Cyberseminar Transcript

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Session: Evaluating the VA Make-or-Buy Decision in Emergency Care

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Moderator: Good afternoon or good morning, everyone, depending on where you are. I am Risha Gidwani Marszowski. I’m one of the Health Economists here at HERC and today I am very pleased to introduce David Chan, who will be giving us a talk on EDUs. David is an assistant professor of medicine at Stanford University. He is also an investigator at the VA as well as being a faculty research fellow at the National Bureau of Economic Research, or NBER. He does a lot of labor and organizational economic work, and he is specifically interested in studying how information is used in healthcare, how this affects productivity, and implications for design of healthcare. He is the recipient of the 2014 NIH Director of High-Risk, High-Reward, Early Independence Award, which he is using to study the optimal balance of information in health IT for patient care. This is an extremely prestigious award given to, I think, only five people per year. He is well deserving of it, and Dave, we’re so happy to have you here today. I’ll turn it over to you.

Dr. David Chan: Thank you very much for that introduction, and it’s lovely to be giving this Cyberseminar, calling from Palo Alto. I understand that some of the other folks that are kind of organizing this call are in Boston. I hope everybody is nice and warm and safe. And I was just saying this is the perfect day to give a Cyberseminar. So I’m very excited to be giving this seminar, which is, topically it’s on the effect of care, either in the VA or outside of the VA in emergency care. But I’m going to be organizing this seminar around a broader didactic theme of how does one evaluate outcomes that aren’t due to a randomized controlled trial, and this kind of relates to some of the previous Cyberseminars through HERC on empirical methods and economics. So I’m going to be combining some of that with some of the substantive findings that we have comparing outcomes in the VA and outside of the VA and excited to be walking through that.

All right. So let’s see. Okay, so as a background, this is an area of obvious longstanding research and policy interest. How does the VA compare against non-VA alternatives? And this is of obvious interest because the VA spends a lot of money not only financing but also delivering care, and it has quite an extensive experience in doing so but the natural question is, is the VA the best setting to deliver care for Veterans or are there options outside of the VA where care would be better delivered? And this relates to things like Veteran Choice. So in recent years, this question has become particularly relevant because there have been efforts to redirect VA resources towards financing care for Veterans in non-VA facilities. So what I’m doing in this talk, again to recap, is I’m going to start with what do we currently know about this question? What are some of the key barriers to learning more about this question? And given these barriers, what are some quasi-experimental approaches that can we take to learn more in the emergency care setting?

So first I’m going to start with a poll question. How would you primarily describe yourself, a clinician; a researcher; a policymaker, manager, or administrator; or a Veteran? And so I understand that some of you might have more than one hat that you have at the VA, so just how would you primarily describe yourself?

CIDER Staff: And responses are coming in. We’ll give everyone a few more moments to respond before we close out the poll and go through the results. It looks like we’re slowing down here, so I’m going to close this. And what we’re seeing is 10% of the audience saying clinician; 52% researcher; 17% policymaker, manager, or administrator; zero Veteran; and 21% other. Thank you, everyone.

Dr. David Chan: Great. Great, so obviously this question, I think, has some relevance from multiple points of view. As a clinician, so I also practice as a hospitalist in the VA. We’re interested in where do patients receive better care? And also how do patients receive better care, potentially, in one place or the other? Understanding the mechanisms is very important for us to kind of redesign our clinical processes so that we can provide potentially better care. Like in the Palo Alto VA as a hospitalist, we’re constantly asking during our daily meetings, what are some of the processes where we communicate to the ED physicians, emergency department physicians, we communicate with nursing staff, we coordinate with care outside of the hospital. And those things all have intuitive content in that you would think that better follow-up would lead to better outcomes. But having some outcomes actually linked to that empirically would help us devote our priorities as clinicians on the wards.

And then if my patients receive care outside of the VA, what are the implications for coordination and outcomes? So we know that our Veterans not only receive care in the VA – sometimes they do receive care outside of the VA, particularly for emergency care when they can’t necessarily plan where they’re going to be or where they're going to go for their care. And how do we as the VA design a system where we can optimize their care given this fact? Now most of us are researchers it seems like, and there is an obvious reason why if you’re at the VA and you’re interested in VA research, there’s an obvious reason why you'd be interested in kind of comparing VA versus non-VA care, not only for the policy and substantive reasons, but also there are methodological reasons why that we as researchers bring to the table, particularly how do we measure and how do we compare outcomes between the VA and non-VA care when these two settings fundamentally see different patients who arrive in these two settings for different reasons.

And then from the policymaker, manager/administrator perspective, we’re interested in where do we invest more in VA care? This has been a pretty key topic in the recent discussion about improving wait times and improving the capacity for Veterans to receive care and kind of bringing the resources that we have at the VA to state-of-the-art standards versus outsourcing care. And by outsourcing care, I mean having the VA finance care that’s outside of the VA in order to provide Veterans with better choice, particularly in areas and for diseases where outside of the VA might do as well, if not better, in providing Veterans care. And then finally, for Veterans, they’re obviously interested in where can I get the best care and what does this depend on? The answer might not be straightforward that 100% of the time the best care exists in the VA versus non-VA. And like if you have a specific condition and if you live in a specific area, where would be the best place for you to get care?

