Transfusion News from Asia

The first issue, 2024

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Editorial

We are pleased to announce that the Japanese Society of Transfusion and Cell Therapy (JSTMCT), in collaboration with the Taiwan Society of Blood Transfusion (TSBT), has launched a new journal titled "Transfusion News from Asia" (TNFA). TNFA is a biannual electronic publication jointly produced by these two societies for their members.

This magazine features topical articles covering areas such as transfusion medicine, cell therapy, and the latest information from the regions the membership represents. TNFA delivers expertly curated, insightful, and captivating news. Additionally, TNFA analyses current and emerging trends that impact transfusion medicine and cell therapy.

In this inaugural issue, we have received diverse contributions from specialists in Japan and Taiwan. Particularly noteworthy is the in-depth exploration of the state of transfusion medicine during the pandemic period of SARS-CoV-2, coinciding with the preparations for this issue.

In this issue, we have also briefly highlighted the interactions between the two societies. Additionally, we are excited to share that speakers from Japan will participate in the symposium organized by TSBT, scheduled for this coming December. We anticipate that TNFA will foster ongoing exchanges between these two societies.

Kazuhiro Nagai, Task Force for TNFA, JSTMCT

A Chronicle: learning from the past.

Kazuhiro Nagai
Director, Department of Clinical Laboratory, National Hospital Organization Nagasaki Medical Center

In May 2023, against the backdrop of the ongoing global changes caused by the SARS-CoV2 pandemic that originated in 2020, the 71st academic conference of the Japanese Society for Transfusion Medicine and Cell Therapy (JSTMCT) took place in Chiba, Japan. One notable event at this conference was the joint symposium between TSBT (The Society of Blood Transfusion, Taiwan) and JSTMCT, made possible by the proposal of Professor Shigeki Miyata, the chairman of the conference and a distinguished member of the Japanese Red Cross Central Research Institute. This symposium marked a significant milestone, signaling the resumption of live academic exchange between these societies.

This article aims to document the collaborative relationship and academic exchange in blood transfusion and related areas between the two societies, highlighting past achievements and shedding light on future intellectual developments in blood transfusion and cell therapy within the East Asia region.
Initially established in 1954 as the Japan Society of Blood Transfusion, JSTMCT underwent a name change in 2006 to reflect its expanded focus on transfusion medicine and cell therapy. Since then, the society has consistently played a crucial role in advancing these fields and promoting safe and appropriate practices. JSTMCT has also been actively involved in international activities, hosting the 24th International Society of Blood Transfusion (ISBT) Congress in 1996 and the 20th ISBT Asian Regional Congress in 2009.

TSBT, established in 1987, has been responsible for nationwide assessments of hospital blood banks and blood donation organizations. Since its inception, the society has provided ongoing in-service education and training for blood bank personnel and physicians. Notably, Taipei has hosted the Regional Congress of the International Society of Blood Transfusion twice, in 1999 and 2011.

The first encounter between these two societies occurred in the late 1980s when the Japanese Society of Transfusion Medicine visited Taiwan and initiated a series of exchanges with the Taiwan Society of Blood Transfusion. Since then, academic interactions between the two societies have flourished. Here is a list of Japanese professors who have visited Taiwan for academic exchanges and delivered lectures:

1988: Professor Yasuto Okubo from the Red Cross Osaka Blood Center and Professor Takeshi Abe from Teikyo University.
1990: Professor Eiichi Tokunaga, Professor Kusuya Nishioka from the Japanese Red Cross Central Institute, and Professor Sadayoshi Sekiguchi from the Hokkaido Blood Center.
1991: Professor Hiroshi Tohyama, President of the Japanese Society of Blood Transfusion, and Professor Shinji Yuasa from Juntendo University.
1993: Professor Tsuneo Takahashi from the Hokkaido Blood Center.
1995: Professor Akaza and Professor Takeo Juji from the Japanese Red Cross Central Institute.
2000: Professor Kusuya Nishioka, Senior Technical Advisor of the Japanese Red Cross.
2003: Professor Shigata Asano from the University of Tokyo and Professor Tsuneo Takahashi.
2006: Professor Kenji Tadokoro from the Japanese Red Cross.
2007: Professor Shigeru Takamoto from Aichi Medical University.
2015: Professor Kazuo Muroi from Jichi Medical University.
2016: Professor Masahiro Satake from the Japanese Red Cross.

Additionally, in 2018, the 66th annual meeting of JSTMCT was held in Utsunomiya, Japan, from May 24-26. Professor Kazuo Muroi from Jichi Medical University presided over the meeting and invited two speakers from Taiwan, Dr. Tzong-Shi Chiueh (formerly Professor of the Department of Laboratory Medicine, Linkou Chang Gung Memorial Hospital) and Dr. Fang-Yeh Chu (formerly Director of the Department of Clinical Pathology & Quality Management Center, Far-Eastern Memorial Hospital, and President of TSBT). Dr. Chiueh provided recommendations for promoting the appropriate use of red blood cell transfusion based on nationwide databases, while Dr. Chu introduced transfusion medicine and the blood industry in Taiwan, including the history of TSBT and its relationship with JSTMCT.

