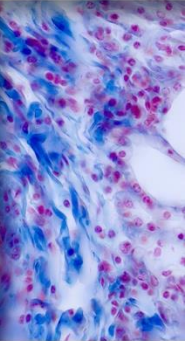




ASCP 2024  
ANNUAL MEETING

# RBC Alloantibody Exchange: Connecting Blood Banks to Prevent Delayed Hemolytic Transfusion Reactions

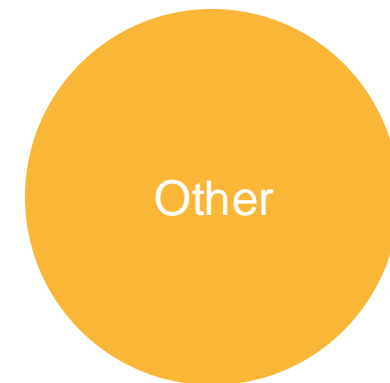
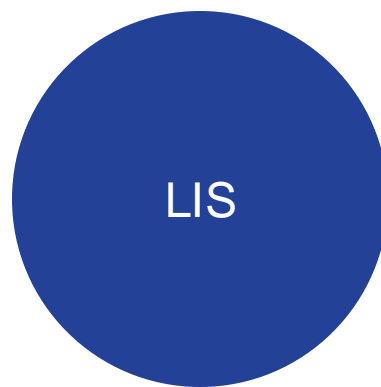
Rahim Wright, MLS(ASCP)<sup>cm</sup> Nuvance Health (Danbury Hospital)



# DISCLOSURE

- I have no financial relationships with ineligible companies to disclose

# What is everyone's specialty?



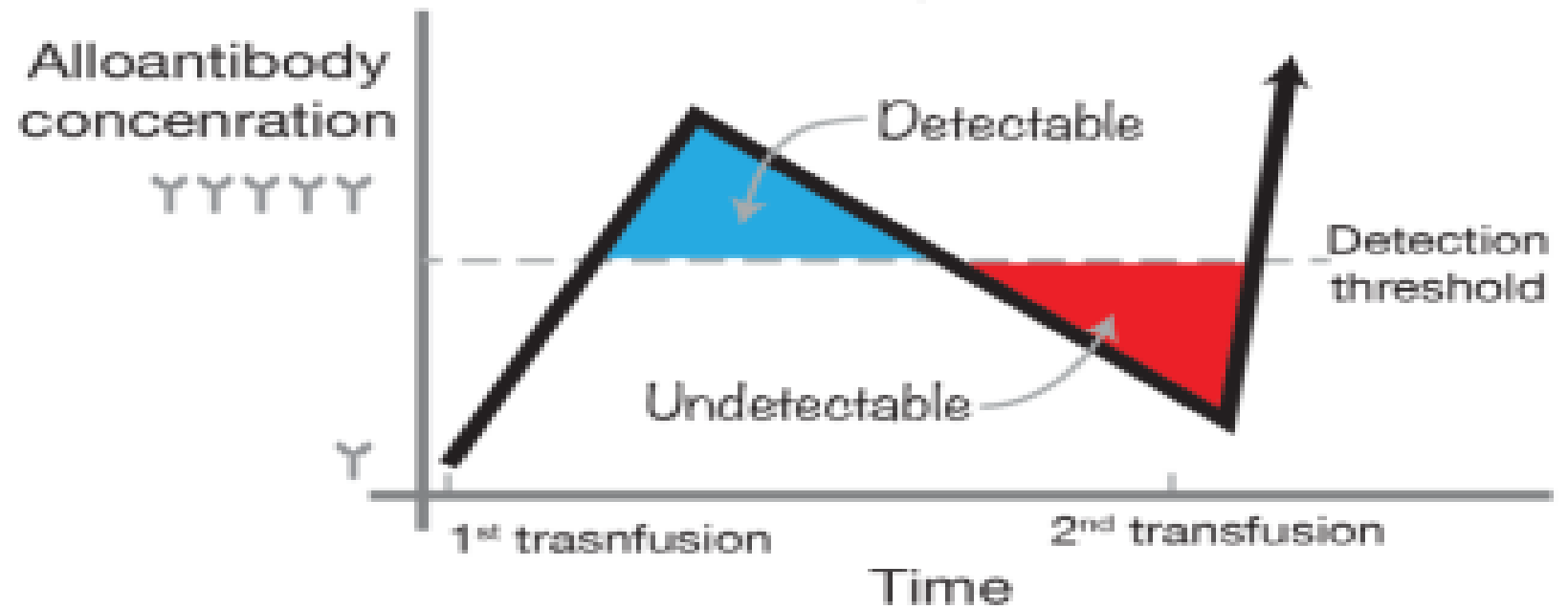
[Poll question 1](#)

