

**RANDALL** What I'm going to do, fairly briefly, is talk about the landscape of kidney transplantation-- focusing a lot about the word "current" because some things have changed, which may affect what we say to patients, what patients perceive, and actually who gets transplanted. I don't have any disclosures.

So this summarizes what's going on at Gift of Life which is the organ procurement organization. Donors are up. They work very hard at trying to get people to consent to organ donation and to have these potential donors wind up resulting in a lot of organs being transplanted. And we have a very good cooperative relationship with them, as do all the transplant centers in Michigan, which is not always the case across the country. So it's a really great relationship.

The number of kidneys transplanted from Gift of Life is basically holding steady, actually a little more increase lately even though the trend line is down. And not all kidneys that are recovered in Michigan are transplanted in Michigan. Some go out to recipients in other states because of sharing rules.

Sometimes there's differences in what the need is and how the quality of the organ is perceived, and they can go out by that mechanism as well. But you can see the trend line for a number of transplants in Michigan is up. Although, as you can see here, there's by no means enough organs to go around.

This outlines-- every year-- the number of people that are added to the wait list and the number of people that are getting transplanted. So every year there's more people getting listed-- more people needing a transplant than people getting a transplant. And it accumulates. So we're not even talking about the size of the wait list. We're just talking about the people for that year. So there's a huge need for organs.

This is a map showing where we stand, and shows-- if you were listed in 2010-- what percentage of people-- what was your chance of getting transplanted within five years. And you can see, there's tremendous geographic variation across the country. We sit in the middle of that. Our wait time for a deceased donor transplant is about four to five years. But that varies greatly by blood type. So if you're O, you can wait as long as seven. If you're A, it's more like three or four. If you're AB, it's more like two. B is like five or six.

But this is something that's recognized across the country as being an issue-- the fact that where you live affects how you can get a transplant. Getting that equalized is challenging for reasons that I'd be happy to talk about offline but are probably too detailed to go into. And donation rates, obviously, matter a lot. So I said that Gift of Life works hard to increase donation rates. And in general, again, we sit in the-- sorry I can't see my--

**AUDIENCE:** Is darker better?

**RANDALL** I'm sorry. Darker is better. OK. So that donation rates of 29.3 per-- or 29.3% on this one-- darker is also better.  
**SUNG:** OK? So going back to waiting-- major metropolitan areas-- LA, San Francisco, Chicago, New York-- these are classically the places where people wait a long time, and also organ donation rates aren't necessarily as good. But there's not a one-to-one ratio. You can see that some states are dark here and some states are light here. But in general, organ-- obviously, the higher the donation rate, the better the odds of transplant are and the shorter the waiting time. But there are other factors as well.

About 30% to 40% of transplants in Michigan recipients are from living donors. And we certainly spend a lot of effort trying to promote and educate about living donation because there are many advantages, which you all are probably quite aware of-- of having a living donor. The transplants, on average, last longer. But even more importantly, you don't have to wait as long, and you get transplanted earlier.

All of this has plateaued, and there have been a number of things that have happened over the years that have maybe limited the expansion of living donation-- some good, some not so good. We know better about what living donors are risky. We know better about predicting the risk of end-stage renal disease in people who want to be donors. The government stepped in and in some way threw a wrench into living donation in the interests of safety, which again, I won't get into, but maybe had unintended consequences. But there's been a little bit of an uptick in the past couple of years.

There are six centers actively performing adult kidney transplantation in Michigan. They're all over the place. They cover all different types of insurance, so which center your patient goes to can depend on a number of different things. They all tend to operate pretty similarly because we're very constrained in how we operate by CMS. And they all have-- for the most part-- similar outcomes. There may be variation in the types of transplants-- I'm sorry-- in the types of patients that are transplanted. But again, this is sort of nibbling at the edges. So there's a whole large segment of people that would probably be transplanted by everybody. And then when you get to the marginal candidate, you may have some variation. So it's always worth it to get a second opinion.

So the outcomes, in general, are good. One thing about these two comparisons is that the scale is not the same. But one-year survival, which is in green-- or I should say, failure rates have improved greatly over the past several decades. So for a deceased-donor transplant, the failure rate at one year is probably in the neighborhood of 6%. For living-donor transplants, the failure rate at one year out here is more like 2%.