During the joint symposium held at those mentioned above 71st academic conference of JSTMCT in Chiba from May 10-13, several speakers from Taiwan participated, including Dr. Shin-Yi Tsai (Mackay Memorial Hospital), Dr. Kate Shu (Mackay Memorial Hospital), and Dr. Ken Jhong (PuriBlood Medical Co., Ltd.). From Japan, Dr. Shunji Kawamoto (Shonan Atsugi Hospital) and Dr. Akira Oda (Japanese Red Cross Kinki

From left to right, Dr. Tzong-Shi Chiueh, Dr. Kazuo Muroi, and Dr. Fang-Yeh Chu. At the venue of the 66th Annual Meeting of the JSTMCT (Utsunomiya, 2018).

Block Blood Center) delivered presentations. The symposium provided an opportunity to discuss common themes, such as Patient Blood Management, resulting in productive sessions. This occasion marked the resumption of direct exchange between the two conferences, signifying a significant milestone following the pandemic, as the previous conference was held in 2018.

The ongoing exchanges and joint projects between these two societies have contributed significantly to the advancement of medical technology in both countries. The chronicle of their collaboration reflects a longstanding and fruitful partnership in advancing the science and practice of blood transfusion and related fields in the Asia Pacific region.

Assessment of factors influencing physicians' intention to prescribe transfusion using the theory of planned behavior

Shin-Yi Tsai*[1-3]
[1] Department of Laboratory Medicine, Mackay Memorial Hospital, Taipei City 104, Taiwan
[2] Department of Medicine, Mackay Medical College, New Taipei City 252, Taiwan
[3] Department of Health Policy and Management, Johns Hopkins Bloomberg School of Public Health, Johns Hopkins University, Baltimore, Maryland, 21205, United States
*Corresponding author: Shin-Yi Tsai; E-Mail: stsai22@jhu.edu

Taiwan Society of Blood Transfusion hosted a series of conferences in which they coordinated with different clinicians to share their experiences to advocate Patient blood management (PBM) during those years. PBM, a multidisciplinary approach, has three main aims:

1) Optimization of the volume of red blood cells;
2) Minimization of blood loss;
3) Harnessing and optimizing the tolerance of anemia.

The clinicians, including surgeons, physicians, residents and transfusion practitioners, can promote PBM by following practical strategies, as follows.

1) Management of anemia before and after surgery;
2) Inpatient and intraoperative measures to reduce blood loss and increase the use of foreign blood-saving measures, e.g., by optimizing surgical and anesthetic techniques, treatment with tranexamic acid (TXA) and autologous blood salvage;
3) Strict indication concerning blood transfusion.

Blood shortage is a persistent problem affecting Taiwan's healthcare system. Our smart-health laboratory developed a questionnaire measuring clinicians' intention to prescribe transfusion based on the theory of planned behavior (TPB), measuring four aspects of behavioral intention: (1) attitude, (2) subjective norms, (3) perceptual behavior control, and (4) knowledge, as commonly used in studies on health advocacy. We have recruited sufficient subjects for exploratory factor analysis that indicates no statistically significant correlations between the demographic characteristics and test scores.

Regarding perceived knowledge, the results revealed that the effect of age, hierarchy of doctors, and education level was significant. In terms of subjective norms, a significant effect for education level was noted [$t(129) = 2.28$, $p < 0.05$], with graduate school graduates receiving higher scores than college graduates. An analysis of variance demonstrated the effect of hierarchy, education level, and medical specialty on perceived behavioral control. The results of the regression analyses revealed that perceived knowledge ($\beta = 0.32$, $p < 0.01$) and subjective norms ($\beta = 0.22$, $p < 0.05$) were significantly related to clinicians' behavioral intention. The relevant findings have been disclosed in the conference hosted by Taiwan Association for Medical Education.

Our study revealed that factors affecting clinicians' blood transfusion management can be explained using the TPB-based questionnaire; it contributes to designing a questionnaire with closed-ended questions based on the TPB. We assessed the factors that affect clinicians to give transfusion orders to use blood and blood products efficiently. Through analyzing the relevant factors affecting blood transfusion orders, we can consider the field dynamics of hospitals. It demonstrated that physicians' perception of whether most people approve of PBM and their self-assessment of their PBM knowledge affect their intention to proceed with PBM and has shown that physicians' behavior has a strong influence on optimizing the usage of blood, namely PBM. Our findings contribute to recognizing the unmet needs and infer that the optimal policy on PBM and a support system among physicians must be established and maintained to increase physician's confidence in improving the healthcare outcomes. We hope to share and help more international clinicians modify the questionnaire in different medical environments and cultures to investigate the factors influencing physicians' intention to prescribe blood products for promoting PBM in various healthcare systems in the future.

Sharing of experience in the transfusion-medicine educational training in Taiwan during the COVID-19 pandemic

Jhy-Sheng Chang, Secretary General of the Taiwan Society of Blood Transfusion
Ying-Ju Chen, Convener of the Education and Training Committee, Taiwan Society of Blood Transfusion

The Taiwan Society of Blood Transfusion (TSBT) was founded in 1987. Its main purpose and task are to promote the development of transfusion medicine research and improve the

Figure 1. Experiment courses in the lab located at the Medical College of National Taiwan University

quality of the blood bank process, respectively. The workshop on transfusion medicine and various training courses are held each year. They include an advanced training course for staff of the blood bank; the 3-4 days course is held every two years. The course includes experimental operation guidance and theory teaching. TSBT is a unique Association in Taiwan that can hold the high-level training course due to well-experienced tutors.