# What is an alloantibody?

- Alloantibodies are immune antibodies that can be produced following exposure to foreign red blood cell antigens such as the transfusion of donor red blood cells (RBC)
- Alloantibodies may be clinically significant in future transfusion scenarios, potentially resulting in delayed hemolytic transfusion reactions (DHTR) or cause difficulty in locating compatible RBC units in the future
- Primary alloimmunization can occur over days to months
- Transfuse antigen negative RBC units for the alloantibodies identified
- 30%-60% of alloantibodies can become evanescent over months to years

# Alloantibody Production and Evanescence

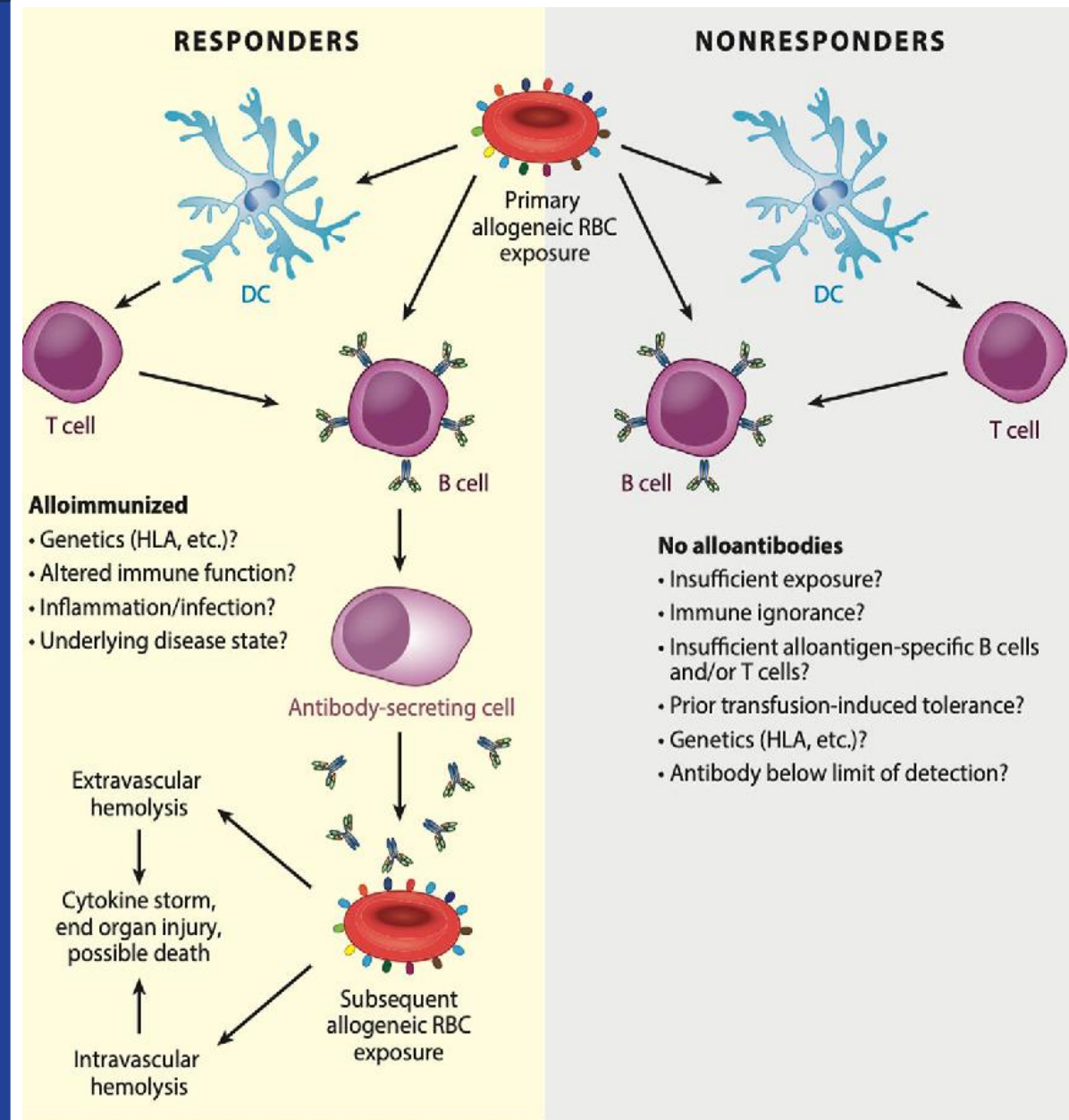
## Changes in Alloantibody Concentration with Repeat Transfusion