So with that, I am going to now poll you on what do we currently know about the quality of VA versus non-VA care? Number one, we know a lot: Veterans receive better care in the VA. Number two, we know a lot: Veterans receive worse care in the VA. Number three, the evidence is mixed and we also know which Veterans benefit where. Number four, the evidence is mixed, but we actually don’t know which Veterans kind of benefit where. And then number five, we fundamentally can’t compare systems with different patients, so the answer is actually not knowable.

CIDER Staff: And I know this is kind of a big question that people may need to put a little bit of thought into, so it may take us a few extra moments to get responses, but responses are coming in. I want to make sure to give everyone enough time to answer before we close the poll question out. We’ll give you all a few more moments to respond before we close it out and go through the results here. And it looks like this slowed down here, so I’m going to close the poll. And what we’re seeing is 16% of the audience saying we know a lot: Veterans receive better care in the VA. Zero saying Veterans receive worse care in the VA. Nineteen percent saying the evidence is mixed, we know which Veterans benefit where. Fifty-one percent saying the evidence is mixed, we don’t know which Veterans benefit. And 14% saying we cannot compare systems with different patients. Thank you everyone.

Dr. David Chan: Great. So that was really good to see. It seems like there was a diversity of opinions and there’s a little bit of truth in all of these options. And I’m also glad to see that nobody picked number two because actually there’s very little evidence to suggest that despite a lot of the policy discussions have kind of been had with that assumption floating in the background, but there’s actually very little evidence to support number two.

But what do we currently know about the VA versus non-VA? So there’s been actually a lot of research comparing the VA versus non-VA. Even though we can’t really compare apples to apples, it’s still interesting to know what are the differences in process measures and what are the differences in outcomes for patients who use the VA versus patients who don’t use the VA. A lot of the research has been done by researchers in the VA, including people in the Palo Alto center. And I suspect a lot of people on the phone might have actually been involved in this research.

So I think that we know much more about process measures, where we can kind of measure whether a clinician is doing what they should be doing for a given disease process. There have been a lot of studies on this and there have also been systematic reviews compiling the findings of these studies. And these systematic reviews have concluded that the VA is generally better than non-VA care, at least on process measures.

On outcomes, however, the findings have been mixed. People generally have looked at mortality, but there are key problems with comparing mortality in the VA versus non-VA. And this alludes to number four, or I think number five actually in the poll that you just took. And the key problem is how do you compare two different systems that have different patients that access those systems for different reasons?

So just to recap which fundamental questions that remain, so in terms of process measures, it’s interesting and important to understand the process of care, but it’s difficult to know how these processes actually map to outcomes. We have clinical intuition that they should. There have been previous studies that link these process measures to outcomes. But when you’re designing a healthcare delivery system and you’re trying to figure out what process measures matter most, we know very little about which process measures matter most and indeed if some of these process measures might actually be redundant or uninformative. And there have been, indeed, some VA thought leaders such as Ken Kaiser and Ashish Jaw that have written thought pieces about how the proliferation of process measures that we have sometimes can be unhelpful because we don’t actually know what to focus on and we actually don’t know how this multitude of process measures maps to patient outcomes, which is what we should be caring about.

But then turning to outcomes, we have the fundamental problem of different patients in different scenarios choosing the VA versus the non-VA alternative. So the question is that if we are focusing on outcomes and we want to link outcomes to process measures, how can we compare these outcomes?

I’m going to be addressing this in a specific setting of emergency care, which is a very important setting in the VA and non-VA for Veterans. Emergency care happens to be one of the most expensive types of care that the VA pays for outside of the VA. And applying the previous slide to emergency care, some of the examples of potential confounds that you would have if you were just to compare outcomes in the VA emergency care versus non-VA emergency care is that trauma patients, for example, may be directed away from the VA since many VA EDs do not have trauma capabilities. So you'd be comparing patients who have trauma versus patients who don’t have trauma. And fundamentally how do you compare mortality across those two different types of patients?

Second, patients who are unconscious may not be delivered by ambulance to the VA, and the ambulance can’t ask them if they are a Veteran, so they can’t determine that the patient is a Veteran, then the ambulance would by default perhaps send the patient to a non-VA facility. So that’s another reason why the non-VA facility might be having sicker patients than the VA facility.

On the other hand, Veterans who have lower socioeconomic status may choose the VA because it’s cheaper for them. And so there are things that would direct relatively sicker patients to the VA and other things that might direct relatively sicker patients to the non-VA. So just comparing mortality outcomes between the VA versus non-VA would have that fundamental difficulty.

