Access the recording here:
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TRACIE
HEALTHCARE EMERGENCY PREPAREDNESS INFORMATION GATEWAY

Healthcare System Preparedness Considerations Speaker Series

ASPR
Administration for Strategic Preparedness and Response

Lisa Villarroel, MD, MPH
Chief Medical Officer for Public Health, Arizona Department of Health Services

Dr. Lisa Villarroel, MD, MPH is the Chief Medical Officer for Public Health at the Arizona Department of Health Services. Dr. Villarroel has served as the medical director for the emergency response to Ebola, Zika, opioid, vaping, and the COVID-19 crises. During the COVID-19 pandemic, Dr. Villarroel was the architect of the Arizona Surge Line, the Arizona Surge Staffing Initiative, and Arizona's post-acute care tracker (PACCT). She received her bachelors in biology at Princeton University, her Doctor of Medicine at Northwestern University, a masters in public health, and a certificate in Media and Medicine from Harvard Medical School.

Centralized ECMO Referrals During COVID-19: Providing a “Fair and Just Opportunity”

January 2025

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ARIZONA
DEPARTMENT OF
HEALTH SERVICES

Dr. Lisa Villarroel has nothing to disclose.

Outline

- The background
- **The problem: Lack of equitable access to care**
- The solution: The Arizona ECMO Protocol
- **The impact: “Fair and Just Opportunity”**
- The lessons learned

The Background

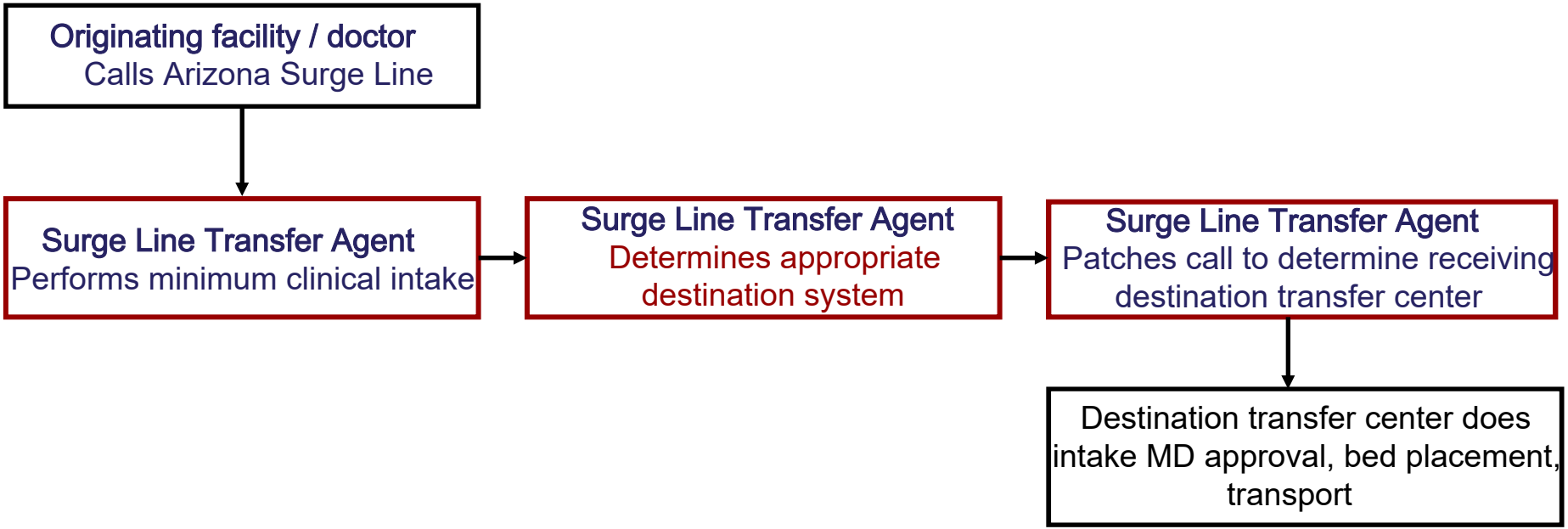
At the start of the pandemic, two groups independently organized to enhance COVID-19 patient care.

