醫療財團法人
台灣血液基金會
捐血救人 Taiwan Blood Services Foundation

2018 Annual Report

2018
Annual Report

醫療財團法人
台灣血液基金會
捐血救人
Taiwan Blood Services Foundation

Contents

Program activities

Statistics

Appendix

Message from the President

The Taiwan Blood Services Foundation (TBSF) is an important hub for blood donation and supply in Taiwan. Since taking over the chairmanship and being fully aware of my responsibility, I have devoted myself to the provision of sufficient blood products for clinical uses, the cultivation of blood professionals, the integration with international development of blood science and technology and the improvement of quality in blood donation and supply, so that the TBSF meets the requirements and expectations from all walks of life.

Last year, we also achieved some remarkable results thanks to the joint efforts from all of us. Among them, we have succeeded in persuading the hospitals to fully use the leukoreduced blood products, which is the best choice for patients with blood transfusions. Following our theme of "The Pioneer of Safe and Sufficient Blood Supply" to have gained the SNQ (Symbol of National Quality) certification and won the "Silver Award" in the National Biotechnology Clinical Quality Award in 2017, our TBSF has once again obtained the SNQ

certification and won the “Bronze Award” in 2018, by presenting the theme of "The comprehensive and highly efficient laboratory testing of donor blood to ensure transfusion safety in Taiwan.".

In addition, we also hosted the 5th APEC Blood Safety Policy Forum, in which 110 experts from home and abroad attended. This academic conference was so successful that our TBSF is highly affirmed by the international community for its outstanding performance in blood service business. After the introduction of new technology and successful production of Mi^a monoclonal antibody, we have expanded to the universal screening of donors for the expression of Mi^a antigen and label the Mi^a-antigen test results on each bag of red blood cell products, so that the hospital blood bank can select the right blood product according to the label marked on the bag and use it on the patients right away to effectively improve the safety and efficiency of blood transfusion. This labeling of Mi^a-antigen is the initiate in the world.

TBSF plays a very important role in Taiwan's clinical and health care industry. In the future, we will continue to promote the development of Taiwan's blood industry, and we will further enable our people to better understand the blood donation and supply situations in Taiwan. It is hoped that everyone of us will support the national blood policy and help maintain stable blood services.

Purpose, Vision, Mission

Our Purpose

Upholding the concept of "happy blood donation and safe blood use," the TBSF practices a voluntary non-remunerated blood donation system, insists on strict blood quality control and provides the most complete services for blood donors and blood recipients so as to ensure a sufficient blood supply for clinical uses.

Our Vision

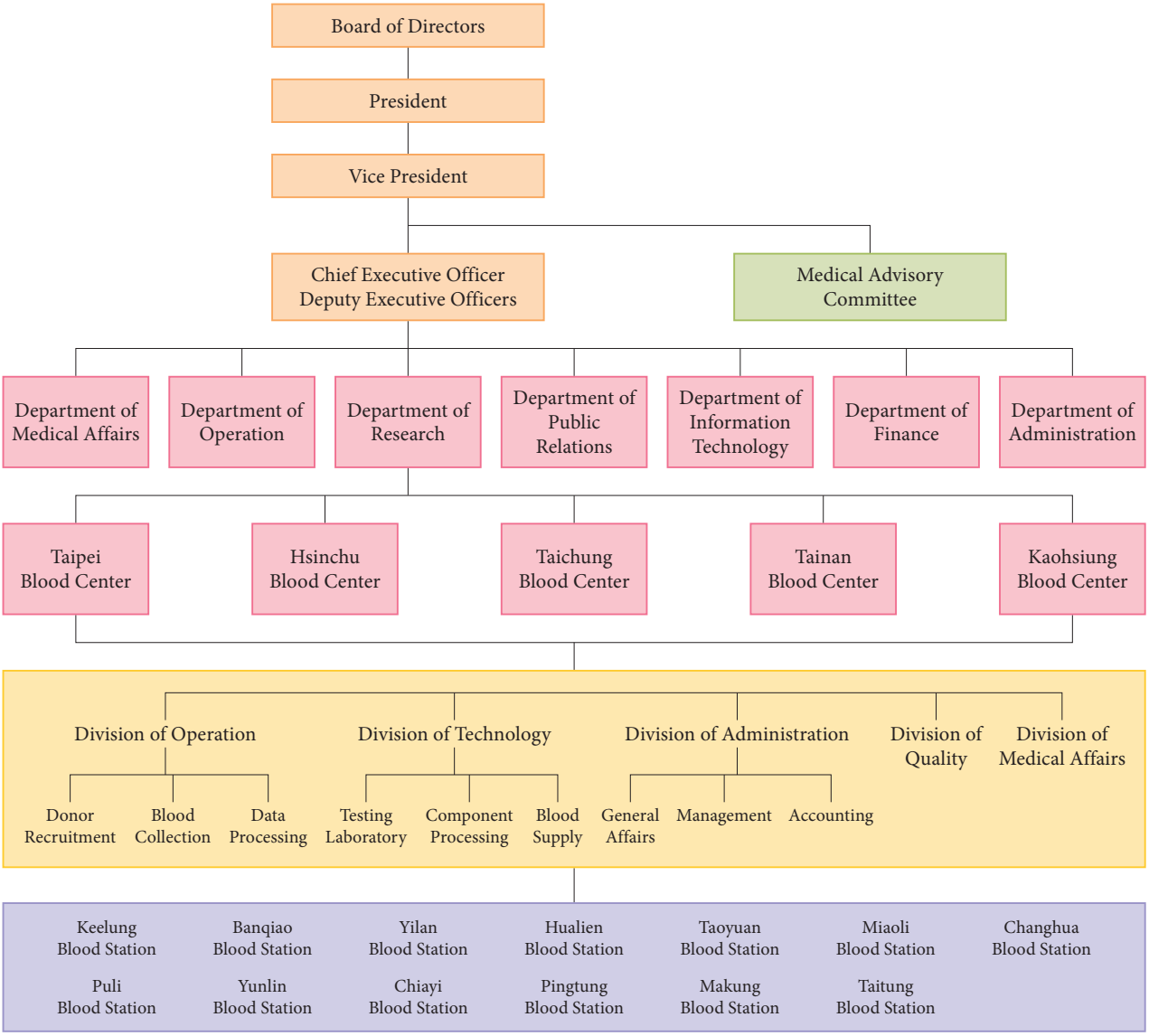
Adhering to sustainable development under the principles of integrity, harmony, efficiency, and innovation, the TBSF vows to become the leader in blood supply for safe clinical uses in Taiwan.

Our Missions

The Foundation is to practice a non-remunerated blood donation system, to conduct donation and supply of blood, to improve the quality of blood for medical use, to protect the rights of patients, and to enhance the health of the citizens. Specifically, the missions of the Foundation are:

1. To plan and implement blood donation services.
2. To establish blood donation systems, and to conduct research and development on safe blood use.
3. To conduct research on blood science and technology.
4. To collect , laboratory-test, and supply blood for patients of public and private hospital.
5. To conduct research on the health maintenance of blood donors.
6. To conduct matters concerning the use and safety management of blood suitable for transfusion.
7. To plan and supply blood in large quantity at times of major disasters or wars.
8. To commission toll fractionation , to storage and supply domestic plasma derived products.
9. Other matters concerning blood donation and supply.

Organization



There are 2 centralized testing laboratories in Taipei and Kaohsiung Blood Center.

Chronicles
(1974-2018)

1974

April • Chinese Blood Donation Association was formally established on April 19.

August • Taipei Blood Center was established on August 1.

1975

October • Taichung Blood Center was established on October 31.

1976

September • The donation ceremony of the first blood donation mobile, "Ren-Yi Bloodmobile", was held on September 3.

December • The Kaohsiung Blood Center was established on December 21.

1977

September • The Technical Advisory Council was formed on September 14. In order to increase the control over blood quality, improvements in blood screening, and other handling processes related to the collection, testing, derivative production, supply, and disposal of blood, as well as other technical issues, experts and researchers were specifically invited to join the council to provide specific suggestions. The first batch of council members included Chun-Hui Yan, Zhen-Hui Liu (Director of Experimental Diagnosis Department, currently known as Department of Laboratory Medicine NTU Hospital), Yun-Fei Huang (Director of Hematology, Tri-Service

General Hospital), and Dr. R. Palmer Beasley (Maxwell Finland Award in 2011, Hepatitis B Foundation's Distinguished Scientist Award in 2010).

1978

June • Chinese Blood Donation Association began issuing the bi-monthly "Blood Donation Newsletter".

July • Taipei Blood Center was the first to start the production and supply of blood component products. During the initial stages, the center supplied packed RBC, washed RBC, WBC concentrates, platelets, FFP, and FP.

September • Dr. Baruch S. Blumberg visited Taipei Blood Center and proposed that plasma tested positive for HBsAg could be used to manufacture Hepatitis B vaccines. (Dr. Baruch S. Blumberg was the co-recipient of the Nobel Prize in Physiology or Medicine in 1976 for discovering the Hepatitis B)

1979

August • Kaohsiung Blood Center began the production and supply of blood component products.

October • Taichung Blood Center began the production and supply of blood component products.

1980

January • To support the blood donation campaign, Taipei Mayor Teng-Hui Lee (later became the first elected President in Taiwan) encouraged citizens to participate actively in the blood donations and arrived at Taipei Blood Center, becoming the 150 thousandth blood donor in Taipei.

1981

April • Began to supply frozen RBC, frozen deglycerolized RBC, and cryoprecipitate.

July • Tainan Blood Center was established on July 1.

1982

January • Tainan Blood Center began the production and supply of blood component products.

1983

January • Taipei Blood Center began to conduct apheresis blood donations, and offered WBC apheresis and platelet apheresis services.

March • Hsinchu Blood Station, Taipei Blood Center was established on March 1.

1984

July • Taipei Blood Center and National Taiwan University (NTU) Hospital collaborated to establish the "Hemophilia Care & Research Center" on July 18.

1985

January • Hualien Blood Station was established on January 16.

April • To promote national research and development in blood science and technology, the National Science Council, Executive Yuan collaborated with South African Medical Research Council to delegate Su-Juan Lin (Supervisor of Component Departmnet, Taipei Blood Center) to South African National Blood Service to learn the dry powder production techniques of cryoprecipitate for a period of 2 months.

1986

November • Due to illness, one French priest in Taiwan required to transfuse C,e and Fya antigens negative, group O blood. Taipei Blood Center immediately contacted French National Blood Service (EFS) and delivered 1,600 units of the same blood type to Taipei in time for transfusion.

1987

March • The bi-monthly "Blood Donation Newsletter" published by the Chinese Blood Donation Association was changed to a monthly publication, "The Blood".

April • When the car bomb attack occurred in Colombo, Sri Lanka on April 21, Taipei Blood Center immediately provided about 11 thousand units of frozen plasma to Sri Lanka by air transport. The incident created the first precedent of Taiwan providing blood supplies in foreign assistance.

June • Effective from June, the Department of Health, Taiwan Provincial Government revoked all blood bank operations jointly organized by the Red Cross and the ten county hospitals, and

ceased all paid donations; as well as assisted the hospitals to set up their blood banks, supplied by the Chinese Blood Donation Association, to improve the blood quality.

1988

January • Began HIV antibody screening test for all blood donors.

1989

January • Increased the maximum age limit of blood donors to 65 years old

December • To prevent blood donations from high-risk AIDS groups and other unsuitable donors, the Blood Centers have issued out "Considerate Call leaflet", whereby donors could call to notify the Centers if the blood donated is unsuitable for use to avoid jeopardizing harming the health of recipients.

1990

January • Chinese Blood Services Foundation was formally established on January 1.

September • Due to the unrest, Sri Lanka made requests to Taiwan for plasma and other medical supplies. The Foundation immediately sent 200 bags of frozen plasma by airfreight to Sri Lanka to assist the wounded for the first time.

1991

January • Ceased sending blood usage notices.

• The Department of Health, Executive Yuan reduced the legal age for blood donation from 18 to 17.

April • Hualien Blood Center was established on April 1.

1992

May • Hsinchu Blood Center was established on May 1.

• Magong Blood Station was established on May 1, becoming the first blood donation station established on the outlying islands.

• Began HCV antibody screening test for all blood donors.

• Began to supply leukocyte-reduced RBC.

September • Began to provide HLA Class 1 and antibody screening services.

- Chinese Blood Donation Association was awarded the first "National Public Service Award – Social Service Award".

1993

January • President Teng-Hui Lee issued a public plea for blood donations, urging the people to participate actively in the blood donation campaign and be a happy donor.

February • Began to provide HLA matching services in platelet apheresis

July • The first case of AIDS window period infection in Taiwan occurred on July 21.

1994

March • In accordance with Department of Health, Executive Yuan regulations, with effect from March 1, blood donors must present their Identification Cards or other certification when donating blood. At the same time0, to eliminate the risks of people abusing the blood donation for testing AIDS, all donors would not be notified of the HIV test results.

October • With effect from October 1, a pilot trial was implemented to change intervals between whole blood donations (including 250cc and 500cc) to 3 months.

November • With effect from November 3, an additional 1% was charged in every unit of blood transfused as the relief fund for HIV contacted via blood transfusions.

December • To protect the right to know of blood donors, the testing reports were once again sent to donors. Besides HIV testing results, the donor should be notified of all other testing items.

1995

July • Began HIV-2 screening test for all blood donors from July 1.

October • Effective from October 1, the interval between whole blood donations of 250cc would be resumed to 2 months whereas the interval between whole blood donations of 500cc would be resumed to 3 months.

1996

January • With effect from January 26, Anti-HTLV inspection was implemented on blood products to ensure the safety of medical blood supplies.

1997

January • The "TBSF" plasma derivative production was officially launched on January 1.

April • Taipei Blood Center was the first to conduct pilot trials of plasma apheresis donation.

1998

February • Began RBC irregular antibody screening test

April • Established the first public umbilical cord blood bank in Taiwan, and collaborated with Department of Obstetrics & Gynecology, NTU Hospital, formally commencing the collection of umbilical cord blood.

1999

November • The 10th Western Pacific Regional Congress of the International Society of Blood Transfusion (ISBT) was held in Taipei from November 11~14, during which the Foundation and the Blood Centers present on 29 scientific abstracts

December • The Foundation was awarded the second National Public Service Award on December 29.

2001

April • Began to supply leukocyte-reduced platelets apheresis.

November • On November 5, the Foundation passed UKAS ISO 9001: 2000 accreditations and a certification conferring ceremony was held.

2002

June • In order to prevent new type Creutzfeldt-Jakob diseases (CJD), effective from June 25, the Department of Health amended the health requirements of blood donors whereby donors are ineligible to donate if they have traveled to or resided in United Kingdom for more than 3 months, shortened from 6 months. Donors who have traveled to or resided in Europe for a cumulative time of 5 years or more from 1980 were also included in the donation eligibility conditions.

2003

January • The online donor inquiry system was officially launched on January 28.

May • The severity of the SARS outbreak greatly impacted the blood donation and supplies of the Blood Centers.

2005

January • Effective from January 1, the calculation for the annual donation volume and the number of apheresis donations conducted a year of the donor was changed from calendar-based computations to birthdate-based computations.

2006

June • The Foundation established a free Donor Service Hotline 0800-099-519 on June 1 to provide comprehensive services.

2007

June • On June 6, an HLA-matched umbilical cord blood was sent to the Bone Marrow Transplant Center in Hong Kong.

2008

January • The domestic "TBSF" component derivatives were officially supplied to the hospitals and medical institutes for use on January 1.

April • The Foundation was officially renamed as "Taiwan Blood Services Foundation" on April 28.

July • To strengthen services to the donors, beginning from July 1, cholesterol, uric acid, and ferritin inspection services were offered to regular donors (donated blood within the past three years) every six months to increase the health awareness of donors and encourage them to protect their health.

2009

September • The "Automatic Low-Temperature Archive Samples Bank" built within Hsinchu Blood Center was completed and launched on September 1.

2010

January • The "Inventory Stock Management System" of the Foundation was activated on January 1,

vastly improving procurement and warehousing efficiency.

2011

May
- On May 30, the Foundation donated 1,249 bottles of "TBSF" High Purity Factor IX Concentrate, and commissioned DHL to deliver the supplies to the "World Federation of Hemophilia" in Dublin, Ireland, where the supplies would be donated to 14 other countries, such as Bangladesh, Philippines, Tunisia, Kenya, Jordan, Egypt, Lebanon, Bolivia, El Salvador, Nicaragua, Paraguay, Moldova, Uzbekistan, and Kyrgyzstan.

June
- On June 27, the Foundation delivered a second batch of supplies containing 2,400 bottles of "TBSF" High Purity Factor VIII Concentrate to the "World Federation of Hemophilia" in Dublin, Ireland, where the supplies would be donated to 6 other countries, such as Myanmar, Laos, Sudan, Cuba, Paraguay, and Kyrgyzstan.

July
- On July 18, the Foundation delivered a third batch of supplies containing 2,462 bottles of "TBSF" High Purity Factor VIII Concentrate to the "World Federation of Hemophilia" in Dublin, Ireland, where the supplies would be donated to 5 other countries, such as Bangladesh, Vietnam, Syria, Ecuador, and Uzbekistan.