TSBT rented the medical labs of medical colleges for the experiment part of the training course before 2020. However, due to the restrictions of epidemic regulations, medical colleges can no longer provide laboratories after the outbreak of COVID. In order to maintain the traditional training courses that have existed for 30 years, the Secretary-General and the Education and Training Commission actively seek alternatives. It's necessary to have on-site teaching because the training expenses of trainees before Covid were sponsored by the hospital. The virtual courses were approved by the Ministry of Health and Welfare of the Taiwan Government after the outbreak of Covid. Each student must attend the theoretical courses held through virtual meetings on holidays through Microsoft Teams. The experimental course was taught in 8 blood banks in different regions on the same day, and students freely choose a site to attend in advance. This practice replaces the centralized teaching in a medical college laboratory in the past. Students can avoid accommodation and long-distance journeys and serve a variety of plans when an emergency epidemic situation occurs.

This approach has the following advantages and has been highly recognized by students:

1. Samples, reagents, and handouts required for the course were transported by express
delivery avoiding the movement of personnel in different regions and epidemic infection.
2. The experimental course is held by a local well-experienced host, and the tutors in each region are trained quickly.
3. Directly use the conventional equipment and reagents of the hospital to avoid the extra preparation required for courses held in medical schools in the past.
4. Strengthen the association between the TSBT and blood banks in various regions.

The workshop held by TSBT is a virtual three-day course in 2022 due to the epidemic outbreak in Taiwan. It was the first

Figure 2. Experimental course in different blood banks

time to hold case-based discussions, adopted to make up for the shortage of experimental courses.

The logic has been trained and assessed through the analysis of cases with rare blood types and unexpected antibodies; a student infected with COVID completed the virtual course and obtained a training certificate. The virtual course of theory and the in-person experimental course compose an effective teaching model that was given feedback by the students. Therefore, TSBT will continue to use the model of "virtual theoretical courses and regional blood banks to complete experimental courses" in future courses after 2022.

The surprise of the COVID period for TSBT's continuing education courses is that the online courses have expanded the participation of students, diversified teaching models, and various course contents. TSBT completed the certification

Figure 3. THN education and training course is the main live broadcast room in 2022. Left: Dr. Tzong-Shi Chiueh, the president of TSBT (location: New Taipei Municipal TuCheng Hospital)

course of blood bank consulting physicians for 38 clinicians in the form of virtual courses in 2021, and TSBT also cooperated with the Taiwan Nurse Association (TWNA) to hold the Taiwan Hemovigilance Network (THN) course in October 2022, with 2300 students participating, which is the biggest workshop in TSBT history. We are convinced that the design of various diversified and practical course content, coupled with a virtual teaching platform, attracts many professional medical technical scientists to participate actively in the workshop, and we truly believe that transfusion medicine maintains patients safety continuously.

The impact of the COVID-19 pandemic on blood service in Japan and countermeasures

Toru Miyagi, Yoshihiko Miyashita, Tomohiko Mitsuyoshi, Yuki Kato, Masamichi Mikame, Nelson-Hirokazu Tsuno
Japanese Red Cross Kanto-Koshinetsu Block Blood Center

The COVID-19 pandemic outbreak in Wuhan, China, in December 2019, spread worldwide and also importantly affected Japan, where initial cases were reported in January 2020. Thereafter, we experienced eight COVID-19 waves by December 2022 (1), as shown in Fig 1. In spite of the relatively

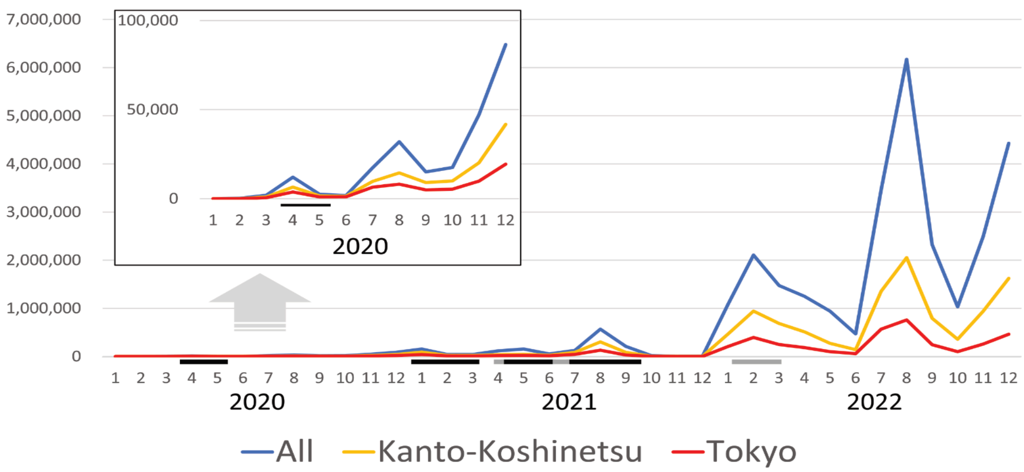

Fig 1. Number of newly confirmed COVID-19 cases in Japan from Jan 2020 to Dec 2022. Data from 2020 are magnified for a better visualization. Black and gray bars indicate the time emergency situation was declared and semi-emergency coronavirus measures were taken in Tokyo, respectively. Kanto-Koshinetsu region includes Tokyo, Chiba, Kanagawa, Saitama, Ibaraki, Tochigi, Niigata, Yamanashi, Gunma, and Nagano prefectures.

