History and Challenges of Blood Transfusion Services in Malaysia

C. G. Lopez
Transfusion Services in Clinical Practice

Transfusion Medicine (also involving Blood Banking and Hospital Transfusion Services) is regarded as an essential service in the modern hospital practice, but has remained a rather ill understood poorly defined discipline among the many other precisely framed specialties and subspecialties of medicine.
The Reality

In reality the development of transfusion services compared to that of other disciplines in Medicine has travelled a difficult and rugged path in Malaysia like in many other countries.

A review of its history in this country offers some insight, how the service has evolved and how challenges were overcome.
Beginnings

1950 – 1954 Blood Banking began as a back room activity of the General Hospital KL.

1955 first steps taken by a group of Red Cross ladies - organized blood donors and donations once a week on Wednesdays in a small room. Donors were recruited from the police and armed forces and government officers.
Early Actions To Improve Service

- **1958** a part time medical officer (M/O) appointed by the Ministry of Health with one supervisor full-time (Lab Technologist)

- **1960’s** Directors of the Ministry of Health recognized importance and serious deficiencies and hazards of the service

- **1961** in the GH, staff increased to 1 M/O, 2 supervisors, 2 assistant nurses and 1 attendant.

- Appointed long serving Laboratory Technologists and Hosp/Assistants as Blood Bank Supervisors in major general hospitals to take on the responsibility
Early Blood Banks

• Donors were mostly replacement and/or given sick leave or paid by relatives of patients. By **1970** over 5803 units blood collected in the General Hospital KL alone.

• Lab conditions remained rudimentary.

• All blood collected in bottles using reusable equipment and needles were sharpened manually.
Early Blood Banks

- Service was uncoordinated
- Insufficient number of blood donors
- Frequent transfusion mishaps; serious and even fatal incidents.
Launching of the National Blood Transfusion Services

April 1972

NBTS launched by the Director General of Health Services with the National Blood Transfusion Centre set up as "an independent body sited at the Blood Services Centre, Hospital Besar, Kuala Lumpur integrating all government hospital blood banks services in the country including the serving of the Hospital Besar with proper staff and facilities under the Hospital Division of the Ministry of Health"
National Blood Services Centre

Haematologist appointed as Director with 1 Medical Officer and 5 technologists.

No diagnostic haematology laboratory within the 2000 bed hospital. A few more staff requested to set up lab - to contribute to the development of the clinical aspects of the transfusion service and run 24 after-hours emergency service.
National Blood Services Centre

The Laboratory
Typical Peripheral Hospital Blood Bank 1972
Typical Peripheral Hospital Blood Bank  1972
Early Changes Nationwide

Bottle system immediately changed to disposable plastic bag blood collection system throughout the country.

Blood component separation became possible and the first fresh frozen plasma and cryoprecipitate were produced in August 1972.
Cramped Donor Premises

Assistant Nurses only
Technical Training

- **Dangers** pertaining to sample collection, laboratory testing and transfusion of blood itself were **clearly evident**

- **Intensive technical training courses** were launched, initially **with external consultants and WHO support** and continued in the **School of Medical Laboratory Technology**.
Standardization and Traceability

- **Standardised Operating System** in both the laboratory and hospital ward setting throughout the country.

- In 1974, all hospitals in the country were provided with *instruction booklets on the procedures* - requesting of blood, transport and storage of blood in wards, the transfusion of blood and the reporting and management of transfusion reactions.

- **Procedures quickly put in place** to ensure that patients were transfused with the correct blood, and *all records* from donor to patient were *traceable*.

- Established the *earliest Quality Management principles* in the laboratory and at critical points between the request for a blood component and the actual transfusion.
Standardization and Traceability

• Required the **printing of standardized stationary, labels, record forms** for all transfusion procedures for all hospitals in the country.

• **Central purchasing and supply of bags and reagents, stationary** carried out by the **Central Medical Store** in Kuala Lumpur in close collaboration with the **National Blood Services Centre** and all these items were **distributed nationwide** according to requirements as requested by regional centres.

