amount of dollars. So that’s how much we’re going to value it for these analyses. I do think that getting more meaningful results might require going more to a cost, excuse me a cost-effectiveness analysis. And looking at hey you know what we spent this much money on facilitation and this is the number of days of hospitalizations that we prevented. And is it worth spending that money to keep those Veterans out of the hospital? Because you know as a clinician I do mostly research and some clinical work I’d much rather spend an equivalent dollar value in outpatient mental health care than on inpatient mental health care. Not just because of the dollar values but because my goodness inpatient stays are so disruptive to a Veteran’s life. They can be so scary, they’re disruptive in the family’s lives, they threaten job security, and all that kind of stuff. So hopefully one way to get at the core of what the question’s getting at is doing analyses that look at outcomes beyond dollar values given that oftentimes our dollar values are just kind of vague estimates in general. But again I can’t, I can’t imagine that I’ve fully addressed the concerns raised in the question because there are a lot of good points there that, you know a lot of it comes down to how willing you are to accept the fuzziness and the 10,000-foot views of what has been presented today.

Moderator: Right. Thank you. This next question is, how does the modeling approach apply to introduction of novel health care technologies that may not have equivalent costs in HERC tables and/or introduces moving care to other modes such as telehealth?

Dr. Christopher Miller: I guess my gut reaction to that is I’m not entirely sure. I think that in the context of novel care delivery that isn’t reflected in HERC I would imagine people would have to find another way to come up with a defensible good faith estimate for what the costs are. So not necessarily a particularly helpful answer but I don’t see really any way around that. If you’re going to undertake you know these type of cost analyses you need some kind of estimate of what the inputs are whether it’s from HERC or some other source. And I think the key is just explaining really clearly how you came up with your cost estimate and how you calculated it and what variation you might be willing to build into your simulation models in case you’re wrong in your estimate.

Moderator: Thank you. Is it a problem that program costs are directly calculated but visit costs are inferred from Medicare reimbursements?

Dr. Christopher Miller: Mmhmm.

Moderator: Seems like it could systematically overestimate visit costs presuming that the VA is more efficient than average.

Dr. Christopher Miller: Absolutely. I think to answer maybe the rhetorical question that was embedded in the first part of that literally yes of course it’s a problem. And so I think the question becomes, I mean are there better ways to estimate it? There may be. I’m not sure with the transition to Cerner that something may be done to make it easier to estimate costs for that stuff. And the only thing I would note though is in terms of our analyses hopefully because we’re looking at visit costs for the CCM-enhanced teams and the non-CCM-enhanced teams, if we are chronically over or underestimating the amount of kind of time and employee salary that went into delivering these services. If we’re doing that same chronic over or underestimation for both the CCM-enhanced and non-CCM-enhanced teams hopefully it wouldn’t change our core results of the kind of substantial savings from inpatient visits. Now having said that if we are chronically undervaluing, or sorry excuse me if we’re chronically overvaluing the savings from inpatient stays and undervaluing the costs in terms of outpatient visits then that might challenge our results more fundamentally. Because it might put us closer to that 6% of the simulations where CCM-based care was more costly.

Moderator: All right. How did you develop distribution of assimilation?

Dr. Christopher Miller: So Kevin, Dr. Griffith could speak more, in more detail to that. But my understanding is that it was by kind of randomly varying the costs, I don’t know if you folks are still seeing my screen but let me go back to that. Do-do-do. Oh here we go. So it was by varying facilitation costs randomly to plus or minus 15% of our estimates. And you can see by randomly varying the inpatient and outpatient costs, kind of within that 95% of the confidence interval for the difference-in-differences calculation. So that’s kind of the spread that we looked at for our simulation models. Again running it 10,000 times with random variation between those two things to get each of these, to get that overall distribution of savings. If that makes sense.

Moderator: Okay. With your example of BHIP what is your, what has your analysis done to the future of the BHIP concept?

Dr. Christopher Miller: That’s a good question. So in parallel with these analyses basically the VA Office of Mental Health and Suicide Prevention is really looking to increase the extent to which BHIP-based care is really built around the CCM elements. So we are hopeful that this kind of more team-based, more collaborative model will continue to spread within VA. And it certainly seems like that’s the direction OMHSP is taking it although of course I don’t want to speak for VA operational office. And for the, I will say that, for the renewal of Behavioral Health QUERI we are looking to extend these, this work in additional medical centers. Again while being a bit more attentive to sustainability and maintenance as I eluded to previously before.

Moderator: Could this, I’m sorry, did all your estimates includes just your one, would you assume this is future years or would costs change over time? In particular wouldn’t a facilitation cause shrink over time.

Dr. Christopher Miller: Yeah. So I mean at least the way that we did it, right where we stopped facilitation at each site at the end of the year. Essentially from the perspective of our analyses, implementation costs go down to zero after year one. Again though we have a manuscript under review that suggests that the hospitalization differences between groups, at least got to non-statistical significance in year two. So while we haven’t done formal analyses in year two it looks like the costs for implementation of the CCM-based care in year two became zero but the savings may very well have become zero as well.

Moderator: Okay.

Dr. Christopher Miller: So again I think this speaks to the need for more work to really work on sustainability of this stuff so that after the implementors or the facilitators stop talking to each other, you know CCM-based care can continue to be delivered. It’s worth noting that one of the modules in our BHIP-CCM Enhancement Guide was focused explicitly on sustainability. In retrospect our results suggest that we need to spend more time and earlier time in the facilitation process to really talk about how to carry this forward. Because if all this stuff goes away at the end of our facilitation year well then we may have some cost-savings for that year. But it’s a real shame if none of that stuff is continued.

Moderator: Okay. All right. Thank you, Dr. Miller. So we are just about at the end of the hour and I’d like to respect everyone’s time and just wrap up. We do apologize if some of the questions were not answered. Please feel free to email your questions to the email address Dr. Miller has provided on your slides. And with that, thank you so much Dr. Miller for taking time to prepare and present today.

Dr. Christopher Miller: Of course. Thanks everybody for your time and attention.

[ END OF AUDIO ]