small number of infections in Japan compared to other countries, blood services were severely affected owing to the government's declaration of a state of emergency, associated with the fear of the population of this unknown disease without preventive and therapeutic measures at the time. During the pandemic, especially in its initial period of uncertainty, various measures have been attempted at the Japanese Red Cross Blood Services (JRCBS), the sole blood service operator in Japan, to prevent blood shortage. In this report, the data on the blood services in the COVID-19 period and the strategies applied by the JRCBS will be presented, especially focusing on red blood cell (RBC) donation. Presently, in Japan, blood donations are

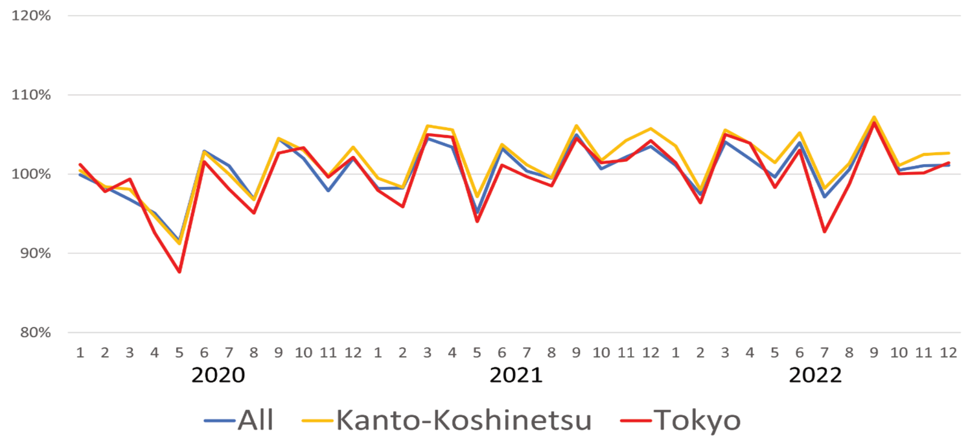

Fig 2. RBC supply in Japan. The monthly supply of RBC manufactured from 400 mL whole blood is shown as a percentage of the average for each month in 2017-19. Kanto-Koshinetsu region includes Tokyo, Chiba, Kanagawa, Saitama, Ibaraki, Tochigi, Niigata, Yamanashi, Gunma, and Nagano prefectures.

100% voluntary non-remunerated (VNRD), and 200 mL and 400 mL of whole blood collection are available, the latter representing the vast majority.

JRCBS operates the blood service through the Wide Area Management System, in which the country is divided into 7 regions, and testing/processing are consolidated into the so-called “block blood centers”, and the JRCBS headquarters oversees the nationwide management. Annually, 1.2 million RBC bags, representing around 37% of the whole country, are

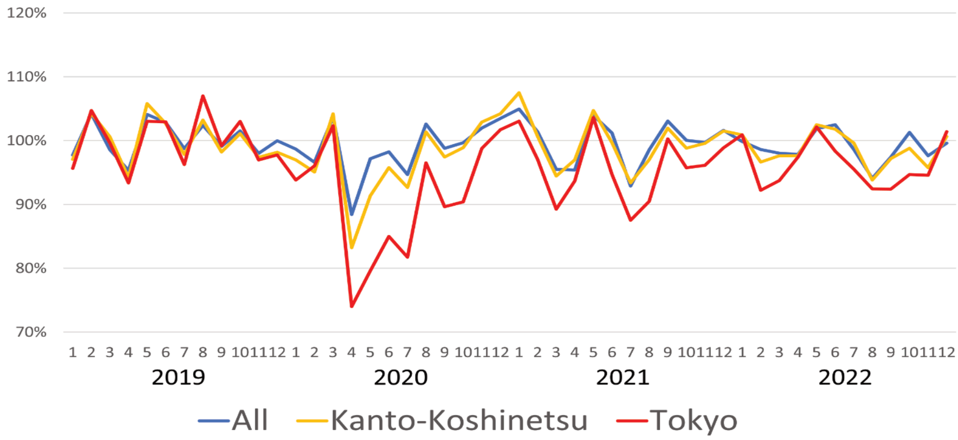

Fig 3. The achievement rate to JRCS's whole blood collection plan. Achievement rates were especially low in the beginning of the pandemic (April – July 2020), with most evident decrease in Tokyo. Kanto-Koshinetsu region includes Tokyo, Chiba, Kanagawa, Saitama, Ibaraki, Tochigi, Niigata, Yamanashi, Gunma, and Nagano prefectures.

supplied at the Kanto-Koshinetsu Block, the largest region in Japan, comprising Tokyo and surrounding 9 prefectures. In May 2020, decreased supply of RBC to hospitals, mainly dependent on the postponement of surgical procedures, was observed, but it quickly returned to usual levels (Fig 2). On the other hand, a substantial decrease of blood donations, especially whole blood, occurred, mainly dependent on the absence of potential donors in the workplaces and schools. Prior to the outbreak, especially in the urban area, almost one-third of whole blood donations were derived from blood drives to company offices and high schools and universities. With the outbreak, most companies promoted remote working, high schools and universities were closed, and many events were cancelled. As a result, the whole blood collection plan could not be achieved (Fig 3).

Various measures have been taken by the JRCBS to prevent blood shortage, which are described below, including the associated issues:

(1) Reduction of the time from collection to supply.

