

14th PAN ARAB
TRANSFUSION
MEDICINE
CONFERENCE
QATAR 2024



Inspiring
Transfusion
Excellence Across
Arab Nations

Joint-Provider



Under the Patronage of

وزارة الصحة العامة
Ministry of Public Health
دولة قطر - State of Qatar



30 November to 2 December 2024

Sheraton Grand Doha Resort & Convention Hotel,
Doha, Qatar

Establishing an Arab Rare Blood Donor Registry: Challenges and Opportunities

Dr. Zainab Alarimi, MD, FRCPA

Haematopathologist and the Director of the Blood Banks Services, Oman

Joint-Provider



Under the Patronage of

وزارة الصحة العامة
Ministry of Public Health
دولة قطر - State of Qatar



Disclosure Statement

I make the following declaration in relation to this CPD Activity :

- This complies with the Ministry of Public Health in Qatar Department of Healthcare Professions MoPH-DHP accreditation standards.
- There is NO Conflict of Interest.
- There is no plagiarism or copyright infringement.
- The content is balanced and free of bias, either commercial or non-commercial.

**14th PAN ARAB TRANSFUSION MEDICINE
CONFERENCE QATAR 2024**

Inspiring Transfusion Excellence Across Arab Nations

Joint-Provider



Under the Patronage of

وزارة الصحة العامة
Ministry of Public Health
دولة قطر - State of Qatar



Outline

- Definition
- Oman experience
- Rare blood Donor programs
- Challenges
- Summery and conclusions

14th PAN ARAB TRANSFUSION MEDICINE
CONFERENCE QATAR 2024

Inspiring Transfusion Excellence Across Arab Nations

Joint-Provider



Under the Patronage of

وزارة الصحة العامة
Ministry of Public Health
دولة قطر - State of Qatar



What is Rare Blood?

- ☐ Negative for High prevalence antigens with occurrence of less than 1 in 1000, (0.1%) but France: 4/1000, Japan: 1:100-1000
- ☐ Negative for multiple common antigens (1:200 to 1:1000)
- ☐ More than 150 out of 385 antigens are considered as rare



Providing patients with a rare blood with a phenotype of 1 in 1000 or less is a global challenge when the only option is the transfusion

	Rh					Kell		Duffy		Kidd		MNS				Results
	D	C	E	c	e	K	k	Fy ^a	Fy ^b	Jk ^a	Jk ^b	M	N	S	s	
1	+	+	0	0	+	0	+	+	+	+	+	+	+	+	+	3+
2	+	+	0	0	+	+	+	0	+	0	+	0	+	0	+	3+
3	+	0	+	+	0	0	+	+	0	+	+	+	0	+	+	3+
4	+	0	0	+	+	0	+	0								3+
5	0	+	0	+	+	0	+	+								3+
6	0	0	+	+	+	0	+	0								3+
7	0	0	0	+	+	+	+	0								3+
8	0	0	0	+	+	0	+	+								3+
9	0	0	0	+	+	0	+	+								3+
Auto																0

Characteristic reactivity:

- All cells reactive at the same strength
- Autocontrol negative (if not recently transfused)



14th PAN ARAB TRANSFUSION MEDICINE
CONFERENCE QATAR 2024

Inspiring Transfusion Excellence Across Arab Nations

Joint-Provider



Under the Patronage of



Overview of Department of the Blood Banks

Services

Serology & NAT:

ABO/Rh group including
weak D testing,
HIV, HBV, HCV, HTLV &
Syphilis
Malaria and Dengue