• Whenever **logistic problems and shortfalls** occurred the National Blood Services Centre managed to provide advice and the **backup** necessary to maintain safety standards.
Screening of donations for Hepatitis B was started at the National Blood Services Centre in 1973 and later in other parts of the country.
Clinical Services
National Haemophilia Care

The availability of blood components and hematology laboratory facilitated diagnosis and management of haemophilia.

Comprehensive care program, central registry and regional care centers were organized for haemophilia and other similar coagulation problems.

Haemophila problems were severe!
Haemophilia patient Pseudotumour
Comprehensive care – orthopaedic
Comprehensive care – Dental
By the late 70’s, the National Haemophilia program was well established offering comprehensive haemophilia care with cryoprecipitate as the basis for management.
Early Haemophilia Society

The **Haemophilia Society of Malaysia** offered **strong social support** for patients with haemophilia and their families.
Haematology and Haemophilia Care Services

- Linkage of haematology, haemophilia care, and blood transfusion imbued a strong clinical bias
- Provided a better understanding of transfusion needs for patients
- Provided unique opportunities for medical officers and technologists to receive comprehensive and meaningful training in both transfusion and haematology in the same premises.
National Annual Data

• Compilation of national annual data from all blood banks in the country provided essential information on progress, data for development possibilities, for public information, and donor recruitment programs.

• Encouraged individual blood banks to monitor their achievements and compare performance with others.
By 1975 blood transfusion became safer and more blood and blood components became available to save life and support advancing clinical services.
The Ministry of Health relinquished direct administrative control of the Blood Services Centre to that of the General Hospital.
The Centre however continued

- to undertake and assume the responsibilities of a national referral and training centre including consolidating the national haemophilia care program

- the work of coordinating activities in the country planning and training of medical officers
Non Remunerated Donation Policy

Formalized in **1979**, when the first **National Seminar for Transfusion Services** was held. **Private sector was also represented** to discuss the problems of transfusion services. **Policy established** that the National Transfusion Services incorporating all blood banks in the country would be run on a **voluntary non remunerative blood donor system**.
Group Blood donations increase

• With greater public awareness and increasing number of successful mobile group donations, the dependency on replacement donors was substantially reduced particularly at the National Blood Services Centre and to a lesser extent in other state regional centers.

• Blood support began to be extended to other hospitals in the city for emergencies.

TARCollege student and Donor Organizer, NBSC
1980
New Standardized Procedures
National Blood Transfusion Service and
National Haemophilia Program
Peraturan Peraturan
Untuk Kakitangan Kakitangan
Makmal Tabung Darah

Bahagian Hospital
Kementerian Kesihatan
Malaysia.
There was much pressure from certain quarters to reduce further the status and function of the National Blood Services Centre to become a department of the Hospital. Area initially assigned for fractionation program given over to cardiology.

“Haemophilia is a genetic disease – therefore not a priority for MOH “
“Pay donors to get more donors! ”
“Hepatitis is everywhere – why all the testing ?”

Early AIDS period – “Donors should not be questioned on sensitive areas related to sex”
Dr Sreenivasan in his editorial in the Malayan Medical Journal 1985 in his plea for a truly national blood transfusion service, acknowledged the foresight of the early Directors of Health Services in establishing the seeds of a National Blood Transfusion Service but commented that focus was lost a few years later.
Plea For A Truly National Blood Transfusion Service

“The Blood Services Centre .......had to compete with all other less complex, less demanding 'supporting' services for all its requirements. .. endeavoured to keep up with the latest trends in the practice of clinical blood transfusions, ........but it became administratively a hospital-based transfusion service.

At the same time it had to undertake and assume the responsibilities of a national referral and training centre without adequate facilities of staffing, equipment and space”

G A Sreenevasan Med J Malaysia Vol 40 No 1 March 1985
1985 AIDS Epidemic – A “Blessing” for the Transfusion Service
The Ministry of Health once again directed attention to the Transfusion Services; a larger budget, and more staff – technologists, a microbiologist and scientist were made available.

Fractionation program initiated

Factor VIII concentrates replaces Cryoprecipitate for management of Haemophilia
1986 - 1987

- It was possible to launch and establish nationwide screening tests for the HIV virus without difficulty by mid 1987 within the established framework of the NTBS.