As a usual routine, RBC are ready for supply two days after collection, but during the COVID-19 outbreak, it was tested/processed to be available for supply on the next day.

Although effective, it is a stopgap measure, which imposes a heavy burden to the manufacturing site.

(2) Inventory management within the region and nationwide.

Blood collection was increased in less affected areas, especially in the countryside, to compensate for decreased donations in the urban area. Inventory adjustments were made within the same region, and also nationwide, beyond the regions. This measure showed effective when areas with high-infection rate were limited.

(3) Use of mass-media to encourage blood donation.

In addition to sending repeated requests by e-mail, direct mail and phone calls, to donors registered in our programme (LoveBlood), the mass-media, including TV, radio, web, and newspapers, were used to inform potential donors on the safety of blood donation sites, and the need and the importance of blood donation. The PR effect through the mass-media revealed to be immediate and highly effective, but sometimes associated with side effects, that was the excess inventory. Therefore, use of mass-media, although very effective, need to be dealt cautiously and strategically.

(4) Enhance preventive measures of blood collection sites.

For donors feel safe to come for blood donation, various preventive measures were implemented at the blood donation sites. All staff at the donation sites received daily check of their health status at the time of arrival at the site, and their body temperature taken and recorded. All staff was requested to wear face masks, frequently sanitize hands by alcohol, and blood collection nurses to change the gloves for each collection. Staff

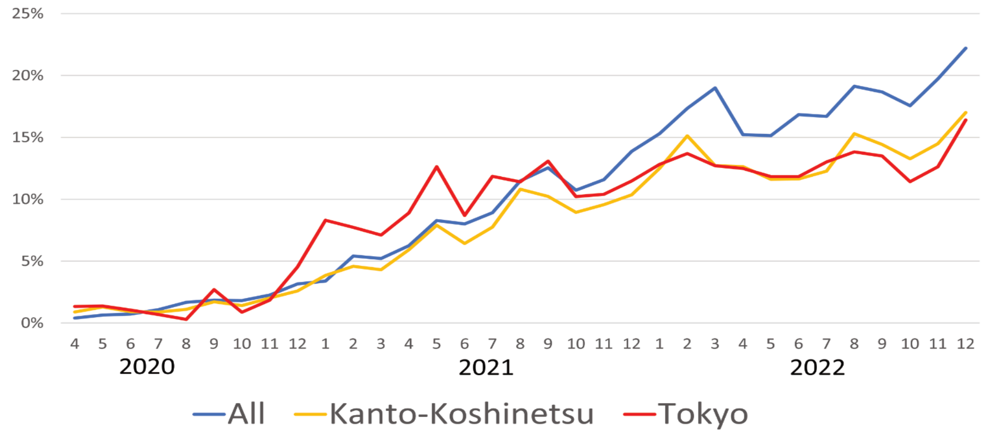

Fig 4. Blood donation appointment rate for mobile-collection sites in Japan. The appointment for whole blood collection significantly increased.Kanto-Koshinetsu region includes Tokyo, Chiba, Kanagawa, Saitama, Ibaraki, Tochigi, Niigata, Yamanashi, Gunma, and Nagano prefectures.

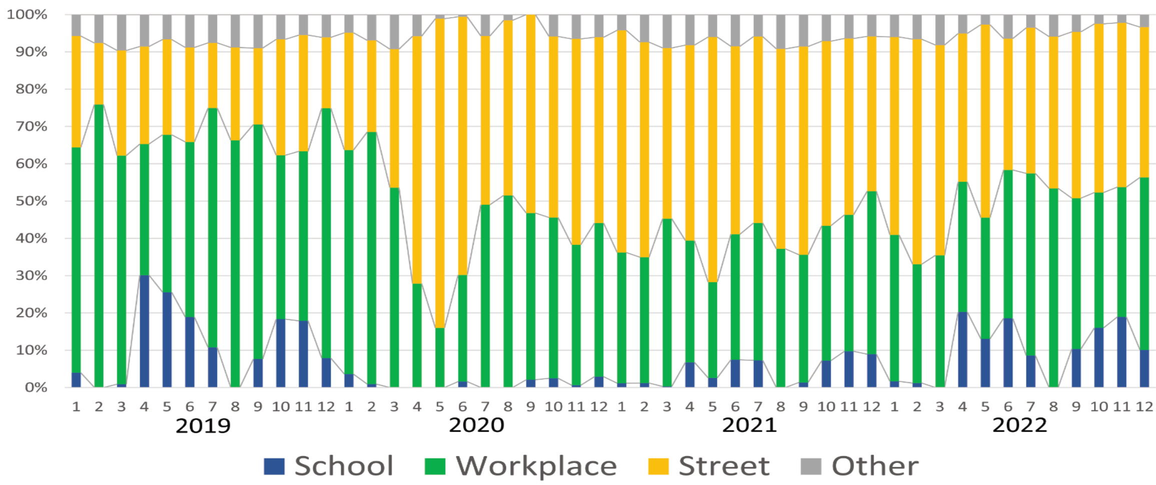

Fig 5. Whole blood collections by mobile-collection site in Tokyo, shown as percentages of total mobile collections. "Street" includes those sent to streets around station areas, shopping malls, etc., with or without the assistance of blood drive volunteers. In Tokyo, there was evident reduction in the rate of mobile collections at workplaces and schools, especially in the first year of pandemic, balanced by those at “street”.

