NATIONAL BLOOD AUTHORITY
AUSTRALIA

Monitoring International Trends

April – June 2022

The NBA monitors international developments that may influence the management of blood and blood products in Australia including but not limited to:

- potential new product developments and applications
- global regulatory and blood practice trends
- events that may have an impact on global supply, demand and pricing
- emerging risks and relevant issues.

Some key topics that have appeared in news media, online publications, and industry and research updates have been included in this report, including:

- **Blood Supply:** Blood supplies have been affected by the COVID-19 pandemic, seasonal flu and natural disasters in Australia. The Therapeutic Goods Administration (TGA) has approved the removal of restrictions on blood donation from people who lived in the United Kingdom between 1980 and 1996, with changes coming into effect on 26 July. In Canada and Austria, there have also been changes to deferral rules for certain groups to make blood donation policies more inclusive.

- **Blood Disorders:** The United States Food & Drug Administration (FDA) has granted breakthrough therapy designation to Sanofi's haemophilia A treatment 'efanesoctocog alfa'. Researchers have noted positive results in early trials of treating von Willebrand disease with the haemophilia treatment 'Hemlibra' (emicizumab).

- **Transfusion:** The use of whole blood in trauma patients has been a focus of research in 2022, with multiple studies looking at the effects of low titre O whole blood in United States trauma centres.

- **Gene Therapy**: The haemophilia A gene therapy from BioMarin, 'Roctavian' (valoctocogene roxaparvovec), has been granted conditional marketing authorisation in the European Union, however, the company has delayed lodging the treatment with authorities in the United States. The FDA's Cellular, Tissue, and Gene Therapies Advisory Committee has recommended approval of the gene therapy 'Beti-cel' (betibeglogene autotemcel) for use in patients with transfusion dependent beta-thalassemia.

- **COVID-19:** The on-going effects of COVID-19 have been highlighted, with studies suggesting that 'long covid' will continue to impact some people. The TGA has provisionally approved the use of the Moderna 'Spikevax' vaccination for children six months to five years old and Nuvaxovid's 'Novavax' vaccine as a booster for Australians aged 18 and above.

- **Other items of interest:** The Australasian Society for Clinical Immunology and Allergy (ASCIA) has released its *Immunodeficiency Strategy for Australia and New Zealand* focusing on primary immunodeficiencies. The Australian Government are encouraging all Australians to get vaccinated against influenza, with free seasonal influenza vaccines available for groups with higher risk of complications. Two projects funded under the National Blood Authority's National Blood Sector Research and Development Program have reported the results of their research.

Contents

1 Blood supply

This section contains news articles and government agency statements on blood supply, changes to donation criteria, and a report from the UK Infected Blood inquiry.

1.1 Blood supply – Australia

National Blood Donor week occurred in June. ASCIA has advised its members of the need to switch blood products due to the shortage of the immunoglobulin product 'Privigen'. Blood product shortages are occurring across Australia as a result of seasonal illness and COVID-19 infections.

- Changes to IVIg supply - Australasian Society of Clinical Immunology and Allergy
- National blood donor week 2022
- Urgent call for O negative blood as stocks plummet
- Blood shortage: Australian Red Cross calls for donors
- Blood donor services forced to reduce operating hours due to WA's labour crisis
- 'Transfusion confusion': Migrants turned away from donating blood in Australia
- Urgent plea for blood donations as flu, COVID hit supplies
- Misconceptions hinder blood donation
- Research collaboration to improve patient access to rare blood types
- Efforts to reduce blood wastage not in vein
- Australia's blood stocks plummet as donors off sick with flu and COVID

1.2 Blood supply – North America

April was 'National Minority Health Month' in the US, with the American Red Cross reminding donors to think about conditions affecting diverse communities. CSL Behring and Grifols have won a decision to review a US government ban on Mexican residents travelling to the United States to provide blood for products.

- Red Cross seeks to help eliminate health disparities through its blood program
- Blood donors needed as supply falls below 50 percent
- AABB Monthly Platelet and Group O Survey
- CSL, plasma companies win reversal on suit over Border Patrol blockade of visas for paid collections
- FDA takes steps to relax blood donor requirements
- Red Cross, hospitals at odds over expensive blood technology
- American Red Cross receives ISO 9001:2015 certification
- Hema-Quebec sees spike in blood donation cancellations and no-shows
- Blood collection tube shortages continue - 'routine' labs should be limited
- Canadian Blood Services reports having smallest base of donors in a decade

1.3 Blood supply – World news

The 14 June is World Blood Donor Day. The aim of the day is to raise global awareness about the need for safe blood products, as well as highlighting the critical contribution voluntary blood donors make and supporting blood transfusion services.