- At end of 1987, 33,793 units of blood were collected at the National Blood Services Centre, with a total of 182,469 from all centres in the country. It became possible to supply blood and blood components to more hospitals within the city.
End of 1987

- The view that the training of post graduate medical personnel in one of the branches of Pathology was sufficient to provide the necessary skills for the transfusion services did not help.

- Most of the medical officers from the Blood Services Centre eventually qualified as Histopathologists.

- By the end of 1987 there were still only 2 haematologists at the National Blood Services Centre and for the National Transfusion Service.
This was a period of more intense activities including establishing :-

An internationally recognized Quality System

A Contract Blood Fractionation Program with the Commonwealth Serum Laboratories in Australia.

The National Blood Services Centre became an International Training Centre (ITC) for Haemophilia care
National Blood Services Centre 1995

Showing Regular Donors 45% 25759

Total donations 56,670 in 1995 at NBSC
End of the Era

Though the national BTS was developed around hospital-based premises and administration, the National Blood Services Centre fulfilled its mandate.

Succeeded in upgrading and developing relatively safe clinically orientated coordinated and standardized transfusion services nationwide. By this time blood collection by the Centre had increased to over 100,000 units.
End of the Era

From its humble beginnings it also laid a sound foundation for further development towards a new distinct administrative structure separate from hospitals but with strong coordinated links with hospitals.

A key issue was identified – more specifically trained specialists to drive the further development process to fruition.
Degree Of Progress Through The Years
Degree of Progress

Blood Collection (Malaysia) 1972 - 2005

A 10 fold increase in collection over 3 decades
A dramatic drop in replacement donors between 1980 to 2005

Degree of Progress
Replacement donors from 1980 -2005

A dramatic drop in replacement donors between 1980 to 2005
Number of Cases of Haemophilia A, Haemophilia B and VWD between 1975 till 2009 in Malaysia

- **Haemophilia A**
- **vWD**
- **Haemophilia B**
Hemophilia Children Today

Special Thanks to En Aris Hashim President of the Society for 10 years
Fractionated Plasma Products Received From CSL (1991 - 2006)

Year

Quantity (Number of Vials):


Factor VIII  Albumin 20%  Intragam (IVIG)  Prothrombinex  IM Ig G  NSA 5%  Hep B (M)

*
### Total Products received from Commonwealth Serum Laboratories 2008 (in vials)

<table>
<thead>
<tr>
<th>Product</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albumin 20% NSA</td>
<td>26,949</td>
</tr>
<tr>
<td>Prothrombinex</td>
<td>6,593</td>
</tr>
<tr>
<td>Intragram</td>
<td>50,405</td>
</tr>
<tr>
<td>Biostate (Factor VIII Concentrate)</td>
<td>11,109</td>
</tr>
</tbody>
</table>

| Cost of Fractionation           | RM 18.2 million |
| Commercial Value                | RM 35 million   |
- FVIII  RM 190.00
- FIX    RM 250.00
- IVIgG  RM 280.00 *
- Albumin RM 140.00
Datin Dr G Duraisamy
2nd Director 1988 – 1997
Fractionation Program
Apheresis
International Quality systems
National Proficiency Testing System
( haematology and blood banking )
International Haemophilia training centre
HCV National Screening Program
National Training Programs ( international experts )

Dato Dr Yasmin Ayob
3rd Director 1997 – 2008
Specialist Training in Transfusion Medicine
NAT Testing
Viral Inactivation
Cord Blood Program
Blood Freezing ( Rare Blood types )
Haemovigilance
Accreditation
International Relations
Dr Norhanim binte Asidin
4th Director 2008 –2009

Blood Donor Aspects

Dato Dr Faraizah Karim
Deputy Director 2001 –

The long serving Deputy Director- the capable stand-in who is always available!