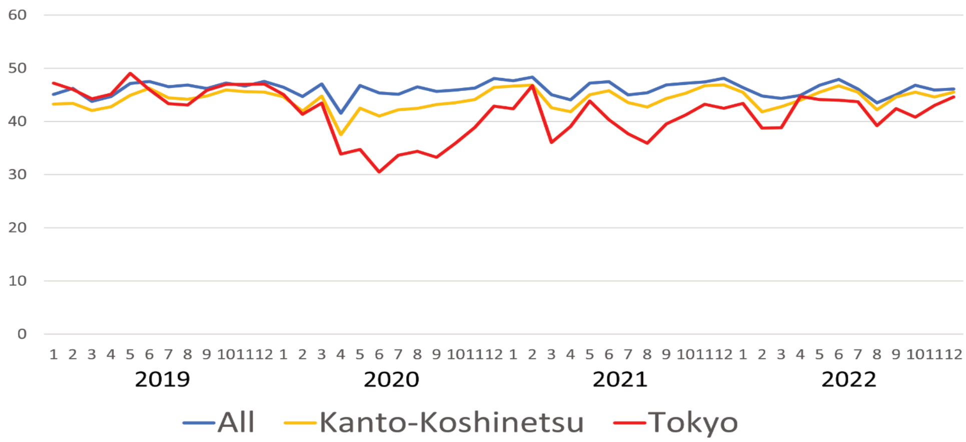

Fig 6. Number of whole blood collected per blood collection bus. An evident decrease in the number of donors per mobile was observed in the beginning of the pandemic in Tokyo. Kanto-Koshinetsu region includes Tokyo, Chiba, Kanagawa, Saitama, Ibaraki, Tochigi, Niigata, Yamanashi, Gunma, and Nagano prefectures.

was subjected to COVID-19 antigen test, when required. Blood donors also have their body temperature taken, and are requested to wear a face mask and sanitize hands with antiseptic solution at arrival to the donation site.

(5) Promotion of appointment for blood donation

A web-based blood donor programme (LoveBlood) is available at the JRCBS, where donors can make an appointment for donation. Through this system, donors can make an appointment to not only fixed-, but also mobile-collection sites. Donation with appointment is very useful to prevent crowding at the collection sites and enables flexible and effective blood collection planning. Donation with appointment was a strategy implemented prior to the pandemic, but it was considered especially important during the pandemic. At fixed-collection sites, appointment rate for apheresis was 41.1% in April 2020, just at the beginning of pandemic, but increased to 86.8% in December 2022. Similarly, at the mobile collection sites, the appointment for whole blood collection significantly increased from 0.4% to 22.2% (Fig 4).

(6) Shift of the location of mobile-collection sites from "workplace" to "street".

Since people disappeared from workplaces and schools during the pandemic, the location of mobile collection sites had to be reconsidered, and instead of sending them to company offices/ factories and schools, they were sent to "street", such as those around train stations and shopping malls. The ratio of "workplace" decreased, and on the contrary, that of "street" increased, especially in the metropolitan Tokyo, as shown in Fig 5. Prior to pandemic, many companies cooperated with JRCBS in promoting donation, by allowing employees to donate during working hours. Thus, many mobiles were sent to these workplaces, which are almost not affected by weather conditions, yielding adequate amount of blood on weekdays, through cooperation from many repeat donors. With most mobiles going to “street”, these advantages were lost, with decreased number of donations per bus (Fig 6), requiring additional measures, such as increasing the number of mobiles, and finding and requesting donors living close to the mobile site to cooperate.

As described, many strategies were taken to prevent blood shortage during COVID-19 pandemic in Japan. The strategies implemented are not different from other countries, and are essentially consistent with WHO guidelines (2). There's no silver bullet or “one-size fits all” to overcome such a situation, therefore, multiple measures needed to be implemented in combination to achieve appropriate demand-supply management of blood products not only in regions but in the whole country during the pandemic. The saga is still ongoing.

Acknowledgments
We would like to thank the staff of the Japanese Red Cross Kanto-koshinetu Block Blood Center and the JRCS Blood Service Headquarters for providing the data for this report.

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Blood supply for patients in southern Taiwan, remote areas and offshore islands

Cheng Hung Yeh[1], Chi Ming Hung[1], Sheng-Tang Wei[2], Sheng-Mou Hou[2]
Kaohsiung Blood Center, Kaohsiung, Taiwan[1]
Taiwan Blood Services Foundation, Taipei, Taiwan[2]

Taiwan has a total land area of 36,000 km² and nearly 100 surrounding offshore islands. Despite a length of only 394 km from north to south, Taiwan offers peaks reaching an altitude of nearly 4,000 m. Steep terrain, mountains, and hills account for approximately two-thirds of the total land area of Taiwan. Meeting the blood transfusion demand of patients in remote mountainous areas and offshore islands is a crucial task for the Taiwan Blood Services Foundation.

Kaohsiung Blood Center is responsible for the medical blood supply services of approximately 180 medical institutions in southern Taiwan, including those in Kaohsiung City, Pingtung County, Penghu County, and Taitung County. More than 400,000 and 40,000 units of blood are derived from whole blood and apheresis blood donation, respectively. The 17 hospitals in remote areas and on offshore islands only account for 10% of the total number of hospitals and consume less than

8% of the total blood donated. Kaohsiung Blood Center has overcome many difficulties in delivering blood to remote areas and offshore islands and satisfying the needs of local hospitals.