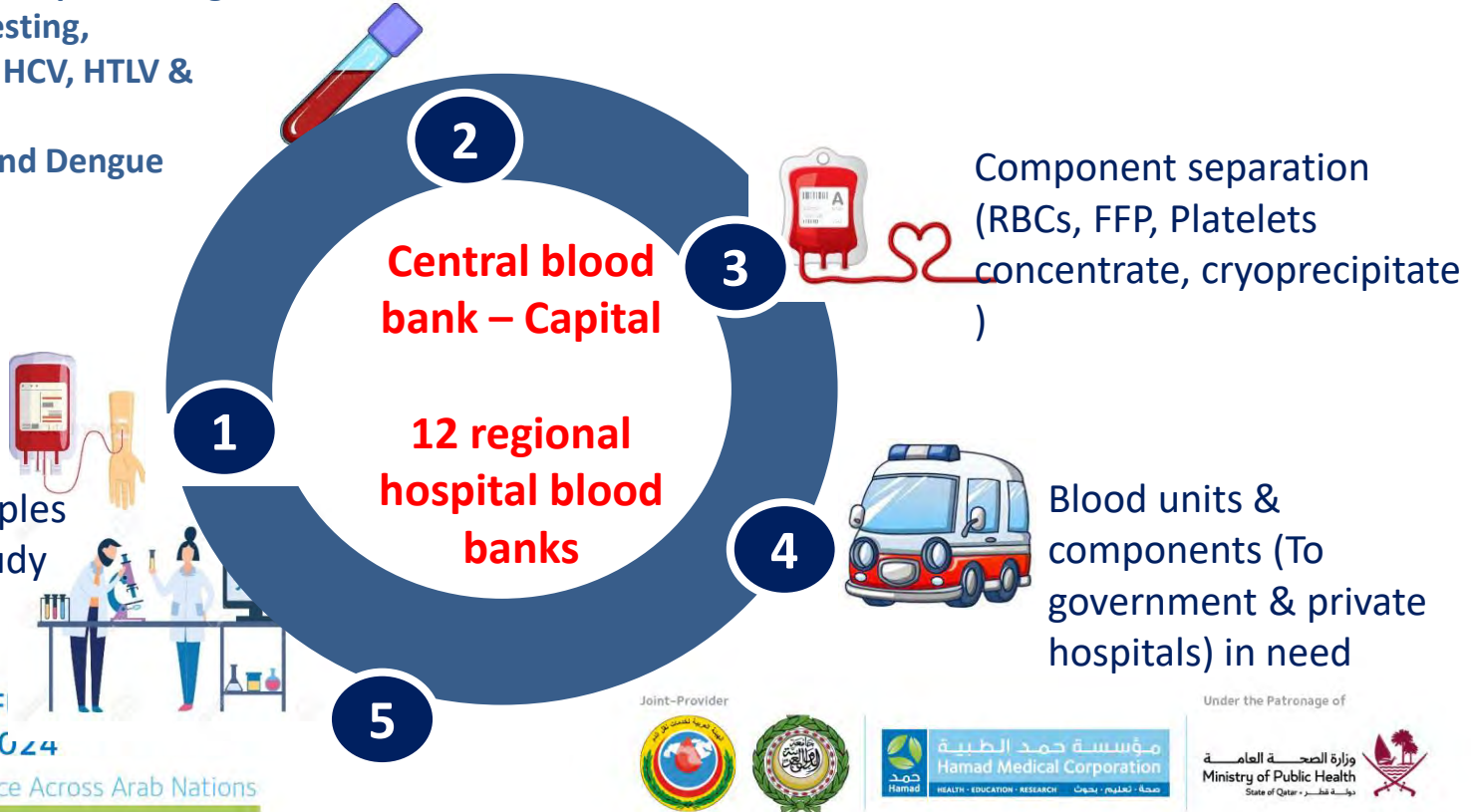
Whole blood,
Apheresis – RBCs,
Plasma & Platelets

Red cell Referral lab:

Patients & donors samples
Adsorption, elution study
Phenotyping
Rare donor registry

14th PAN ARAB TRANSFUSION
CONFERENCE QATAR 2024

Inspiring Transfusion Excellence Across Arab Nations



Immunohematology reference laboratory

- Identification of donors with rare types and maintaining the database of rare blood groups in Oman as well support all the hospitals with rare blood.
- Provide services for 15 blood donor centers, hospital blood bank laboratories and other medical centers, thalassemia centers, and transplantation center
- High number requests due to the high number of haemoglobinopathy patients requiring antigen negative for multiple antigens
- Freezing of the RBC Not yet available but we are in the process of establishing the service

Prevalence and Specificity of Antibodies against High Frequency Red Cell Antigens in Oman - A National Reference Laboratory Experience

A Al Jahwari¹, K Al Habsi^{1,2}, Z Al Arimi^{1,2}, R Al Muhaidhri^{1,2}, S Al Khan^{1,2}

¹Hematopathology Residency Training Program, Oman Medical Specialty Board, Muscat, Oman

²Department of Blood Banks Services, Ministry of Health, Muscat, Oman

³Hematology Department, Sultan Qaboos University Hospital, Muscat, Oman

INTRODUCTION

Diagnosis and management of patients with antibodies against high-frequency antigens (HFAs) pose significant challenges in transfusion medicine, particularly when established rare donor registries and frozen blood inventories are lacking.

AIM

- To estimate the prevalence and specificity of antibodies against HFAs
- To analyze demographics and clinical profiles of the affected patients
- To study the phenotypes of rare donors in Oman.

METHOD

- This is a retrospective descriptive study conducted in the central blood bank which also has the main reference laboratory in the country.
- All referred cases from January 1st 2017 to December 31st 2023 were manually screened and cases of antibodies against HFAs are collected.