Arizona's 5 ECMO programs formed the **Arizona ECMO COVID-19 Workgroup,** a group to discuss best practices and research.

Arizona Department of Health Services created the **Arizona Surge Line**, a centralized interfacility transfer system for COVID-19 patients.

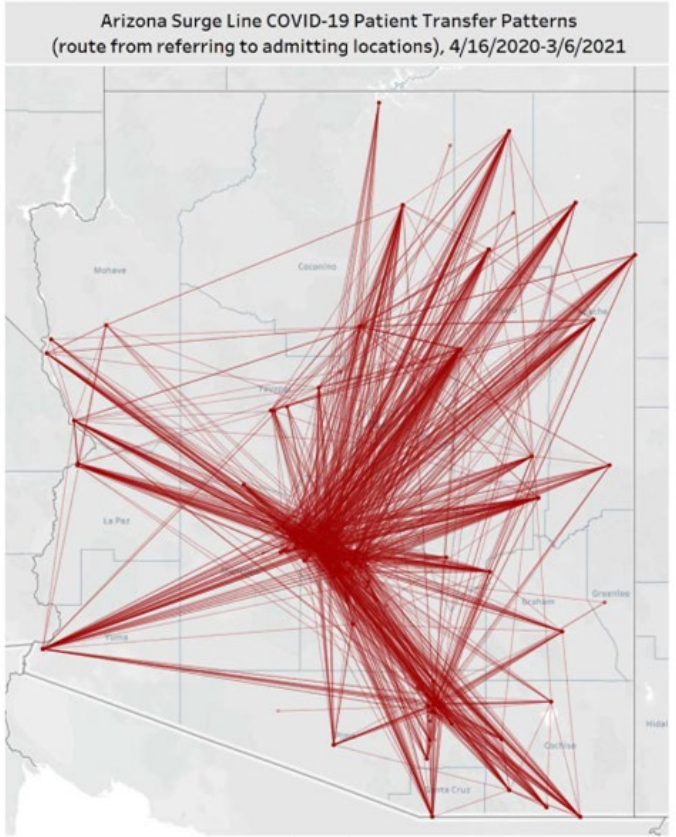
THE ARIZONA SURGELINE

By the end of Surge 2, the Arizona Surge Line had become a trusted, transparent entity.



By the end of Surge 2, the Arizona Surge Line had become a trusted, transparent entity.

- 6,732 COVID-19 transfer requests
- 160 hospitals participated (mandatory)
- Receiving hospitals determined transfer acceptance decision
- Regular meetings held on transfer data
- Disproportionately assisted IHS, CAH and tribally operated hospitals



Frontiers of Public Health (2024)

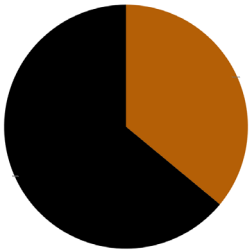
By the end of Surge 2, the two groups had not identified significant concerns over COVID-19 ECMO transfers.

Surge 1
Apr. 16, 2020 - Sept. 19, 2020

Surge 2
Sept. 20, 2020 - Mar. 6, 2021

174 total transfer requests for COVID-19 ECMO

Average: 3.8 requests/week
Peak: 12-13 requests/week



36% SUCCESSFULLY TRANSFERRED

63% NOT TRANSFERRED
(lack of capacity, prolonged wait, not a candidate)

The problem

As Surge 3 began, COVID-19 ECMO transfer requests through the Arizona Surge Line dramatically increased.