So the policy object of interest that we’re trying to answer in this research and that other researchers have had in mind is what is the causal effect of VA care on outcomes? And to be specific about that, I want to talk about a counterfactual world where you took the same Veteran with characteristics that we observed but also characteristics that we don’t observe. In fact, we take the exact same Veteran and we imagine the outcomes that that Veteran would receive in the VA setting versus the outcomes that that same Veteran would receive in a non-VA setting. And that’s kind of the object that we have in mind. Of course, we can never observe the same Veteran on the same emergency ride on the same day going to both places because the Veteran is going to go to one place or the other. So of course, we can’t actually see those counterfactual outcomes, but it’s useful to have that in mind when you are designing your study. That’s the object that we’re going to try to approximate.

So this concept and this policy object of interest is not new. This concept is what lies behind what we consider a gold standard in empirical research both in the social sciences, but certainly most of you are aware that in clinical research this standard of the randomized controlled trial is the gold standard. And the idea behind this is motivated exactly by what I just talked about. What would the same patient get under one arm versus the other arm? And the way that we can approximate that is by random assignment of patients to one arm versus the other. If you randomly assign patients to a treatment arm versus a control arm, then you know that there is no selection or no confounding by indication into one arm versus the other. And then we can ask, what is the treatment effect? What is the causal effect of getting treatment versus control?

So that is the benchmark that we are starting from and that is something that we are wanting to approximate but we can’t actually do in many settings, and this is an example of such a setting where it might be prohibitively costly, difficult, or otherwise unethical or undesirable to actually randomize people to the VA versus the non-VA setting. So what do we do here?

Previous approaches, almost every single study that has compared the VA versus non-VA setting. So none of these studies have been randomized control trials. That’s not surprising. And all of these studies will control for patient characteristics. Now what does that mean? So essentially we don’t want to compare patients that are sicker in the non-VA setting or the VA setting versus patients who are healthier in another setting. So if we have characteristics that predict how sick that patient is, then we’re going to want to control for that in a regression. So patient age, patient prior diagnoses, if the patient used the emergency department before, those are all things that we can observe in the data. And if we want to be comparing apples to apples, we can hope to approximate that by controlling for observable characteristics.

The key assumption behind this is that conditional on these controls, patients will be as good as randomly assigned to the VA. So as long as control for age, as long as we control for whether the patient has been to the emergency department before, then the assumption is that after we control for that, anything left over is randomly assigned. There’s no systematic sorting to the VA versus the non-VA.

There are obviously problems to this. All of the researchers and probably almost everybody on this call, even non-researchers, will know that even when we control for stuff it’s not perfect if we can’t observe everything that we need to control for. That’s a fundamental problem of controlling for observable characteristics. There are many things in claims data, particularly if you’re seeing the patient in Medicare. We don’t have all of the detailed data that we have in the VA. We don’t know what their ESI score is, for example. We don’t know what their vital signs are. We just know diagnoses that are recorded, and of course, those are subject to the physician’s interpretation. And so there’s a difficulty if you can’t observe the things that you need to control for. And then even when we start to observe more data and more characteristics about the patient, we have this problem of the data being potentially infinitely rich and we only have a finite number of observations. So there is a fundamental problem of controlling for everything, and those approaches are definitely non-trivial and people are still working on how to use machine learning approaches, for example, when you’re trying to get a causal estimate.

So what I’m going to be doing in this talk and for this project is to outline an econometric approach, which is to try to mimic a randomized controlled trial by identifying a randomizing device. You can think of this as a coin flip. The people who receive “heads” are more likely to go to VA. This is what, in econometrics, is called a first stage. And getting “heads” is uncorrelated with anything about the patient, particularly underlying health, and we call this an exclusion restriction. In this setting, we’re going to focus on two instrumental variables. So the technique that we’re applying in this setting is call instrumental variables, or IV.

My last poll question, how familiar are you with instrumental variables? Very familiar; I've been taught them but haven't used them in analysis; I've heard of them but no formal training, or I've never heard of them.

CIDER Staff: And we’ll give everyone a few moments again to respond to the poll question before we close it out and go through the results. It looks like we are slowing down here, so I’m going to close the poll. And what we’re seeing is 20% of the audience saying that they are very familiar and have used them in analysis, 20% have been taught them but have not used them in analysis, 20% have heard of them but have no formal training, and 40% have never heard of them. Thank you everyone.

Dr. David Chan: Okay, thank you. So it looks like I have, this is great. So 60% have heard of them, but I still have my work cut out for me and this is exactly the purpose of this seminar, which is to introduce this concept.

So an instrumental variable, again, you should think of this as a coin flip, something that is approximating random assignment. And you can talk about the specific instrumental variables, whether you think it’s believable whether it approximates random assignment, but the goal is that it does. And you can think of it as a coin flip. And if the coin lands on heads, the instrument is supposed to kind of nudge the Veteran towards the emergency department in the VA. And if tails, it goes in the opposite direction. So the coin needs to be meaningful. Basically, the coin needs to kind of help determine whether the Veteran goes to the VA or the non-VA setting. That’s called the first stage or that’s called the relevant condition. And then the other one is that the coin flip needs to be uncorrelated with anything about that Veteran. And that’s called the exclusion restriction.