And then long term-- at 10 years after living-donor transplant, more than half are still going. In fact, now, the most recent projection is about 38%. Whereas for a deceased-donor transplant, you're getting right to the 50% market, 10 years. So there's obviously, as I said, a difference in outcome.

One thing that we have utilized a great deal, not only in allocation, but to some extent in decision making about deceased donor organs, is something called a Kidney Donor Profile Index. And what this attempts to do is to project survival based on certain characteristics that are known about the donor and that also could be analyzed in large databases. All these variables get put into a formula, and each donor has a number associated with it, which is on a 0% to 100% scale. And you can see that survival after transplant correlates to that, which is what the idea is.

But even in this sort of 90 to 100 range where the organ quality is not as good, it's important to remember that people who receive these transplants still have a survival advantage compared to being on dialysis. So it's not that these are bad organs, they just don't live as long.

One of the goals of allocation that I will touch upon is to try to channel these organs to people who may not have as long a survival after transplant. So it's age discrimination to say people who are old, but that's kind of how it shakes out-- or people who maybe don't have as good a survival on the wait list, like diabetics and also older people. So there's mechanisms to try to do that and centers generally follow that.

So about two and a half years ago, the allocation system for kidney transplants changed. Kidney allocation is incredibly complex, and the people who actually do it for a living couldn't tell you all the rules. It's like the tax code. Everybody wants to simplify it, but nobody can figure out how. Or it's too radical, so people don't agree upon it.

But there were a couple of things that were done that were pretty good. And part of this was getting at trying to get organs with longer projected survival to patients with longer projected survival. So some of you may remember there was the ECD system which worked a little bit at getting these expanded-criteria donor organs to people that were older-- or at least to prevent them from going to people that were younger-- and that was moderately effective. But there was nothing preventing an 18-year-old kidney from going to a 75-year-old recipient, and everybody had the sense that maybe that wasn't the best use.

So one of the things that was done is something called EPTS which is the Estimated Post-Transplant Survival. And this is sort of a simple formula to project recipient's survival after transplant. And so what was done is that the candidates in the top 20% of Estimated Post-Transplant Survival now receive kidneys from donors with a KDPI of 20% or less-- in other words, the top 20%-- so it's going young for young.

There was a dialysis time calculation change which did not affect us in Michigan because we had already gone to that system in 2006, I remember. What this does is basically if you're put on the wait list after you've already been on dialysis, you get credit for time served-- if you will-- having been on dialysis. So somebody who had been on dialysis three years the day they got put on the waiting list-- they basically had three years of waiting time. So most of you are all probably familiar with this. But this was new for most of the country at the time, in 2004.

There were subtle calculations in how sensitization was worked into the allocation system. The Kidney Donor Profile Index was used as an adjudicator of organs, and there's a slide to come that'll put those in greater detail. The other thing that happened is that-- and I realized-- I sat in the back over there, and I realized most you can't really read the writing on this-- but I'll walk through it.

One of the things that it did was for highly sensitized patients-- and so for every-- these are different KDPI stratus, so these are formerly ECD, or like it. These are the less than 20 which are the best kidneys. It used to be that if you had a PRA of 100%, you would get access to kidneys all across the country only for zero mismatch and other perfectly matched donors.

But it turns out that there are donors with which-- even if you have a PRA of 100, which makes it sound like you have antibodies, and it's everybody, and that's not you. Actually, there are donors with which someone with a PRA of 100 is compatible with, even if it's not a perfect match. And so what the change was, was to expand mandatory national sharing-- in other words, access across the country-- for any compatible donor for people with PRAs greater than 98. And so that was actually very effective, as I'll show.

So this summarizes what the different strata of KDPI mean, and there are all these different rules. But essentially, this-- for KDPIs less than 20-- the top 20 means the top 20 of Estimated Post-Transplant Survival, like I mentioned. Here-- and there's all zero mismatches and things like that-- for KDPIs between 0.21 and 0.34, kids get priority over adults in all circumstances. Not that kids wouldn't get priority here, but we don't really even need to offer these organs that are of some-- even normal-- quality to kids. They get access to the best organs, which I think most people agree is a good thing.

So this is the meat of the waiting list. These are where most of the organs that are transplanted fall. So you have your zero mismatches, your prior living donors, and then local according to mostly waiting time. But there's also matching at the HLA-DR locus that is still a part of this. And also a PRA score so anybody who sensitize gets a little bit of a bump up. And the way it was adjusted was to almost exactly calibrate your access based on your PRA to really try to make a level playing field.