Surge 3
July 4, 2021 –

Transfer requests for COVID-19 ECMO

Average: 3.8 → **10.5** requests/week

Peak: 12-13 → **21** requests/week

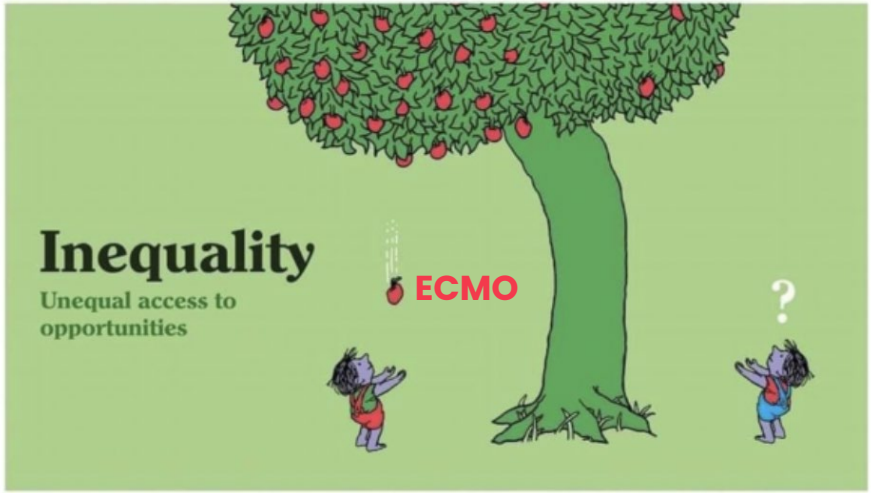
ECMO COVID-19 transfer requests were being rapidly declined, without an evaluation of the patient for eligibility.

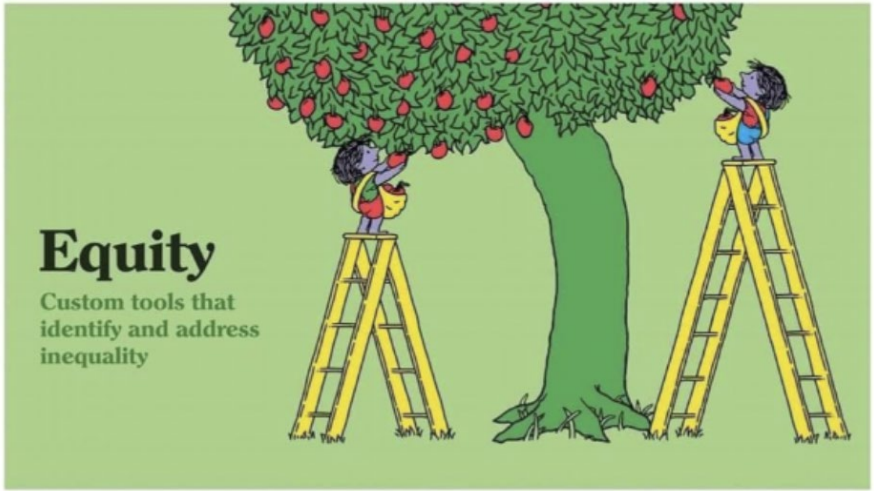
SAMPLE RECORD: SURGE LINE PATIENT
• Hospital A declined for ECMO capacity XX/XX 2:02pm
• Hospital B declined for ECMO capacity XX/XX 2:05pm
• Hospital C declined for ECMO capacity XX/XX 2:12pm
• Hospital D declined for ECMO staffing XX/XX 2:17pm
• Hospital A declined for ECMO capacity XX/XX 3:17pm
• Hospital B declined for ECMO capacity XX/XX 3:18pm
• Hospital C declined for ECMO capacity XX/XX 3:18pm
• Hospital D declined for ECMO staffing XX/XX 10:22am
• Hospital C declined for ECMO capacity XX/XX 10:46am
• Hospital X declined for ECMO capacity XX/XX 10:51am
• Hospital B declined for ECMO capacity XX/XX 11:06am

The ECMO Workgroup and Arizona Surge Line met and identified four shortcomings with the current transfer protocol.

- ➔ Lack of effective workflow
  Surge Line would call each site repeatedly until placement or not a candidate
- ➔ Lack of situational awareness
  ECMO programs didn't know the demand
- ➔ Lack of referral transparency
  Referring physicians and families did not know status or eligibility
- ➔ Lack of equitable access to care
  External transfers were not getting evaluated for future placement or waitlist

Equity of access to ECMO was something both groups were focused on.