So there are two potential instruments that we have here that have been used in the prior literature. One of them is a newer instrument, which we’re going to spend more of our analysis on in this particular question. This is called the ambulance instrument. So it’s perfect for an ED setting. And the coin is which ambulance picks you up? So this study found that certain ambulances are more likely to send patients to certain hospitals than other ambulances. And it’s using that variation in the ambulance that picks you up to determine which ED do you go to. In this study, we’re going to use this variation to ask whether the patient goes to the VA ED.

There's a second instrument which is a much older instrument and is considered a classic instrument in health economics, and this is called the differential distance instrument. So the coin is where do you live differentially relative to the VA versus non-VA ED? And you receive a “heads” if you live closer to the VA ED versus the non-VA ED. So both instruments have been developed in this broader health economic literature that considers the effect of hospital spending or intensity on outcomes. Here, we’re going to use this particularly for the effect of VA versus non-VA emergency care on outcomes. And in practice, it’s important to realize, and I’ll talk about this in a later slide, that controlling for stuff still plays a role here. But instead of the idea that controlling for stuff is going to soak up all patient characteristics, both observable and unobservable, controlling for here is now a much more limited role. The controlling for stuff basically is an effort to identify the right lottery that the patient is in. So if a patient lives in one city versus another city, there are different lotteries that will determine where that patient’s going to go to. You want to control for the city that the patient lives in, but you don’t actually need to control for patient characteristics like age or prior medical condition.

So just a couple slides on the study design. We are using VA data on elderly Veterans and we’re linking those data to Medicare data as well. So we can observe both VA emergency department visits as well as non-VA ED visits in the Medicare data. We observed 34 million visits in the VA data and 24 million visits outside of the VA. We’re going to restrict these visits to those taken by elderly Veterans that are brought in by ambulance, in markets where the Veteran could have been sent either to the VA or the non-VA. And it’s going to be apparent why we make those sample selection criteria. And after doing those sample selection steps, we have a sample of 8 million ED visits for 2.7 million Veterans.

In the data, we observed the Veteran location. In other words, where did the Veteran live, as well as where did the Veteran get picked up by the ambulance and the ED location that the Veteran went to as well as other nearby locations that the Veteran could have gone to. We observed characteristics of the Veteran prior to the ED visit, such as previous diagnoses, previous healthcare utilizations and office visits or emergency department visits. Third, we crucially used the ambulance identity that we observed in Medicare claims. So we can know the tax ID of the ambulance as well as other things that the ambulance records on that claim. And then, finally, we observed characteristics of both the VA and non-VA hospital when we want to compare different pairs of VA and non-VA hospital. Some of this we get from the American Hospital Association. Some of it we get from Hospital Compare, which is a site that Medicare runs, and some of this we get from SAIL, for any of you in the VA who are familiar with that comparing different VA hospitals.

The outcomes we’re going to look at are diagnoses made during the ED visit. We’re going to look at charges and costs associated with the ED visit as well as subsequent hospitalization. We’re going to look at follow-up visits after the ED visit. And then finally, of course, we’re going to look at mortality both during as well as after the ED visit.

On this slide, I’m just going to throw in front of you some math. And this is, basically the thing you should take away from here is you have this regression or this relationship that you are interested in where you have an outcome like mortality and a treatment such as going to the ED that you’re interested in. The problem is you have selection into treatment or confounding by indication and not all of that selection is based on observable characteristics. So what you’re going to do is you’re going to use this instrument, Z, and this instrument drives treatment. A key assumption is that this instrument is not selected. There is no confounding by indication for this instrument. So then you can use this instrument to have a predicted D, or predicted VA versus non-VA. And this is called a first stage. You need that coin flip to matter. If you get a heads, you’re more likely to go to the VA. If you get a tails, you’re less likely. So you need this coefficient here to be non‑zero and this is a testable assumption. And then once you have this thing being a randomly assigned instrument, you can use this to then look at the effect of this instrument on the outcome.

Of course you’re interested in this regression here, but this is what we call a reduced form regression, or for those of you in the clinical trials world, this is also called intent to treat. So the effect of the instrument on the outcome is the same thing as intent to treat. The reason why this thing, this pi 21 is different than this rho is because you have some Veterans who will always go to the VA regardless of the ambulance that picks them up and you’ll have some Veterans that’ll never go to the VA regardless of the instrument that picked them up. These guys are called non-compliers. Just like in the clinical trials world, you’ll have non-compliers, and that’s why you have a difference between the intent to treat with the actual effect of treatment on the outcome.

And so this is just a nice framework to think about, how do we think about non-compliers? How do we think about this effect of this instrument on the outcome relative to the effect of the treatment on the outcome? And how do we use this instrument to get a causal effect on the outcome here? So the term is reduced form, first stage, and instrument are some of the terms that I’ll be using in the remainder of this talk.

