Error in new lung transplant algorithm harmed sick and dying patients

July 1 2024, by Gregory Royal Pratt, Chicago Tribune

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The new algorithm was supposed to help distribute lungs more fairly to people who desperately needed life-saving transplants.

But a flaw in the process for awarding the organs to sick and dying patients meant some people didn't receive the care they were entitled to, the Chicago Tribune has learned.

Specifically, patients with type O blood received fewer transplants last year than would have been otherwise expected, according to records obtained by the Tribune and interviews with patients, surgeons and advocates. That's because the new system failed to fully account for the fact that type O patients can accept donor lungs only from people who also have type O blood.

The problem occurred over a six-month period in 2023 but is only now coming to light publicly amid a dispute over how many patients were affected and whether the organization governing transplants should have been more transparent in explaining what went wrong.

A group of transplant surgeons has criticized the Organ Procurement and Transplant Network, which sets rules for organ distribution under a contract with the federal government, for not releasing more information publicly about an incident the surgeons described in a letter as "deeply troubling."

When the network changed its algorithm for lung distribution in March 2023, it touted the new system as more efficient and fair, helping ensure vital organs didn't go to waste. A key change was scrapping firm geographical boundaries on how far organs can travel for transplant, recognizing that those limits kept some patients waiting too long for organs to become available in their area.

It also added a score that weighted and combined a number of factors related to the patient's need for a transplant and how well the person matched the organ donor.

In July, the network acknowledged an error with the revised algorithm, publishing a report that said roughly 35 fewer transplants had been given to type O patients than would have been expected in the first three months of the program's implementation. A change to correct the issue did not go into effect until the end of September, but a six-month report from the network, issued the following month, did not increase the estimate of the impact from 35.

In a paper presented this month to the American Transplant Congress, a University of Colorado team argued for a higher number, calculating that the error likely resulted in 138 fewer lung transplants for type O patients. The O blood type is the most common, amounting to nearly half the U.S. population.

"This just shouldn't happen," Jesse Schold, a professor of surgery at Colorado and the paper's co-author, said in an interview with the Tribune.

In the presentation, Schold and the professors said they are concerned that even the repaired system might "still result in disparities in transplant rates by blood type."

The Organ Procurement and Transplant Network declined to make officials available for interviews. In a written statement, network President Dianne LaPointe Rudow said patients with blood type O were not skipped entirely, saying some "still received transplants and recipients received lungs from donors of compatible blood types."

In response to written questions about the number of patients harmed by the error, the network said "it is not possible to accurately predict the number of patients that would have received a transplant or would have lived or died based on a certain policy because there are a variety of dynamic factors that contribute to a person receiving a transplant that

vary per each unique organ, including the characteristics of a donated organ (such as blood type, size, disease history), a transplant center's acceptance of an individual organ for their patient, a waiting list that's always being updated."

Asked to explain what went wrong with its algorithm, network officials said the modeling used to predict outcomes made a basic scientific error by assuming recipients could receive lungs from donors of any blood type.

"While evaluating why actual transplant volume for blood type O recipients did not match the modeling results, it was determined that the modeling overestimated blood type O transplant rates because the simulation allowed for recipients to receive lungs from donors of any blood type, regardless of compatibility," the network said.

In the real world, no patients were given organs of the wrong blood type, as numerous safeguards exist to protect against such a mismatch. But blood type O patients were effectively deprioritized under the new system, causing them to receive fewer lung transplants.

'Hidden in plain sight'

The changes to the transplant algorithms, which were years in the making, underscore the thorny questions the organization faces as it supervises the distribution of vital organs.

Determining who gets available donor organs is governed by a formula based on factors including someone's level of need, likelihood of survival, biological aspects such as blood type or height, patient access to transplant centers, and efficiency, which includes logistics and distance.

In recent years, the Organ Procurement and Transplant Network has

grappled with geography as a factor in patient care and sought to move away from hard rules based on distance. Under previous models, a patient whose medical urgency was low but who lived closer to a donor hospital than someone who needs the donated organ more could take priority over the sicker person, the network said.

"Geography presents inherent challenges in developing equitable transplant policy for candidates across the nation," the former president of the OPTN/UNOS board of directors, Yolanda Becker, said at the time.

"There are differences in the distribution of transplant centers and in the size and configuration of organ procurement organizations. In addition, there is geographic variability in the concentration of disease patterns that cause organ failure and causes of death that make organ donation possible."

The model implemented last year is known as "continuous distribution," and in time, the network plans to use a version of it for all organs.

Not long after the revised algorithm was implemented in lungs, however, the network realized that it was putting patients with type O blood at a disadvantage.