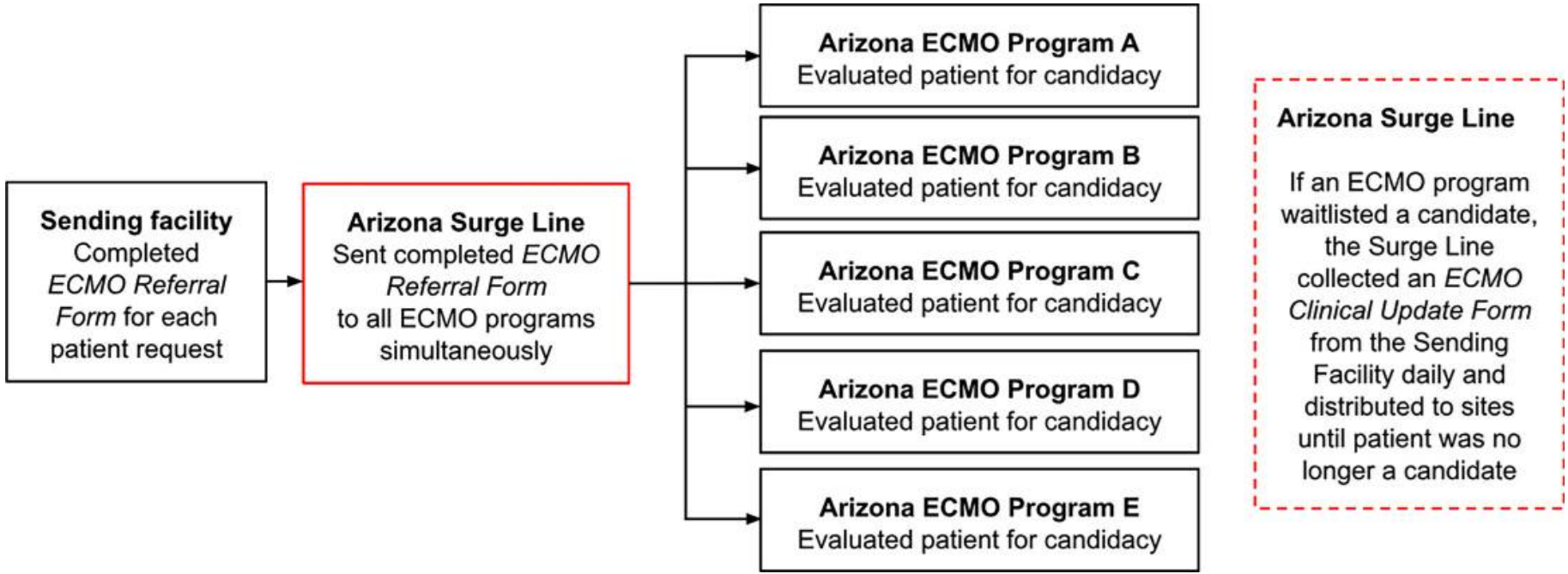


Modified from https://unitedwaynca.org/blog/equity-vs-equality/

The ECMO Workgroup and Arizona Surge Line resolved to create a protocol that afforded ALL potential candidates – not just those within an ECMO capable hospital system – <u>the same eligibility review.</u>

The Solution

The Arizona ECMO Protocol was drafted over four weekly meetings.



