

Type and Screen

A Rational approach

Dr. K. Cheirmaraj
Ortho Clinical Diagnostics
a division of *Johnson & Johnson*
LIMITED



Type & Screen

- Type & screen – to be done during patient admission
- Blood Typing – Both patients and donors blood samples were typed for ABO & Rh grouping by forward and reverse grouping
- Blood Screening – Both patients and donors Serum/ plasma samples were screened for the presence of any unexpected or irregular antibodies using Antibody screening cell panel in AHG phase.

Incidence of Red cell alloantibodies :

- General Hospital Patient – upto 1 – 2%
- Multi transfused or multiparity patient – upto 5%
- Transfusion dependent diseases – upto 30%

Prevalence of Red cell antibodies :

Rh > Kell > Duffy > Kidd > other antigens

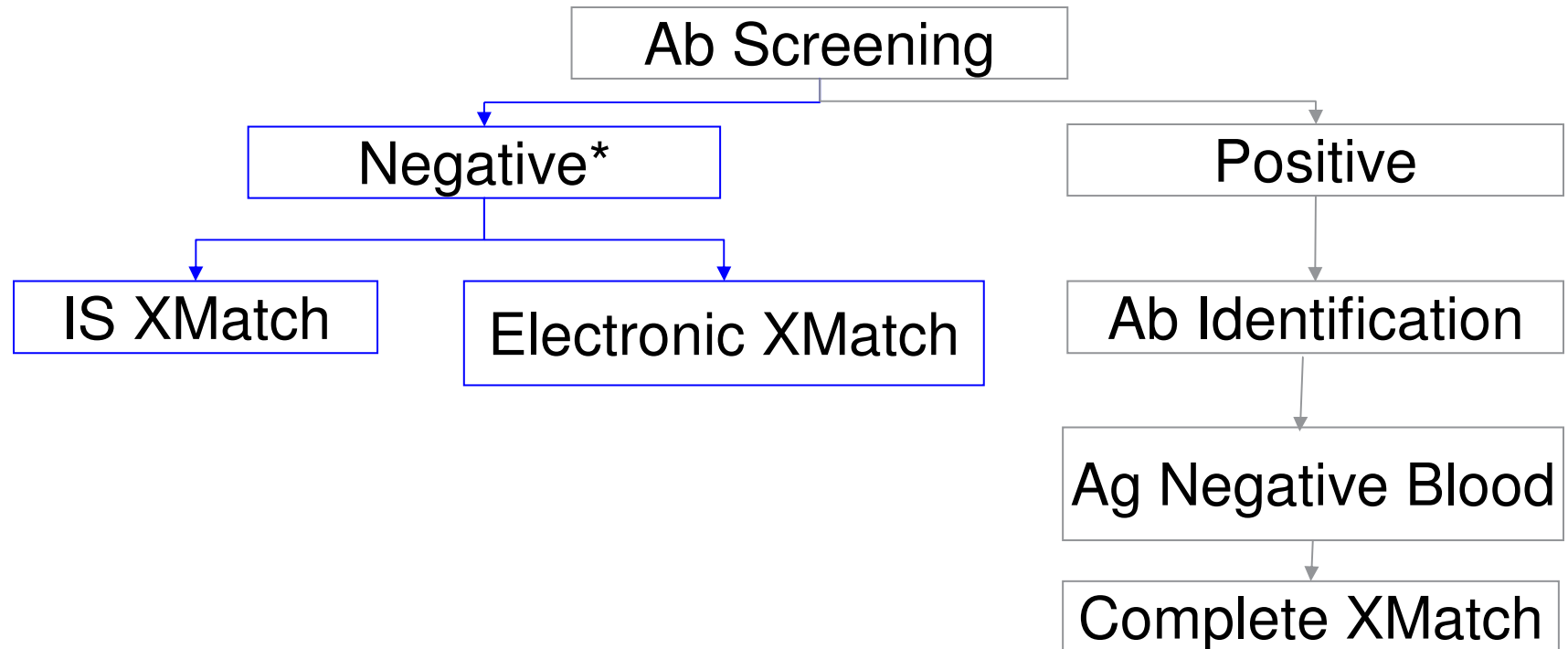
Type & Screen Policy

- Type & Screen
 - Type & Screen concept started in the 1960's
 - Abbreviated XM (IS XM) for Ab Screen negative patients adopted 1970's – 1980's
 - Electronic XM for Ab Screen negative patients adopted 1990's - 2000's

- In 1984, AABB recommended that the Complete –X Match could be replaced by an abbreviated X match in patients with negative Ab Screen.
- Type & Screen approach is safe as it can be able to pick up the clinically significant antibody in a better way than X-match.
- However, before implementation, the safety needs to be evaluated.

Note: donor units are also Antibody Screen Negative

Type & Screen Policy



Strength & Weakness

- Type & Screen Policy

Strength :

- Antibody Screen more efficient than crossmatch
 - Screen cells characterized to provide appropriate antigens
 - Homozygous antigen expression when possible
 - Donor blood may have weak antigen (heterozygous expression) & appear compatible
 - Antibody screening can be done on patient admission before the need for blood units arise.
 - Convenient automation along with grouping.
 - Predictable turn around time.