October
- The Taipei Blood Center obtained the cGMP certification on October 5.
- The Taichung Blood Center obtained the cGMP certification on October 27.

November
- The Tainan Blood Center obtained the cGMP certification on November 17.
- The 2011 Asia Regional Congress of the International Society of Blood Transfusion (ISBT) was held in Taiwan from November 19~23, during which the Foundation and the Blood Centers present 55 scientific abstracts.

December
- Hsinchu Blood Center obtained the cGMP certification on December 1.
- Kaohsiung Blood Center obtained the cGMP certification on December 9.

2012

March
- The Reference Laboratory of Taipei Blood Center obtained the Taiwan Accreditation Foundation (TAF) certification on March 12.

April
- The HLA Reference Laboratory of the Foundation obtained the Taiwan Accreditation Foundation (TAF) certification.

May
- The Reference Laboratory of Kaohsiung Blood Center obtained the Taiwan Accreditation Foundation (TAF) certification on May 14.

2013

January
- The Nucleic Acid Amplification Testing (NAT) was implemented on all blood products of the Foundation.
- In accordance with the Personal Information Protection Act, blood usage reports were ceased to protect the confidentiality of the blood users.

February
- Beginning from February 1, NAT negative blood products would be supplied.

September
- In the "Pharmaceutical Inspection Co-operation Scheme (PIC/S) 20th Expert Circle Meeting on Human Blood, Tissues, Cells and ATMPs" organized by the Food and Drug Administration, Ministry of Health and Welfare on September 9~14, 47 participants from 22 countries were invited to visit Taipei Blood Center and engage in inspection simulation.
- On September 13, the umbilical cord blood bank suspended operations, and 2,056 specimens of umbilical cord stem cells were transferred to the College of Life Science, National Taiwan University for use in biomedical research.

2014

July
- A TransAsia aircraft crashed in Magong, Penghu Island on July 23. The Kaohsiung Blood Center activated the contingency response mechanism, ensuring a stable supply of blood for the Penghu regions.
- On July 31, a major gas explosion occurred in Qianzhen and Lingya Districts, Kaohsiung City, causing high fatality and casualty rates. The Kaohsiung Blood Center immediately deployed blood supplies to ensure a reliable supply.

December
- On December 31, the Foundation completed the establishment of WiFi networks for blood donors at the 103 blood donation sites.

2015

February
- A TransAsia aircraft crashed in Taipei City on February 4. Taipei Blood Center immediately deployed personnel and blood supplies to the hospitals.

June
- On June 27, an explosion occurred in Formosa Fun Coast in New Taipei City. The Foundation immediately deployed personnel and blood supplies to offer support to the hospitals.

July
- In order to reduce transfusion reactions, TBSF would adopt two types of measures in donor screening and blood supplies with effect from July 1. 1) Plasma from male donors would be prioritized for clinical transfusions. 2) Leukocyte Antibody Detection (LAD) tests would be conducted on apheresis donations from female donors. Donors with antibodies would be advised to donate whole blood.

November • With effect from November 1, blood donors who have donated blood in the past 2 years and are above 40 years of age would have to undergo additional cholesterol, LDL-C, and HbA1c tests every 3 years, and BMI values would be included in every inspection report.

2016

January • A major earthquake occurred in southern Taiwan on January 6, causing building collapses and heavy casualties. Media reported of blood shortages while internet users forwarded messages of blood shortage on the social media. The Foundation immediately issued a press release on the response measures taken.

July • From July 27~December 22, Technical Specialist Meng-Hua Yang of the Research Department of the Foundation joined Dr. Uchikawa's team in studying the monoclonal antibody production techniques for the Miltenberger blood group at the Kanto Koshin-etsu Block Blood Center, Japanese Red Cross.

August • "BE THE 1—Donor Recruitment Campaign" was a global campaign in which American company Abbott invited the captain of Portugal national football team, Cristiano Ronaldo, to be the representative for the recruitment of blood donation. The Taiwan Blood Services Foundation had obtained the authorization from the headquarters of the global campaign, allowing the portrait of international football star, Cristiano Ronaldo to be displayed in Taiwan, in the hopes of inspiring more people in Taiwan to become donors.

October • The LINE official account ID, "Blood", of the Foundation was formally launched on October 6. The three main functions of the account include "Smart Inquiry", "Personalized Notices", and "Specified Feeds". It is like a mobile assistant for blood donors, and it created a new benchmark in smart inquiries.

2017

February • 1st: Haemovigilance system for adverse transfusion reactions was formally launched online.

March • The 7th-term board of directors of Taiwan Blood Services Foundation (TBSF) convened an extraordinary meeting and elected Sheng-mou Hou to take over the President.

April • 1st: Hualien Blood Center was renamed as Hualien Blood Station and placed together with Yilan Blood Station under the administration of Taipei Blood Center. Meanwhile, Taitung Blood Station was placed under the administration of Kaohsiung Blood Center.

May • From 18th to 20th: The TBSF, the Taiwan Society of Blood Transfusion (TSBT) and the International Haemovigilance Network (IHN) jointly hosted the "International Forum on Blood Transfusion Safety and Haemovigilance," to which Professor Erica Wood, President of the International Haemovigilance Network in Australia; Dr. Masahiro Satake, Director General

On May 20, 2017, the Taiwan Blood Services Foundation (TBSF) and Taiwan Society of Blood Transfusion (TSBT) co-organized the "International Symposium on Blood Transfusion Safety and Haemovigilance." Shown in the photo from left to right were Dr. Dong-Tsamn Lin, CEO Sheng-Tang Wei of TBSF, Professor Kai-Cheng Qian of China, Deputy Director Kun-Fu Liao of Medical Department of Ministry of Health and Welfare, President Fang-Yeh Chu of TSBT. Dr. Erica Wood from Australia, Dr. Masahiro Satake from Japan, Superintendent Yu-Ping Chen of Institute of Medicinal Biotechnology from China, and Secretary-General Chong-Hee Que of TSBT.

of the Central Blood Institute, Japanese Red Cross Blood Services Headquarters; and Professor Kaicheng Qian, Medical Director of the Shanghai Blood Center in China were invited to give keynote speeches.

July

- Food and Drug Administration (FDA) conducted 2017 GMP auditing on preparation of source plasma at each Blood Center.

September

- From 9th to 13th: On-site audits were conducted on the production and transport processes of those suppliers producing whole-blood blood bags, including the blood-bag manufacturing facilities of Japan Medical System (JMS) in Singapore and the medical device facilities of Kawasumi Laboratories, Thailand (KLT) in Korat, Thailand.
- 27th: FDA of Ministry of Health and Welfare hosted the “2017 Council on Blood Self-sufficiency Policy” at our Taipei Blood Center.
- 28th: Taiwan is well-known for its high national blood donation rate in the world. The Korean Broadcasting System (KBS), the national TV station in South Korea, visited Taiwan from August 28 to October 1, interviewing former president Ying-jeou Ma for his blood

donation experience; TBSF President Sheng-Mou Hou for the blood policy in Taiwan; Lan Goa Yu-Yun, a volunteer at the TBSF, for the touching story of blood donation for three generations in her family; Pets Tseng, a blood donor ambassador and singer in Taiwan; and some representatives of young blood donors. The show was broadcast on October 23 in Korea.

November

- 1th: Blood donors showing a positive reaction on treponemal test are required to have a RRP test.
- 6th: Commissioned by FDA of Ministry of Health and Welfare, the TSBT held at the TBSF a summary report on its visits to blood donation agencies.
- 21th: TBSF held a meeting to elect its 8th-term directors and supervisors. Sheng-Mou Hou was elected as chairman of the board.

December

- 2th: The TSBT held its 30th anniversary symposium, to which the TBSF President Hou was invited to deliver opening remarks and many colleagues were invited to speak and present posters. In addition, the TBSF also contributed to the TSBT Anniversary Issue an article titled "Blood Services in Taiwan in the Past 40 Years".
- Using the theme of "The Pioneer of Safe and Sufficient Blood Supply" to participate in the accreditation for 2017 SNQ (Symbol of National Quality) in the category of "Peripheral Medical - Public Welfare Service Group," the TBSF passed the evaluation to win the certification. On the 26th, the TBSF was again awarded "Silver Award" in the 20th National Biotechnology and Medical Care Quality Award.
- 15th: The TBSF participated in the "APEC Life Sciences Innovation Forum 4th Blood Safety Policy Forum" held in Jakarta, Indonesia. It was also announced by the Forum that TBSF President Sheng-Mou Hou will be Chairman for the "2018 APEC Life Sciences Innovation Forum Blood Safety Network" and the 5th Blood Safety Policy Forum. It is expected that the Forum will be held in December 2018 in Taipei.

2018

February

- 9th: Using the theme of "The Pioneer of Safe and Sufficient Blood Supply" to participate in the accreditation for 2018 SNQ (Symbol of National Quality) in the category of "Peripheral Medical - Public Welfare Service Group," the TBSF won the "Silver Award" in the National Biomedical Medical Quality Award, nicknamed as the Oscar Award for Medical Care. To affirm the winners, Vice President Chien-Jen Chen received the award-winning units, and TBSF CEO Sheng-Tang Wei attended the award ceremony.

March

- 2nd: TBSF participated in the international activity of #BloodDonorEmoji jointly sponsored by the Carolinas Blood Center and APBN. Recognized by the unit, the TBSF logo has been shown in its official website since then, thus increasing greatly the visibility and identity of

TBSF in the international community.

- 5th -16th: Inspectors from the Risk Management Team of Food and Drug Administration (FDA) of Ministry of Health and Welfare went to Japan to conduct the field inspections on the Chitose Plant and the Kyoto Plant of Japan Blood Products Organization, the second blood products company commissioned by the TBSF.
- 12th to 16th: Three VIPs of the Laboratory Department, Kanto-Koshihisa Blood Center, Japanese Red Cross Society, namely Dr. Makoto Uchikawa, Department Head Dr. Nelson H Tsuno and Supervisor Toyota Shibata, were invited to the TBSF for exchange visits and technical guidance. On March 13th, Dr. Tsuno gave a speech titled "Activities of the Laboratory Department, Kanto-Koshihisa Blood Center, Japanese Red Cross Society" at the Taipei Blood Center.
- 31st: The TBSF's Public Relations Department contributed an article named "Recruitment of Young Blood Donors in Taiwan" to "Transfusion Today" published by ISBT. The article was published in the first quarter (No. 114) of 2018.

April

- 26th - 27th: Accompanied by Dr. Marie Lin of the MacKay Memorial Hospital, Deputy Director Dr. Thida Aung and Dr. Kyu Kyu Swe of Myanmar National Blood Center, Department of Medical Services, Ministry of Health and Sports visited our Taipei Blood Center on April 26 and the TBSF on April 27 to exchange experience and negotiate a memorandum of understanding (MOU), in the hope that the two sides can cooperate for a long time in the future.
- 27th: President Nguyen Van Kinh and Vice President Nguyen Vu Trung of the National Hospital of Tropical Diseases, Hanoi, Vietnam led a delegation of 4 to visit the Taipei Blood Center.

May

- 4th: Alicia Bellido Prichard, Vice President of the OneBlood Blood Institute in St. Petersburg, Florida, USA, and four guests from the national blood centers of Malaysia, Bangladesh, Sri Lanka and Indonesia visited the Taipei Blood Center to observe the blood donation and supply process.

June

- 14th: In response to the "2018 World Blood Donor Day," the TBSF published the press release calling for people to "Be there for someone else. Give blood. Share life."

July

- 31st: The TBSF and CSL Behring held a joint signing ceremony, in which Chairman Sheng-Mao Hou of TBSF and Vice President Zhi-Cheng Li of CSL Behring China signed the "Toll Fractionation, Sales and Services Agreement ", the QA Agreement and the PV Agreement. The contract-signing ceremony was witnessed by Deputy Director Hui-Fang Chen of Food and Drug Administration (FDA), Mr. Gary Cowan, Representative of The Australian Office in Taipei and Mr. David Hartley of CSL Behring Australia's plasma fractionator.

August

- 8th: The TBSF Blood Management Information System, whose customized design took 3 years and 3 months to complete, is officially launched today.

The TBSF and CSL Behring held a joint signing ceremony, in which Chairman Sheng-Mao Hou of TBSF and Vice President Zhi-Cheng Li of CSL Behring China signed the "Toll Fractionation, Sales and Services Agreement ", the QA Agreement and the PV Agreement.

September
- 1st: Online Blood Ordering Operation Zone for Medical Institutions and the Blood Donor Zone under the Blood Management Information System are officially opened today.
- 4th: Medical Technology Officer Mr. Ryan Howey of East Asia and Pacific Region of the US Embassy visited the Taipei Blood Donation Center to observe the operating procedures for blood collection, inspection, composition analysis and supply.
- 10th: Dr. Gebrehiwot Gebregiorgis Girmay, a pediatrician of Ethiopian Ayder Referral Hospital, who is receiving training in Taiwan under the Friendly National Medical Personnel Training Program sponsored by the Taiwan ICDF, visited the Taipei Blood Center to learn of the procedures of blood donation and supply.

October
- 1st: The level of donor elevated ALT is changed to 100 U/L.
- 21st: Taiwan Railway's Puyuma train derailed in Yilan, causing 18 deaths and 187 minor or serious injuries. The Taipei Blood Center immediately delivered by ambulance 441 units of various types of blood products to the hospitals for urgent use. A second batch of 450 units of blood was also delivered before midnight the same day.

November
- Using the theme of "The comprehensive and highly efficient laboratory testing of donor blood to ensure transfusion safety in Taiwan." to participate in the accreditation for 2018 SNQ National Quality Mark in the category of "Peripheral Medical - Public Welfare Service Group," the TBSF passed the evaluation to win the certification. Later, the TBSF was even awarded

"Bronze Award" in the National Biotechnology Medical Quality Award. To affirm the winners, Vice President Chien-Jen Chen received the representatives of the award-winning units on January 24, 2019 and encouraged our citizens to work hard to imporve the quality of domestic biotechnology and protect the rights to public health.

December

- 5th: All blood donors are tested for Mi^{a} antigen, and test result is labeled on blood bag. On top of the blood types of A, B, O and Rh, the addition of this blood type has created a new record in the world.
- The TBSF Board of Directors approved the amendment of "Guidelines for the moral aid for transfusion-infected HIV, hepatitis B, hepatitis C and death caused by transfusion-related acute lung injury." Starting from January 1, 2019, the fee levied on each blood product is reduced from 1% to 0.5% to lessen the burden of blood transfusion.
- 10th – 11th: The TBSF hosted at the NTUH International Convention Center the 5th APEC Blood Safety Policy Forum in 2018, in which 110 domestic and foreign experts and VIPs from 22 economies attended, and Minister Shi-zhong Chen of Ministry of Health and Welfare gave a speech. On the 12th, 42 foreign guests from 16 economies visited the Taipei Blood Center.

Program activities

Program activities

1. Taiwan Hosted Its First APEC Blood Safety Policy Forum In 2018

Taiwan Blood Services Foundation (TBSF) and Asia Pacific Economic Cooperation (APEC) Life Sciences Innovation Forum (LSIF) Blood Safety Network co-hosted the 5th APEC Blood Safety Policy Forum at the NTUH International Convention Center on December 10 and 11, 2018.

Starting in 2014, TBSF has been a regular attendee at APEC Blood Supply Chain Policy Forum. The chair of the LSIF Executive Board in 2018 was Shih-Chung Chen, Minister of the Ministry of Health and Welfare. With the support of the ministry, TBSF President Dr. Sheng-Mou Hou was elected as the chair for the Blood Safety Network in 2018 and the foundation hosted the APEC Blood Safety Forum that was held for the first time in Taiwan.

The theme for this year's Policy Forum is "Raising and Converging Standards through Centers of Excellence for Blood Services". Access to a safe and sufficient supply of blood and related products and services, including blood transfusion, is a critical element of any health system. APEC has outlined a number of specific goals as part of the APEC Blood Supply Chain 2020 Roadmap to establish quality systems and implement good manufacturing practices to optimize the safety of the blood supply. The Policy Forum will identify ways in which centers of excellence can help accelerate GMP certification in APEC economies and open up new opportunities to converge the quality and safety standards for blood products across the Asia-Pacific region.

The two-day forum invited leading experts including Mr. Michael Schmitz, advisor at APEC LSIF; Dr. Yuyun Soedarmono, regional director of the International Society of Blood Transfusion, South East Asia; Ms. Veronica Ann Armstrong, Quality & Regulatory Consultant; Dr. Saraswti, Director of Primary Health Services, Ministry of Health, Indonesia; Dr. Myung Han Kim, Director General, Blood Services Headquarters, Korean Red Cross; Dr. Nor Nazahah Mahmud, Transfusion Medicine Specialist and Deputy Director II, National Blood Centre, Ministry of Health, Malaysia; Dr. Ubonwon Charoonruangrit, Director, National Blood Centre, Thai Red Cross Society; Dr. Tani, Director of Osaka Blood Center, Japan Red

Cross Society; Dr. Christian Schärer, Head Inspectorate, Swissmedic, Swiss Agency for Therapeutic Products and Chairman, WHO Blood Regulators Network; Dr. Julieta Rojo-Media, Director General, National Center of Blood Transfusion, Mexico and Prof. Thierry Burnouf, Vice-Dean, College of Biomedical Engineering, Taipei Medical University. Ms. Ying-Hua Chen, senior specialist, Food & Drug Adminsitration, Ministry of Health and Welfare, addressed the forum on behalf of Taiwan. Scholars and experts from Taiwan in the audience included Prof. Marie Lin, transfusion medicine expert, Ti-Yuan Lee, former deputy minister of Ministry of Health and Welfare and Ching-Chuan Yeh, former minister of Ministry of Health and Welfare and current president of the Chinese Blood Donation Association, all of whom had fruitful discussions and exchanges with international scholars and experts.