Annals Am. Thorac. Soc. (2024)

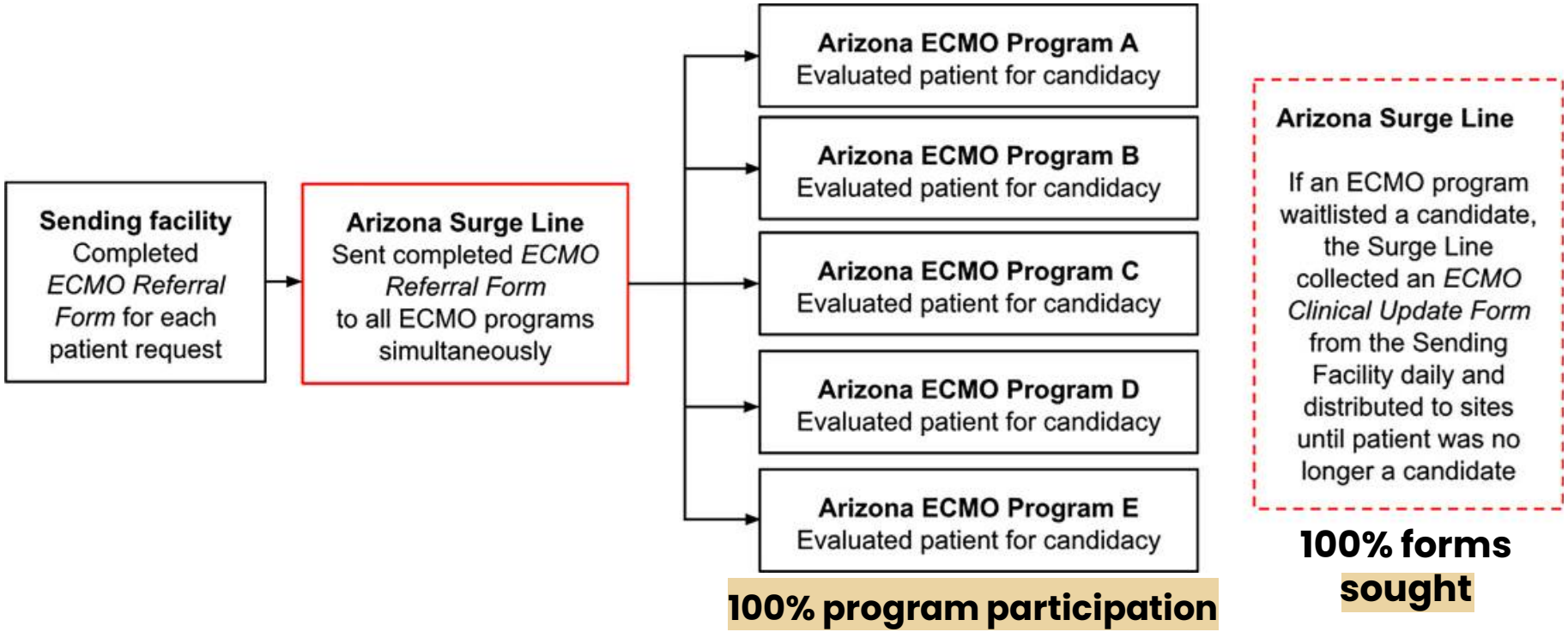
An ECMO Tracker was created at the Arizona Department of Health Services, which all ECMO programs could access.

Staffing Ratio Status	Facility Name	More info?	Available	Opening Today	On Premises	In Use	Reserved	Can't Use	Waitlist	Last Updated
🟡	Banner Children's at Desert	Yes	2	1	2	0	0	0	0	
🟡	BUMC-P		0	0	14	9	4	1	2	
🔴	BUMC-T (Adult)	Yes	0	0	7	2	2	3	2	
🔴	BUMC-T (Peds)	Yes	0	0	2	2	0	0	0	
🔴	Dignity Health-St. Joseph's		0	0	8	2	1	5	0	
⚪	HonorHealth-JCL		0	0	2	0	0	2	2	
⚪	HonorHealth-Shea		0	0	3	1	0	2	2	
🔴	Mayo Clinic		0	0	6	4	2	0	0	
🟡	Northwest	Yes	0	0	2	0	1	1	0	
🟢	Phoenix Children's Hospital		1	0	10	1	1	7	0	

Sample data

The Impact

The Arizona ECMO Protocol had full, voluntary participation.



Annals Am. Thorac. Soc. (2024)

There was a disproportionate impact on patients from facilities without ECMO and from vulnerable home zip codes.