Special Interests – Clinical Aspects and Haemophilia Care
President of the Haemophilia Society
Present Director,  
National Blood Centre  

Dr Roshida binte Hassan  2009-  

Will take on the new challenges!
New Challenges
The Old and New
National Blood Centre
List of Departments and Units

Departments (10)
- Administration
- Donors- Recruitment Collection, Care
- Health Education
- Component Production & Fractionation
- Immunohaematology
- Transfusion Microbiology
- Quality & Biochemistry
- Thrombosis and Haemostasis
- Cord Blood Bank
- Histocompatibility & Immunogenetics

Units (6)
- Inventory
- Haemophilia
- Haematology
- Transfusion Medicine
- Platelet Lab
- Haemovigilance
Malaysia: Positive Points

♦ Basic organizational structure of National BTS in place involving all Ministry of Health hospitals blood banks, Regional centers and National Blood Center

♦ standardized procedures and data collection

♦ supplies and administrative concerns are well-coordinated within the Ministry of Health

♦ Regulations for private blood banks
Malaysia: Positive Points

♦ Integration with hospital and clinical services – therefore possible to look after micro level issues e.g. ward and lab errors, monitor rational use of blood

♦ Integrated national haemophilia program

♦ Centralization of major regional centers on-going

♦ Trained technical staff
Issues

♦ Few transfusion specialists
♦ Insufficient critical mass of professional input for interactive complex decision making to coordinate activities or analyze problems at the different levels of organization
♦ Blood Banks of other Ministries e.g. University Hospitals, Armed Forces Hospitals not included yet under concept of the National Blood Transfusion Services
♦ Insufficiency of blood resource sharing capabilities – episodic shortages of blood, rare blood types, specific groups, inefficient plasma collection for fractionation etc
♦ Policies may not be uniformly implemented
♦ Replacement donors – may still be required in the private sector
♦ Probable differing recruitment and selection practices in private sector
♦ Competition for donor groups esp in bigger cities
Early Days of Transfusion

Present day Blood Bank Model

Blood centre collects, processes blood and distributes blood to hospitals. No contact with patients.
Underlying Principles Underscoring The Need For Training In TM

“Prevention of blood banks turning into bureaucratic institutes that lose connection with bedside medicine”
Malaysian Model

Clinically orientated
Nationally Coordinated
and Integrated service

Blood Banking
Transfusion Services
Transfusion Medicine
The hospitals’ needs are actually the raison d’être for all activities related to the collection of blood. This is where the real information can be gleaned on the safety, supply needs, demands, and changing trends.
The happenings and needs at micro level turn the wheel of macro level decision making, policies, activities and development – so that the transfusion of every unit of blood is a safe and successful one - without immediate or long term reactions e.g. transmission of infectious disease.
Because TM covers diverse areas of activities and knowledge bases

In Malaysia ..... 

in order to consider training needs and objectives, the boundaries of transfusion medicine need to be defined within the context of present activities carried out in the country
TM Specialists are required at all Levels of operation

- Micro Hospital Level
- Macro Inter Regional Level
- Macro Regional Level
- Macro National Level
Knowledge Base

Needs to cover a wide spectrum of fields

- Public relations, donor recruitment, care and follow up
- Blood collection systems, processing and production of blood components,
- Immunohaematology, laboratory medicine, haematology, immunology, microbiology, cellular therapies
- Clinical transfusion
- Epidemiology
- Quality and management systems
At Micro Hospital Level TM specialists required

- To **monitor requests, errors, incidents** and transfusion of blood products in clinical situations
- To **act as consultant** in all transfusion related problems
- To **enable clinical interaction** for the management of complex clinical problems
- To carry out appropriate **research**
- To **plan further development** in line with clinical needs.
- To **implement haemovigilance & TM ERS**
At Macro Regional and Inter-Regional Levels

Trained TM specialists required to coordinate different operational levels, activity areas, processes and procedures, categories of staff, the needs of other hospitals in the city, area or region.
TM Specialists required For Programs at Macro National Level

- Multiplex training modules / schemes
- Specialist training program
- Regulatory system
- Accreditation system
- Proficiency schemes
- National Quality Management
- National Haemovigilance Program
- International Haemophilia Training Centre
- Research
- Expert Panels for tough decision making
TM Specialists required for Programs at Macro National Level to cope with International Issues

- the rapidly changing situations and scenarios in our world today,
- the sudden start and fast spread of known and emerging diseases
- changing technology the implementation of which can result in enormous costs
- need to establish linkages of national transfusion services with the world at large
- International rare blood group registry

- international bar coding labeling system
Challenge 1
The Concept of Training Specialists in Transfusion Medicine Hits a Brick Wall
Year 2000 – “idea mooted – universities reluctant to provide training.