The forum included discussions regarding the APEC Blood Supply Chain 2020 Roadmap, currently implemented items among member economies, introduction and discussion over APEC White Paper on raising and converging standards through Blood Laboratory Centers of Excellence, APEC economies experience in implementing the model, the economic benefits of the Blood Laboratory Centers of Excellence model, developing center of excellence implementation plans, the Economic Potential of Regulatory Convergence of Blood and Blood Products

Opening remarks by Dr. Sheng-Mou Hou, TBSF President.

Keynote speech by Dr. Yuyun Soedarmono from Indonesia.

Ms. Ying-Hua Chen, senior specialist, Food & Drug Administration, Ministry of Health and Welfare, sharing the status of regulatory reform and future prospects for blood and blood products in Taiwan.

in APEC and reexamining Self-Sufficiency in APEC Economies.

Shih-Chung Chen, Minister of the Ministry of Health and Welfare, who was present at the forum, said "To improve quality and efficiency, Taiwan has been gradually merging its local and regional blood product manufacturing facilities. In 2001, we have merged six blood screening laboratories into just two, which obtained the ISO 15189 as well as PIC/S GMP certification, meeting the standard of center of excellence. Center of excellence is also the theme of this forum. I would like to invite everyone to visit Taipei Blood Center to see what we have accomplished and give us your feedbacks."

Remarks by Shih-Chung Chen, Minister of the Ministry of Health and Welfare, who made exchanges with other economy representatives.

Group photo with all the guests from various APEC member economies, who will continue to formulate better blood safety policies to provide better care for the patient and medical care quality.


Experts and scholars gave recognition to Taipei Blood Center' blood processing process with the help of a center staff member. Both sides had positive exchanges.

Experts and scholars given a tour on our bloodmobile and shared their experience.

After the two-day forum ended, 42 representatives from 16 member economies visited Taipei Blood Center to understand the center's procedure in centralized screening and blood processing.

During the visit, the representatives were greatly intrigued by Taiwan's integrated screening model and greatly commended Taiwan's standardized process that has earned various certification. They believed that Taiwan's model could serve as a reference for their own blood systems in their economies. They also could not stop singing praises to Taiwan's high blood donation rate and high blood quality requirements.

After the tour, the representatives returned to their countries with what they have learned at this forum with the hope to improve their blood quality and converge blood standards. They hoped that by doing this, their economies will enjoy better blood safety, earn the GMP certification, reach self-sufficiency in blood products and formulate a even more advanced national blood plan.

71 attendees from 20 APEC economies attended the 5th APEC Blood Safety Policy Forum, including government officials, scholars,

experts and representatives from international organizations, patient groups and the private sector. The forum was held with the goal to facilitate exchanges among APEC economies to accelerate GMP certification for their blood centers. All the speeches, discussions and ideas presented at the forum will serve as a reference for the APEC Blood Safety Whitepaper with the goal to improve health and economic benefits and eventually provide equal access to better blood products and medical care for patients in need.

2. Recruitment and retention of blood donors

Starting from January 14, 2018 and ending on February 18, 2018, the Blood Donation Month used in particular the "Yu Ren" blood donation vehicle and the story of blood donor Ye Shi-bin to awaken people to the importance of continued blood donation.

The "Yu Ren" blood donation vehicle was donated in the name of Su Yu-ren, a blood donor, who died in 1995, when he tried to rescue other people in a fire. To remember his righteousness, the general public and his family raised funds to build this blood donation vehicle. The TBSF began to give this model car as a souvenir to blood donators in 2018, hoping to pass down this story forever. Meanwhile, Ye Shi-bin, a 37-year-old blood donor, who needed blood transfusion very often because of brain tumors and burns, has joined the ranks of blood donation for 20 years since his recovery. Ye said it is an action to express his gratitude towards the society.

The theme of the "2018 World Blood Donor Day" is "Be there for someone else. Give blood. Share life." The promotion aims to regard blood donation as a behavior of solidarity and mutual assistance, not only focusing on basic human values such as altruism, respect, compassion and kindness, but also emphasizing and supporting the voluntary non-remunerated blood

The "Er Mei" blood donation mobile stationed in Ximending is the first anime blood donation mobile in Taiwan.

donation system. It is also hoped to stimulate regular blood donors to continue their enthusiasm of donating blood and encourage those who are healthy but have never donated blood, especially young people, to donate blood regularly and then develop a good habit of donating blood.

After winning gold in the 2017 Summer Universiade, Yang Chun-han has been dubbed as "the fastest man in Taiwan", although he has a higher hope beyond this title. We are fortunate to invite Yang Chun-han to shoot a short film for us and serve as a spokesman for healthy blood donation.

To encourage young people to donate blood, Taipei Blood Center, TBSF has cooperated with the famous new light novelist "Lan Qi Zuo Ren", author of "Residence of Monsters", to launch the first animated spokespersons, who are the handsome and charming vampire and the kind and warm young nurse. Shouting the slogan "Giving your blood", they are calling on young people to donate blood for charity. In addition, the first anime theme blood donation mobile in Taiwan is also launched in this event.

"Good Hearts and Good Hugs", a Hotai Motor-sponsored public welfare microfilm to promote blood donation.

Under the cooperation between the Taipei Blood Center, TBSF and the Hotai Motor Co., Ltd., the "Journey of A Bag of Blood," a promotional video directed by Lin Guan-ting, founder of Taiwan Taike Story YouTube, was filmed and uploaded to the fan page. This video leads fans to see what security checks a bag of blood donated by someone must pass through before it reaches the person in need. In addition, Dino Lee, nicknamed national school hunk, was invited to feature in the micro-film "Good Hearts and Good Hugs" to act as the

ambassador of Hotai blood donation campaign, in the hope to arouse more young people to pay attention to blood donation issues.

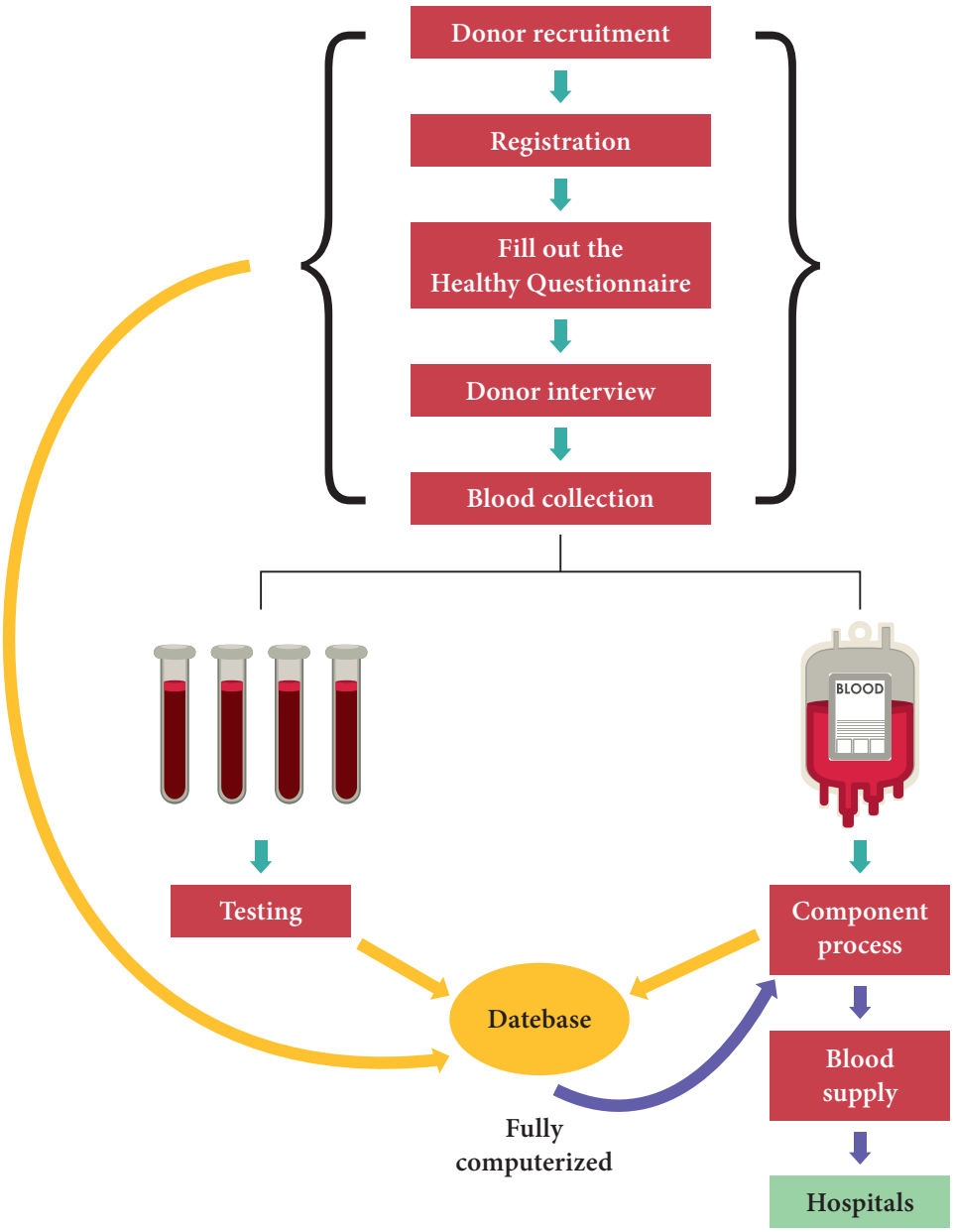
To express thanks and respect to the enthusiastic blood donors, each of the TBSF Blood Donation Centers held the “Annual Blood Donor Awards Ceremony ” in each blood center.

35 outstanding representatives of the 2017 Annual Excellent Blood Donors were received by President Tsai at the Presidential Office on September 3, 2018.

At the Taiwan HealthCare Expo held at the Taipei Nangang Exhibition Center from November 29th to December 2nd, the TBSF showcased three themes, namely the “Pre-storage Leukoreduced blood components”, the applications of “TBSF (20%) Human Albumin” and "TBSF Human IVIG". In addition, a blood donation mobile was driven in and stationed inside the exhibition venue for service for the first time ever.

To enhance publicity for the recruitment of young blood donors in Taiwan, the TBSF contributed an article named "Recruitment of Young Blood Donors in Taiwan" to the "Transfusion Today" Quarterly published by ISBT.(No.114,March 2018) In addition, Issue 17 of Journal of the Ministry of Health and Welfare published its interview with President Hou in June 2018, reporting such topics as Taiwan being ranked first for its national blood donation rate in the world, the Young Blood Donors campaign, the events held on the World Blood Donor Day, the policy to promote leukoreduced blood components, Taiwan Haemovigilance System, the SNQ (Symbol of National Quality) and the National Biotechnology and Medical Care Quality Award, the hosting of APEC Blood Safety Policy Forum and so on. In order to promote the concept of continual blood donation down to the youth groups, the TBSF collaborated with the "Youth Literary" Monthly to publish a special issue for children in December 2018 (Issue 506), of which 17 pages, including the cover and inside pages, were printed with illustrations and cartoons using easy-to-understand text to teach children the basic knowledge of blood and the concept of saving life by blood donation.

3. Blood operation process



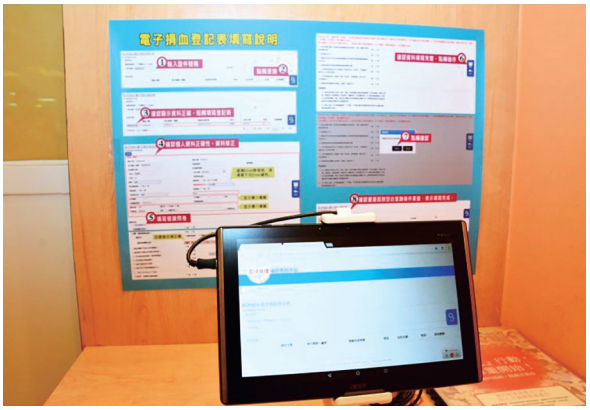
The production of each bag of blood results from regional blood donation activities held after the evaluation and planning by the Donor Recruitment Section of the Blood Center. The personal information of each blood donor is filed and stored after the blood donor completes the blood donation registration form, the physical examination interview, and the blood collecting process. Then, each tube of collected blood is sent to the Laboratory for viral, biochemical, & blood-type testing. The examination results are automatically delivered to the computer for storage. Each blood bag is sent to the Blood Component Processing Section to be further processed as each kind of final plasma product, such as packed RBCs, platelets, and so on. Finally, each qualified blood bag will be sent to the Distribution Section based on the needs of the hospital.

4. Blood donation operation process

A “Private Interview Space” is arranged in each blood center, blood donation room, and blood donation van so that each blood donor can honestly complete the survey and relevant questions in private surroundings. The following is an introduction to the blood donation process:

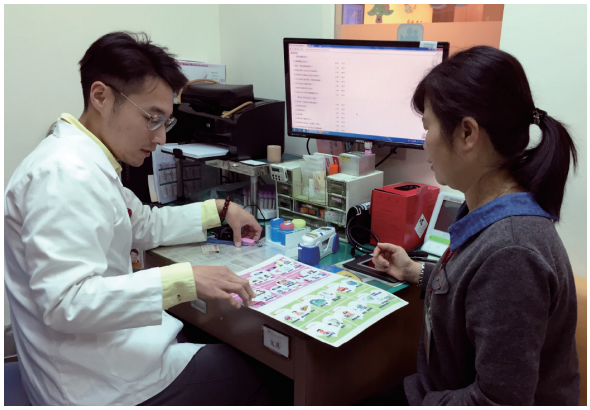
A photo ID, such as an Identification Card of Taiwan is needed to verify the identity of a blood donor during the blood donation process. In 2018, more than one million people donated their blood so the blood supply reached approximately 6 billion milliliters.

Inside the blood donation van, each seat is equipped with a monitor that plays a health lesson video about blood donation to remind blood donors of the importance of blood safety.

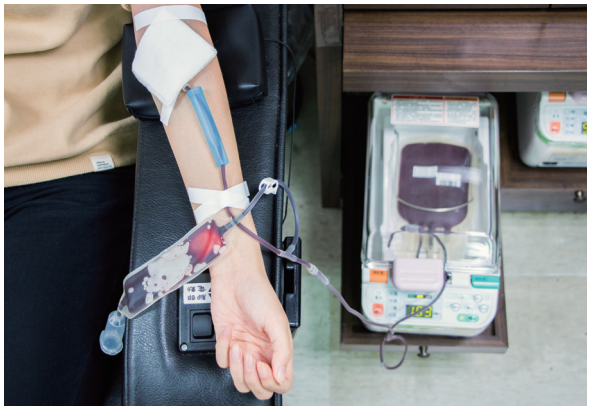


Each person needs to fill in the blood donation registration form, which in addition to basic information, also asks questions concerning recent individual health status and whether there is a high risk of sexual behavior and other issues that need to be answered honestly. Lastly, each person needs to sign the form.

The “Private Interview Space” is arranged to enable blood donors to honestly answer the questionnaire and related questions in private surroundings.



In addition to measuring weight, body temperature, blood pressure and hemoglobin, a staff will provide health education about blood safety and ensure that the blood donor is qualified. This is the first step for blood safety check.



During the blood collection process, each blood bag is put in the automatic oscillator for weight measurement, and the quantity of collected blood is monitored to protect the safety of blood donors.

The "Conscience Call Back" sheet can remind blood donors to call the blood center back via the phone number on the sheet to ensure appropriate follow-up treatment of the blood can be carried out if they have not told health professionals of high-risk behaviors or any issues that they think may affect the safety of the blood.

Each blood unit will have four tubes reserved for each test.

The collected blood will be temporarily stored in a temperature-controlled container to maintain quality.

In the bright and open blood donation rest area, snacks like cookies and milk are served. Magazines and TVs are also provided in the area so that blood donors can relax after the process.

The collected blood and tubes will be delivered to the blood center by professionals in dedicated incubators and trolleys.