So the ambulance instrument, this was developed by Doyle and colleagues in 2015. This is actually a picture from that paper here and I have references at the end of the slide that you can actually go and read this paper if you’re interested in. So this is an example of Bellevue hospital in New York. You have very granular zip code blocks here where you ask, what if you’re picked up by one ambulance versus another ambulance in the same zip code. And they found that in New York City, some of the ambulances are owned by the hospital. So if you’re picked up by those ambulances, you’re highly likely to go to the hospital that the ambulance is owned by. On the other hand, if you’re picked up by the fire department ambulance, you’re much more likely to go to Bellevue. And so there’s some variation by the ambulance that picks you up. And the idea is that this variation is unrelated to the patient characteristics, particularly when you control for the zip code that the ambulance arrives in.

So just to think about this ambulance, what are some of the potential reasons for this ambulance to matter in terms of whether you go to the VA versus non-VA? Again, this is called the first stage. Why do we have our first stage here? And the answer is that ambulances may be affiliated with certain hospitals like in the New York City example. Ambulances might have different degrees to which they ascertain whether a patient is a Veteran. And ambulances may have bases of operation that are closer to the VA versus non-VA. So after an ambulance picks you up and sends you to the hospital that you go to, the ambulance might have to go to a certain catchment area to wait for the next call. And if the ambulance's base of operation is actually closer to the non-VA hospital versus the VA hospital, that’s a plausible source of variation that would make that ambulance want to go back, want to send you to the non-VA hospital on its way back to its base of operation.

Now there are certain assumptions that are key for this quasi-experimental design. And this is called exclusion restriction again. So first we need that ambulances need to be randomly assigned, conditional on zip code. So for two Veterans who live in the same zip code, we can’t have that ambulances are choosing, the one who is more likely to send patients to the VA is choosing sicker patients. Instead, we need some kind of mechanical system in which an ambulance from one company versus another company are as good as randomly assigned to that patient. And to some extent, we can test that, but this is fundamentally an assumption. And then secondly, we can’t have that ambulances of different propensities are sent to the VA versus non-VA directly affect patient health.

So this is a graphical representation of the first stage. The question that the first stage answers again, is the VA versus non-VA ED usage predicted by the ambulance propensity to send to VA for other patients? So we are going to look at all of the other patients that that ambulance has a claim for. We’re going to ask, for those patients, how many of the times, what percentage of the time does the ambulance send to the VA versus the non-VA? And then we’re going to ask if that is predictive of whether the ambulance is going to send this particular patient to the VA versus non-VA. And here we have on the x-axis this kind of propensity based on the other patients, and then we have on the y-axis whether that patient is going to be sent to the VA versus non-VA. And we can see that it’s a very highly predictive relationship here where the ambulance's practices predict whether this particular patient is going to be sent to the VA versus non-VA. This particular graph is based on HRR, a health referral region, but we do all of our analysis based on conditioning on zip codes. So this should actually read zip code. This is an earlier graph of VA analysis.

The second assumption, which is more difficult to show, is this assumption that patients are as good as randomly assigned to the ambulance identity. And this is fundamentally, we can’t show this with 100% certainty because, of course, we don’t observe everything about the patients, but what we can ask is whether what we do observe about the patients appears balanced between ambulance companies. And this is very similar to a randomized controlled trial where any randomized controlled trial that you read, you’re going to see a table called a balance table. And it’s going to compare the characteristics of people that are assigned to the treatment arm versus the control arm. There you would hope that it would mechanically be balanced because there is actually a randomizing device in the trial that you’ve designed.

Here, we want to test whether patient characteristics that are picked up by high propensity VA ambulances are similar to those who are picked up by low propensity ambulances. And so here we have different quintiles of the propensity of the ambulance. So you can see that from the lowest quintile to the highest quintile, there’s a six percentage point difference in whether an ambulance is going to send you to the VA versus non-VA. We see that the age of these patients are similar. We see that the predicted 28-day mortality, based on age and other patient characteristics, is also roughly balanced across these quintiles. And then we do this for every single Elixhauser category, but just showing an abbreviated version. For example, congestive heart failure looks approximately balanced across these categories. Cardiac arrhythmias, hypertension, COPD, and diabetes look approximately balanced across these categories. And we know that they’re balanced because they feed into predicted 28-day mortality.

I am probably going to skip through this slide in the interest of time so that we have questions to talk about this later, so we basically, so we have time for the questions. But basically this instrument accounts for the possibility that there are non-compliers. And I just spent some time talking about that. So it’s okay if there are some patients that will never get sent to the VA, for example, unconscious patients. And because we’re conditioning on zip code, we’re not going to ever compare two Veterans in different zip codes. We’re only comparing two Veterans in the same zip code that happen to be picked up by a high-propensity ambulance versus a low-propensity ambulance. And it’s okay also if, so basically I talked about these non-compliers and it’s okay if these non-compliers are systematically different from the compliers. That’s exactly why we’re using an instrument.

The second instrument that I want to spend some time talking about is this differential distance instrument, which is a classic instrument in the previous literature. Basically the idea is if you live closer to the VA, you’re more likely to go to the VA. The assumption is that those who live differentially closer to the VA are no different than those who live differentially farther from the VA. It’s important to also note that this instrument is differential distance, not absolute difference. So if you live in a rural area, you’re going to be far from the VA and far from the non-VA alternative so that your differential distance is going to be approximately the same as somebody who lives in an urban area. And you can see some of this when you look at this in 3D. So if you look, one axis is distance to the non-VA. The other one is distance to the VA. As you move farther from the city, you’re going to actually go farther on both axes. And you can see that the probability of going to the VA depends on differential distance, not really on absolute distance. If you’re living far from both the VA and the non-VA, it really doesn’t determine your probability of going to the VA. It’s really the differential distance that determines that.