Weakness :

Antibodies may be missed if the corresponding antigen is not present in the screening cells

Antibody screening – Recommendations :

A 1.2 Antibody Screening

A 1.2.1 Techniques used for antibody screening **shall** be those that are capable of detecting clinically significant red cell antibodies reactive by haemolysis and/or haemagglutination at 37°C.

A 1.2.2 Reagent red cells **shall** consist of at least two group O red cells [**NOT POOLED**] and should express the following antigens: C, c, D, E, e, M, N, S, s, K, k, Fy^a, Fy^b, Jk^a, Jk^b.

Where possible, one cell should be of the probable R₁R₁ genotype (CDe phenotype) and the other of the probable R₂R₂ genotype (cDE phenotype). Where appropriate, additional antigens may be included to reflect the antigenic profile of the local population.

A 1.4.1 If no clinically significant red cell antibodies are detected in the antibody screen and there is no known history of clinically significant antibodies, the crossmatch may consist of an immediate spin technique only or another procedure capable of detecting ABO incompatibility [eg., computer crossmatch, see A1.6].

Ref : Guidelines for pre-transfusion testing, 4th Edition, 2002



Australian & New Zealand
Society of Blood Transfusion Inc

Current scenario in India:

Reactive approach -Type & Crossmatch policy

- Patient gets admitted in Hospital
- Pre-operative tests/post admissions tests performed which do not include Antibody screening.
- Patient sample sent to Blood Bank with requisition, a day before or few hours before the need.
- Blood Bank types patient blood & FXM(Full Cross Match) is performed with the required units
- Compatible units were reserved for the patient
- In case of incompatibility, blind FXM(urgent) performed with all the possible units including O negative units in the inventory;
- in case of non resolution, hunt is directed to other blood bank or least compatible blood is provided with the consent of surgeons or surgery is postponed.

Crossmatches...

Will

Verify donor cell ABO compatibility

Detect most antibodies against donor cells

Will Not

Guarantee normal survival of RBCs

Prevent patient from developing an antibody

Detect all antibodies

Prevent delayed transfusion reactions

Detect ABO/Rh errors

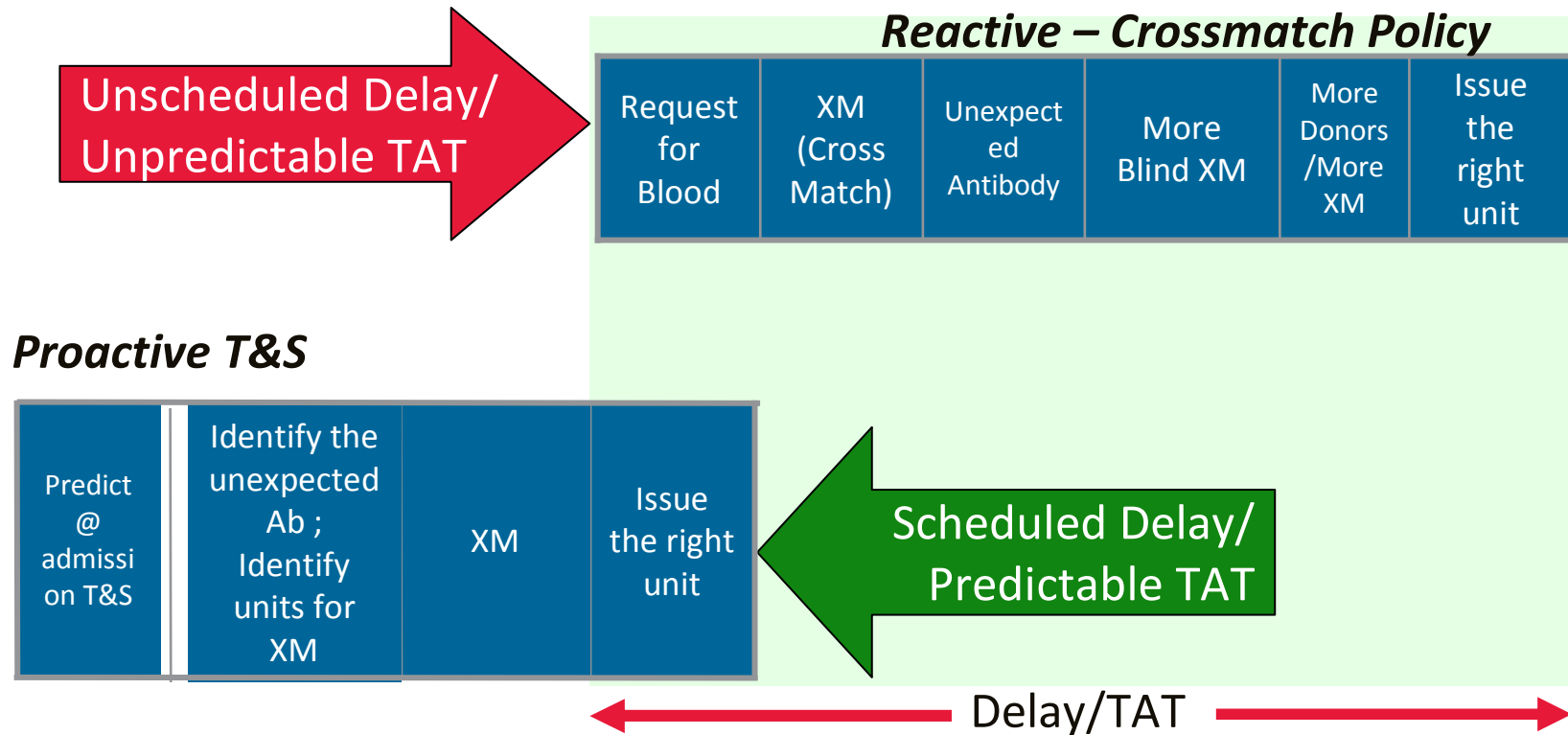
Proactive approach – Type & Screen Policy