And then these-- the KDPI is greater than 0.85. Again, we're supposed to replicate the ECD system. The one thing that changed here, though, is that these organs-- organs are allocated at the local level, almost, with some exceptions. And that was the way it was for ECD kidneys. What this change did was basically made one level in the region.

So our region is Michigan, Ohio, and Indiana. So if there is a KDPI greater than 85 donor in Ohio, it basically-- the list is one list based on the Michigan list, the Ohio list, and the Indiana list. And all the people for these kidneys pre-consent to receive these organs. So there's discussions that we have about the pros and cons, and one of the pros is there's the potential for them to get transplanted earlier. Although depending upon the particulars and who signs up, that's not necessarily guaranteed.

So the other thing that has really been underutilized across the country, is a provision that allows B candidates to receive kidneys from donors of what's called A2 blood type. So A2-- about 10% of A people have a subtype of A2, and it's based on antigen density. But essentially, most people who are B will not-- or 90% of people who are B will not necessarily react against A2. So these are transplants that are done on an experimental or trial basis in some areas of the country for a decade.

And the results are basically equivalent to ABO-compatible transplantation without any risk of rejection-- without any special immunosuppression-- nothing. It's basically, for all intents and purposes, a regular transplant. And so this provision allowed people with-- as long as you had a process to do it-- who were B to get tested for antibodies against A, and if they didn't have it, then they would be eligible for it. And so the idea is to increase access for B candidates who are disadvantaged. It does have the effect of reducing access for A candidates who were more advantaged in the first place.

And so we've done this, and we've transmitted a number of B people with A2 kidneys. And we found this to be-- it's worked out very well. They haven't been any different in terms of their outcomes compared to any of the other transplants. So this has worked out very well. So if one of your patients asks about it, hopefully you can say, oh, yeah, I heard about this. I don't see anything wrong with it. I think you should do it.

There's a dirty little secret that I will share in that I don't think this was the intent of the program or of the change. I think the intent was for these people who were B-- when this thing called the matron comes out, which basically orders all the people who were up for a transplant for a given donor-- I think these people who were B would go into the list for A with the same criteria in terms of waiting time and things like that.

But what's happened is a lot of these people have gotten pushed to the top, and I'm still not entirely sure why. But some of our people in this program have gotten transplanted within a year with one year of waiting time. So it's a huge advantage that I don't know if it will persist, but I'm kind of loathe to say anything about it because it's really advantaging those people who are taking advantage of the program. So don't repeat that please.

[LAUGHTER]

So with all these allocation changes, I just want to show that transplant volume, if anything, has increased. So there haven't been any adverse effects on transplantation. This change-- I referred to with PRA-- meant that a whole lot more patients. So this a very dramatic effect. We transplanted a whole bunch of people with high PRA when this change went into effect.

Obviously, there was a backlog of these people and this "bolus effect." So it's kind of leveled out but to much higher rates. And if you look at transplant recipients in Michigan, this goes-- this is a graph by PRA-- the highest PRA patients are in pink here-- greater than 98-- so this took place at the end of '94. There was a big bolus, even though the thing was only in place for two months in '94. And then it continued to be high, and it's maybe leveled off a little bit but at much higher levels. So there is really a big improvement in access for this most highly sensitized patients.

There was a concern that only young people would be transplanted in a system that kind of prioritized-- or at least assessed-- age or post-transplant survival. And you do see-- if you compare the blue to the green-- a decrease in those over age 65, in those 50 to 64, and an increase in younger recipients. So that did happen across the country.

In Michigan, the effect was a little more modest. So you can see that it came into place here. There was a bit of a decrease in '14 and '15 but then the percentage over 65 actually increased again in 2016. These blue bars are a little bit bigger than they were before, but not a dramatic effect. So this-- whether you agree or disagree that age should matter in getting a transplant-- at least the changes didn't have a major disruptive impact on the patients.

Now, the dialysis wait start time policy basically is designed to help access to transplantation for people who don't have access to the waiting list. So, in general, this change tends to help African Americans or people of lower socioeconomic status who may have diminished access to health care. And that was by design. So across the country, if you look at ethnicity in the pre and post, you do see a large increase in transplants among African Americans, a corresponding decrease among whites, a little bit of an increase in Hispanics.