Much hindrance encountered from stakeholders.”
The Myth of Transfusion Medicine

• Specialization in Transfusion Medicine not a requirement in most countries. Specific degree courses not available.

Reason

• Its diverse parts can be split or made to fit under other different disciplines of Medicine – therefore specific training and specialization in blood banking, transfusion services and transfusion medicine for medical graduates has not evolved
Malaysia has forged path in right direction by establishing its own training program for specialization in Transfusion Medicine to cope with need.
Specialist Medical Post Graduate Degree Program

After much effort

**Year 2006** - course started in collaboration with the **University Sains Malaysia** with 3 students (1 from Yemen) qualifying May 2010

**4 year Course** covers all areas of Blood Banking, Clinical Transfusion and Transfusion Medicine

Trainees are **posted to various departments** of the National Centre, **clinical areas** of the hospital and National Heart Centre for 1st 2 years followed by submission of **thesis**, and **posting to peripheral centres**
Challenge 2. Improving safety – NAT testing at NBC Kuala Lumpur

To improve safety and bring down costs for new expensive technology centralised NAT testing started in identified region covering blood banks in Selangor, Negri Sembilan and Pahang states.

Large volume centralized testing in other regional centres being planned in Peninsular and East Malaysia will involve high expenditure, trained staff and new premises.
National Blood Centre NAT Testing LAB
<table>
<thead>
<tr>
<th></th>
<th>National Blood Centre</th>
<th></th>
<th>Private Hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total No. Screened</td>
<td>Total No. Screened</td>
<td>NAT</td>
</tr>
<tr>
<td>Serology ( % Pos )</td>
<td>NAT 25 *</td>
<td>Serology ( % Pos )</td>
<td>NAT 32 *</td>
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<tr>
<td>HBV</td>
<td>1:236 25 * 1:315</td>
<td>1:152 1:149</td>
<td>1:524 1:727</td>
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<tr>
<td>HCV</td>
<td>1:1047 2 1:1059</td>
<td>14 1:524</td>
<td>1:727</td>
</tr>
<tr>
<td>HIV</td>
<td>1:3967 1 1:3854</td>
<td>2 1:320</td>
<td>1:1163</td>
</tr>
<tr>
<td>Syphilis</td>
<td>1:1309 1:1576</td>
<td>1:443 1:485</td>
<td></td>
</tr>
</tbody>
</table>
With increasing sophistication of clinical services and private Hospitals, stakeholders especially members of the public will have high expectations of safety and quality of blood.

Will NAT testing be carried out throughout the country? Or will stakeholders be informed to accept the residual risk?

Further investigation and look back studies of occult HBV infections would be necessary.
3. National Data on Transfusion Services

- **1987** - comprehensive data collection – private hospitals collected approx. 10% of total blood donations

- **Presently** comprehensive data available only from Ministry of Health blood banks.

- Data pertaining to **blood donations**, **component production**, **blood safety** and **usage** from private sector, Armed Forces hospitals, University hospitals - not available
4. Integration of Activities and Regional Coverage

• NBC has 10 Departments and 5 units – representing integrated activities, provides service to the largest hospital in the country and supplies/supplements blood to other hospitals in the city and region

• What activities will be carried out in new regional centres and subcentres need to be identified and area of radial coverage need to be established
Resource sharing capabilities can be optimized further especially when episodic shortages occur during holiday periods, for rare blood types and for plasma collection intended for fractionation.

Though Fractionated Blood Products supplied free to Ministry of Health hospitals, the equitable distribution of these life saving commercially expensive products not yet possible as coordination of all blood banks including University Hospitals, Army hospitals and those in private sector, not yet achieved.
6. Pathogen Reduction

Offers **greater product safety.** Present technologies offer **inactivation /reduction** of a wide range of **viruses, parasites and bacteria** (not spore forming bacteria) plus **leukocyte inactivation.**

The technology for Red Cells is not yet available.