The following table lists relevant criteria and conditions for blood donation:

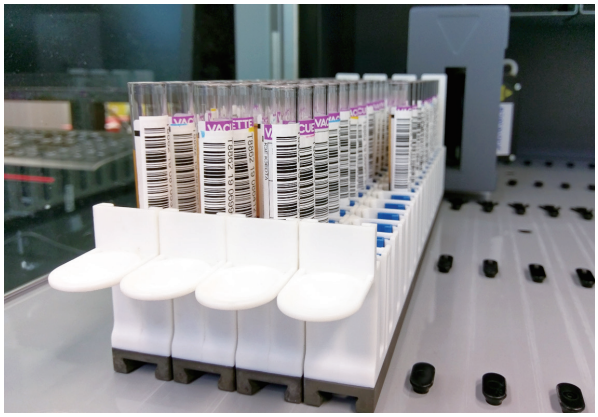
	Whole blood		Platelet apheresis	
Volume	250 ml	500 ml	1 unit	2 units
Age	17-65	17-65	17-65	17-65
Body weight	male: 50 kg female: 45 kg	60 kg	60 kg	60 kg
Oral Temperature	35.5~37.5°C			
Hemoglobin	male: 13g% female: 12g%			
Platelet count			180,000/uL	Trima: 250,000/uL MCS: 300,000/uL
Interval	2 months	3 months	2 weeks	
Max donations per year	male: 1500 cc female: 1000 cc		24 donations	

5. Inspection Testing

To ensure that the quality of examination is consistent and labor costs are kept low, laboratory testing is mainly performed in two sites. Testing Sections in Taipei Blood Center and Kaohsiung Blood Center are in charge of nationwide blood examination operations. Currently, standard examination items include: ABO blood type, Rh blood type, irregular antibody screen, ALT, HBsAg, anti-HCV, anti-HTLV, anti-HIV, syphilis, and viral nucleic acid testing (HBV, HCV, and HIV-1). The examination operating procedure is as follows:

Daily inspection operations can accommodate up to 6,000 specimens using fully automated testing equipment. Test results are delivered via an exclusive network to each blood donation center to meet the goals of speed, accuracy, and safety.

The specimen will undergo a centrifugal operation process for the convenience of fully automated testing operations.



After tubes are ranked in order, a fast fully automated barcode scan is performed to accurately and safely obtain information.

A variety of automated test equipment

Freedom EVOlyzer:

used to test HBsAg, anti-HCV, anti-HTLV, anti-HIV and so on. To ensure test sensitivity, British working standards are used for each test run.

Beckman AU5800:

Fully automated ALT, Cholesterol, and LDL-C test equipment.

Beckman PK7300:

Fully automated blood type, syphilis test equipment, and irregular antibody screening.

TIGRIS:

Fully automated viral nucleic acid test (HBV, HCV, and HIV-1)

In 2016, the TBSF sent staff to the Kanto-Koshihisa Blood Center, Japanese Red Cross Society, to study the production of monoclonal antibody reagents for rare blood types and then produce the hybridoma cell line that can stably subculture and secrete the antibody of Anti-Mia.

Since December 5, 2018, the TBSF has expanded its tests on the Mia antigens, and up to now more than 130,000 Mia antigen-negative blood donors have been tested. All the Mia antigen test results are indicated on each bag of red blood cell products, so that if a patient needs to transfuse the antigen-negative blood products, the hospital can directly select the right blood products according to the labeling on the blood bags and immediately inject them to the patient. The labeling of Mia blood group antigen on each blood bag is not only the first new record in the world, but also helps the hospital blood bank to effectively improve blood transfusion safety.

Using the theme of "Comprehensive and highly efficient laboratory testing of donor blood to ensure Transfusion Safety in Taiwan of Taiwan Blood Services Foundation" to participate in the accreditation for 2018 SNQ (Symbol of National Quality) in the category of "Peripheral Medical - Public Welfare Service Group," the TBSF passed the evaluation to win the certification. Later, the TBSF was even awarded "Bronze Award" in the National Biotechnology and Medical Care Quality Award.

6. Blood donor services

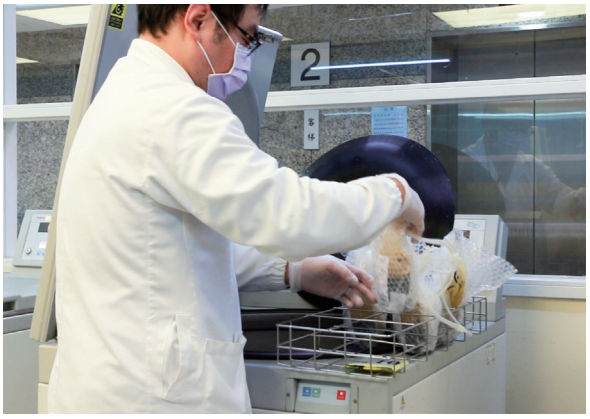
In addition to the routine regular blood donation testing, since November 1st 2015, our Foundation has also performed three tests, namely, Cholesterol, LDL-C, & HbA1c, every three years for consenting blood donors who are older than 40 years old and have donated blood more than once within the past two years. The BMI of a blood donor is shown in the test report. Blood donors who have shown a positive response to hepatitis (HBV and HCV) tests are provided with counseling (referral) messages.Furthermore, for blood donors who are older than 40 years old and have donated blood more than once within the past two years, if they have donated whole blood more than 100 times or apheresis blood more than 500 times, they can receive one free abdominal ultrasonic examination in one of our Foundation's appointed hospitals.

7. Component Processing

After non-remunerated blood donated is returned to the blood donation center, it will go through the counting process, computer input, blood component processing, checking and bacteria testing (Apheresis platelet) to be made into a variety of final blood products. These final products will be supplied to each hospital for patient blood transfusions after undergoing strict blood testing processes.

Generally, blood will be sent to the Component Process Section within 8 hours of blood collection.

The number of blood units is counted and recorded in the computer.



Based on different centrifugal criteria, different final blood products can be produced.

Blood can be separated into plasma in the upper layer and red blood cells in the lower layer based on the principle of different blood composition density. The Automatic Blood Components Extractor can squeeze plasma out into adjunct bags to be sealed.

Using a WBC filtering device, white blood cells triggering an immune response can be removed to make the blood safer for transfusion recipients.

Packed RBC is sealed into four sections for blood group testing and cross matching in the future. Each blood bag tubing has a unique blood section number for further tracing, checking, and testing.

Every blood bag has a unique barcode and blood-type label for further tracing, checking, and testing.

Qualified blood items are put in blue baskets while unqualified ones are put in red baskets; while ones with unidentified results are put in green baskets, and ones that have not been examined are in yellow baskets.

Separated plasma and each final product needs to be carefully placed neatly to avoid stacking for uniform freezing.

Each qualified component needs to be labeled and placed neatly in blue baskets. These items are then managed in the warehouse according to different temperature conditions.

Other matters

Each unit of apheresis platelets is supplied only after passing bacteria testing to ensure the safety of transfusion recipients.

The preservation time, temperature, and material cost for each final product are listed in the table below:

Component	Expiration	Storage temperature	Cost (Dollar/ unit)
Packed RBCs	35 days or 42 days	1~6°C	475
Washed red blood cells	24 hours	1~6°C	675
Deglyceride Frozen RBC	10 years	< -65°C	1,375
PLT Concentrate	5 days	20~24°C	300
White blood cell concentrate	1 day	20~24°C	300
Apheresis platelets	5 days	20~24°C	4,300
Fresh frozen plasma	1 year	< -20°C	300
Frozen plasma	5 years	< -18°C	200
Cryoprecipitates	1 year	< -20°C	150
Whole blood	35 days	1~6°C	575
Leukocyte-Poor RBC	35 days or 42 days	1~6°C	925
Pre-storage Leukocyte-Reduced Apheresis Platelet	5 days	20~24°C	7,300

8. Distribution

The management, allocation, and transportation of blood for medical use are monitored based on the strictest standards in the five blood donation centers. The blood storage warehouse in each blood donation center sets different conditions for preservation temperature, environment, and equipment for different blood products. Blood supplies for hospitals are always available 24 hours. Specific refrigerator vans for blood freezing/storage are responsible for the allocation and transportation of blood for medical use in each hospital blood bank.

Current blood supply channels include five blood centers, 13 blood stations, and several proxy-supply hospitals.

Each blood storage warehouse of a blood center is equipped with a central temperature monitoring system to monitor blood temperature 24 hours/day. In addition to written documents, relevant information about temperature is filed and stored in electronic files so the records are more complete and accurate, and both the blood items and the equipment are safer and more secure. Each blood transportation vehicle of a blood donation center is equipped with the latest cold-storage/freezing system to monitor whether the temperature is stable and maintained within the standardized range so that the quality of each blood item can be ensured.

Blood supplies are currently classified into two categories: individual and group. Individual blood supply refers to the approach for an individual to get blood from the blood center when patients in hospitals that neither have blood banks nor a signed group-supply contract for the need of a blood transfusion. Group blood supply refers to hospitals that have blood banks or have signed a "group-supply contract" with a blood center. With this approach, the blood center will regularly deliver blood products needed to each hospital for storage so that blood is ready for transfusion at any time.

Meanwhile, each blood center has established a list of blood donors filed by red blood cell antigen. If a blood usage emergency occurs, the center will contact blood donors for immediate support.

The blood supplies of each blood donation center are available to hospitals 24 hours/day.

The quantity of stored blood in each blood center needs to be maintained at more than seven days for safety concerns. Four to seven days of storage are a bit lower, while less than four days of storage is considered dangerous. There is a safe storage quantity signal display set up on the official website of Taiwan Blood Services Foundation so that people can check the latest information of each blood donation center.

Each kind of final blood product to be dispatched to hospitals will be checked by computer one-by-one to ensure safety.

Based on the needs of each hospital, final products are put into boxes with clear labels for blood-type and blood item name.

Each packaged box of blood items will be put into a dedicated incubator bags.

They are put in specific transportation vehicles according to the temperature requirement of the blood item with temperature-monitored equipment and are ready to be delivered to each hospital.

In line with the health policy of "National blood used by the nation", our Foundation started to collect source plasma in January 2007 to ease the difficult situation of a lack of blood preparations in Taiwan. The collected blood plasma's original material is delivered by batch to the CSL plasma factory in Australia to be further processed into blood derivatives. Four blood derivatives of the TBSF are made: 20% Human albumin for Intravenous Use, Human Immunoglobulin for Intravenous Use, 250IU Blood Coagulation Factor VIII Concentrate, and 500IU Blood Coagulation Factor IV Concentrate. Among them, TBSF Human Immunoglobulin for Intravenous Use is the main supply in Taiwan and can already achieve the 100% supply-to-demand goal.

9. Reference Laboratory

As medical treatment improves, the demand for each subtype of blood clinically provided to patients receiving long-term blood transfusion also increases. Some blood types are quite rare. We continue to provide red cell testing services, transfusion reactions, and transfusion infection survey services, as well as source red cell to produce the testing reagents for pre-transfusion antibody screening. The clinical safety of blood transfusion is ensured through the following actions,

1. To provide HLA- or HPA-matched platelets.

2. To supply antigen-negative red blood cells (mainly E-, c-, Mia-) .

3. To supply predominately male donor plasma and the screening for leukocyte (HLA & HNA) antibodies among female platelet donors.

10. Research on Quality assurance and blood safety

The Taiwan Blood Services Foundation and each blood center have passed ISO 9001 quality assurance. Our foundation and the laboratories in each blood center have also passed the ISO 15189 medical laboratory certification audit. Operation procedures include blood donor screening, blood collection, blood testing, blood component processing, storage & management, blood transportation and so on, all of which follow standard operating procedures (SOP) and are regularly audited by Taiwan's health authorities (including TFDA, PIC/S GMP audit) and other certified bodies (SGS and TAF).

To produce plasma preparations for medical use in Taiwan from plasma raw material, we are regularly audited by Australian CSL plasma factories (the major plasma-producing factory in the world) and approved by the Australian government (TGA).

Our Foundation and the laboratories at the blood centers continuously participate in proficiency testing both inside and outside of Taiwan, including proficiency tests at CAP, NRL, ASHI, and the Taiwan Society of Laboratory Medicine.

We completed the initial study of the Dengue fever outbreak in Southern Taiwan in 2015, and these reports were presented at the ISBT in 2016.

Regarding blood donor management, we have analyzed the following repeat-donation behavior of blood donors with increasing willingness to donate from Northern Taiwan due to significant events, namely the relevant factors influencing the quantity of the blood donation group, the corresponding construction for a predictive model of blood donation quantity, the effect analysis of introducing "Encouraging blood donors to donate fixed locations on regular weekdays" to the blood donation forecasting model, and the research of sleep quality and discomfort due to blood donation of blood donors from Eastern Taiwan. Regarding blood quality, the quality of packed RBCs returned and proxy-issued by hospitals has been discussed. With regard to the data bank, we accumulate, plan and organize huge amounts of data of blood donation/supply every year so we hope that such data may benefit relevant research.

To improve blood quality and increase blood safety, we continue our research programs. All research programs have been reviewed by the IRB (Institutional Review Board), and the IRB of our Foundation has passed the audit by the Ministry of Health and Welfare. Our research results are primarily recognized by blood transfusion medical experts and published in academic journals and at medical associations of blood transfusion both internationally and domestically.

11. Blood transfusion safety

To assist the hospitals in seeking possible causes of blood transfusion reactions, we have completed the establishment of Taiwan Haemovigilance System with Taiwan Society of Blood Transfusion in 2016, which five hospitals (namely National Taiwan University Hospital, Taipei Veterans General Hospital, Far Eastern Memorial Hospital, Linkou Chang Gung Memorial Hospital, and Tri-Service General Hospital) have taken the lead in demonstrating how to send notifications since 2017. At the end of 2018, 23 hospitals have been qualified for notification, with a total of 4,728 notified cases. It is expected that after the system is gradually expanded to all the hospitals in Taiwan, we will be able to collect and analyze blood data from patients, provide better blood transfusion strategies to solve those issues related to blood donation and transfusion, and help to improve blood transfusion safety.

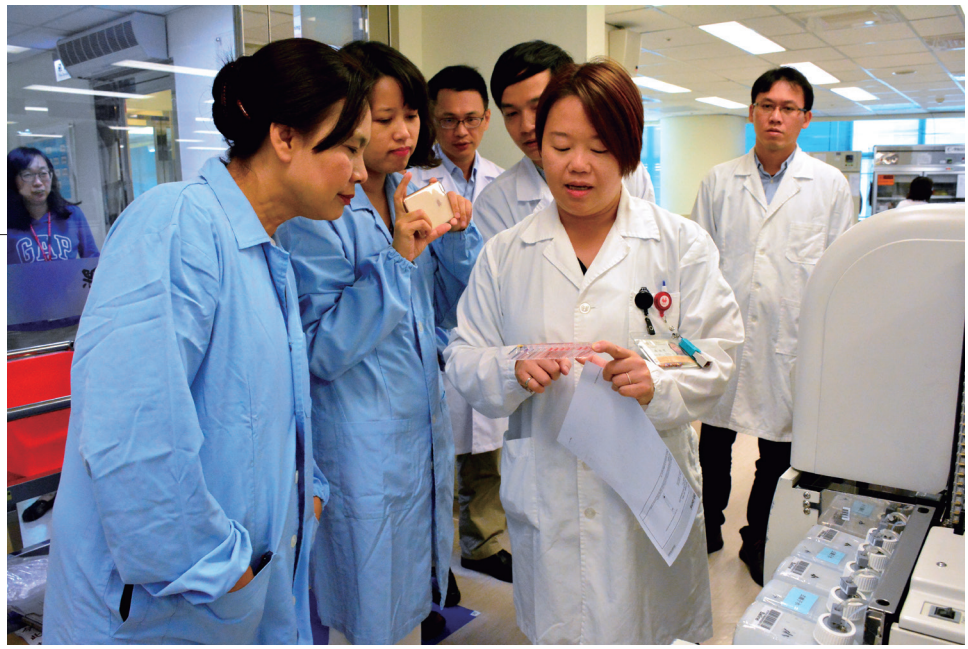
Furthermore, to reduce the risk of transfusion-related acute lung injury (TRALI), the policy of supplying male-donor-only plasma has been implemented since July 11th, 2015. Female blood donors for apheresis donation must pass the

leukocyte antibody screening, which has led to the reduction in donations of antibody-positive blood. Therefore, more protection is provided for our blood supply. In addition, medical doctors at our Foundation actively hold medical lectures about blood transfusion in each hospital to advocate the concepts of "Blood transfusion reactions and preventive procedures", "Blood component therapy-usage of pre-storage leukocytes reduced blood components", and "Proper and effective blood transfusion", "Taiwan Haemovigilance System and Practice". These concepts can help to reduce the possibility of patient adverse reaction caused by blood transfusion, improve recovery, and reduce hospitalization costs so that the medical quality of blood transfusions can be promoted even further.

12. International exchange and training plan

Exchanges with other nations through active participation in international conferences and acquiring relevant new knowledge not only provides an important reference for every aspect of improvement but also serve as important channels for better understand of international situations.

Dr. Thida Aung and Dr. Kyu Kyu Swe, deputy directors of the National Blood Center Department of Medical Services Ministry of Health and Sports; Alicia Bellido Prichard, vice president of the OneBlood Blood Institute (located in St. Petersburg, Florida), Florida, USA; and president Nguyen Van Kinh and vice president Nguyen Vu Trung of the National Hospital of Tropical Diseases, Hanoi, Vietnam; pediatrician Dr. Gebrehiwot Gebregiorgis Girmay of Ayder Referral Hospital, Ethiopia; and personnel from national blood centers of Malaysia,



Dr. Thida Aung and Dr. Kyu Kyu Swe, deputy directors of the National Blood Center of Myanmar, listened carefully to the technical staff.