**Figure 1A.** A blood transfusion, like a vaccine, can trigger the formation of an antibody (x-axis: 1<sup>st</sup> transfusion). Over time, the amount of antibody declines and may become undetectable (red triangle). Re-exposure to blood, like a booster vaccine, can trigger further antibody production (x-axis: 2<sup>nd</sup> transfusion). This causes a delayed hemolytic transfusion reaction.

# Possible outcomes of allogeneic exposure

- Majority of patients do not form alloantibodies.
- Patients can be alloimmunized due to:
  - transfusion
  - pregnancy
  - transplantation



# Which type of hemolysis is commonly found in DHTR?

Extravascular

Intravascular

[Poll question 2](#)

# Delayed Hemolytic Transfusion Reaction (DHTR)

- Result of anamnestic response from previous alloimmunization
- The alloantibody was previously undetectable by standard pretransfusion testing and rebounds after subsequent transfusion
- Occurs several days to weeks after transfusion
- Extravascular hemolysis is the pathway for RBC destruction of donor cells
- Moderate jaundice, mild fever with or without chills, anemia, rapid drop in hemoglobin back to pretransfusion level
- Hemoglobinuria can occur in rare cases
- DIC, acute renal failure are generally not present

# Delayed Hemolytic Transfusion Reaction cont.

- Antibodies most associated in DHTR : Rh, Kidd, Duffy, Kell and MNS
- A concern for sickle cell patients due to need of multiple transfusions
- Possibility of hyperhemolysis syndrome in sickle cell patients. (donor and recipient cells are destroyed)
- Can mimic vaso-occlusive episodes resulting in DHTR being underreported
- Can be a cause of postoperative anemia in postsurgical patients which could be mistaken for other causes

# Prevention!!

- Transfuse only symptomatic anemia
- Maintain antibody records
- Transfuse antigen negative blood even if current screen is negative (in most cases)
- Investigate when needed for previous transfusion at other institutions
- CHECK ALLOANTIBODY EXCHANGE- a national database which is recommended by AABB!



**Have you had to contact another hospital for more information on a patient's transfusion history?**

**YES**

**NO**

[Poll question 3](#)

# Alloantibody Exchange

- Secure electronic cloud database that provides a patient's transfusion requirements at different institutions
- The exchange works with different LIS systems
- Shares the ABO Rh type, RBC antigens, alloantibodies, transfusion requirements (ex. irradiation) and monoclonal antibodies (Darzalex/anti-CD38)
- The exchange lists the institution where the data is provided and the direct phone number to verify information if needed
- Hemoglobin S (Hgb S) (sickle cell disease) has special protection under HIPAA and requires the patient's explicit consent to transfer



# Safety, Speed and Efficiency

- Speeds up communication compared to telephone only exchange
- Get information on patient's antibody status to plan efficient antibody identification workup
- Solve dual population issues faster
- Find antigen negative units faster
- Safer for patients that are unable disclose transfusion history
- Automatic uploads, single sign on, little impact to workflow after set up