And then we can look at mortality. This is called the reduced form, just to give you an intuition of the finding that we get. If you look, the farther you live away from both the VA and the non-VA, that doesn’t determine your mortality as much as the differential distance between the VA and the non-VA. So here you can already get a sense of the results that we’re going to find. We find that people that live closer to the VA are less likely to go to the VA. Those same people are more likely to die. The people who live close to the VA, who live far from the VA, I’m sorry, I’m going to try to state this again. The people who live closer to the non-VA are less likely to go to the VA and they are, sorry, they’re less likely to go to the VA here and they’re more likely to die. So the ones who are more likely to go to the VA, which live close to the VA, are less likely to die. So this implies that there is a mortality effect of going to the VA. Going to the VA reduces mortality under the assumption that the patient characteristics of differentially living closer to the VA are uncorrelated with, basically those characteristics are uncorrelated with your differential distance.

This is a map of differential distance in the US. And basically they are concentrated across the 130 VA stations that we see. But of course, all of this is conditional on a small geographic area. And here it’s conditional on health services areas. So there’s 908 of these areas.

You can see this in the Pittsburgh example, where the VA is the black dot. The non-VA locations are the white dots. In this HSA, it turns out that the VA happens to be relatively central, but in another HSA such as Houston, the VA is not necessarily central. And so you have patients who can live in the middle of the city who will be a little farther differentially from the VA and also patients that are equal distance from the VA might be very far differentially from the VA but not so far differentially from the VA depending on whether there is another non-VA ED close to them. So it’s a fairly complicated object that’s robust to things like do you live in the rural area versus an urban area, and do you live in the center of the city versus on the outside of the city.

Moderator: Dave, there’s one question. I'm sorry.

Dr. David Chan: Yeah.

Moderator: There’s just one question. So when you’re doing the differential distance, the person is asking whether you’re using any VA facility or specifically the VA facilities that have EDs in order to create the instrument?

Dr. David Chan: This is just, the differential distance instrument is created without looking at whether patients use the VA or not. That’s just asking how far do you live from the VA versus how far do you live from the non-VA, the closest non-VA alternative. So that’s the instrument. Then in the first stage we’re going to ask whether this is correlated with whether you use the VA emergency department versus the non-VA emergency department. So that kind of leads to this graph here, which is the first stage. Like does your differential distance drive your use of the VA ED? And here we find where if you live farther from the VA ED you’re less likely to go to the VA ED, unsurprisingly, and if you live closer to the VA you’re more likely to use the VA ED.

Moderator: So I’m sorry\_

Dr. David Chan: \_Yeah.

Moderator: \_to clarify, I think that the question is, when you’re looking at the differential distance you’re looking at the differential distance to a VA ED, not to a VA facility.

Dr. David Chan: Correct. Sorry. Yes. It’s the distance to the VA ED.

Moderator: Perfect. Thank you.

Dr. David Chan: All right. So apologies if I don’t get through the entire talk. I think I’ll probably skip through slides and I’ll probably spend a little bit more time on some of the findings so that we can open up for questions here. This is actually the first time I’ve given this talk here and I’d kind of love to hear some feedback.

So this is similar balance table where you find the patient characteristics are not correlated with the differential distance. And a quick note on these two instruments is that they are very, they are almost by design uncorrelated with each other. The ambulance instrument is within zip code, which means that it’s all within patient location. The differential distance instrument, even though it’s within HSA, it’s fundamentally an instrument about where does the patient exactly live. What's the five-digit or nine-digit zip code within an HSA? So you wouldn’t expect the result to be mechanically correlated. And they’re looking at the same questions from very different angles.

So the first result that we have, that we’re going to look at is mortality. We’re going to look at 30-day mortality. And we find that the baseline mortality of these patients is 10 percentage points. So it’s quite high. These are elderly patients who are brought in by ambulance to an emergency department, find that they have a lot of comorbidities, and that within 30 days, 10% of them die. We find that for patients, based on these instruments, based on actually both of these instruments independently, the effect on mortality is a five percentage point reduction. So that’s actually a 50% reduction from the baseline of 10 percentage point. We find that these results are robust across, both looking at this within design, so the baseline results are using within design, all within HSA or within zip code. And these results are averaged across each of these within areas. But we also find that this result holds when we look across locations. Just there’s less of this causal interpretation to looking across locations, but we find a pretty strong relationship that supports our findings.

So just to give you some more concrete data here, if you were to look only for Veterans who live in the Houston HSA or only look at Veterans that live within the Pittsburgh VA, sorry, the Pittsburgh HSA, you find a relationship that holds throughout HSAs, which is that for patients that live farther from the VA they’re less likely to use the VA and they’re more likely to die. So based on the assumption that differential distance is uncorrelated with characteristics that predict mortality, we then attribute a causal interpretation to this relationship that going to the VA reduces mortality. And this is true within individual HSAs.