Dr. Hirokazu Tsuno (second from right), Dr. Makoto Uchikawa (left) and supervisor Chizu Toyota (right) visited the blood test operation.

Bangladesh, Sri Lanka, and Indonesia visited the Taipei Blood Center, TBSF.

Three VIPs of the Inspection Department, Kanto-Koshihisa Blood Center, Japanese Red Cross Society, namely Dr. Makoto Uchikawa, Department Head Dr. Hirokazu Tsuno and Supervisor Chizu Toyota, were invited to the TBSF for exchange visits and technical guidance. On March 13th, Dr. Tsuno gave a speech titled "Introduction to the Inspection Department, Kanto-Koshihisa Blood Center, Japanese Red Cross Society" at the Taipei Blood Center.

The TBSF participated in the international activity of #BloodDonorEmoji jointly sponsored by the Carolinas Blood Center and APBN in the United States. Recognized by the unit, the TBSF logo was shown in its official website on March 2, 2018, thus increasing greatly the visibility and identity of TBSF in the international community.

To strengthen the interaction and the mutual learning between Taiwan and mainland China, our Foundation has started the “Health professionals of blood donation & blood supply” training class, which covers topics including recruitment of blood donors, blood collection, testing and blood composition supply since March 2015. We held 1 training sessions in 2018 with 4 people from China (the Qingdao Blood Center) participated in the training course.

13. Information business and network security

Our Foundation has used the previous blood donation/supply management information system for more than a decade. Considering the assessment and concern of future blood donation services, the improvement of internal operational processes, blood safety, and quality control, our Foundation have completed the updated blood management information system and formally launched it online at August 8th of 2018. We hope to take advantage of these computer technologies to attain our digitalized, paperless, and automation goals to promote both operation quality and blood donor services.

To strengthen the prevention of malevolent software spread by new blackmail software via webpages or e-mail, we regularly invite professional lecturers to give educational training to all the staff at each blood donation center, in addition to daily updating of computer viral protection software codes. We hope to protect the personal information of blood donors, employees, and internet friends in a highly standardized way through everyone's efforts and the monitoring by the personal

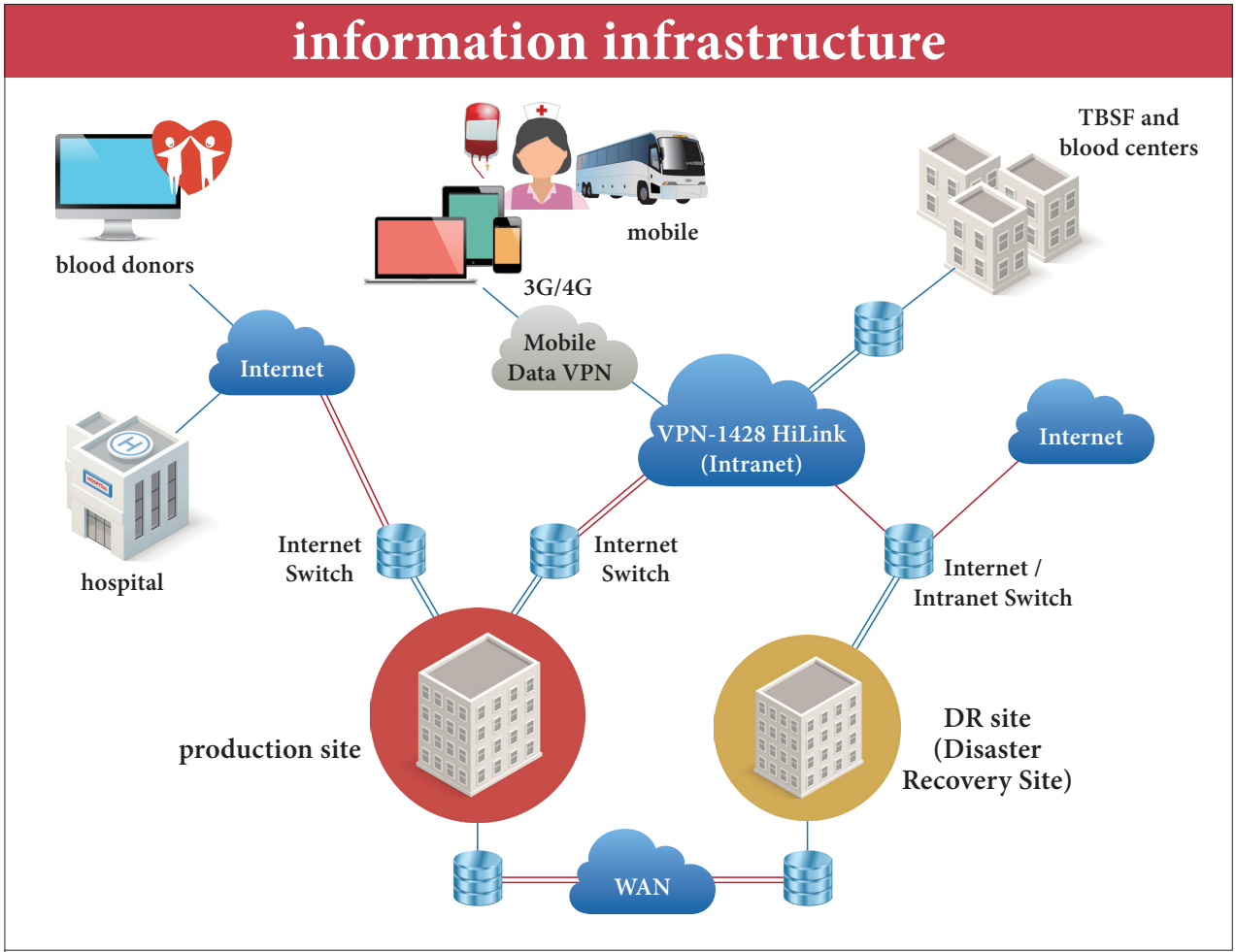


Illustration: Our Foundation provides the internet framework for the blood donation/supply system. Via a high-speed internet cable and wireless transportation, the information of blood donors can be checked quickly and accurately at each blood donation site.

information management committee. To increase complete network efficiency and effectiveness and the safety of computer information, we conduct risk assessments of information assets on information facilities and data. The risk classifications are all controlled in the range of low risk. In March 2016, the AD (Active Directory) web domain and virtual platform setup project was launched to establish and integrate the internet service management framework of activity contents at our Foundation and blood donation centers.

The system framework of the LINE interactive application platform adopts Gateway and Firewall to separate the LINE OA server from the backstage management server and database to ensure the safety of blood donor information. The backstage function of the system can execute all automatic displays and accurately display to respective blood donors for blood donation activity broadcasts or individual blood donation invitations. In the future, more functions will be developed for the purpose of promoting blood donations.

To ensure computer information security, the TBSF has not only updated its anti-virus software virus codes this year but also established the Symantec Messaging Gateway (SMG) to strengthen the mail functions in filtering malware, web sites, viruses, and so on. When an attached file is identified by the system as malware, the attachment to the email will be automatically deleted by the system.

New system online, building a smart management donation blood supply process

The TBSF's newly customized information system was finally launched on August 8, 2018 after undergoing the process of system analysis, program writing, unit testing, integration testing, data conversion, parallel testing, environmental construction, and education and training.

In operation from 1999 to 2018, the original donation and blood supply system has existed for nearly 20 years. As a result, all its software and hardware were no longer able to carry and calculate millions of pieces of data. In the face of the leap forward in digital technology and the need to update many functional requirements, the TBSF has since 2015 fully re-evaluated its user requirements, network architecture, programming language, and database. Interviews and planning were carried out across the entire line of blood collection, recruitment, testing, and component, blood supply, medical services, quality management and work processes. In addition, online blood donor appointments, filling forms, inquiry systems, and hospital network operating systems were developed. In order to build a system that meets the needs and is in line with the times, the TBSF has invested a lot of manpower and time to plan this highly automated blood management information system and applies cloud technology to fully upgrade the software and hardware devices and uses the network and digital technology to integrate the workflows and services from the system side. It is expected that the system developed this time will enhance the consistency in work performance, the rigor in quality control and the service efficiency.

The TBSF has not only overcome the overwhelming challenge in transferring the

information on blood donors that has been accumulated for more than 40 years to the new system, but has also incorporated the databases originally scattered in the blood donation centers across the country into the era of cloud synchronization and virtual and real integration. In the part of the blood donation process, the TBSF has used the cross-platform APPs in the cloud technology to import by a single click the blood donor's data into the database, making the work and service processes even more rigorous and smoother. All high-end information devices are placed in the professional IDC (Internet Data Center) computer rooms, so as to synchronize remote backup and improve system stability and availability.

The most significant change for blood donors is the high degree of electronization of the process and the simultaneous uploading of the blood donor data to the database. After a blood donor logs in the system, he or she can key in through a tablet the blood donation registration form and the health questionnaire and then confirms his or her personal information by a digital signature. As this data collection process is digitized and can be carried out online in advance, blood donors do not waste time in waiting for the registration and filling the form on the spot. This paperless movement is not only more environmentally friendly but also more convenient in that a blood donor can either insert his or her health insurance card or read the barcode on his or her ID card to get his or her name and other personal information, accelerating the data display time and replacing the manual operation with automation for double certification to greatly reduce human errors.

It is particularly worth mentioning that the health questionnaire is designed to be more rigorous. This is to strengthen blood safety management by linking a donor's reply to each question in the front-end health questionnaire to each of the blood products and the control code of donors in the blood management information system. If any condition not suitable for blood donation is triggered, the system will automatically intercept the blood donor and trace back all the blood products in the past according to the conditions set by the system, forming a completely monitored protection network in the blood safety management.

In order to shorten the waiting time for the blood donors, the new Blood Management Information System provides an appointment service for making blood donations. Those who donate whole blood can make appointments in advance within one month, and the system will take the initiative to remind the donors by email 2 days before the appointment date. Those who donate blood by apheresis can make 2 appointments within a month, but if your blood donation conditions are not met, the system will suspend your appointment for blood donation.

In the "Donor Special Zone" system, you can check the previous blood donation records, the next donation date, the records of praise and recognition, and even download the blood donation certificate online. All of these operations can be done not only on a personal computer, but also on your mobile phone or tablet. Now, the processes and services before and after blood donation are more convenient, and closer to the donors, making

blood donation a convenient and simple good thing!

For the hospitals, we have also constructed a "hospital network operation platform" on the system. Not only can the hospital blood bank directly subscribe to various required blood products through the platform, but it can also answer in the system such information as blood uses, blood transfusion investigation, blood consultation application, etc. This horizontal integration of the hospital's blood and blood supply operations improves the response efficiency, making the two-way management of blood products more rapidly and more reliably. It not only provides better and more efficient services for the hospitals, but also improves the blood quality for medical uses.

At the beginning of the launch, people may feel a little bit unaccustomed, but in order to improve the overall quality for the supply of blood and blood products through the efficient digital network and cloud technology, people are urged to support the smart blood information management system so as to create a highly efficient mechanism for blood donation and supply service.

Information security issue is never ending

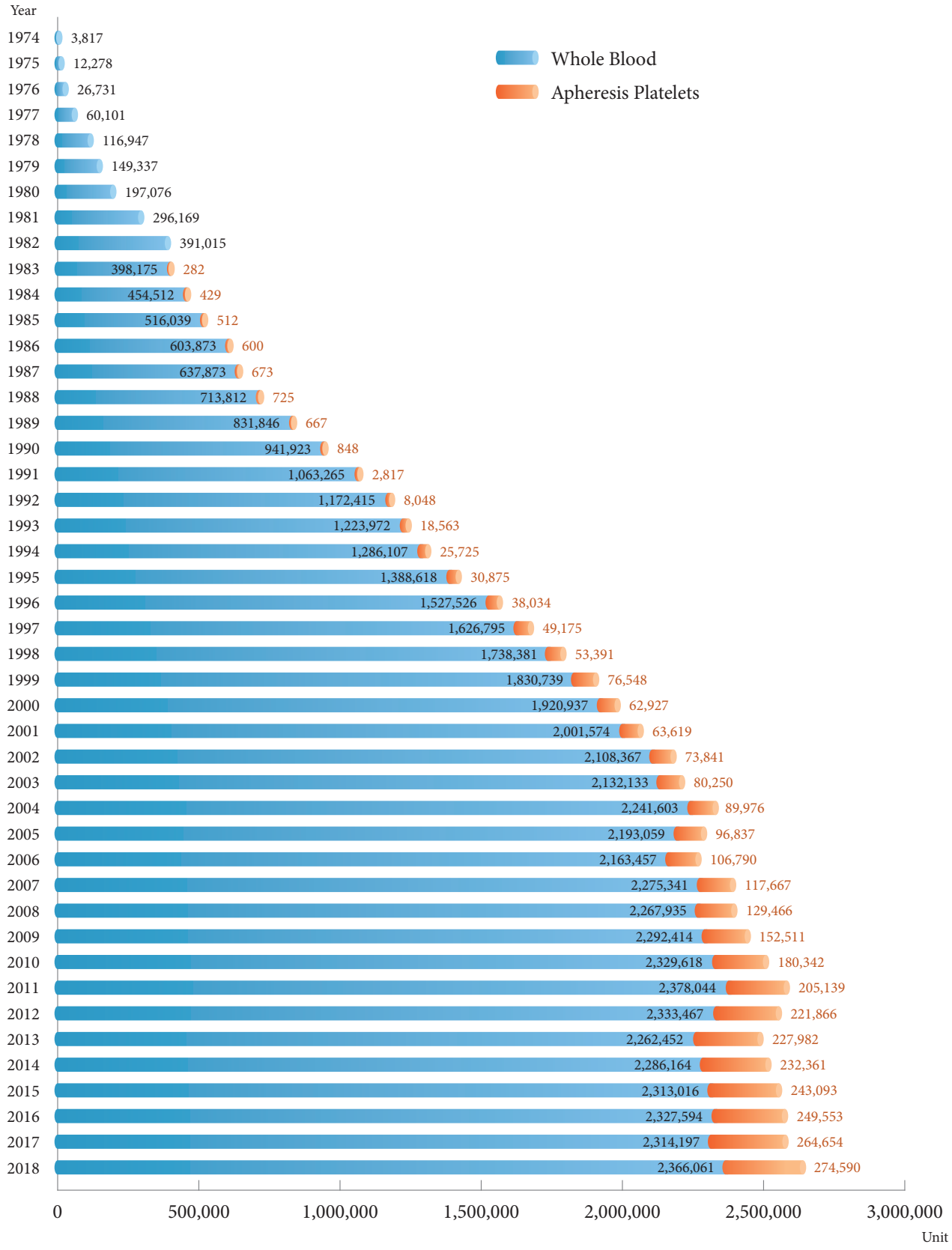
After the new information system was launched, we have installed the information security system on the Gateway of the TBSF main office and the end points of each of the TBSF Blood Donation Centers so as to strengthen information security and meet the requirements of the regulations.

To ensure the security of TBSF computer information system, we need not only to continuously update the antivirus software, but also to establish the Symantec Messaging Gateway (SMG) to enhance the filtering of malware and virus from the email and URL system. When the system judges an attachment of an email to be malicious software, the email attachment will be deleted automatically by the system.

We conduct information asset risk assessments on information equipment and materials every year and control the possible risk levels to a low risk range. The enhancement of information security requires a high degree of cooperation from all our colleagues. As everyone must have a correct concept, we hold annual all-round education and training to give lectures and conduct assessments and continue to deepen the publicity of security issues, so that our colleagues can collect, handle and utilize personal information according to relevant laws, administrative orders or internal norms. We also send letters to our subcontractors, requesting them to conduct on-site audit on personal information management for the printing of inspection reports that we outsource to them, and no major defects have been found so far. We also regularly convene the Personal Information Management Committee to examine how effectively each blood donation center manages its personal information in a particular year. It is hoped that while strengthening the information security management, we can also protect the private information for our blood donors and internal colleagues.

Statistics

Annual Blood Collection by Blood Centers, 1974-2018



Note: 1. whole blood :250ml/1 unit; 500ml/2 units.