- World Blood Donor Day 2022: Donating blood is an act of solidarity. Join the effort and save lives
- Vietnam: Voluntary blood donation a popular movement in Vietnam
- The Netherlands: Balancing non-discriminatory donor selection and blood safety in the Netherlands
- Israel: Israel opens world's most protected blood bank, rocket-proof and underground
- Namibia: In Namibia, blood donations rise thanks to free transport to donor clinics
- Iran: WHO staff donate blood as an act of solidarity to save lives in Islamic Republic of Iran
- Ireland: Irish Blood Transfusion Service makes urgent appeal for donors
- United Kingdom: An international inquiry into the contaminated blood tragedy Library
- India: Probe ordered into deaths of 2 people due to 'wrong blood transfusion'
- Nigeria: NBSC targets one million blood donors

1.4 Regulatory and donation criteria changes

TGA approval to lift 'mad cow' blood donation ban for people who lived in the UK

The TGA has approved removing blood donation restrictions on people who lived in the United Kingdom between 1980 and 1996 at the height of an outbreak of Creutzfeldt–Jakob disease. Lifeblood confirmed approval has been provided and commenced collecting blood from these previously excluded donors from 26 July, after making some adjustments to its screening process.

Risk of variant Creutzfeldt–Jakob disease transmission by blood transfusion in Australia

This study investigated the possible risk of contamination with Creutzfeldt–Jakob disease in the Australian blood supply after the removal of restrictions on travelers to and residents of the UK (1980-1996) donating blood. The authors predicted that the chance of a clinical case occurring from transfusion was 1 in 1.4 billion and concluded that removing the Lifeblood donation deferral would result in virtually no increased risk of transfusion transmission, with an overall estimated gain of at least 57,000 donations annually.

Canadian Blood Service seeks to scrap sex workers ban

Canadian Blood Services has provided a recommendation to Health Canada to remove a lifetime ban on donations by sex workers. They have recommended a one-year deferral be in place after paid sex work, with the potential for restrictions to be completely removed in the future.

Canada removes ban on blood donations from gay men

The Canadian government has confirmed that they will lift the donor deferral period for men that have sex with men, with policy changes expected to come into force by 30 September 2022.

Reported non-compliance with pre-donation screening among blood donors in Québec, Canada: A focus on the 3-month deferral for men who have sex with men

In 2019, the Canadian donation deferral for men who have sex with men was shortened to 3 months. This study surveyed residents in Quebec to determine compliance with screening procedures amongst donors. Researchers found that reported non-compliance with the 3-month deferral period and the disclosure of other HIV behavioural risk factors was low.

Risk of transfusion-related acute lung injury and human immunodeficiency virus associated with donations from trans donors in Quebec, Canada

This Canadian study assessed the risks of transfusion-related acute lung injury (TRALI) and HIV associated with donations from trans persons in the Quebec area. The study included 134 donors of which 58 were deferred from donating a blood-derived product with the remaining 76 being eligible donors.

Austria lifts blanket restrictions on LGBTQ+ people donating blood

The Austrian government has lifted a de facto ban on LGBTQ+ citizens donating blood, with all Austrian residents now being deferred from donating blood if they have had sex with three different partners within the previous three months.

1.5 Blood donor characteristics and donation effects

The genomic landscape of blood groups in Indigenous Australians in remote communities

Australian researchers mapped the blood group profiles of the Indigenous Tiwi Islander population to identify possible antigen variants. Researchers found that the genetic makeup of participants was distinct from that of other populations, a finding they hope will contribute to improving transfusion safety for the Tiwi people and the other Indigenous Australians.

On consciousness of the decision to discontinue blood donation: Intention to return and effective recovery activities

This study looked at the reasons that blood donors decide to stop donating blood, surveying 1,263 donors that have had not given blood in Germany for more than 36 months. Researchers found that 44.9% of former blood donors did not consciously decide to stop blood donation and that the best way to incentivise donors to return were flexible donation hours, online appointment scheduling and sending out reminders.

National transfusion database to cover all blood usage in Australia

An integrated national database of blood usage in Australia is being set up by the Transfusion Research Unit at Monash University, Melbourne. The National Transfusion Dataset (NTD) aims to collect information about where, when, and how blood products are used across all clinical settings with the ability to link with clinical outcomes.