And then this is the relationship when you look across the 908 HSAs. For each of these HSAs, we ask what’s the average differential distance to the VA and we ask what’s the average mortality. And we find this relationship where if the average, the differential distance to the VA increases, the average mortality increases as well.

We have some findings where we started to look at what happens after in terms of process measures and what happens in terms of spending for Veterans that arrived to the VA versus non-VA. We find that patients who arrive to the VA are less likely to be admitted briefly, sorry, they’re less likely to be admitted at all, but conditional on admission they’re more likely to be, sorry. So if you go to the VA, you’re less likely, you’re more likely to be admitted, but conditional on admission your length of stay is shorter. So basically if you just look at this graph here, for the VA patients the zero day, sorry. So they’re actually less likely. So the zero days means that you’re not admitted. The more patients that are randomly assigned to the VA ED are not admitted at all, meaning you’re less likely to get admitted at all, but for the patients who are admitted, you have many short lengths of stay on the non-VA side. And this then rolls up to things like cost, which we haven’t looked at yet, but this is implications for are patients being admitted for the ED visit.

Another way of looking at this is the emergency level that the E&M codes are being billed for, for patients that arrive to the non-VA ED versus the VA ED. And we find that there is a systematically higher level of E&M billing in the non-VA. So this is, you would read this as Medicare. Among the Medicare or non-VA EDs, there are many more level fives and level fours where there are much fewer. So just looking at level five alone, there are 44% or 45% of the E&M codes are billed at a level five versus only 9% are billed at a level five, or they’re not billed but they’re recorded as a level five within the VA.

So if you’re asking about this make-or-buy decision, when the VA is looking at not just the outcomes but also what are the cost implications if the VA were to pay what Medicare is paying, the VA would pay at a higher level for the same patient. The same patient would be recorded as a higher level outside of the VA. And there are obvious reasons if the payment, if Medicare’s fee for service versus VA is vertically integrated, why people would record higher levels of intensity outside of the VA.

So just to sum up, so we introduced, I spent most of the talk talking about this quasi-experimental approach and introducing some of you guys to this idea of instrumental variables. And the idea here is to try to mimic a randomized controlled trial. We can never do a randomized controlled trial for practical reasons and ethical reasons, but what can we do empirically to try to approach this? And in order to approach this, we require assumptions about instruments being uncorrelated with underlying patient health, but there are things that we can do empirically to show that they do appear uncorrelated at least on things that we can observe. And these things, again, follow the randomized control literature of showing balance. And so given that, the results that we have so far, and I’m putting less emphasis on the results than the methods, but we have already a number of different ways of looking at mortality using two different instruments, using within area variation as well as variation across areas. We find that a pretty robust result that VA ED on average decreased mortality by a substantial amount. We’re starting to see some evidence that VA EDs also would cost less than the Medicare EDs just based on the billing that happens and whether the patient is likely to be admitted in the Medicare ED versus the VA ED. And these have implications for how the VA can optimize Veteran health in this make-or-buy decision.

There’s a lot of future work that we still have on our plate. So an obvious direction here is, for which Veterans is the health benefit the largest in the VA? And are there some Veterans who might benefit from the non-VA care? So for example, trauma patients, they’re probably unlikely to go to the VA, but they are especially the ones that would benefit outside of the VA versus mental health or substance abuse. You can think of conditions that the VA might do particularly well on and then maybe some conditions that the non-VA setting might do well on.

And we can also characterize, what is it about these hospitals that make them perform better relative to the non-VA alternatives? Is there variation in these hospital cares of the VA versus non-VA? In Palo Alto, we’re comparing Stanford versus Palo Alto. In other settings, there might be an academic medical center and a relatively small VA location. In yet other settings VA location can be more specialized and more, have higher capacity relative to the non-VA alternative.

And then finally we’re really interested in the mechanisms that drive this effect. So some potential mechanisms can include follow-up care or continuity of care. The fact that VA EDs have access to the medical records of the Veterans versus Medicare non-VA EDs might not. Are there specific resources and in areas of expertise, again, along the lines of substance abuse, mental health that would really benefit Veterans in the VA EDs? And this whole thing up for questions, are there any other mechanisms that we should look into?

So with that, I’m just going to end with a slide on references for anybody that’s interested in reading more about this literature and I’ll open it up to questions.

Moderator: Great. Thank you, Dave. Right now, we just have one question. So audience members, if you are interested in querying Dr. Chan further about this, please submit. One question is about just a general analyses as to whether urgent care centers on the VA side were included.

Dr. David Chan: Right. So we did not include urgent care centers in the analysis. We’re focusing on patients that are brought in by ambulance, so that would be less relevant for urgent care centers. But from a policy angle we are interested in, this is not this analysis that I've just presented to you, but we are interested in what would be, implications be of building more urgent care centers and that would be, so that would definitely be policy relevant.