2. Single adult dose per unit for apheresis platelet and double dose counts for 2 units.

Annual Blood Collection by Blood Centers, 1974-2018

Unit

Year \ Blood Centers	Taipei Blood Center	Hsinchu Blood Center	Taichung Blood Center	Tainan Blood Center	Kaohsiung Blood Center	Hualien Blood Center	Total
1974	3,817	0	0	0	0	0	3,817
1975	11,734	0	544	0	0	0	12,278
1976	22,976	0	3,539	0	216	0	26,731
1977	42,277	0	9,004	0	8,820	0	60,101
1978	71,195	0	18,132	0	27,620	0	116,947
1979	92,730	0	24,723	0	31,884	0	149,337
1980	103,070	0	37,941	0	56,065	0	197,076
1981	141,944	0	58,861	22,535	72,829	0	296,169
1982	178,518	0	75,272	54,848	82,377	0	391,015
1983	166,589	0	81,054	49,897	100,917	0	398,457
1984	187,362	0	101,219	60,123	106,237	0	454,941
1985	212,340	0	126,400	66,602	111,209	0	516,551
1986	244,830	0	157,679	75,742	126,222	0	604,473
1987	220,585	0	187,697	88,036	142,228	0	638,546
1988	263,387	0	202,488	92,310	156,352	0	714,537
1989	312,578	0	231,199	119,179	169,557	0	832,513
1990	373,188	0	238,548	139,423	191,612	0	942,771
1991	421,109	0	252,561	156,192	205,905	30,315	1,066,082
1992	370,657	125,164	246,912	160,502	222,832	54,396	1,180,463
1993	388,038	149,011	243,638	161,876	241,022	58,950	1,242,535
1994	406,604	161,765	252,889	173,297	252,897	64,380	1,311,832
1995	428,194	192,614	274,883	183,239	268,862	71,701	1,419,493
1996	459,619	220,519	303,393	209,790	295,052	77,187	1,565,560
1997	471,476	244,527	330,239	224,863	323,066	81,799	1,675,970
1998	510,626	253,910	363,878	239,515	336,566	87,277	1,791,772
1999	553,940	266,497	378,516	257,309	360,060	90,965	1,907,287
2000	557,873	278,782	412,654	275,983	367,373	91,199	1,983,864
2001	579,618	294,690	425,953	285,551	381,998	97,383	2,065,193
2002	624,408	307,553	439,269	301,756	406,502	102,720	2,182,208
2003	618,458	313,214	462,180	305,455	411,132	101,944	2,212,383
2004	642,945	333,898	489,079	321,441	437,362	106,854	2,331,579
2005	650,850	320,732	463,553	322,630	429,914	102,217	2,289,896
2006	659,268	322,197	453,015	326,286	403,243	106,238	2,270,247
2007	694,060	338,614	488,984	348,662	413,210	109,478	2,393,008
2008	684,968	342,069	491,754	358,126	413,348	107,136	2,397,401
2009	718,841	326,619	487,230	382,251	420,616	109,368	2,444,925
2010	738,274	343,531	500,298	389,938	423,333	114,586	2,509,960
2011	753,611	347,807	507,104	405,553	453,274	115,834	2,583,183
2012	752,304	343,225	504,362	405,409	434,767	115,266	2,555,333
2013	737,642	336,853	487,170	401,442	414,876	112,451	2,490,434
2014	743,926	337,408	485,767	409,314	431,181	110,929	2,518,525
2015	744,106	355,943	498,956	418,909	423,721	114,474	2,556,109
2016	771,779	364,244	507,973	421,457	447,145	64,549	2,577,147
2017	841,241	360,146	520,231	420,428	436,805	-	2,578,851
2018	869,019	373,358	536,306	424,617	437,351	-	2,640,651

Note: 1. Total blood collection units：calculated by both whole blood and apheresis collection.

2. 250ml per unit for whole blood and 500ml counts for 2 units.

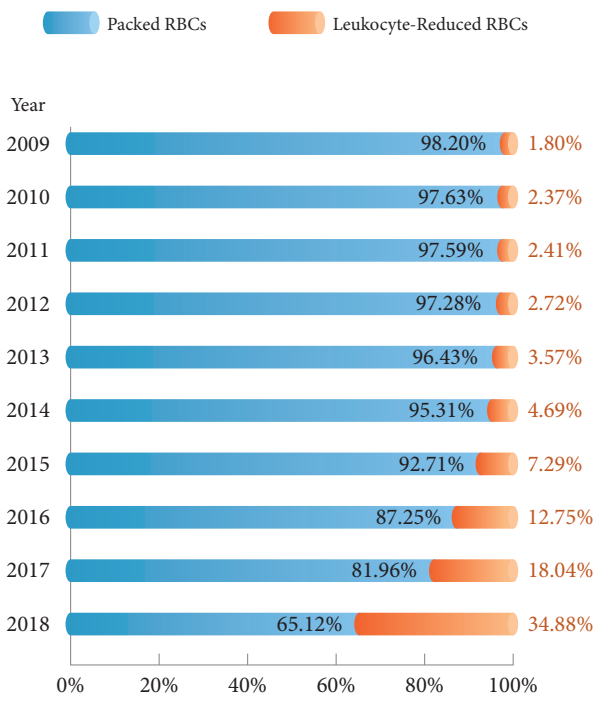
3. Single adult dose per unit for apheresis platelet and double dose counts for 2 units.

4. As of April,2017 Hualin Blood Center had been renamed as Hualien Blood Station and placed under the administration of Taipei Blood Center.

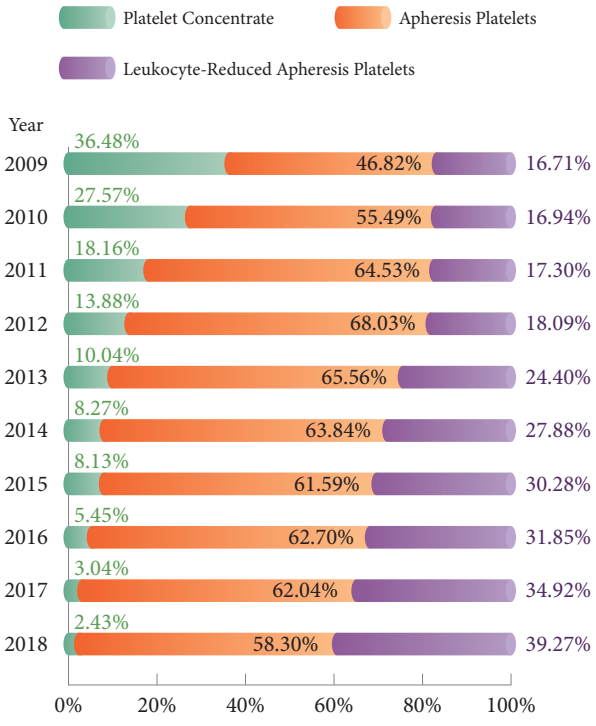
Annual Blood Supply, 2009-2018

Unit

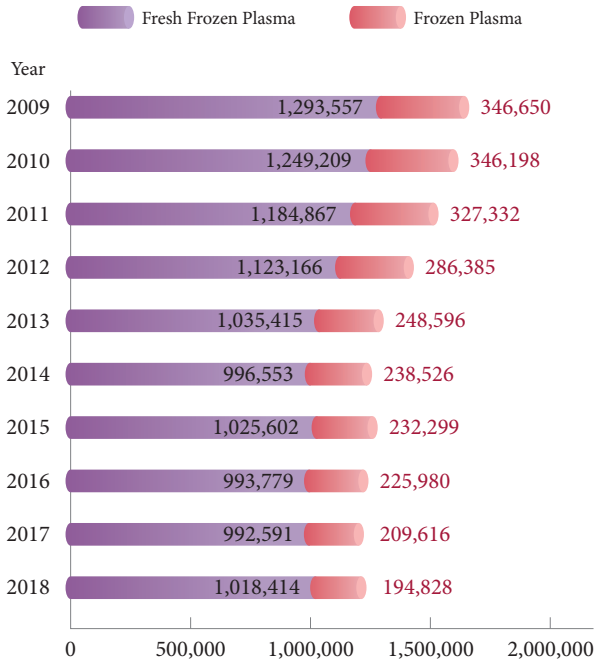
Red Blood Cell Products



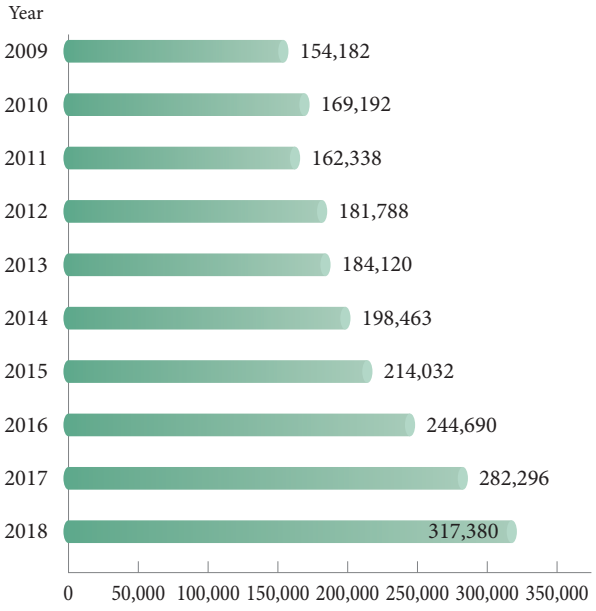
Platelet Products



Plasma Products



Cryoprecipitate



Note: 1. 250ml per unit for whole blood and 500ml counts for 2 units.

2. Single adult dose per unit for apheresis platelet and double dose counts for 2 units.

3. Platelet concentrate per dose for adults 12 units.

Blood and Blood Components Issued in 2018

Unit

1. Whole Blood

Blood \ Blood Centers		Taipei Blood Center	Hsinchu Blood Center	Taichung Blood Center	Tainan Blood Center	Kaohsiung Blood Center	Total
RBCs	Whole Blood	9,345	5,353	2,483	4,394	945	22,520
	Packed RBCs	483,478	212,077	236,929	253,243	293,049	1,478,776
	Washed RBCs	9,464	1,754	2,746	3,462	3,911	21,337
	Leukocyte-Reduced RBCs	252,999	111,879	232,171	108,123	86,746	791,918
	Frozen Thawed Deglycerolized RBCs	6	0	0	0	0	6
Subtotal		755,292	331,063	474,329	369,222	384,651	2,314,557
Plasma	Fresh Frozen Plasma	309,190	167,622	196,432	186,944	158,226	1,018,414
	Frozen Plasma	41,625	32,893	33,402	37,032	49,876	194,828
Cryoprecipitate		144,820	41,812	53,246	51,840	25,662	317,380
Platelet Concentrate		23,488	34,748	13,664	8,942	0	80,842
WBC Concentrate		3,444	12	0	32	0	3,488
Total Units Issued		1,277,859	608,150	771,073	654,012	618,415	3,929,509
Rate of Components		99.27	99.12	99.68	99.33	99.85	99.43
Rate of Whole Blood		1.24	1.62	0.52	1.19	0.25	0.97
（PR ratio）		46.45	60.57	48.45	60.66	54.10	52.42

2. Apheresis

Blood \ Blood Centers	Taipei Blood Center	Hsinchu Blood Center	Taichung Blood Center	Tainan Blood Center	Kaohsiung Blood Center	Total
Apheresis Platelets	60,224	15,581	30,414	28,656	26,808	161,683
Leukocyte-Reduced Apheresis Platelets	44,522	18,974	16,806	10,580	18,027	108,909
Total	104,746	34,555	47,220	39,236	44,835	270,592

Note: 1. 250ml per unit for whole blood and 500ml counts for 2 units.

2. Single adult dose per unit for apheresis platelet and double dose counts for 2 units.

3. The plasma numbers issued are for medical usage only,plasma for fractionation not included.

4. PR ratio=Plasma/RBCs.

Whole Blood Collection per 1000 Head of Population, 2009-2018

Liter/1,000 population

Year	Item \ Blood Centers	Taipei Blood Center	Hsinchu Blood Center	Taichung Blood Center	Tainan Blood Center	Kaohsiung Blood Center	Hualien Blood Center	Total
2009	Blood Collection (Liter)	162,627	78,084	118,486	90,979	96,972	25,955	573,104
	Population	6,953,984	3,442,631	4,472,795	3,418,467	3,747,033	1,034,435	23,069,345
	Liter/1,000 population	23.39	22.68	26.49	26.61	25.88	25.09	24.84
2010	Blood Collection (Liter)	166,138	81,744	120,517	90,927	96,025	27,055	582,405
	Population	6,974,554	3,499,663	4,477,114	3,409,906	3,745,132	1,032,012	23,138,381
	Liter/1,000 population	23.82	23.36	26.92	26.67	25.64	26.22	25.17
2011	Blood Collection (Liter)	168,680	81,785	120,913	93,291	102,674	27,168	594,511
	Population	7,054,442	3,498,987	4,484,098	3,400,813	3,737,885	1,026,326	23,202,551
	Liter/1,000 population	23.91	23.37	26.96	27.43	27.47	26.47	25.62
2012	Blood Collection (Liter)	167,283	80,345	118,749	92,669	98,441	25,880	583,367
	Population	7,086,152	3,525,575	4,496,195	3,397,242	3,734,579	1,021,830	23,261,573
	Liter/1,000 population	23.61	22.79	26.41	27.28	26.36	25.33	25.08
2013	Blood Collection (Liter)	163,347	78,323	113,190	91,759	93,637	25,359	565,613
	Population	7,131,766	3,555,325	4,510,598	3,394,334	3,733,713	1,018,477	23,344,213
	Liter/1,000 population	22.90	22.03	25.09	27.03	25.08	24.90	24.23
2014	Blood Collection (Liter)	164,463	78,068	112,667	93,876	97,458	25,009	571,541
	Population	7,160,559	3,579,347	4,517,652	3,388,101	3,728,935	1,017,442	23,392,036
	Liter/1,000 population	22.97	21.81	24.94	27.71	26.14	24.58	24.43
2015	Blood Collection (Liter)	164,554	81,996	114,808	95,724	95,492	25,681	578,254
	Population	7,187,196	3,623,818	4,532,292	3,379,761	3,724,569	1,013,926	23,461,562
	Liter/1,000 population	22.90	22.63	25.33	28.32	25.64	25.33	24.65
2016	Blood Collection (Liter)	165,198	83,228	116,315	96,395	101,248	19,516	581,899
	Population	7,192,687	3,687,412	4,557,494	3,366,498	3,940,509	789,180	23,533,780
	Liter/1,000 population	22.97	22.57	25.52	28.63	25.69	24.73	24.73
2017	Blood Collection (Liter)	184,975	81,657	117,976	95,089	98,853	-	578,550
	Population	7,979,516	3,712,819	4,564,263	3,361,871	3,934,001	-	23,552,470
	Liter/1,000 population	23.18	21.99	25.85	28.28	25.13	-	24.56
2018	Blood Collection (Liter)	191,341	84,391	121,787	95,958	98,039	-	591,516
	Population	7,969,664	3,753,798	4,578,749	3,351,546	3,925,863	-	23,579,620
	Liter/1,000 population	24.01	22.48	26.60	28.63	24.97	-	25.09

Note: 1. Mid-year population, data from the ministry of interior.

2. 250ml per unit for whole blood.

Blood Donation by Blood Centers, 2009-2018

Donation

Year	Item \ Blood Centers	Taipei Blood Center	Hsinchu Blood Center	Taichung Blood Center	Tainan Blood Center	Kaohsiung Blood Center	Hualien Blood Center	Total
2009	Blood Donation	533,399	243,416	365,843	290,406	313,686	82,434	1,829,184
	Population	6,953,984	3,442,631	4,472,795	3,418,467	3,747,033	1,034,435	23,069,345
	Donation Rate	7.67%	7.07%	8.18%	8.50%	8.37%	7.97%	7.93%
2010	Blood Donation	531,254	255,439	372,360	291,710	313,490	84,989	1,849,242
	Population	6,974,554	3,499,663	4,477,114	3,409,906	3,745,132	1,032,012	23,138,381
	Donation Rate	7.62%	7.30%	8.32%	8.55%	8.37%	8.24%	7.99%
2011	Blood Donation	534,349	254,731	377,883	303,895	329,804	85,445	1,886,107
	Population	7,054,442	3,498,987	4,484,098	3,400,813	3,737,885	1,026,326	23,202,551
	Donation Rate	7.57%	7.28%	8.43%	8.94%	8.82%	8.33%	8.13%
2012	Blood Donation	526,216	248,420	371,259	304,184	300,906	83,536	1,834,521
	Population	7,086,152	3,525,575	4,496,195	3,397,242	3,734,579	1,021,830	23,261,573
	Donation Rate	7.43%	7.05%	8.26%	8.95%	8.06%	8.18%	7.89%
2013	Blood Donation	513,907	241,765	351,790	294,771	278,740	79,992	1,760,965
	Population	7,131,766	3,555,325	4,510,598	3,394,334	3,733,713	1,018,477	23,344,213
	Donation Rate	7.21%	6.80%	7.80%	8.68%	7.47%	7.85%	7.54%
2014	Blood Donation	509,548	239,797	345,234	295,028	287,690	76,822	1,754,119
	Population	7,160,559	3,579,347	4,517,652	3,388,101	3,728,935	1,017,442	23,392,036
	Donation Rate	7.12%	6.70%	7.64%	8.71%	7.72%	7.55%	7.50%
2015	Blood Donation	509,230	251,630	349,238	296,569	282,832	78,382	1,767,881
	Population	7,187,196	3,623,818	4,532,292	3,379,761	3,724,569	1,013,926	23,461,562
	Donation Rate	7.09%	6.94%	7.71%	8.77%	7.59%	7.73%	7.54%
2016	Blood Donation	511,032	253,135	349,751	293,792	296,706	58,592	1,763,008
	Population	7,192,687	3,687,412	4,557,494	3,366,498	3,940,509	789,180	23,533,780
	Donation Rate	7.10%	6.86%	7.67%	8.73%	7.53%	7.42%	7.49%
2017	Blood Donation	570,695	248,783	356,189	288,466	288,391	-	1,752,524
	Population	7,979,516	3,712,819	4,564,263	3,361,871	3,934,001	-	23,552,470
	Donation Rate	7.15%	6.70%	7.80%	8.58%	7.33%	-	7.44%
2018	Blood Donation	590,235	256,830	361,137	283,349	288,327	-	1,779,878
	Population	7,969,664	3,753,798	4,578,749	3,351,546	3,925,863	-	23,579,620
	Donation Rate	7.41%	6.84%	7.89%	8.45%	7.34%	-	7.55%