Blood donor eligibility criteria for medical conditions: A BEST collaborative study

Researchers conducted an international survey of blood donor centre members of the Biomedical Excellence for Safer Transfusion (BEST) collaborative to compare eligibility criteria. Considerable regional variability in criteria was found, with most respondents believing the eligibility criteria for their blood donor centres were based on regulatory requirements rather than published data.

Whole blood donor return rates after deferral for tattooing or body piercing

Researchers surveyed blood centre members of the Biomedical Excellence for Safer Transfusion (BEST) Collaborative and the European Blood Alliance Donor Studies Working Group on tattoo and piercing deferrals and return rates. Researchers found that women and young donors were more often deferred than male and older donors, but men were more demotivated by tattoo or piercing deferral, resulting in lower return rates compared to women.

Improving donor retention following a temporary deferral: A cluster randomized controlled trial of deferral educational materials

This study investigated the effectiveness of educational materials in increasing the retention of deferred blood donors in Australia. In a randomised trial, deferred donors were either: given a brochure while at the donor centre and sent an email, just sent an email, or not provided with

additional information as part of a control group. The brochure and email group also included a guided conversation led by staff at the point of deferral. Donors were followed up for 3 months after their deferral had ended to determine if they had attempted to donate. Researchers found that the odds of a donor returning within 3 months increased by 16% if they were in the brochure and email group compared with the control group. Donors in the email only group were not significantly more likely to return than donors in the control group.

Designing and testing an ethnic-ancestry question for Australian blood donors: Acceptability, feasibility, and understanding

Australian researchers conducted a survey of 506 current blood donors asking their views on ethnic-ancestry questions. These questions assist donation centres to meet demand for rare blood-types. Donors reported being very comfortable providing information about their ethnic-ancestry, with most donors able to select an ethnic-ancestry option with which they identified.

Blood donor motivators during the COVID-19 pandemic

This study looked at the motivators for blood and plasma donors in the Netherlands during the COVID-19 pandemic. In total 3,175 donors who donated between 1 and 14 April 2020 participated in an online questionnaire. Researchers found that older donors were more likely to donate with the aim of getting tested for COVID-19 antibodies and helping COVID-19 patients. Younger donors indicated that 'getting out of the house' and 'not having to go to work' motivated them to donate. Helping COVID-19 patients was the highest motivating factor across all age groups.

What would it take to convince you to donate? A survey study of the relationship between motivators, barriers, and payment for whole blood, plasma, and platelet donation

This study examined the level of payment required to convince individuals to engage in whole blood, plasma, and platelet donations in the United States. Researchers found that across the three different forms of blood donation, a higher proportion of respondents with a history of whole blood donation indicated that they were willing to donate without any financial compensation. However, despite reporting a strong commitment to blood donation, many respondents indicated that financial remuneration would convince them to engage in whole blood, plasma, and platelet donation.

Trust and distrust: Identifying recruitment targets for ethnic minority blood donors

Researchers looked at the idea of trust and distrust to understand why people from ethnic minority communities in the UK were less likely to be blood donors. Researchers noted conditional distrust of UK healthcare organisations (NHS) amongst people from ethnic minority groups. However, they also differentiated the UK blood service (NHSBT) from the rest of the NHS and found the NHSBT was less likely to elicit distrust amongst ethnic minority donors.

A critical contribution in a time of crisis: Examining motivations and deterrents to COVID-19 convalescent plasma donation and future donation intentions among prospective Canadian donors

The Canadian Blood Services undertook three clinical trials during the COVID-19 pandemic that recruited several thousand prospective convalescent plasma donors. This study looked at the motivations and deterrents for donors to participate in a clinical trial during a pandemic. Researchers found that there was a relational aspect to donation willingness, with the potential to help family and friends a strong motivation to donate.

Screening platelet function in blood donors

This study aimed to determine the prevalence of functional platelet abnormalities in a population of blood donors with a clinical history of bleeding diathesis or with history of haematomas larger than 4cm during blood donation. In the group of 2434 donors, 195 were identified based on a history of haematoma and 88 donors had a bleeding score indicating a potential bleeding disorder. The study

found that the bleeding questionnaire provided was a valuable tool to screen blood donors for potential platelet defects, but that platelet dysfunction was rare in the blood donor population assessed.

Frequency of Hepatitis B, C, and Human Immunodeficiency Virus in blood donors

Researchers aimed to determine the prevalence of hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) antibodies among blood donors in a Pakistani blood bank. A total of 23,656 blood donors visited and donated blood across 2020 and 2019. A total of 1.4% of patients with HBV, 1.5% with HCV, and 0.03% were seropositive in the year 2020 compared to 2019 in which, 1.6% HBV, 2.07% HCV, and 0.09% HIV blood donors were seropositive.