To meet the blood transfusion demand of patients in remote areas and offshore islands, and to devise blood donation strategies to stabilize blood donation, big data algorithms have been used to develop a blood inventory monitoring and early warning system. The proposed system can predict blood inventory for subsequent weeks or months on the basis of the daily blood inventory of the blood donation center, which enables the early allocation of blood inventory in times of low blood donation and high blood consumption. In addition, various innovative strategies have been adopted to stabilize blood donation, such as increasing the average blood donation frequency, increasing the convenience of blood donation, increasing the blood donation volume at blood donation sites, and offering online services and phone numbers for making blood donation appointments. In the jurisdiction of Kaohsiung Blood Center, the blood donation rate is 7.76%, and the volume of blood donated at fixed blood donation sites accounts for 60.2% of the total volume of blood donated, which is the highest nationwide. In addition, to run the blood donation campaign in remote areas and on offshore islands, blood donation activities are held regularly in the countryside, and the bloodmobile is shipped with vessels to offshore islands to increase the convenience of blood donation on offshore islands. The world's first service robot "Pepper" for blood donation has been introduced, which greatly benefits the education and dissemination of voluntary blood donation.

Compared with metropolitan areas, remote areas and offshore islands have inferior medical capacities. In terms of blood supply strategy, Kaohsiung Blood Center delivers blood daily to remote areas and offshore islands by aircraft and automobile at all costs. A roundtrip drive to Taitung County is approximately 360 km (with the farthest one-way drive being approximately 180 km), whereas the daily roundtrip flight to

Magong Airport of Penghu County is more than 300 km. Without increasing the burden on hospitals and patients' families, the Center's timely blood delivery rate has increased to 99.6%. Platelet products have a short shelf life; for this reason, an active rotation mechanism has been adopted to replace expiring platelet products in remote areas and on offshore islands with the freshest platelet products every day. Patients in remote areas and on offshore islands can thus receive the freshest blood products. To supply patients with blood products in a timely manner, Kaohsiung Blood Center established four medical blood supply support networks with local hospitals in remote areas and on offshore islands by connecting Mountain Town Tribe, South of the Border, Eastern Half of Taiwan, and Offshore Island of Taiwan. When a local hospital urgently requires blood products, it may contact neighboring hospitals. The support network satisfies the locals' needs for blood product. When large volumes of blood (for transfusions or disasters) and rare blood types are needed, Kaohsiung Blood Center always proactively activates the emergency blood supply mechanism to ensure the nonstop supply of blood products.

Kaohsiung Blood Center has greatly improved the quality of blood transfusion in remote areas and on offshore islands. The Center follows the standards of the American Association of Blood Banks and the regulations of the World Health Organization for blood collection, component preparation, component supply, and blood product delivery. The center has also received ISO9001:2015, ISO27001, ISO15189, PIC/S GMP, and Taiwan Accreditation Foundation certification. In 2019, the Center received the Symbol of National Quality endorsement as the guardian of remote areas in southern Taiwan and offshore islands. In addition, the Center earned bronze in the 2019 National Biotechnology and Medicine Care Quality Awards. The Center has also received national recognition for its efforts to satisfy the medical needs of patients.

History and perspectives of Taiwan Hemovigilance Network

Fang-Yeh Chu
Immediate Past President of TSBT
Department of Clinical Pathology, Far Eastern Memorial Hospital

To systemically collect and analyze transfusion reactions in Taiwan, the Taiwan Society of Blood Transfusion (TSBT) in collaboration with Taiwan Blood Services Foundation (TBSF) established the Taiwan Hemovigilance Network (THN) in 2014. In 2015, the definition and report form of adverse transfusion reaction (ATR) were issued. These hard works were accomplished by the Task Force for Taiwan Hemovigilance Network led by Dr. Fang-Yeh Chu. The web-based interface for THN was completed and online for use in January 2017. The THN takes the policy of voluntary reporting, and all events including mild and serious ATR are reported. The illustrate of the milestones of Taiwan Hemovigilance System is shown in figure 1.