CONCLUSIONS

- Despite our geographical proximity to neighbor countries, our population has a distinct profile of rare phenotypes and antibodies against HFAs. Realizing such finding is essential for efficient healthcare planning.
- Timely access to compatible rare blood is crucial to achieve good patient outcomes and this can be achieved through a well-established national rare donor registry and a local frozen blood inventory.
- Undoubtedly, collaboration with international rare donor registries is vital

CONTACT INFORMATION

- We identified 31 out of 6016 referred patients (0.5%) with antibodies against 14 different HFAs or variants of Rh antigens demanding rare blood (Table 1).
- The median age is 33.5 years, with females comprising 90% of cases.
- More than half of the patients were pregnant, and 13% had sickle cell disease.
- The most commonly encountered antibodies were anti-U and anti-k, constituting 39% of cases.
- Six pregnant patients had anti-U and no cases of hemolytic disease of fetus and newborn (HDFN) were observed.
- One patient with anti-k had a delayed hemolytic transfusion reaction and her pregnancy was complicated by mild HDFN.
- A patient with declining anti-k antibody titer required emergency transfusion using k-positive blood under IVIG coverage with no hemolytic reactions observed.
- The rare P₁K phenotype with anti-P antibodies was found in four patients and two of them had additional anti-PX2 antibodies. Of note, the four patients come from the same area and family tribe.
- Two pregnant patients with anti-P had successful pregnancies.
- A patient with severe HDFN and multiple intra-uterine fetal death due to anti-Jsb antibodies was treated successfully with IVIG, steroids and multiple intrauterine transfusions using maternal blood and imported foreign blood.
- Herein we also report the pregnancy outcome of the first and only reported case of antibody against the novel Luom antigen who had uneventful pregnancy with no clinical or serological evidence of HDFN.
- Through mass donor screening, 89 rare donors were identified (Table 2). Yet, no Rh null or P1K phenotype and no Lan or Jsb negative donors are found.

RESULTS

Table 1: Summary of the cases with antibodies against high frequency antigens

Case No.	Antibody specificity	Relevant phenotype	ABO group	Age	Sex	Serological features (6 cell antibody screen panel)						Number of available Potential donors
						LUSS			Enzyme			
						1	2	3	4	5	6	
1	Anti-U, anti-D, anti-C	S-s ⁺ , C ⁺ , D ⁺	O Neg	38	F	+	+	+	+	+	+	1
2	Anti-U, anti-D	S-s ⁺ , U ⁺ , D ⁺	B Neg	31	F	+	+	+	+	+	+	1
3	Glycophorin B related antibody showing anti-U like specificity	C ⁺ +E ⁺ +K ⁺ -Jk(a+b ⁺), M ⁺ , N ⁺ -J ⁺ , S-s ⁺ , Fy(a-b ⁺)	A Pos	38	F	+	+	+	+	+	+	7
4	Anti-U, anti-E	S-s ⁺	A Pos	42	F	+	+	+	+	+	+	7
5	Anti-U	S-s ⁺ , Fya ⁺ , Fyb ⁺	B pos	28	F	+	+	+	+	-	-	7
6	Anti-U	S-s ⁺ , Fya ⁺ , Fyb ⁺	O Pos	34	F	+	+	+	+	-	-	6
7	Anti-Yta	Yt(a-b ⁺)	A Pos	43	F	+	+	+	+	+	-	2
8	Anti-Yta	Yt(a-b ⁺)	O Pos	6	F	+	+	+	+	+	-	2
9	Anti-Yta	Yt(a-b ⁺)	O Pos	59	F	+	+	+	+	W	W	2
10	Anti-k	K ⁺ -k ⁻	O Pos	29	F	+	+	+	+	+	+	13
11	Anti-k	K ⁺ -k ⁻	B Pos	66	F	+	+	+	+	+	+	14
12	Anti-k	K ⁺ -k ⁻	A Neg	36	F	+	+	+	+	+	+	4
13	Anti-k	K ⁺ -k ⁻	A Pos	64	F	+	+	+	+	+	+	19
14	Anti-k	K ⁺ -k ⁻	O Pos	33	F	+	+	+	+	+	+	13
15	Anti-k	K ⁺ -k ⁻	A Neg	26	M	+	+	+	+	W	W	4
16	Anti-P with anti-PX2	P1K phenotype, k ⁻	A Pos	25	F	+	+	+	+	+	+	0
17	Anti-P with anti-PX2	P1K phenotype	O Pos	56	M	+	+	+	+	+	+	0
18	Anti-P with anti-D	P1K phenotype	A Neg	31	F	+	+	+	+	+	+	0
19	Anti-P	P1K phenotype	O Pos	3	F	+	+	+	+	+	+	0
20	Anti-H	Bombay	Oh Pos	26	F	+	+	+	+	+	+	3
21	Anti-LUOM	Lu(a-b ⁺), LUOM ⁺	O Neg	23	F	+	+	+	+	+	+	0
22	Anti-Lub	Lu(a+b ⁺)	A Pos	41	F	+	+	+	+	+	+	N5
23	Anti-Lub	Lu(a+b ⁺)	O Pos	27	F	+	+	+	+	+	+	N5
24	Anti-Lan	Lan ⁺	O Pos	25	F	+	+	+	+	++	++	0
25	Anti-Ch	Ch ⁺	O Pos	6	F	+	+	+	+	+	+	N5
26	Anti-Ge2	Ge2 ⁺	O Pos	26	F	+	+	+	+	-	-	0
27	Anti-JK3	JK(a-b ⁺)	AB Pos	41	F	+	+	+	+	+	+	3
28	Anti-Jsb	Jsb ⁺	O Pos	39	F	+	+	+	+	+	+	0
29	Anti-Kpb	Kp(a+b ⁺)	O Pos	33	F	+	+	+	++	+	+	2
30	Anti-D, anti-C and anti-Hrs	D variant type 4.2.2, C ⁺ , e ⁺ , E ⁺ , e ⁺ variant, hrs ⁺ , Hr ⁺	O Pos	37	F	+	+	+	+	+	+	7
31	anti-e	C ⁺ , E ⁺ , e ⁺ (highly suspected variant e)	O Neg	44	M	+	-	+	+	+	-	7