# Patient Identification

## Required Fields

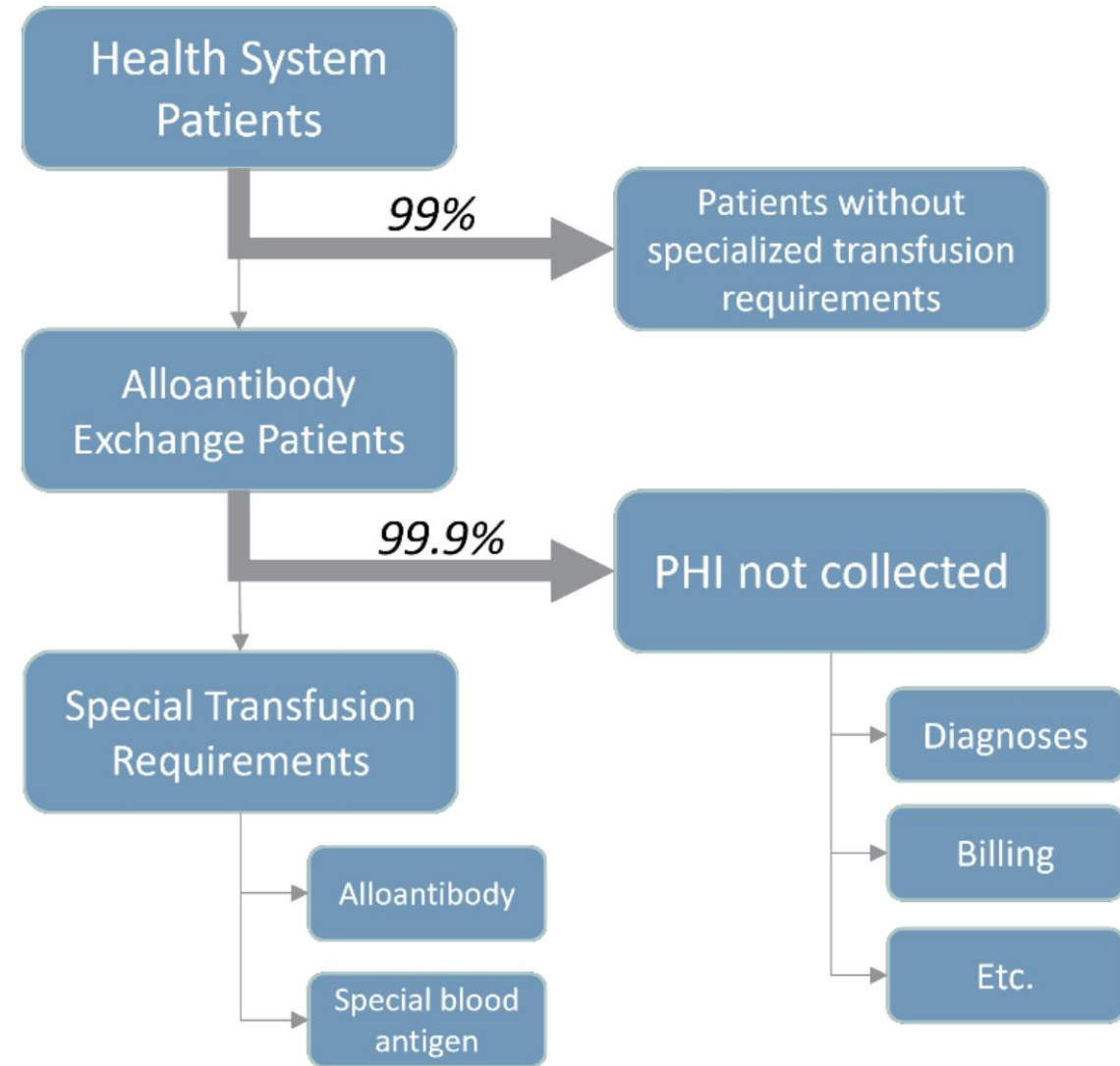
- First name
- Last name
- Date of birth