1.6 Other items

Blood donors' usage intentions of donation appointment-scheduling systems during the COVID-19 pandemic and beyond

This study looked at the effect that an online booking system had on the intention of blood donors to schedule an appointment during the COVID-19 pandemic. An online survey of 3,269 blood donors in Germany asked participants if they would use a donation appointment scheduling system. Researchers found strong acceptance levels of the donation appointment scheduling system among active blood donors at a time when contact limitation laws were strict.

Effect of plasma and blood donations on levels of Perfluoroalkyl and Polyfluoroalkyl substances in firefighters in Australia: A randomised clinical trial

Australian researchers aimed to determine if the level of perfluoroalkyl and polyfluoroalkyl substances (PFASs) in the blood, typically used in firefighting foams, could be reduced by blood or plasma donations. Elevated levels of blood perfluoroalkyl and polyfluoroalkyl substances (PFASs) have been associated with a range of adverse health outcomes. Researchers tested the levels of PFASs in the blood of 285 firefighters and found that those who donated blood and plasma had insignificantly lower PFAS levels than participants that had not donated as part of the trial.

Five Australian domestic plasma products to change

CSL Behring is changing the manufacturing processes and names of five of Australia's domestic plasma products in 2023. CSL Behring will introduce their global manufacturing processes at its Broadmeadows facility in Victoria. This move is being made as per the National Fractionation Agreement for Australia between the National Blood Authority and CSL Behring. The National Blood Authority has stated that the products will continue to comply with the safety and efficacy requirements set by the Therapeutic Goods Administration.

Cerus Corporation announces multi-year contract for the INTERCEPT Blood System for platelets with the American Red Cross

Biotech company Cerus has announced that they will continue to supply the American Red Cross with the INTERCEPT Blood System used to produce pathogen reduced platelets The system will support the Red Cross' goal to transition toward a full pathogen reduced platelet supply within the United States.

2 Blood disorders and treatments

This section includes published new media, research and industry statements on the progress of blood disorder treatments across various conditions.

2.1 Thrombotic disorders

Thromboprophylaxis reduces risk of VTE for patients with sickle cell disease and a central venous access device

The role of thromboprophylaxis in the setting of patients with sickle cell disease (SCD) and a central venous access device (CVAD) is uncertain. The objectives of this research were to:

- determine whether thromboprophylaxis reduces venous thromboembolism (VTE) risk in SCD patients with CVAD
- explore characteristics associated with VTE risk.

Initial findings suggested a strong protective effect of thromboprophylaxis and hydroxyurea against thrombosis in this patient group, however more research is required.

Management of bleeding risk in patients who receive anticoagulant therapy for venous thromboembolism: Communication from the ISTH SSC Subcommittee on Predictive and Diagnostic Variables in Thrombotic Disease

This report summarises the current evidence on the prediction of bleeding in venous thromboembolism (VTE) patients and provides recommendations for the standardised management of bleeding risk.

Platelet transfusion and anticoagulation in haematological cancer-associated thrombosis and thrombocytopenia: the CAVEaT multi-centre prospective cohort

In this pre-print study researchers looked at the results of a multicentre cohort of 105 patients with haematological cancer-associated venous thromboembolism to describe practice, document outcomes, and compare management to national guidelines. They found no clear relationship between platelet transfusion threshold, anticoagulant dose reduction threshold and risk of thrombosis progression or major bleeding.

2.2 Haemophilia

LongHest project: A prospective, observational study of extended half-life treatment in the musculoskeletal health of patients with severe haemophilia A

Researchers evaluated the efficacy of prophylactic treatment with extended half-life clotting factors. Forty-six adult patients with severe haemophilia A were examined over a period of 12 months. They found that treatment reduced the frequency of haemarthrosis in elbows and knees in adult patients and noted that continued administration reduced the intensity of joint pain in patients with elbow haemophilic arthropathy.

Enhanced pharmacokinetics and reduced bleeds in boys with haemophilia A after switching to Kovaltry from other standard half-life factor VIII concentrates

In Beijing Children's Hospital, 47 boys with severe haemophilia A were enrolled and divided into three groups according to their previously used FVIII concentrates. Two separate pharmacokinetic tests were conducted on each participant during the study period from 6 months before to 6 months after switching to ‘Kovaltry’ (antihemophilic Factor VIII [recombinant]) from other standard half-life factor VIII concentrates. Researchers found that participants who switched to Kovaltry from three other FVIII concentrates with the same dosing regimens obtained higher trough FVIII levels and better protection with reduced annualised bleeding rates.