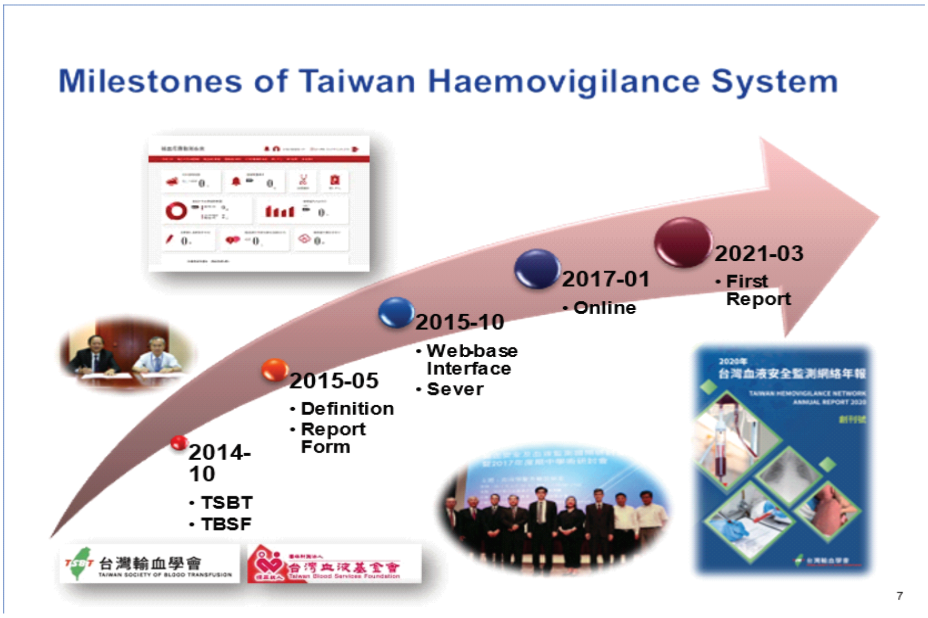

Figure 1. Milestones of Taiwan Hemovigilance Network

In 2017, five pioneer medical centers were invited to report ADR according to the definition of ADR from THN and feedback on the use of the web-based reporting system was collected to further revise the reporting system. The participating hospitals were expanded to 30 in 2018, and further increased up to 65 hospitals with a coverage rate of blood usage being up to 59.9% (Figure 2). The 65 participating hospitals included 18 tertiary hospitals, 30 secondary hospitals, and 17

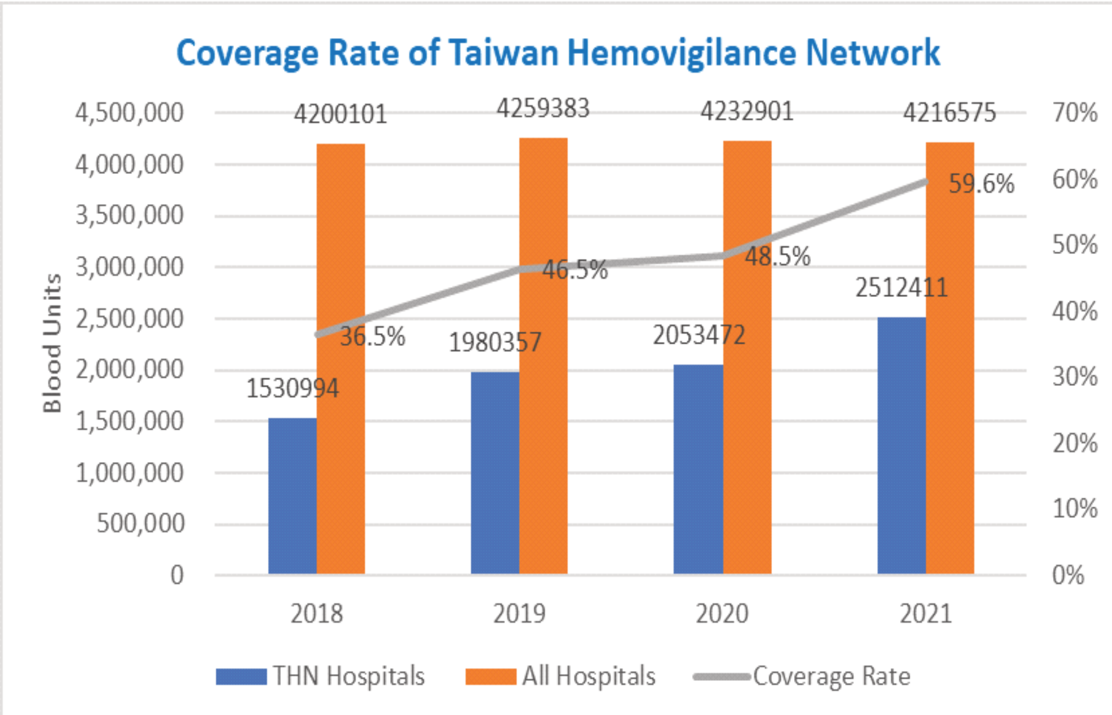

Figure 2. Number of participating hospitals and the estimated THN coverage rate by year. (Modified from Taiwan Hemovigilance Network Annual Report 2021)

primary hospitals. In total, the cumulated reporting number of ATR was 10,811 till the end of 2021. Of the 10,811 ATR, 84 were categorized as severe ATR, including 25 allergic reaction, 20 transfusion associated dyspnea, 11 transfusion related acute lung injury (TRALI), 12 transfusion associated circulatory overload (TACO), 9 hypotensive transfusion reaction, 5 febrile non-hemolytic transfusion reaction, and 1 post-transfusion purpura; 5 were categorized as life-threatening ATR, including 2 allergic reactions and 3 TRALI, 1 transfusion associated graft-versus-host disease that led to death.

With the first publication of Annual Report of Taiwan Hemovigilance Network, the overall picture of ATR in Taiwan began to show (Figure 3). The pulmonary transfusionreactions comprised 51.1% of severe ATR consistent with trends in other countries. In order to reduce TRALI, the policy of mitigating the plasma component from female donors and antibody screening positive female apheresis donors have been launched. Furthermore, TSBT have been making every effort, such as strengthening continuous education and promoting speed-controlled transfusion device, to decrease TACO, a potential preventable ATR. In the near future, more and more hospitals will be expected to join us and the "Big Data" will give the trend of ATR in Taiwan; relevant measures to decrease or even mitigate it will be possible.

Figure 3. First and second Issue of Taiwan Hemovigilance Report 2021