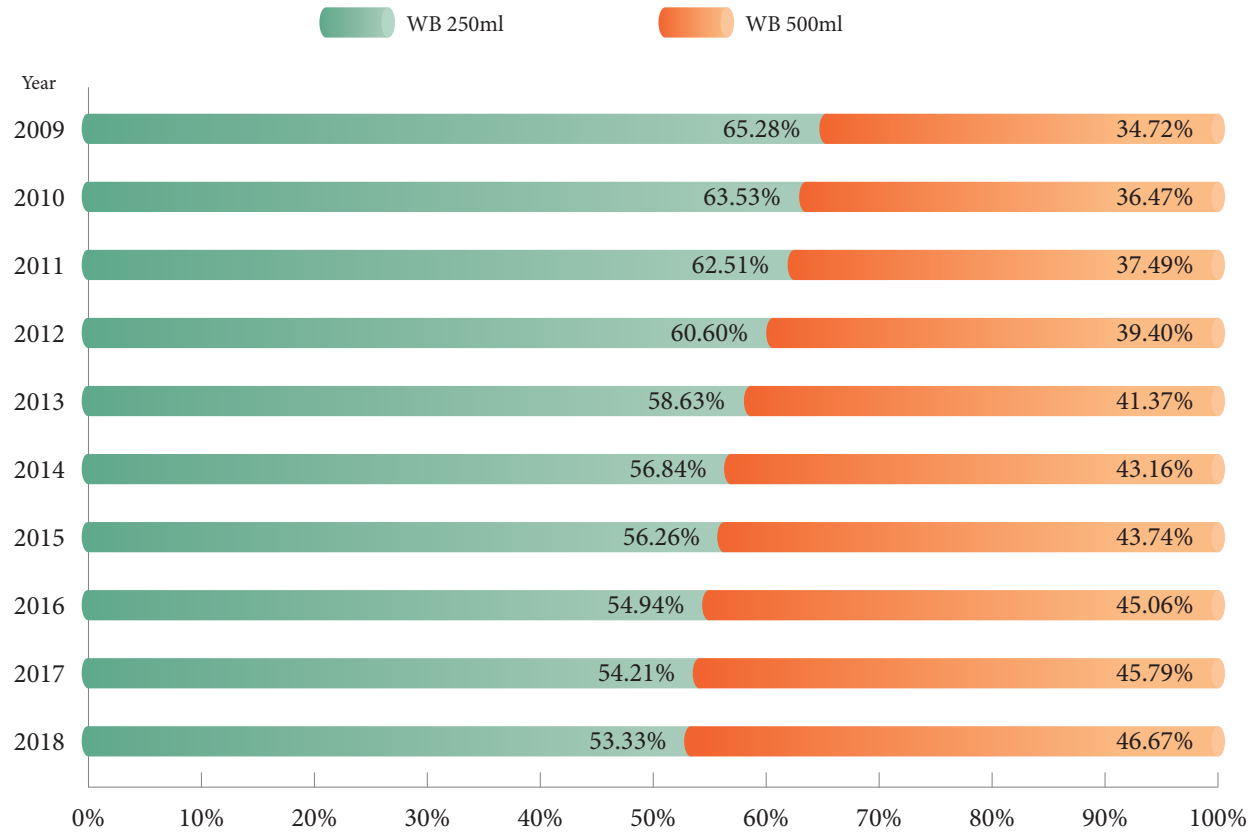
Note: 1. Mid-year population, data from the ministry of interior.

2. Both whole blood and apheresis donations are included

Types of Blood Donation in 2018

Type / Blood Centers	Whole Blood				Apheresis				Total
	WB 250ml	%	WB 500ml	%	Apheresis 1U	%	Apheresis 2U	%	
Taipei Blood Center	281,512	47.69	241,926	40.99	29,939	5.07	36,858	6.24	590,235
Hsinchu Blood Center	126,761	49.36	105,401	41.04	13,541	5.27	11,127	4.33	256,830
Taichung Blood Center	180,610	50.01	153,268	42.44	5,358	1.48	21,901	6.06	361,137
Tainan Blood Center	132,211	46.66	125,811	44.40	9,870	3.48	15,457	5.46	283,349
Kaohsiung Blood Center	139,303	48.31	126,426	43.85	0	0	22,598	7.84	288,327
Subtotal	860,397	48.34	752,832	42.30	58,708	3.30	107,941	6.06	1,779,878

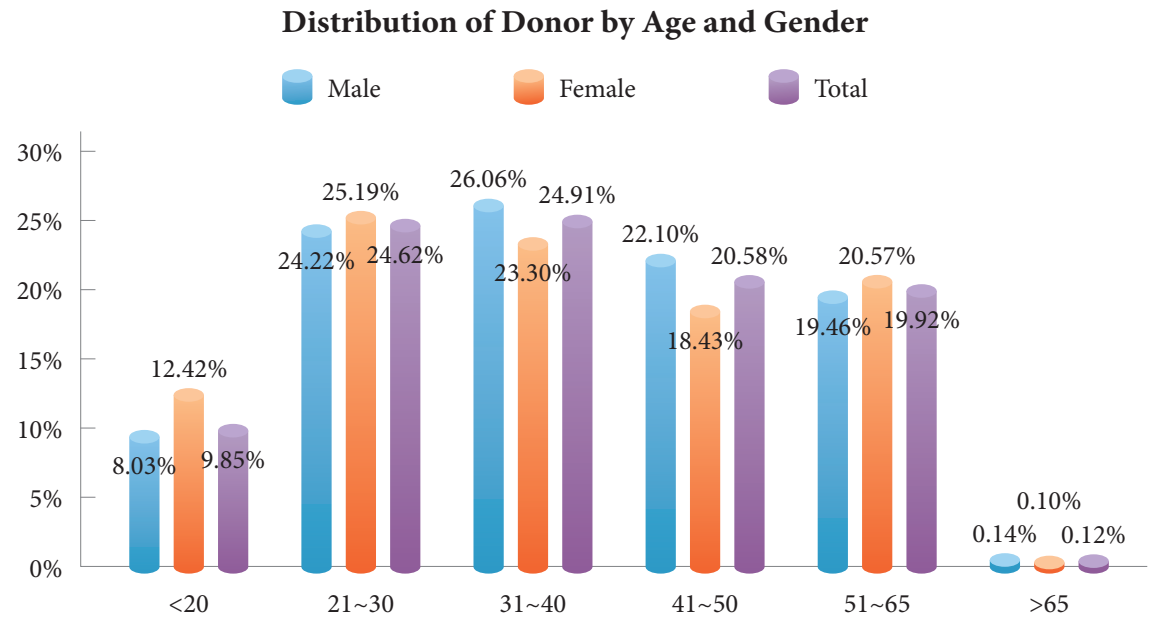
Types of Whole Blood Donation, 2009-2018

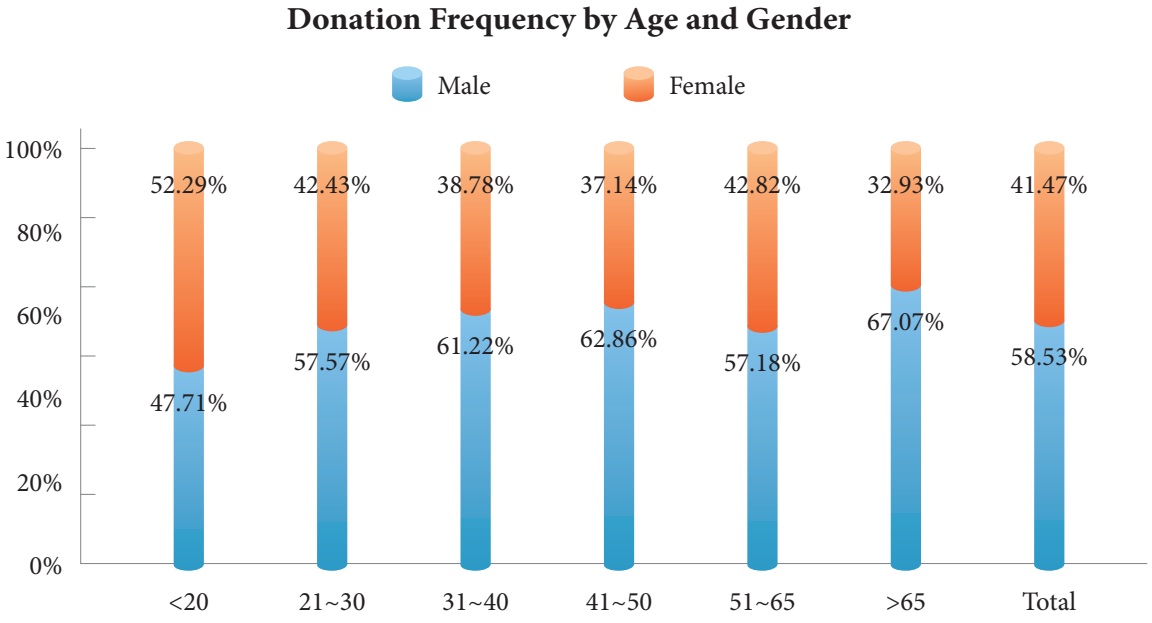


Distribution of Donor by Gender and Age in 2018

Gender \ Age	<20	21~30	31~40	41~50	51~65	>65	Total
Male	47,699	143,907	154,831	131,340	115,640	827	594,244
Female	52,276	106,052	98,095	77,599	86,584	406	421,012
Total	99,975	249,959	252,926	208,939	202,224	1,233	1,015,256

Note: Whole blood and apheresis are both counted.





Donation Frequency by Gender and Age in 2018

Donation Frequence

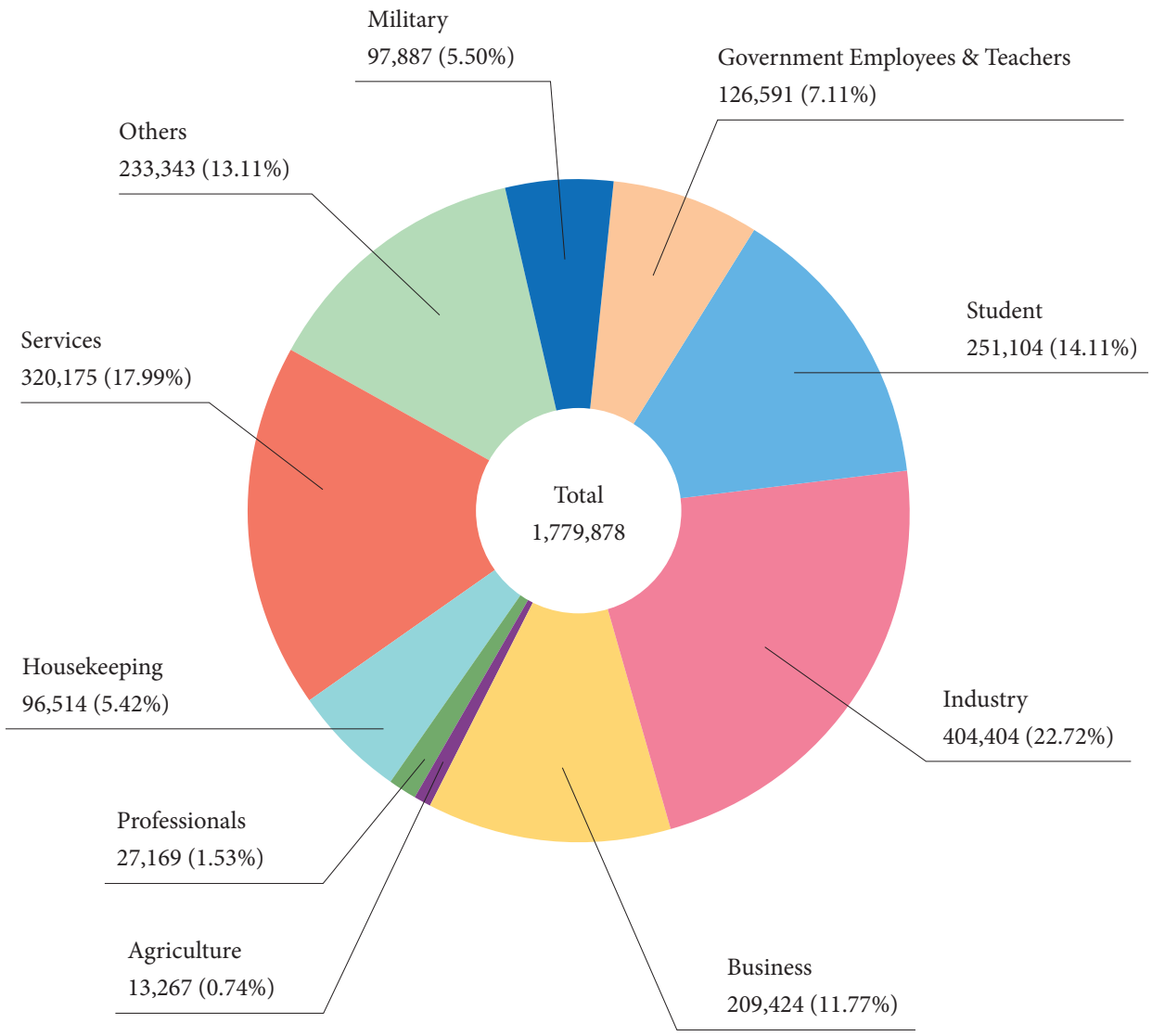
Age / Gender		Donation Frequence	
<20	Male	1.33	1.37
	Female	1.41	
21-30	Male	1.54	1.52
	Female	1.48	
31-40	Male	1.85	1.73
	Female	1.54	
41-50	Male	2.11	1.94
	Female	1.65	
51-65	Male	2.26	2.06
	Female	1.79	
>65	Male	3.58	3.20
	Female	2.42	
Total	Male	1.87	1.75
	Female	1.58	

Blood Donation by Sites in 2018

Donation

Blood Centers / Sites	Taipei Blood Center	Hsinchu Blood Center	Taichung Blood Center	Tainan Blood Center	Kaohsiung Blood Center	Total
Fixed Site	333,109	132,311	158,286	138,965	180,480	943,151
	56.44%	51.52%	43.83%	49.04%	62.60%	52.99%
Mobiles	257,126	124,519	202,851	144,384	107,847	836,727
	43.56%	48.48%	56.17%	50.96%	37.40%	47.01%
Total	590,235	256,830	361,137	283,349	288,327	1,779,878