Surge 3
July 4, 2021 - March 5, 2022

55% of ECMO transfer requests originated from a healthcare system without ECMO capabilities

73% of ECMO transfer requests from a healthcare system without ECMO came from patients whose home zip codes with the highest two quartiles of vulnerability (compared to 43% requests from ECMO systems)

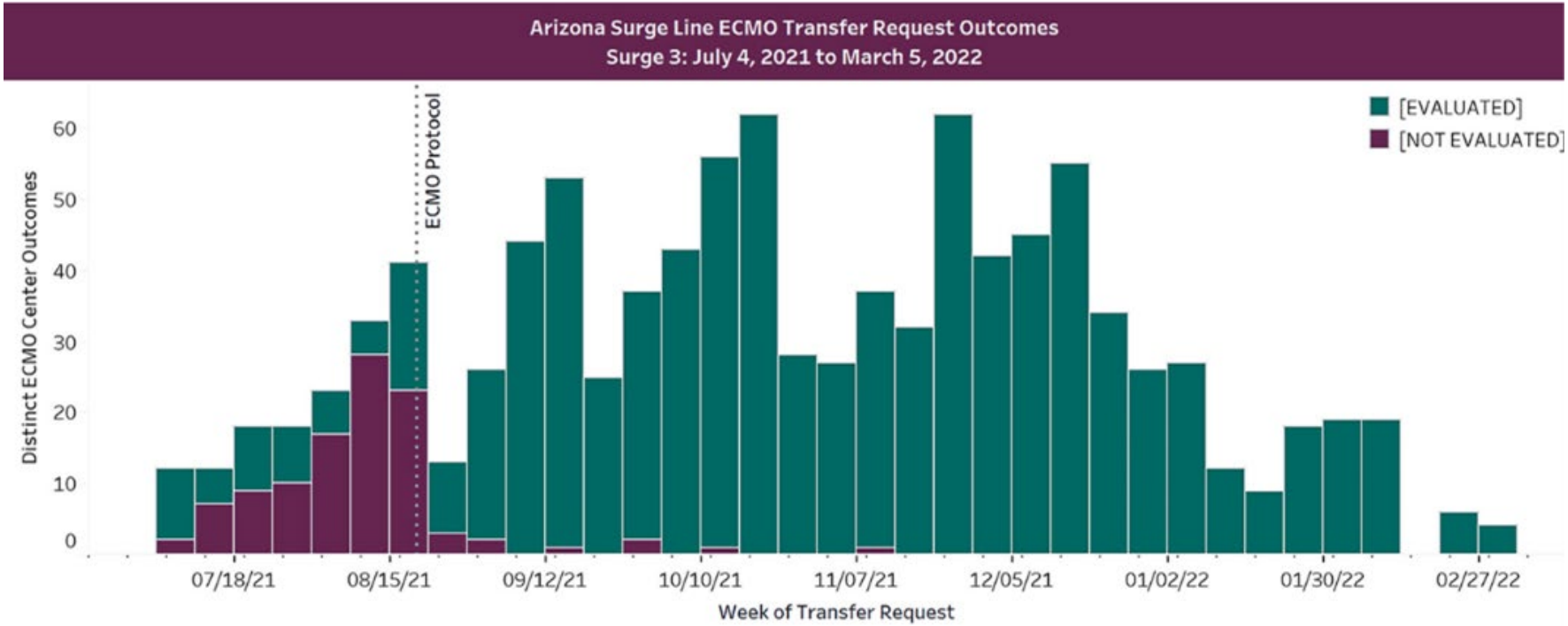
Annals Am. Thorac. Soc. (2024)

There were significant differences found in evaluation outcomes with the Arizona ECMO Protocol.

	Surge 3 (PRE PROTOCOL)	Surge 3 (POST PROTOCOL)
COVID-19 patients with ECMO transfer requests	66	287
Protocol	Calling each system consecutively and repeatedly	Calling all systems simultaneously once
% patients evaluated by no programs	39	4
% patients evaluated by 1+ program	61	96
% patients evaluated by all programs	27	76 ($p<0.0001$)
On average, each patient was evaluated by how many programs	0.9	3.4 ($p<0.0001$)

Annals Am. Thorac. Soc. (2024)

There was a near elimination of potential ECMO COVID-19 patients who were "not evaluated."