At the National Blood Centre, Kuala Lumpur
- Methylene Blue technology (viral inactivation of enveloped viruses) is being used for **plasma**
- Psolaren Technology being used for **platelet concentrates**
Selective Leukoreduction

National Blood Centre, Kuala Lumpur
Presently Selective Leukoreduction carried out in many hospitals

PSUL will result in safer and consistently better quality blood products

19 countries have implemented this costly technology

? In Malaysia

Reduces the storage lesion of Red cells, primary HLA alloimmunization and Cytokine generation

Risk of transmission of cell-associated viruses e.g. CMV herpesvirus and certain bacteria ? the risk of transfusion-associated variant Creutzfeldt-Jakob disease transmission, overall risk of both recipient mortality and organ dysfunction, particularly in cardiac surgery patients, Risk of Immunomodulation
8. Haemovigilance

Ministry of Health hospitals have been monitoring adverse reactions at local level long before 2003.

In 2003 a national program for monitoring transfusion safety implemented. Data collection on adverse transfusion reactions (including near misses)

In 2006 a surveillance program on blood donor reactions initiated

Rate of incompatible transfusion was 1:38,608 – 80% errors occurring in the wards

Hospitals operating under other Ministries and private hospitals will participate under the Patient Safety Council and will further improve overall safety, and recognition of other reactions e.g. TRALI, TA Graft vs Host Disease

Ayob Y, Haemovigilance in developing countries. Biologicals (in press)

Analysis of Transfusion Errors in a Tertiary Care Hospital
Jeyajothi Indra, Maung TH, Hlaing A A, Myint A A, Kyu T N, Nadarajan V
Poster Presentation ISBT Nagoya Nov 2009

Overall error rate over 3 years was 6.2 per 10,000 blood components transfused and involved mislabeling sample tubes, mislabeling blood packs, donor grouping, patient ABO typing compatibility testing and transcription errors.

Simple routine tests and procedures carried out by trained staff, yet errors were frequent.

Apart from improving procedures and automation continuous human resource management generating work interest, team spirit, and attitude of the many different categories of staff, need to be emphasized.
10. Molecular Technology

Molecular techniques becoming necessary in the immunohaematology laboratory especially

To type patients who have been recently transfused
To type patients with AIHA to select antigen-negative RBCs for absorption of autoantibodies - most are too anaemic – insufficient red cells for serological typing
To type donors, including mass screening for antigen-negative donors, when appropriate antisera are not readily available
To type patients who have an antigen that is expressed weakly on RBCs
To resolve blood group A, B, and D discrepancies

Appropriately trained scientists would be required
11. Computerization

Secured data pertaining to deferred donors has been made available to all Ministry of Health blood banks in the country so that these donors can be identified for deferral (not allowed to donate) at any site at any future time.

For the National Hemovigilance program, an electronic data capture system can facilitate collection and reporting of safety information on a real-time basis from multiple sites.

Establishing a computerized network of National Blood Centre with regional centres and hospital blood banks with linkage to the clinical information system will remain formidable challenges.
Conclusion

All these **challenges would require the full concentration of the present directors** to lead the further development of the national blood transfusion services in the right direction.

It would become difficult for uncoordinated independent private hospital blood banks and other institutional blood banks to meet the **increasing expectations of safety standards cost effectively**.

Stricter regulations, licensing, imposition of standards and accreditation systems subject to regular inspections may be necessary and would require massive input of manpower and funding.
Future Path?

A truly coordinated integrated national blood transfusion service or a partially coordinated national blood transfusion service within the Ministry of Health?

The challenges are many and demand a critical mass of expertise at the highest level.

Should a specific National Blood Authority be established for crucial, critical and appropriate decision making?
Acknowledgements

Dr Roshida Bt Hassan  Present Director  National Blood Centre who graciously provided preliminary information  and welcome

Dato Dr Yasmin Ayob for making available valuable information, her published papers and other relevant data on training, haemovigilance and transfusion systems

Dato Dr Faraizah Bt Karim  for her continuing patience and kindness and complete cooperation in providing pictures, data, and answers to innumerable queries.

Datin Dr G Duraisamy who provided information on history and other insights

To our long serving lone scientist Mr Thiruchelvam a/l S Ayadury, the many doctors, technologists, nursing and other staff who helped set the framework of the National Blood Transfusion Service in the early years.
The Start of a Vision 1972

The Fulfillment

Thank You for your attention