## Additional fields

- Birth sex
- ABO/Rh
- Address

# Scope and Privacy

- Only patients with specialized requirements added (1-1.6% of population)
- Only information pertinent to safe blood transfusion is listed
- Sharing patient information is allowed under HIPAA. Informed consent for treatment not required
- “A covered entity may disclose PHI for treatment activities of a healthcare provider”-HIPAA



An aerial view of a city skyline at dusk, with a semi-transparent white overlay containing text. The text is in a bold, blue, sans-serif font. The background shows a dense urban landscape with many skyscrapers and buildings, some of which are illuminated. The sky is a mix of blue and orange, suggesting sunset or sunrise. There are also some yellow and green squares scattered across the image, particularly in the top-left and bottom-left corners.

**Live search of test patient**  
**<https://www.alloantibody.org/lookup>**

# Patient Search

Enter patient demographics for database matching

First name

MI

Last name

Date of Birth

Sex assigned at birth

ABO/Rh Typing

MRN

MRN Institution

SSN

Street Address

City

State

Zip

Phone Number

## Potential Matches

Select	Show Aliases	Name	DOB	MRN	Institution	Address
<input type="radio"/>		SO TRAINING	1993-06-19		Nuvance-East	
<input type="radio"/>		SO TRAINING	1993-06-19		Nuvance-West	

[Back to search](#)

[Submit request](#)

# Search results

## Demographic Information

Show Aliases	Name	DOB	MRN	Institution	Address
	SO TRAINING	1993-06-19		Nuvance-East	

## Blood Bank Data

Data Type	Show All	Result	Date	Notes	Institution	Nuvance-East
Blood Group		A			<a href="#">Nuvance-East</a>	(203) 739-7205 24 Hospital Ave Danbury, CT, 06810
Rh type		Rh negative			Nuvance-East	
Antibody		anti-D	2024-06-07		Nuvance-East	
Antigen		C-	2024-02-21		Nuvance-East	
Antigen		E-	2023-05-24		Nuvance-East	
Antigen		Fy(a)+	2022-08-05		Nuvance-East	
Instructions		History of irradiation	2024-08-14		Nuvance-East	

# Search results

## Demographic Information

Show Aliases	Name	DOB	MRN	Institution	Address
	SO TRAINING	1993-06-19		Nuvance-West	

## Blood Bank Data

Data Type	Show All	Result	Date	Notes	Institution	Agreement?
Blood Group		A			Nuvance-West	
Rh type		Rh negative			Nuvance-West	
Antibody		anti-C	2024-08-26		Nuvance-West	
Antibody		anti-D	2024-08-26		Nuvance-West	
Antibody		anti-E	2024-08-26		Nuvance-West	
Antibody		anti-Jk(a)	2024-08-26		Nuvance-West	
Antigen		Jk(a)-	2024-08-26		Nuvance-West	
Instructions		History of irradiation	2024-08-26		Nuvance-West	

# Disappearance of anti-Jk<sup>a</sup>: a personal experience

- Patient is undergoing treatment for leukemia
- Patient is primarily treated at both Yale and a local hospital in Puerto Rico
- Patient unknowingly developed an anti-Jk<sup>a</sup> antibody that eventually evanesced in Puerto Rico
- Patient arrived back at Yale for pretransfusion testing and the antibody screen was negative
- Patient was unable to disclose previous transfusion history
- Fortunately, the patient arrived with a medical laboratory scientist that was able to connect the dots between the patient and the two different institutions to avoid a potential DHTR
- Antibodies to the JK system are known to evanesce and are a very common cause of DHTR