Table 2: Phenotypes of rare blood donors

Donor phenotype	Total available number/ screened donors	Number of	ABO group	RHD	Available Number
Bombay phenotype (Rh null) (r/r ⁺)	3/14850 0/14850 17/14850		Oh	positive	3
			O	Negative	0
			A	Negative	7
			B	Negative	6
			AB	Negative	3
			O	Negative	1
			A	Negative	7
			B	Negative	1
			O	Negative	1
			A	Positive	12
			A	Negative	3
			A	Positive	6
			B	Positive	1
			O	Positive	2
			B	Positive	1
			O	Positive	3
			O	Negative	1
			A	Positive	1
			B	Positive	1
			O	Positive	12
			O	Negative	2
			A	Positive	5
			A	Negative	1
			B	Positive	4
			B	Positive	1

Demands for Rare Blood(Oman experience)

- 32 Identified with antibodies to HFAs or variants of Rh antigens(Excluding SCD cases requiring multiple antigen negative phenotype.
- Median age 33.5 years, with females comprising 90% of cases.
- Critical situation: 50% pregnant, and 13% had sickle cell disease.
- Search for large number of Blood Donors
- The most commonly encountered antibodies were anti-U and anti-k, constituting 39% of cases.

Donor Phenotype	Total available number/ Number of screened donors	ABO group	RhD	Available Number
Bombay phenotype	3/14850	Oh	positive	3
Rh null	0/14850	-	-	0
r' r'	17/14850	O	Negative	7
		A	Negative	6
		B	Negative	3
		AB	Negative	1
r'' r''	8/14850	O	Negative	7
		A	Negative	1
k-	22/4409	O	negative	1
		O	Positive	12
		A	Negative	3
		A	positive	6
		B	Positive	1
Kpb-	3/4243	O	Positive	2
		B	Positive	1
Jk(a-b-)suspected Jk3 negative	3 /5160	O	Positive	3
S-s- (suspected U-)	8/2398	O	Positive	5
		O	Negative	1
		A	Positive	1
		B	Positive	1
Lu(b-)	23/2592	O	Positive	12
		O	Negative	2
		A	Positive	5
		A	Negative	1
		B	Positive	4
Yta-	2	O	Positive	1
		O	Negative	1
Jsb-	0 /2000+ (by cross matching)			
Lan-	0			
P-	0			
Pxa-	0			
Ge2-	0			

DHTR and HDN risks

- One patients had a delayed hemolytic transfusion reaction and her pregnancy was complicated by mild HDFN.
- A patient with declining anti-k antibody titer required emergency transfusion using k-positive blood under IVIG coverage with no hemolytic reactions observed.
- Some patients had already h/o abortions with one with with severe HDFN and multiple intra-uterine fetal death due to anti-Jsb antibodies was treated successfully with IVIG, steroids and multiple intrauterine transfusions using maternal blood and imported foreign blood.



Demands for Rare blood... Con



Prevalence of SCD 6% with 150 cases annually, HbSS patients (>80%) and 68% with alloimmunization .