In Michigan-- and this is how Michigan recipients go by ethnicity-- so this is Caucasian, this is black, and then the rest are relatively small numbers. But you can see there wasn't a lot of change. And it's because we had already done this in 2006. So any change that came about in Michigan already had effect when we went to that policy in 2006.

So what are the implications? I talked about the waiting list being already in place. Older candidates have more access through broader sharing to higher KDPI donors, but they really no longer have access to the best quality donors. The most highly sensitized candidates have a greater chance of transplant. Younger, healthier candidates receive high-quality kidneys.

I didn't show the details, but the A blood type did wind up being a little bit longer and the B blood type being a little bit shorter. But A still has better access than B does. This did not really address geographic disparities. That was a whole, big elephant that would have probably bogged down the entire process. And so that's something that the community is still working on.

So what are our current challenges and opportunities? Well, all transplant centers are very highly regulated, and what that means is that there are certain benchmarks for outcome. And the benchmarks with the real teeth are one-year graphs in patient survival. And so centers need to meet a certain bar which is based on their case mix and based on national outcomes.

And the performance tends to be quite variable. So sometimes centers get close to being what's called flagged. And then sometimes they're doing better. But everybody has to worry about it, because if you get too far over the line in terms of your outcomes, then CMS can shut down your program, and so nobody wants to do that.

So what that has done has essentially caused programs to be more conservative. So you may have seen that over the years-- that the higher-risk transplant patients aren't accepted as frequently. And all centers have pretty much had to do that and straddle that line.

And there's tons of data to support this risk aversion. This is just one that says that if transplant programs have lower than expected outcomes, they have more wait-list removals subsequently to that because they're paring down their lists. They're becoming risk averse.

So this is something that, for the most part, has probably inhibited the growth of transplants. And we all have worked a lot to try to advocate the more people that get transplanted, the better the overall survival of people who could get a transplant would be. The government has listened to a certain extent. The bar has gotten a little bit lower and eased a little bit. And so hopefully that will allow for a little more expansion and a little more risk taking, which we generally feel to be good.

The other thing you may run across is something called a PHS increased risk donor. So about 20% of deceased donors are at increased risk for transmission of Hep C, Hep B, and HIV. And there's a lot of behaviors in the history that would make someone classified as high-risk. And it could be someone who's doing IV drugs currently. It could be somebody who 12 months ago was in jail for a week. They're both classified the same way. So the details probably matter a little bit in terms of the risk.

Donors are screened very carefully. And the screening tests are very good, but there is what's called the window period. So if the virus was contracted within a week or two of the time that they donated, then you might have a false negative. So there is a risk even with the screening. In actuality, the risk is extremely low. It ranges-- depending on the circumstances-- from one in 300 to one in 10,000.

The other consideration-- even though we don't necessarily like to rely on it-- even though transmission events are rare if it does happen-- there are treatments for all these viruses now. So HIV, Hep C, Hep B-- all very good treatments. Again, I want to emphasize we're not cavalier about it, but people ought to be OK even if a transmission occurs.

There is a risk of remaining on the wait list-- you can argue-- for a kidney patient-- that they're still probably going to be OK when the next offer comes around. But you don't know. Things can happen. There's a risk of requiring HCV and dialysis. And even people that aren't classified as high-risk, basically there is a risk of transmission because people are just going by histories of next of kin who don't always know what people do.

So for all those reasons, we encourage people to accept these increased-risk kidneys, and we're working very hard at not calling them high-risk, which is what they used to be. Because anytime somebody says high-risk, everybody reacts, oh, don't take a high-risk kidney. What do you want to do that for? Really we think the risk is-- the increase in risk is something that is worth considering. We don't penalize people for not accepting these organs, but we encourage people to do so.

And we pretty much use all of them because we'll always find someone that's willing to accept that we may have to go down the list. And this shows the increase. So in Michigan, it used to be-- years ago-- that about 11% were. And now we're in that belt with opioids and all these other things-- like with other areas over here. So it's a lot of donors. And so if we don't transplant these organs, it really is a missed opportunity. So all our thinking in the transplant community has really evolved over the past five years about these donors.

The other issue that we struggle with is what to do with marginal kidneys. We want to transplant as many kidneys as we can. But we also want our patients to have good outcomes. We'd love for everybody to get a perfect kidney. Actually, we'd love for everyone to get a living-donor kidney because those would be perfect. But to do the best for the aggregate people on the waiting list, it's in everyone's best interest that more organs are transplanted.