Occupational Distribution of Donors in 2018



Pre-Donation Donor Deferral in 2018

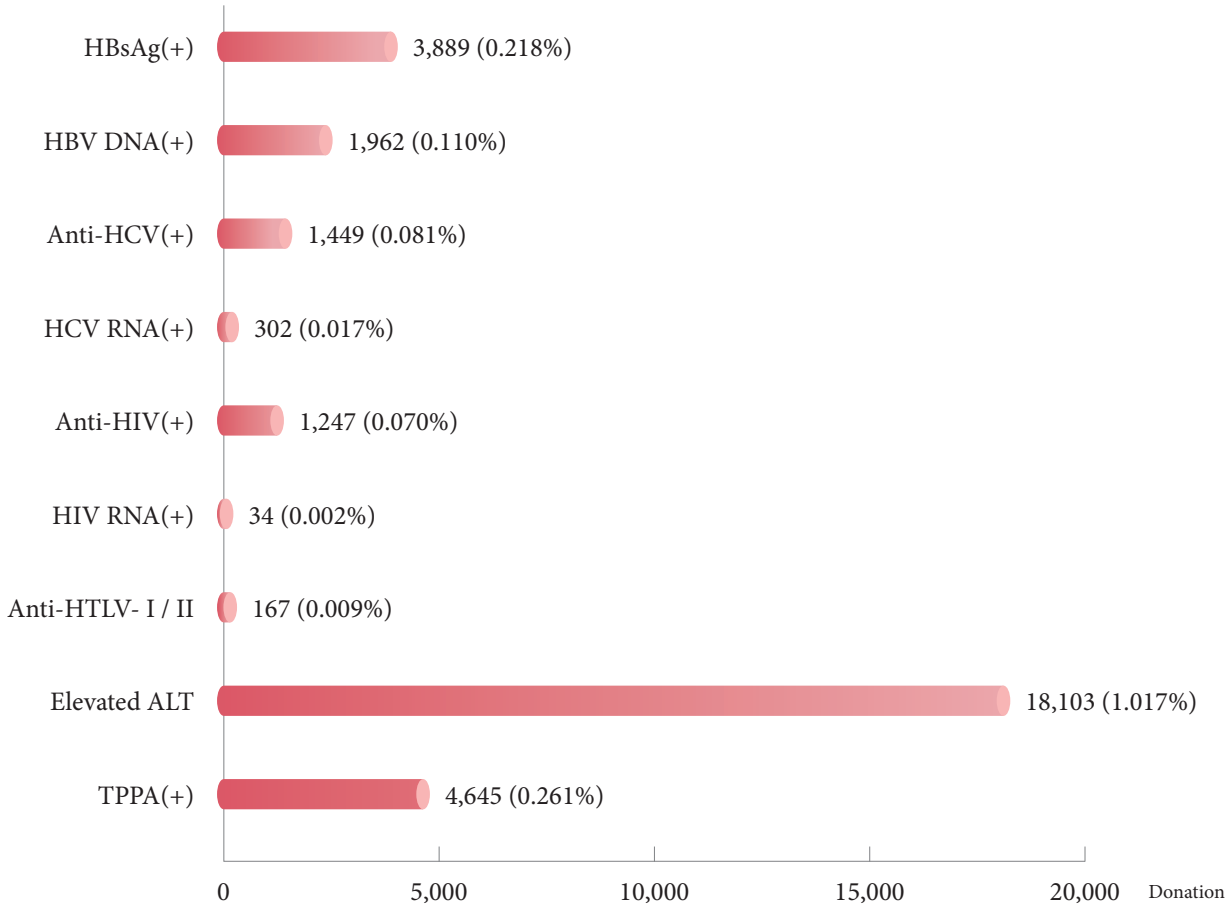
Participants

Reasons of Deferral \ Blood Centers		Taipei Blood Center	Hsinchu Blood Center	Taichung Blood Center	Tainan Blood Center	Kaohsiung Blood Center	Total
1	Low Hemoglobin	43,013	9,074	25,219	15,106	22,246	114,658
2	Blood Pressure too High or too Low	10,331	2,501	5,103	2,416	2,772	23,123
3	Medications	8,584	2,574	3,316	2,696	1,855	19,025
4	Acupuncture, Dental Extraction	6,016	2,166	2,851	2,465	1,713	15,211
5	Abroad Within Past 1 Year	4,600	858	1,230	969	654	8,311
6	Under Medical Treatment	3,772	392	1,982	1,219	758	8,123
7	Lack of Sleeping	2,897	873	1,728	1,101	915	7,514
8	Recipient of Blood or Surgery	2,617	1,272	1,027	1,369	371	6,656
9	Low Body Weigh	1,245	272	348	309	2,167	4,341
10	Heart, Kidney, Lung Disease or Cancer	1,785	828	474	886	162	4,135
11	Blood vessels too thin	944	295	291	362	727	2,619
12	High risk sex within 1 year	972	196	552	308	281	2,309
13	Receiving Injection	785	396	411	363	327	2,282
14	Drug addiction (intaking or injecting) or chronic alcoholism	731	325	335	313	198	1,902
15	Pregnancy or postpartum (including abortion) less than 6 months	406	117	219	159	112	1,013
16	Other Abnormalities	31,046	9,898	19,535	10,733	17,131	88,343
Deferred Participants		119,744	32,037	64,621	40,774	52,389	309,565
Total Participants		709,979	288,867	425,758	324,123	340,716	2,089,443
%		16.87%	11.09%	15.18%	12.58%	15.38%	14.82%

Note: Total participants include deferred participants and successful donations.

Infection Disease Screening in 2018

Positive Rate：1.67%



Note: Criteria of elevated ALT is increased from 68 U/L to 100 U/L since October 1, 2018.

Irregular Erythrocyte Antibody Detected in 2018

Sample: 6,348

Irregular erythrocyte antibody reactive: 5,799 donations (0.3%)

Antibody	Number		Antibody	Number	
Anti-C	36	0.57%	Anti-Jk^{a}	2	0.03%
Anti-c	93	1.47%	Anti-Jk^{b}	0	0.00%
Anti-D	71	1.12%	Anti-Jk3	1	0.02%
Anti-E	1,092	17.20%	Anti-Mi^{a}	2,234	35.19%
Anti-e	36	0.57%	Anti-P1	581	9.15%
Anti-Ce	1	0.02%	Anti-I/HI	1,082	17.04%
Anti-G	3	0.05%	Anti-i	2	0.03%
Anti-M	352	5.55%	Anti-V	4	0.06%
Anti-N	6	0.09%	Anti-Ku	1	0.02%
Anti-S	31	0.49%	Anti-Di^{a}	7	0.11%
Anti-s	0	0.00%	Anti-Di^{b}	1	0.02%
Anti-Le^{a}	403	6.35%	Anti-Wr^{a}	5	0.08%
Anti-Le^{b}	225	3.54%	Anti-Pr	1	0.02%
Anti-Fy^{a}	0	0.00%	Cold Agglutinin	13	0.20%
Anti-Fy^{b}	14	0.22%	Other	51	0.80%

Statistics of ABO and RhD in 2018

Donation

Blood Group	RhD+	RhD-	Total	%
A	472,050	2,095	474,145	26.64
B	418,349	1,803	420,152	23.60
O	775,682	3,502	779,184	43.78
AB	105,870	518	106,388	5.98
Total	1,771,951	7,918	1,779,869	100.00
%	99.56%	0.44%		

Note: Sample amounts are not the same as the total donations , because of the blood drive records but some of them have no testing results.

Statistics of ABO subgroups in 2018

Donation

A subgroups		B subgroups		AB subgroups		Para-Bombay	
A_2	30	B_3	674	A_2B	90	O_{Hm}^{A}	64
A_3	9	B_{el}	52	A_2B_3	1	O_{Hm}^{B}	85
A_{el}	108	B_w	1	A_3B	6	O_{Hm}	11
A_m	3			$A_{el}B$	19	O_{Hm}^{AB}	13
A_x	6			AB_3	208		
A_{int}	10			AB_{el}	4		
				ABm	1		
				AmB	2		
				AwB	2		
				ABx	1		
				AxB	3		
				$A_{int}B$	7		
				B(A)	3		
				cisAB	2		

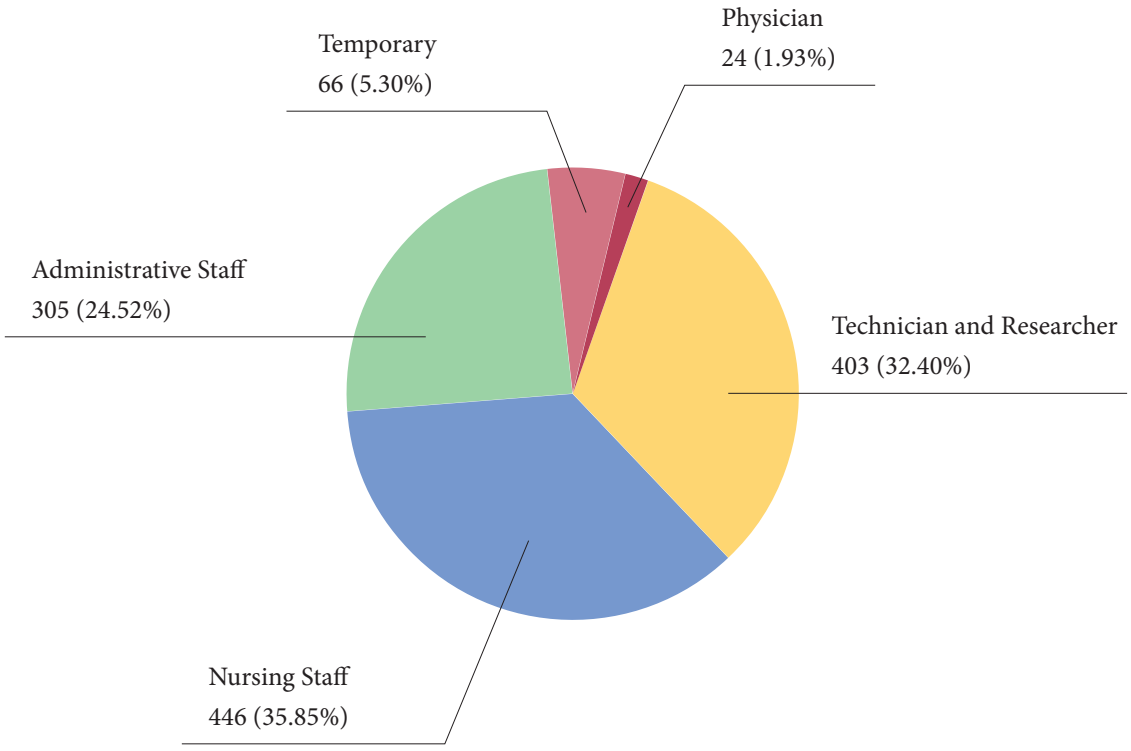
Inventory of Rare RBCs

Blood groups		Unit
Rare blood groups	ABO blood groups	
para-Bombay	A	8
	B	4
	O	12
	AB	2
RzRz	O	18
s(-)	O	24
Lu(a-b-)	A	20
	O	10
Ko	A	4
Fy(a-)	A	2
	B	4
	O	24
Fy(a-)s(-)	O	14
D(-)Fy(a-b-)	O	2
Jk(a-b-)	A	26
	B	22
	O	28
	AB	2
Di(b-)	A	4
	O	10
i adult cell	A	2
	B	3
Jr(a-)	O	3
p phenotype	A	4
	B	1
Lan(-)	AB	3
Dc-	O	6

Human Resources in 2018

Person

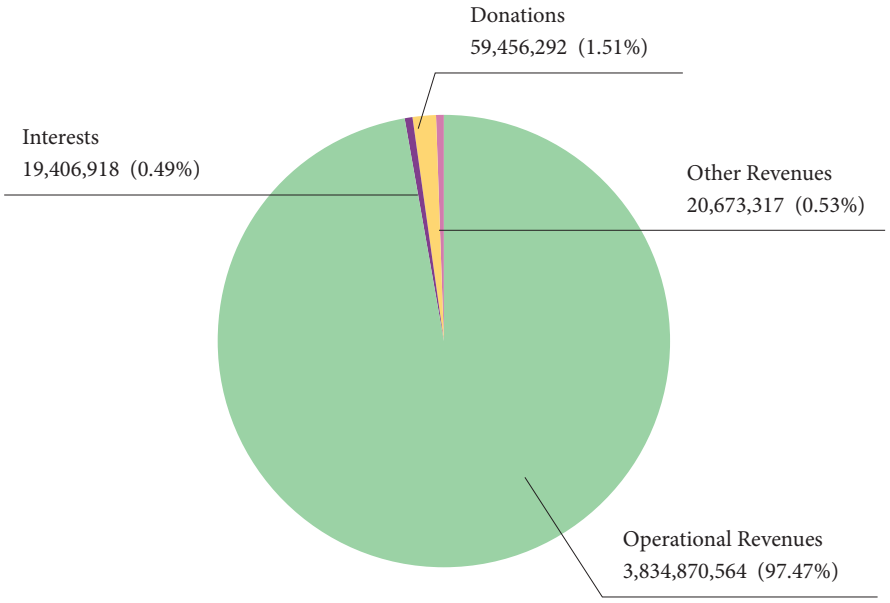
Classufucation / Blood Centers	Physician	Technician and Researcher	Nursing Staff	Administrative Staff	Temporary	Total	%
Head Office	1	12	0	30	2	45	3.62
Taipei Blood Center	9	150	164	99	36	458	36.82
Hsinchu Blood Center	2	53	50	43	1	149	11.98
Taichung Blood Center	3	59	83	55	4	204	16.40
Tainan Blood Center	4	43	81	49	12	189	15.19
Kaohsiung Blood Center	5	86	68	29	11	199	15.99
Total	24	403	446	305	66	1,244	



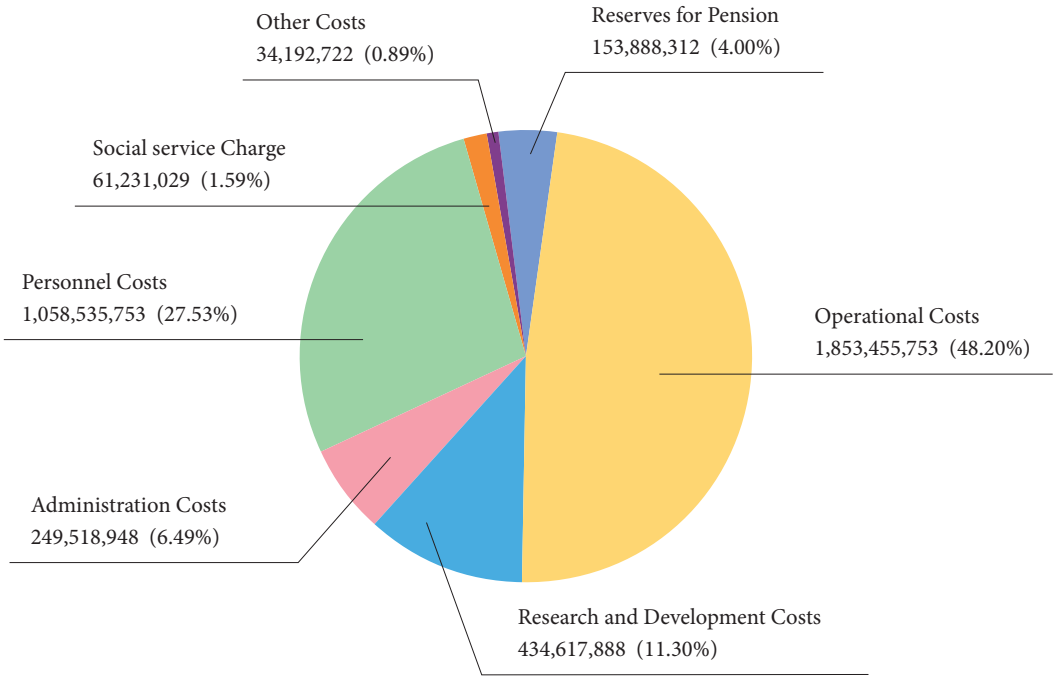
Incomes and Expenditures in 2018

NT Dollar

1. Total Incomes：NT$ 3,934,407,091



2. Total Expenditures：NT$ 3,845,440,405



3. Balance after tax：NT$ 88,966,686

4. Capital expenditures：NT$ 71,171,290 （Equipments purchase）

Appendix

Blood Centers in Taiwan

Head Office

Taiwan Blood Services Foundation

3 FL. No. 3, Nan-Hai Road, Taipei 10066, Taiwan, R.O.C.
TEL: 886-2-2351-1600 FAX: 886-2-2395-1002
Website: www.blood.org.tw

Regional Office

Taipei Blood Center

No. 123, Lih-Der Road, Taipei 112, Taiwan, R.O.C.
TEL: 886-2-2897-1600 FAX: 886-2-2897-1601
Executive Region: Taipei City, New Taipei City, Keelung City, Kinmen County, Matsu County, Hualien County, Yilan County.

Hsinchu Blood Center

No. 8, Lane 215, Guangming 11th Road, Jhubie City, Hsinchu County 302, Taiwan, R.O.C.
TEL: 886-3-555-6111 FAX: 886-3-555-0305
Executive Region: Taoyuan County, Hsinchu County, Miaoli County

Taichung Blood Center

No. 1176, Sec. 4, Taiwan Boulevard, Xitun Dist., Taichung City 407, Taiwan, R.O.C.
TEL: 886-4-2461-2345 FAX: 886-4-2461-3939
Executive Region: Taichung City, Changhwa County, Nantou County

Tainan Blood Center

No. 85, Sec. 1, Yongfu Road, West Central Dist., Tainan City 700, Taiwan, R.O.C.
TEL: 886-6-213-1212 FAX: 886-6-213-3201
Executive Region: Tainan City, Chiayi City, Chiayi County, Yuenlin County

Kaohsiung Blood Center

No. 1837, Gaonan Highway, Nanzi Dist., Kaohsiung City 811, Taiwan, R.O.C.
TEL: 886-7-366-0999 FAX: 886-7-364-1556
Executive Region: Kaohsiung City, Pingtung County, Penghus County, Taitung County


Blood Center
Blood Station
Matsu
Kinmen
Taipei
Keelung
Taoyuan
Panchiao
Hsinchu
Yilan
Miaoli
Taichung
Changhua
Puli
Hualien
Yunlin
Chiayi
Makung
Tainan
Kaohsiung
Pingtung
Taitung

Published by the Taiwan Blood Services Foundation

3F,3, Nanhai Road, Taipei ,Taiwan 10066
Tel: +886-2-23511600
Fax:+886-2-23951002
E-mail:blood@blood.org.tw
http://www.blood.org.tw

Printed in Taiwan, June 2019

醫療財團法人
台灣血液基金會
捐血救人 Taiwan Blood Services Foundation

Taiwan Blood Services Foundation
3F., No.3, Nanhai Rd., Zhongzheng Dist., Taipei City 10066, Taiwan
Tel：886-2-2351-1600 FAX：886-2-2395-1002
http://www.blood.org.tw