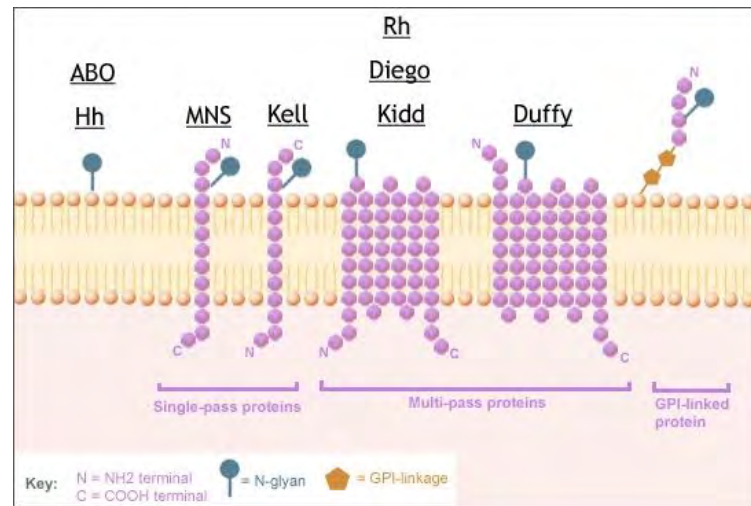
81.6 percent demonstrating Fy(a-b-) due to the homozygous FY*02N.01 genotype.



RH variant alleles were detected in five patients (13.2 %)

Some basics.....

- **ISBT WP: 44 recognized blood group systems containing 385 red cell antigens.**
- **Varies in different ethnicity**
- **So it can be rare in one population and frequent in another population (finding a compatible blood for a patient requiring Fya neg and RhD neg In Asia is very challenging)**



Antigen	RhD Neg	Fya Neg
Caucasians	15%	32%
Asia	1%	<4%
Oman	11%	82%

Table 6. Interracial Frequencies of RBC Phenotypes

RBC Phenotype	European-American (%)		African-American (%)
Rhesus group			
D	83		92
C	68		33
E	29		20
cDe	1.6		42
Kell group			
K	9		2
Duffy group			
Fy (a+b+)	49		2.6
Fy (a-b-)	Rare		68

Data derived from Giblett¹⁹³ and Rosse.¹⁹⁴

Need for an Arab Rare Blood Donor Program

- Most of the patients who require rare blood are urgent cases
- The rare blood group phenotypes encountered in each country may vary according to the differences in ethnicity
- High rate of the SCD patients who require multiple negative antigen for exchange transfusion and for acute crises

A robust program is required to meet the rare blood needs of the Arab countries

International Rare Donor Panel (IRDPP)

- ❑ Established in 1965 as an ISBT initiative in collaboration with the WHO
- ❑ Management and maintenance of the IRDP by International Blood Group Reference Laboratory (IBGRL) in the UK.
- ❑ **Purpose:** to find and facilitate exchange of rare blood units between countries for patients in urgent situations.

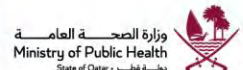
14th PAN ARAB TRANSFUSION MEDICINE
CONFERENCE QATAR 2024

Inspiring Transfusion Excellence Across Arab Nations

Joint-Provider



Under the Patronage of

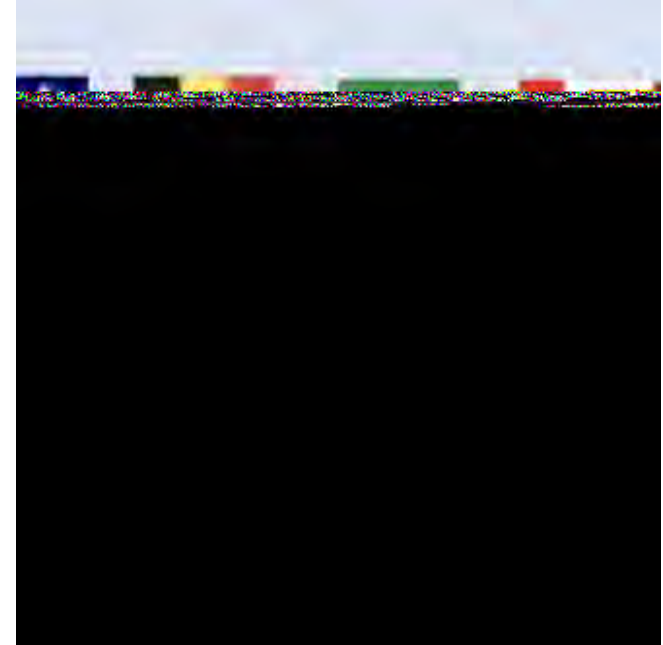


The ISBT rare blood donor working party (ISBT WP) was established in 1985 and now includes 36 members from different countries and 27 advisors