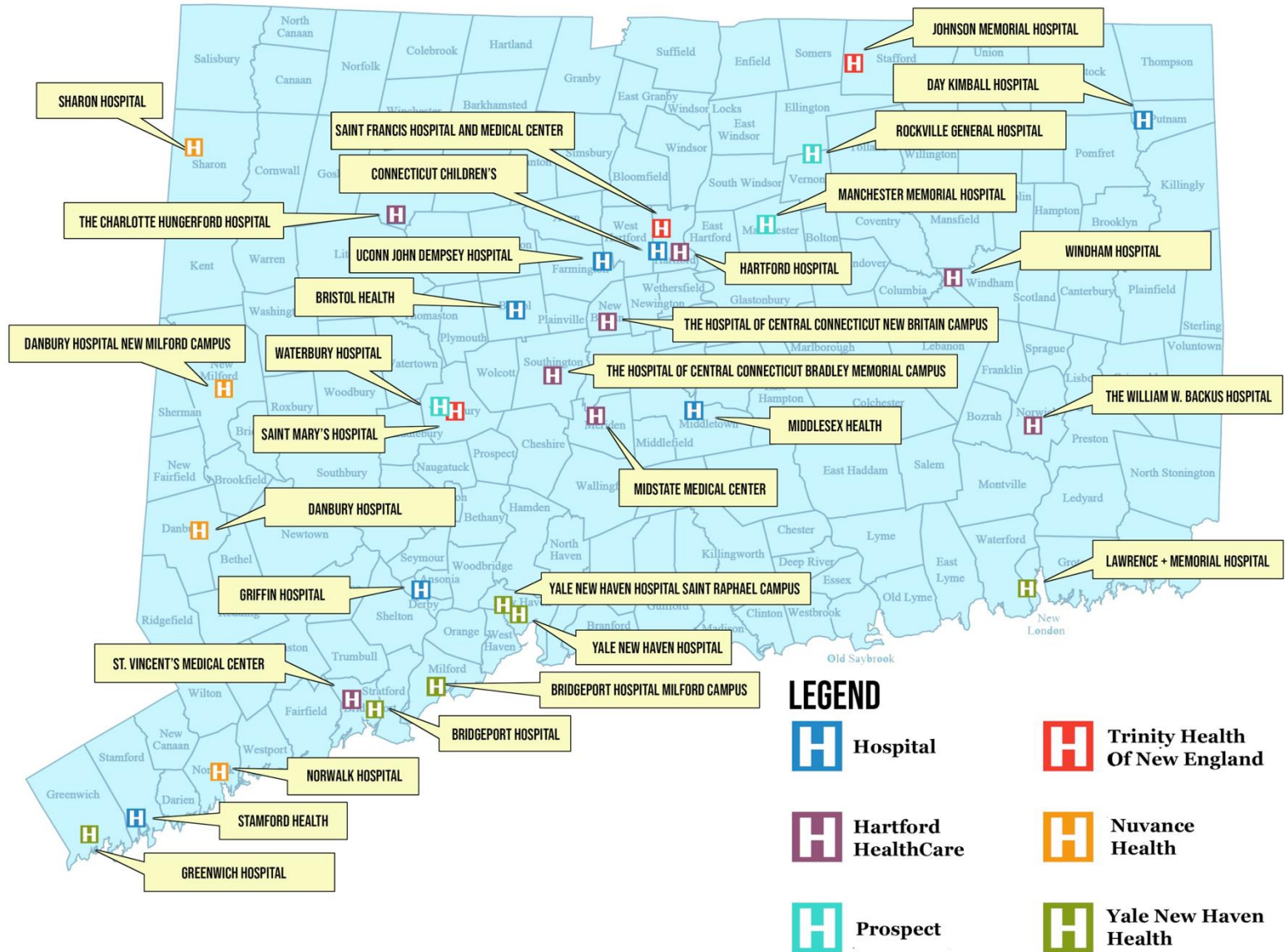
# NUVANCE HEALTH

- 7 hospital network spans Western Connecticut and New York.  
(Nuvance East, Nuvance West)
- Snowbirds, international visitors
- In the process of joining the 21 hospital Northwell Health network  
(New York's largest health system)
- Northwell also has locations in Florida and New Jersey



# Connecticut Hospitals

- Many patients go back and forth between close hospital neighbors (Yale, Stamford, Waterbury, Hartford, Trinity)
- Between Boston and New York