So especially in this KDPI area-- a lot of these organs across the country are discarded. And some may be for legitimate reasons. But others may be risk aversion, or maybe we're relying too much on something that we think is not good. And in Michigan, it's kind of the same thing. Now, Gift of Life has become much more aggressive about recovering donors of all shapes and sizes and ages and health histories. So that is a part of why discards are up.

But still, it's something that we don't really feel good about. We want our patients to do well, but then if there's an organ that we don't use, I'm always feeling very, very torn about what would have happened. So we all struggle with it. This is for donors with brain death. This is for donors after cardiac death which tend to have higher discard rates because they're all little more injured. So we have to be a little more selective with them. If you look over time at the KDPI utilization in Michigan, of these KDPIs over 85%, we're only transplanting about 5% to 6% of our transplants. And we could probably do more.

And so Gift of Life is very interested in this, and is working with transplant centers to try to do some things. One of the things is everybody in the transplant community tends to rely a lot on biopsies of marginal organs. And biopsies can have some predictive value, but not as much as I think, collectively we think. We see a biopsy that doesn't look so good we're thinking, oh, they have chronic kidney disease. We can't use that.

And in point of fact, many people with biopsy findings-- with not perfect biopsies-- mild, chronic changes on biopsies at the recovery-- produce transplants that last a long time. So we're a little bit over reliant on that. We used to biopsy based on a number of different criteria, and Gift of Life has narrowed it down to only KDPI 85 or greater, or by request of the transplant center. That's the cooperative relationship that we have.

But everyone is trying to rely a little bit less on biopsying everything and then getting spooked at every little thing we see, which is sort of a natural instinct. So it's a little bit of sticking your head in the sand, but it's for a good cause because most of the time the biopsy hurts us. And so this has resulted in a decrease in 2017 in the biopsies that are done. And hopefully that will eventually translate into better utilization and higher numbers of transplants.

The other things that Gift of Life are using-- they're trying to standardize the biopsies that they are doing now. They're trying to move to more rapid turnaround of biopsies, so that if a local center doesn't want the transplant, they can offer it out to other centers in a quicker fashion because the time is ticking at that point. More data sharing with centers-- more discussions and brainstorming-- Gift of Life is participating in a project with a group called the Organ Donation Transplantation Alliance which is looking at a number of different ways to increase utilization of organs and transplant. And then a lot of discussion about outcomes-- every transplant center participates in an organ committee with Gift of Life, and we're basically working for the OPO. So we're from transplant centers, but we're really working for the best interests of the OPO, and we wear a different hat.

We're also working-- from the Gift of Life perspective-- on donor kidneys that are perceived to be high-risk. So there are lots of kidneys-- all these kidneys are usable as long as there's education and discussion about how to manage them. And so I think all the centers are committed to trying to transplant as many people as possible. That's in their best interest.

So to summarize-- right now kidney transplants in Michigan are stable and maybe recently increasing despite a number of different challenges. But there is still a huge need. Living donations have been stable. I wouldn't say that that's a good thing. I think that-- and we all think that we need to do more. More or less, the effects of the changes nationally have impacted Michigan in a similar fashion, except with what I mentioned before about the waiting time changes.

The increase in these PHS increased-risk donors presents opportunity but a lot of challenges in education to make sure that people don't get spooked. And this doesn't include patients, but also-- I've heard several times a candidate said, my doctor told me don't take a high-risk organ. So there's some education in there.

There's certainly still geographic disparities. Michigan has still waiting times that are higher than some neighboring areas, although with respect to Ohio, that's kind of leveled out a bit. And again, joint efforts to increase utilization and organ donation are ongoing. So I thank you for your time. I think I did run a little bit over.

[APPLAUSE]

Do we have any time for questions?

**SPEAKER 1:** Yeah, yeah. Go ahead.

**AUDIENCE:** So you mentioned that your last comment was that the areas between Michigan and Ohio-- is there still a slight downtrend?



**RANDALL**

**SUNG:**

Yeah. So there is-- specifically Toledo. I think Cleveland is pretty much where we are now. You may know better than that. Toledo still has a shorter waiting time because they are a single center OPO, and they have a smaller center. But it has changed because I think more people are multiple listing there. And so I think it used to be six months, but I don't think it's nearly that short now. But it's still shorter. And so I think it's the responsibility of every transplant center to inform people about the potential for multiple listing, and so we don't discourage that at all.