ISBT WPRB provides the lists of rare blood recorded in their country to ISBT rare panel and assist in filling rare blood requests

14th PAN ARAB TRANSFUSION MEDICINE
CONFERENCE QATAR 2024

Inspiring Transfusion Excellence Across Arab Nations



Joint-Provider



Under the Patronage of



The American Rare Donor Program (ARDP)

- ❑ (ARDP) is a joint program of the American Association of Blood Banks (AABB) and the American Red Cross Blood Service formed in 1998.
- ❑ ARDP database, REGGI, more than 59 000 active rare donors
- ❑ IgA deficient is included with titre $<0.05\text{mg/dl}$

Joint-Provider



Under the Patronage of



Other Rare Blood programs

- Belgium
- Brazil
- Canada
- China
- Finland
- France
- Iran
- United states
- United Kingdom
- Japan
- Netherlands
- New Zealand
- Singapore
- South Africa
- Spain
- Switzerland,
Germany
- Austria

Regional

Rare Donor program: Kuwait Central Blood Bank

System name	RBCs	O	A	B	AB	Total
MNS	U -, S-, s-	32	16	22	1	71
RH	R ₂ R ₂	157	70	70	18	315
	$\begin{smallmatrix} / / \\ r r \end{smallmatrix}$	70	34	43	6	153
	$\begin{smallmatrix} // // \\ r r \end{smallmatrix}$	7	4	-	1	12
	D - -	2	1	1	-	4
	Rh ^{mood}	1	-	-	-	1
	RHCE ⁺ ce, 733G	4	-	-	-	4
	RHCE ⁺ ceAR	2	-	-	-	2
Duffy	Fy (a-, b-)	748	451	408	120	1727
Kidd	JK (a-, b-)	14	10	11	3	38
Lutheran	Lu (a+, b-)	1	1	1	-	3
	Lu (a-, b-)	2	1	1	1	5
Kell	K+, k-	110	52	45	11	218
	Kp (a+, b-)	1	1	1	-	3
	Js (a+, b-)	1	-	-	-	1
Gerbich	Ge: -2,3,4	18	3	2	2	25
	Ge: -2, -3,4	-	-	2	-	2
Junior	Jr ^a	1	4	1	1	7
Langereis	Lan	-	-	4	-	4
Cartwright	Yt ^a	11	10	4	1	26
H	O _h	4	-			4
	Para-Bombay	-	3	-	-	3
Chido/Rogers	Ch-	1	-	1	-	2
Colten	Co (a-, b+)	-	-	-	1	1
Dombrock	Jo(a-)	-	1	-	-	1

Table 1. Overview of rare donors in Kuwait

Challenges

- Diversity of the population due to immigration and the eligibility criteria due to malaria deferral
- Limited inventory and recruitment of the donors
- The distribution of rare and specific red cell phenotypes varies between races and ethnicities and even changes with time (Canada 2021:H-, Recent: U-)
- Logistics of transportation of the blood across borders
- Expensive service: Requires a well established immunohematology laboratories and freezing of RBC FACILITY

Laureano M, Clarke G, Yan MTS. How do I provide rare red cells to patients? *Transfusion*. 2023; **63**: 670–678

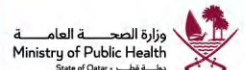
**14th PAN ARAB TRANSFUSION MEDICINE
CONFERENCE QATAR 2024**

Inspiring Transfusion Excellence Across Arab Nations

Joint-Provider



Under the Patronage of



Challenges

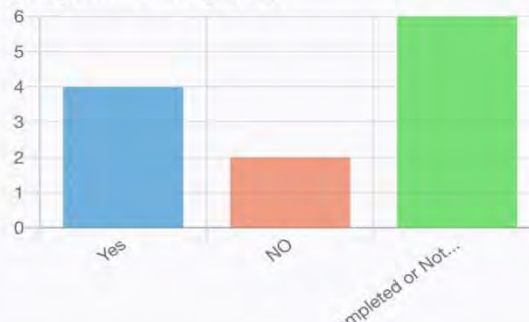
- Inadequate resources (advanced immunohaematology referral laboratory, Human resources, lack of freezing facility and maintenance of storage system)
- Logistics and Challenges related to transportation of a rare blood unit
- Lack of awareness and knowledge (Public, doctors and technical staff)
- Inadequate training in advanced immunohematology
- Financial Constraints
- Variation in testing
- Decentralization of the service in most of the blood banks in the region

Ghezelbash B, Moghaddam M, Aghazadeh S. Challenges of Establishing a National Rare Donor Program in Iran. *Int J Hematol Oncol Stem Cell Res*. 2018 Jul 1;12(3):213-219