- **All patients getting admitted were typed and screened in advance along with other post admission tests.**
- **All donor samples were typed and screened for the presence of any clinically significant antibody.**
- **Patients with Antibody screen negative will be issued the available blood in blood bank using a ISXM (immediate spin xm) as it is mandatory. It helps to reduce the TAT**
- **FXM may not be required if both donor and patient are Ab screening negative, except in cases of multiple transfused patients / multi-gravida.**
- **No blood units are reserved for patients who are antibody screening negative.**

Under Type & Screen Policy:

- Patients with Antibody screen positive can be subjected to Ab Identification to identify the specific antibody.
- If the specific antibody is identified, then one of the following can be performed to provide the compatible blood.
 - Select the donor who are lacking that particular antigen from 'donor registry' if already developed and do FXM.
 - do antigen typing using specific rare antisera in the donor samples and select the donors who are lacking that antigen and do FXM.
 - based on the frequency of the antigen, select the number of donors and do FXM to identify the compatible blood.

T&S (Type & Screen) Policy:



Maximize patient & surgeon satisfaction and Improve BB productivity

T&S effect on Patients

- Receive safe and compatible blood
- Reduces unnecessary bleeding for doing cross-match
- Prevent the transfusion of serologically incompatible blood, due to heterozygous dosage of antigen, missed in FXM.
- No unnecessary delay in scheduling surgery
- Patients who requires a massive blood transfusion will get benefited due to short TAT
- Aids in the prognosis and treatment of hemolytic diseases of newborn.

T&S effect on Surgeons/Clinicians

- Clinicians can receive the compatible blood within short TAT
- Prior information about Ab screening result helps in scheduling the surgery
- Avoids the need for repeated XM, especially in neonates
- Emergency situation can be handled in a better way
- Reduces unnecessary reservation of cross-matched blood for every patient

T&S effect on the Blood Bank

- Gains clinicians confidence by issuing the safe blood within short TAT
- Optimal usage of blood / blood components
- More efficient use of blood bank technologists time in implementation of new technologies viz., NAT, Leuco-reduction, etc.
- Overcome the issue of jeopardizing the blood supply by reserving the XM blood
- Crossmatch to transfusion ratio was reduced .
- Reduces the unnecessary wastage of blood because of unused and reserved/issued blood.
- Improvement in management of the blood stock
- Reduction of manual errors
- Improvement in the quality process

T&S effect on the Hospital

- Enhance the efficiency without compromising patient safety
- Elimination of post-transfusion complications resulting in reduced Length Of Stay in the hospital.
- Enhanced goodwill

T&S effect on Future of Transfusion Medicine

- One step towards 'electronic cross-match'
- More efficient and quick service to the patients by the staff
- SHOT can be reduced to a greater extent
- Effective haemovigilance

Type & Screen Policy

Limitations :

- Weak antibodies may be missed if the screening cells have only a single dose or weak expression of the corresponding antigen.
- Antibodies may be missed if the corresponding antigens are not present on the screening cells.
- Some antigens may be present in Indian populations, while absent in screening cell panels as the panels are not indigenous. . Antibodies against such antigens may be missed by Antibody screening but may lead to incompatibility.

T & S Policy - Experiences:

Apollo Hospitals, Chennai

- No case of missing antibodies by antibody screening when compared to AHG crossmatch in 5000 patients.
- **The compatibility testing to Transfusion ratio :**
 - Before Type & Screen – 1.6 : 1
 - After Type & Screen - 1.09 : 1
- **Turn around time :**
 - Before Type & Screen - minimum of 30 min
 - After Type & Screen - minimum of 10 min
- **Man power requirement :**
 - Before Type & Screen – 15 technicians
 - After Type & Screen - 10 technicians
- **Storage space :**
 - Before Type & Screen - Two 400 units blood bag refrigerators (for storing reserved units)
 - After Type & Screen - One 200 units blood bag refrigerators

Conclusions

- Several studies proved that
 - Type & screen methodology and ISXM achieved the safety level of above 99% similar to FXM.
 - Type & Screen Policy further offers several advantages over existing practice of Type & Crossmatching policy.
 - T & S Policy has potential for more economic transfusion service.

Thank – You

Ortho Clinical Diagnostics
a division of *Johnson & Johnson*
LIMITED