Annals Am. Thorac. Soc. (2024)

Patients were placed on waitlists, but there were not enough circuits to go around.

	Surge 3 (PRE PROTOCOL)	Surge 3 (POST PROTOCOL)
COVID-19 patients with ECMO transfer requests	66	287
% of these patients immediately transferred	23% (n=15)	10% (n=29)
% patients waitlisted	14% (n=9)	62% (n=178)
% patients waitlisted then transferred	0 (n=0)	17% (n=17)

Annals Am. Thorac. Soc. (2024)

The Arizona ECMO Protocol addressed all four identified shortcomings with the standard transfer protocol.

- **Lack of effective workflow**
  Surge Line would call each program repeatedly until placement or not a candidate

  ✓ADDRESSED
  Surge Line would call each ECMO program once

- **Lack of situational awareness**
  ECMO programs didn't know the demand for circuits

  ✓ADDRESSED
  ECMO programs were contacted directly

- **Lack of referral transparency**
  Referring physicians and families did not know status or eligibility

  ✓ADDRESSED
  ECMO candidacy was communicated

- **Lack of equitable access to care**
  Not all transfers requests were getting evaluated for future placement or waitlist

  ✓ADDRESSED
  All transfers evaluated

There are some limitations to this analysis.

- It is assumed the data represents all Arizona *inter*system COVID-19 ECMO transfers. There was an Executive Order mandating the use of the Arizona Surge Line.

- It is possible that the rapid ECMO transfer declines labeled as "due to capacity" were actually evaluated. Given the time stamps, this is unlikely.

- It is possible that of the cancelled ECMO transfer requests before the implementionation of the ECMO Protocol, a significant proportion would fall within the "not evaluated" category, further underscoring the impact of the ECMO Protocol.

The Lessons Learned

Was this effort worth it?

"This didn't get more patients on ECMO circuits."
True, this program did not supply more ECMO circuits or staff. But everyone had a fair shot and got evaluated for an ECMO circuit.

"This doesn't say how the programs triaged their internal and external ECMO waitlists."
True, but we believe they were constantly identifying the best candidate, internal or external.

"This required all ECMO programs to evaluate patients when they had no capacity."
True, but this allowed them to know demand and to fill their waitlists so they can choose the best possible candidate.

Arizona would use this protocol again.

- The Arizona ECMO Protocol provided real-time situational awareness to ECMO programs and public health.
- The Arizona ECMO protocol was an equity-enhancing initiative, and disproportionately assisted rural and small hospital patient access to ECMO.
- It was not expensive.
- It did not require a mandate.

There were lessons learned through this process.

Conceptually:

- This issue would have remained “anecdotal” if there were not the transfer surveillance through the Arizona Surge Line (MOCC).
- This issue required real-time strategizing and relationship building.
- There is still effort to be taken when there are not sufficient beds, medications, or other “stuff.” Does everyone have a “fair and just opportunity” to access those resources?

Practically:

- ECMO Champions at programs are needed to encourage participation.
- ECMO capacity tracked on automated platforms was insufficient for patient care. The manual ECMO Tracker was a hit.
- The standardized transfer forms continue to be used.

And for next time….

- We would revisit standardized ECMO eligibility to streamline the protocol (e.g. 2 systems decline due to eligibility, don't call further).

- We would track patient outcomes.

This is what would be required to replicate this protocol in another jurisdiction.

- ☑ A centralized structure to coordinate transfers within a region (a MOCC)
- ☑ A regional ECMO coordination group representing all ECMO programs
- ☑ Intersystem data transparency, including on impacted vulnerable populations (MOCC could provide)
- ☑ Recognition of equity as a clinical and public health priority

LITERATURE SOURCES

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THANK YOU!

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