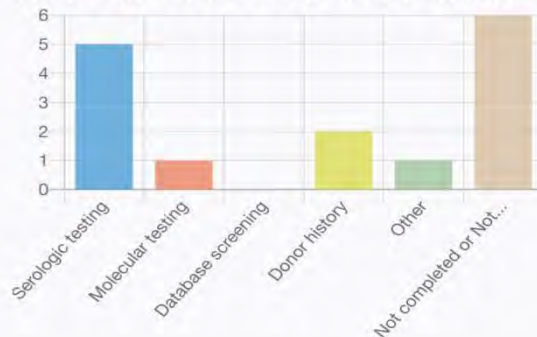
Datta SS, Sil S, Mandal S. Rare blood group registry in India-current challenges and future perspectives. *Front Genet*. 2023 Sep 11

Summery of the survey

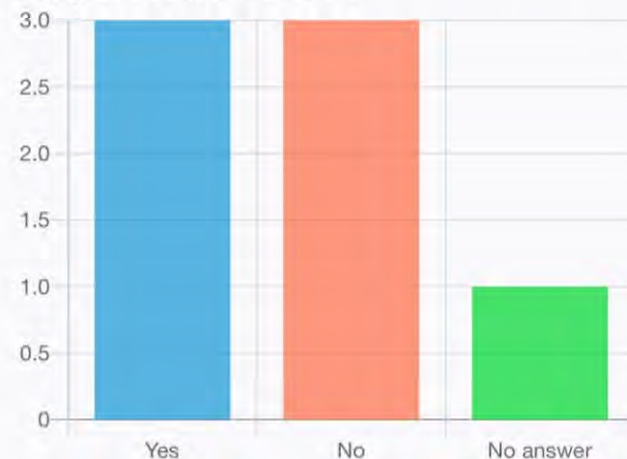
Do you have a rare blood donor program or registry?



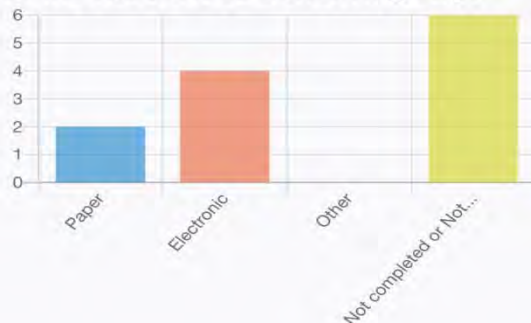
What method does your blood bank use to identify rare blood group phenotypes? (Select all that apply)



Do you have a national Red Cell Reference laboratory to investigate and provide the units required to support Rare Blood ?



Is the Rare Blood donor Registry?