Moderator: Okay. Couple of things coming in. So one question is saying given that the study is conducted amongst the VA Medicare dual-eligibles and the models estimate a local average treatment effect, have you thought about how results will generalize to other key VA sub-populations? I think you sort of touched on this with the mental health component, but if you’re able to expand at all.

Dr. David Chan: Yeah. So that’s a key, very interesting point that I kind of breezed through on one of the slides talking about the local average treatment effect. So for everyone in the call, the local average treatment effect is the effect of the treatment on people that are compliers. For the folks who are not compliers or folks who will always go to the VA or never go to the VA, we don’t really have any estimate of what the treatment effect is – what’s the causal effect of going to the VA on those guys. And this is true not just in this study, but in all studies, and it’s also true in randomized control trials.

And this question about the fact that we’re using Medicare data where we’re restricting to patients we could observe outside of the VA using Medicare data means that our study is particularly looking at the effect on these guys that are above 65 and are on Medicare and also taken in by an ambulance. So these guys, as I was saying, are sicker than your average emergency department patients. There’s a mortality rate of 10 percentage points and they have many comorbidities, so you would actually expect if there was an effect on mortality that the effect should be bigger on those guys who have a higher baseline mortality. So the short answer is we can’t really generalize just based on this finding alone, but we wouldn’t expect that the finding would be unique. Just based on the a priori reasons, we wouldn’t expect that the VA is particularly good, better than outside of the VA for treating older patients. Outside of the VA, there are a lot of old patients as well as in the VA there are old patients, but we hope to get at this by looking at some of the mechanisms. Is it about follow-up care? For what types of diagnoses is the effect bigger? And then we can ask do these diagnoses exist for younger patients? Are these mechanisms plausible for younger patients? And by looking at the mechanisms, we can start to understand more about this underlying economic principles that are occurring that wouldn’t necessarily be limited to the patient population in this study.

Moderator: And for your patient population that was used here, do you have a sense of what the most common reasons for ED visits were?

Dr. David Chan: Yeah, so you see a lot of COP – Go ahead.

Moderator: I think it – Oops, sorry. I was just curious as to the extent to which mental health comorbidities or substance abuse comorbidities are the reason for showing up at an ED.

Dr. David Chan: Right, right. I don’t have the table in front of me, but I think that mental health and substance abuse are a minority of the visit. And most of the visits are for bread and butter kind of conditions like congestive heart failure, acute coronary syndromes, COPD exacerbation. So that’s not to say that mental health conditions aren’t a big part of the effect. It might be that a lot of the effect could still be driven by the mental health conditions when plausibly the VA has very specific resources for Veterans with mental health and substance abuse. So that might be an area where that’s driving a lot of the effect, but there’s certainly a lot of patients, the vast majority of patients do not have mental health conditions that are coming to the ED. And so I suspect that the effect would have to exist in the broader population where they’re coming in for medical conditions, and presumably they would need follow-up care after the ED visit. I didn’t show this on the slide, but interestingly, the mortality effect seems to grow after the ED visit. So there’s certainly a mortality effect in the ED visit and also in the hospitalization. The patients are less likely to die in this visit when they go to the VA as opposed to the non-VA setting. But even after they’re discharged from the hospital, the effect persists and grows a little bit as well. So that seems to suggest that the mechanism of follow-up care and coordination of care could play a big role here. And that would be true both in mental health as well as many of these chronic medical conditions.

Moderator: Great. Dave, I’m curious about your differential distance instrument, and I’m wondering if you were able to test the strength of the instrument in urban areas versus non-urban areas and whether the strength of that instrument was greater in the non-urban or the rural areas relative to urban areas.

Dr. David Chan: Yeah. So yeah, I think most of the strength is actually coming from the urban areas because we are mostly operating in an area where differential distance should be pretty close to zero. And if you’ve got like differential distance when like it’s something like 20 miles or 40 miles, A, the population for that kind of becomes sparser. The population in the rural areas is sparser as well as the instrument just scaled in terms of miles, and so you have this scaling where the farther you live it’s also likely that the differential distance is also going to scale up for, and if you live like 100 miles from both VA and non-VA you can have a differential distance of negative 20 or positive 20. So I think a lot of the power is, and that just, which is kind of akin to a measurement error, I guess. So a lot of the power is actually coming for patients that live relatively close to both the VA and non-VA and those would be the patients in the urban areas.

Moderator: Great. Well, thank you so much, Dave. I think that is it for the questions from our audience members. It was great to hear your presentation and good to hear that the VA is doing well with respect to ED care relative to the non-VA environment. We appreciate your time here, and I think with that, Heidi, we can turn it over to you if there’s any further polling that needs to be done.

CIDER Staff: Nope, I just wanted to let the audience know I’m going to close the meeting out in just a moment. When I do, you will be prompted with a feedback form. We’d really appreciate it if you took just a few moments to fill that out. We really do read through and record a lot of your feedback. Thank you, everyone, for joining us for today’s HSR&D Cyberseminar, and we look forward to seeing you at a future session. Thank you.

[ END OF AUDIO ]