# Multiple antibodies case study

- Patient at Danbury is a candidate for bone marrow transplant
- Patient requires cytomegalovirus (CMV) negative, irradiated products
- The antibody screen is positive in cells 1, 2 and 3
- Antibody panels only give 1 or possibly 2 negative cells so selected cells are the best choice due to the patient having anti-C, anti-Fy<sup>a</sup>, anti-K and anti-S
- The patient went to Yale and the blood bank at Danbury was contacted for help resolving a dual population issue
- Danbury informed Yale about the transfused units and the patient's antibody status
- Yale was able to start running selected cells before the antibody screen was completed

# Missing pieces antibody case study

- Patient is a liver transplant candidate known at Danbury to have a warm and cold autoantibody.
- All screening cells and panels are positive
- Positive cold screen and DAT IgG with all cells reactive in the eluate
- The sample was sent out to the ARC reference lab and only the warm and cold autoantibodies were reported
- Yale had this patient after the ARC workup and identified anti-S and anti-C<sup>w</sup>
- Due to our collaboration, we were able to provide antigen negative blood
- The patient was admitted to Norwalk Hospital several weeks later and was transfused

# Anti-E antibody case study

- Patient has Thalassemia major (genetic blood disorder that causes severe anemia)
- Patient arrived at Danbury in 2005 and required frequent blood transfusions
- Antibody screen was negative at Danbury
- Patient started going to Yale for treatment and Anti-E was reported in 2018
- The patient returned to Danbury in 2019 and the Anti-E evanesced
- Yale was able to share the antibody history to inform Danbury to provide antigen negative blood
- The antibody screen still currently negative in gel

# Bleeding with no history case study

- Bleeding patient arrived in the emergency department at Danbury Hospital
- The physician ordered 2 units of blood to be transfused asap and wished to wait for crossmatched blood
- Danbury Hospital blood bank had no records on this patient
- Fortunately, the patient was in the alloantibody exchange showing as A neg with anti-D and anti-C that was identified in 2014 at another hospital
- Blood bank was able to start the type & screen and the antibody panel with an extra selected cell to rule out anti-E at the same time
- RBC units were antigen typed during the testing of the patient's samples
- All additional alloantibodies were ruled out and the antigen negative units were full crossmatch compatible
- Crossmatch compatible antigen negative units were dispensed faster due the exchange providing data

# Application of alloantibody exchange at Nuvance Health

- Search if transfusion is ordered
- Search if the antibody screen is positive
- Search if the patient is scheduled for surgery
- No major changes to how we transfuse patients
- We order a no charge antibody identification for antibodies not found at Danbury with a comment “Anti-\_\_\_ previously detected at \_\_\_ hospital per Alloantibody Exchange”
- Full crossmatched, antigen negative blood is provided for all clinically significant antibodies found in testing and listed in the exchange
- Pathologist is contacted if blood availability is an issue

# Application of alloantibody exchange at Nuvance Health

- Non-reactive cold alloantibodies (P1, Le<sup>a</sup>, Le<sup>b</sup>, M, N and Lu<sup>a</sup>) require a full crossmatch and the RBC unit does not need to be antigen negative
- Computer crossmatch is acceptable for a cold autoantibody reported in the exchange if the current screen is negative
- Current institution protocols are followed if irradiation or Darzalex/anti-CD38 is listed
- Consult with hematology if Hgb S negative units would be indicated

Do you think this would be a valuable tool in your Blood Bank?

Yes,  
Sign me  
up  
NOW!!

No, not  
for us

[Poll question 4](#)

An aerial view of a city skyline at dusk, with a semi-transparent white overlay containing text. The city lights are visible, and the sky is a mix of blue and orange. There are decorative yellow squares in the top left and green squares in the bottom left.

**For sign up and more  
information, visit  
<https://www.alloantibody.org>**

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# Thank You

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2024

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SEPTEMBER 3-6 | CHICAGO, IL

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An aerial view of a city skyline at dusk, with the word "END" overlaid in the center. The city is illuminated with warm lights, and the sky is a mix of blue and orange. The word "END" is in a bold, blue, sans-serif font. There are decorative elements: a pattern of yellow squares in the top left corner and a pattern of green squares in the bottom left corner.

**END**