Joint-Provider

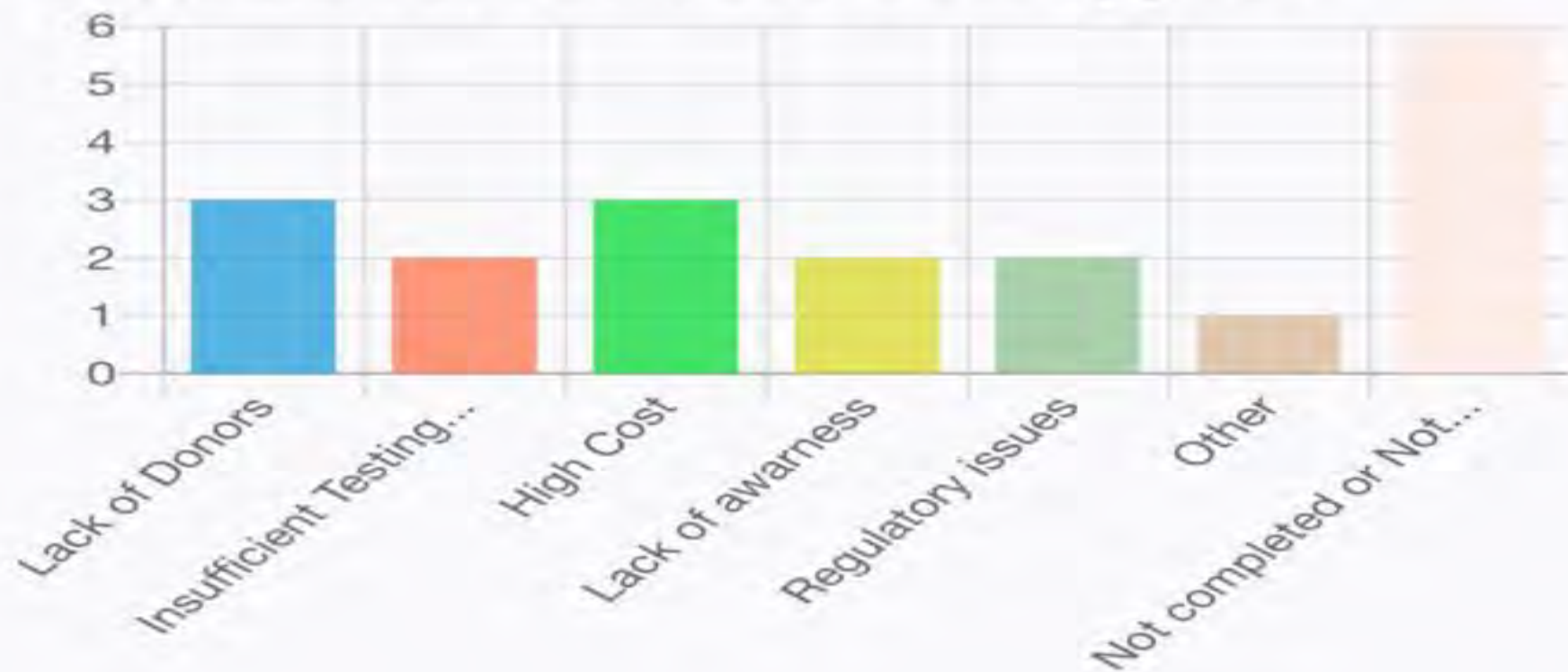


Under the Patronage of

وزارة الصحة العامة
Ministry of Public Health
دولة قطر - State of Qatar



What are the main challenges your blood bank faces in meeting the demands for Rare blood Types?



Steps to create An Arab Rare Blood Donor Registry

- Identify members from each country to be representing their national rare donor program to form (ARDWG)
- To achieve success at the regional, national, and international levels, it is essential for local blood centers to establish and maintain their own registries, thus enabling them to meet the needs of their patients while contributing to broader registry efforts.



Steps to set up a Rare Blood Donor Program

- Creating awareness among the regular voluntary blood donors through education and motivation
- Identifying and recruiting rare blood donors (Family members, mass screening, specific ethnic groups)
- Setting up national / regional reference centers to detect and identify the rare phenotypes
- Appropriate rare blood donor storage and cryopreservation of rare blood
- Effective communication between various blood banks/ blood transfusion services by linking through these national /regional reference centers
- Strengthening the training and education programs for technologists and clinicians
- **Financial and Administrative Support by Higher Management**

Summery and conclusions

- Challenges include technical, logistical, and administrative limitations. But the main limiting factors are poor availability of resources (trained staff) and inadequate donor pool, lack of awareness, inadequate number of laboratories with blood group genotyping facilities, and the decentralized nature of blood transfusion services
- Providing rare phenotype red cells requires a collaborative multidisciplinary efforts from donor recruitment and collection, through production, distribution, and logistics to ensure the timely availability of red cells for patients in need.

**A rare donor program requires perseverance,
patience, and long-term commitment, given that
one cannot predict when rare blood will be
needed**



لا تتردد بالتبرع بالدم إن تواصلنا معك

فربما يكون دمك هو الأكثر توافقا لدى مريض في أمس الحاجة إلى دمك

تؤثر فصائل الدم على عملية نقل الدم واختيار المتبرع، حيث إن الجسم يقبل الدم الذي يحتوي على المستضدات (Antigen) المتوافقة معه والتي لا يعتبرها الجهاز المناعي دخيلة، وقد يؤدي رفضها لحدوث مضاعفات خطيرة على صحة المريض.



ولتقليل هذه المضاعفات فإنه لا بد من توفير دم أكثر توافقا لدم المريض، لذلك يقوم مختبر بنك الدم بعمل الفحوصات اللازمة لاكتشاف مستضدات فصائل الدم (أكثر من ٣٠٠ نوع)، ليتم بعدها البحث عن المتبرعين بالدم المناسبين، وفي كثير من الأحيان يكون عددهم بسيطا جدا، ليتم التواصل معهم ودعوتهم إلى التبرع بالدم.

* المستضدات : تركيبة خاصة من جزيئات البروتينات.

Blood donation hours at the Central Blood Bank (Bausher)

Saturday to Thursday: 8:00 am – 8:00 pm

Friday: 8:00 am – 8:00 pm



أوقات التبرع بالدم في بنك الدم المركزي ببوشر

السبت إلى الخميس : ٨:٠٠ ص حتى ٨:٠٠ م



THANK YOU

**14th PAN ARAB TRANSFUSION MEDICINE
CONFERENCE QATAR 2024**

Inspiring Transfusion Excellence Across Arab Nations

Joint-Provider



Under the Patronage of

وزارة الصحة العامة
Ministry of Public Health
دولة قطر - State of Qatar