Type O transplant patients are a unique group in that their bodies can tolerate only organs from type O donors. But organs from type O donors can also be successfully transplanted into people with other blood types.

To distribute lungs from type O donors fairly, the special needs of type O patients need to be taken into account. But the revised algorithm made it harder for Type O patients to get new lungs because more of the Type O lungs they need were given to patients of other blood types.

The Organ Procurement Transplant Network said it detected the problem through routine monitoring. The organization detailed a proposed fix last August on a special web page, and the changes were ultimately approved in September.

In October, the network completed a six-month monitoring report detailing the effects of the new lung allocation policies. Its overall results highlighted an increase of lung transplants by 11.2% and fewer candidates dying on the waitlist, among other successes.

The report later noted that "the number of transplants decreased for blood type O recipients (from 646 to 601) and increased for recipients of all other blood types."

The American Society of Transplant Surgeons took issue with the report, with the group's top leadership sending a letter in January that criticized the organization for understating the problem and for failing to publish a full analysis of the troubling incident.

"The modeling and data entry error should have been highlighted at the beginning of the document, rather than buried in the middle," the surgeons wrote. "This manner of disclosure—best characterized as 'hidden in plain sight'—obviously has not effectively communicated the implications of the modeling error for patients and does a disservice to the transplant community and the patients we serve."

The Organ Procurement Transplant Network told the Tribune it will not release its analysis.

"The OPTN treats root-cause analyses confidentially, in order to ensure candor and thoroughness by all participants in the process, similar to peer review," the network said.

The surgeons group also asked the network to issue a supplemental report detailing the number of affected patients and the steps taken to ensure more blood-type issues do not occur.

In its response to the surgeons, the network said that its monitoring report "worked as intended to identify trends that deviated from the project outcomes" and that it disclosed the problems appropriately to stakeholders.

"We are committed to catching potential issues as early as possible, but we recognize that there are circumstances, such as this one, where some time must pass in order to allow for enough post-implementation data to stabilize under the new system," the network wrote.

An anxious wait

Seth Karp, a former board member at the Organ Procurement Transplant Network and director of the Vanderbilt Transplant Center, criticized the network's handling of the situation.

"They need to be completely transparent about the error, how it was made, when it was made, when it was figured out that the error was made, what they're doing to rectify it," Karp said. "They need to get a group of experts together to look at this and ensure it never happens again."

The issue with the algorithm did not go entirely unnoticed by patients. Several commenters on the web page describing the proposed fix noted the harm to O patients.

"I am an O-blood type and have been on the 'Wait' list for five months. I have not even had a dry run!" one unnamed commenter wrote. "To say I don't feel like I'm in the game is an understatement. I have always felt

being an O-patient has been a disadvantage. I commend OPTN for identifying the disparity with O patients and I support corrective life saving changes to the CAS point system."

David Sperlein, 62, was one of the patients left anxiously awaiting a lung transplant last year. Sperlein, who has type O blood, caught COVID-19 in October 2022 and was hospitalized. After his release, Sperlein still struggled to breathe, which he and his wife thought was the result of ongoing heart problems.

Weeks later, Sperlein underwent a double bypass operation, but his breathing got worse and he could hardly walk. Doctors determined he needed a lung transplant, but he didn't receive a donor lung until January 2024, even though the doctors told Sperlein he was sick enough to have a competitive score in the system.

"In the beginning, when they put me in the list, I thought, all right, it could be any time," said Sperlein, who lives in Carroll County, Maryland. "Then a month or two later, I'm starting to get a little, not discouraged, but I'm wondering when this is going to happen."

His wife, Jeannine, would check the organ network's website often and was nervous about when they would receive the organ. She praised their medical staff and said they kept the couple up to date, including on the changes the transplant network made to the rules for lung allocation.

"They were trying to advocate as much as they could for a change because they were seeing, like David, that the O's were being passed over because there weren't enough around," Jeannine said. "When that policy changed in October, for O patients, our hope got a little bit better."

Dr. Robert M. Reed, medical director of the University of Maryland

lung transplant program, called the error with the algorithm a "perplexing mistake" that "discriminated" against O patients. During the time the faulty rules were in effect, the program's number of O transplants fell by roughly half, Reed said.

Since the fix was made, the center has seen an uptick in O transplants. But, Reed added, a prolonged wait can cause longer-term harm.

"If you take a patient and they're stable and robust today, if you wait until they're (sicker), they're not going to do as well in the long run," Reed said. "They just struggle to really bounce back and experience the same quality of life and longevity that you can have with a good transplant. Timing it later in the progression of the disease is not favorable."

"A lot of patients on the wait list are, like Mr. Sperlein, at risk for deterioration. He was lucky," Reed added. "We got him a good lung and he's doing well. But that's the exception rather than the rule."

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