FDA grants breakthrough therapy designation to efanesoctocog alfa for haemophilia A

The US Food & Drug Administration has granted breakthrough therapy designation to Sanofi's haemophilia A treatment efanesoctocog alfa. Efanesoctocog alfa is a recombinant factor VIII therapy designed to extend protection from bleeds with once-weekly dosing.

Does difference between label and actual potency of factor VIII concentrate affect pharmacokinetic-guided dosing of replacement therapy in haemophilia A?

Researchers explored the effects of potency differences of individual factor VIII (FVIII) pharmacokinetics parameters and the prediction of FVIII trough levels of dosing regimens. They found that actual potency was higher than batch potency in 45 of 50 patients, resulting in maximal FVIII levels and optimal protection against bleeds without additional costs. Despite this difference, the authors suggest that discrepancies between actual and label potency are negligible when applying guidance of FVIII concentrates in haemophilia A patients.

Traumatic tonsillar haemorrhage during haemophilia A treatment with emicizumab

Doctors at the Narita Red Cross Hospital in Japan report the case of a paediatric patient who experienced traumatic tonsillar haemorrhage while undergoing emicizumab treatment.

Changing paradigms of haemophilia care across larger specialized treatment centres in the European region

Researchers conducted a survey in 19 European Collaborative Haemophilia Network centres across 17 countries to track recent changes in the haemophilia treatment landscape and determine the impact of changes on haemophilia treatment and comprehensive care centres in the region.

Switching to nonacog beta pegol in haemophilia B: Outcomes from a Canadian real-world, multicentre, retrospective study

This study captured data from 42 haemophilia B patients on the Canadian Bleeding Disorders Registry to assess the treatment outcomes of patients after switching to Refixia (nonacog beta pegol). Researchers found bleeding control with low factor consumption after switching to Refixia, irrespective of the previous product.

Health-related quality of life, direct medical and societal costs among children with moderate or severe haemophilia in Europe: multivariable models of the CHESS-PAEDs study

This report analysed health-related quality of life, medical, non-medical and societal costs among children and adolescents with moderate and severe haemophilia A or B without inhibitors. Researchers concluded that children with haemophilia and their caregivers experienced lower quality of outcomes, with severe patients experiencing the most significant impacts.

Revised terminal half-life of nonacog alfa as derived from extended sampling data: A real-world study involving 64 haemophilia B patients on nonacog alfa regular prophylaxis

Researchers evaluated the terminal half-life of Benefix (nonacog alfa), a standard half-life recombinant factor IX (FIX) treatment, in haemophilia B patients receiving prophylaxis. Researchers collected FIX values, from routine visits to French treatment centres for patients with severe haemophilia B. A total of 455 FIX activity observations from 64 haemophilia patients treated with Benefix were obtained from eight centres. Researchers found that the terminal half-life of nonacog alfa was longer than had been described in studies where the sampling was not extended beyond three days.

Risk factors for bleeding in people living with Haemophilia A and B treated with regular prophylaxis: a systematic review of the literature

This review looked at the literature relating to risk assessment models and risk factors for bleeding in people with haemophilia on regular prophylaxis treatment. The authors found that plasma factor

levels, history of bleeds and physical activity should be considered when building a risk assessment model for bleeding in people with haemophilia.

Analysis of pooled real-world data from Germany, Italy, and the United States of rVIII-SingleChain compared with standard- and long-acting FVIII products for prophylaxis of haemophilia A

Researchers evaluated the annualised bleeding rates, dosing frequency, and factor consumption of four recombinant FVIII products using data from haemophilia centres in the United States, Germany, and Italy. Researchers suggest that rVIII-SingleChain prophylaxis may provide improved bleed protection, less frequent dosing, and lower consumption compared with standard-acting FVIII products, and comparable protection and consumption to the other long-acting FVIII product in patients with haemophilia A.

Associated comorbidities, healthcare utilization & mortality in hospitalised patients with haemophilia in the United States: Contemporary nationally representative estimates

Researchers evaluated the reasons for hospitalisation in child and adult haemophilia patients in the United States using a nationally representative cohort. They found that bleeding and catheter-related infections were significant causes of hospital admissions among children with haemophilia, while adult haemophilia admissions tended to be associated with age-related comorbidities.

Bone health in haemophilia carriers and persons with von Willebrand disease: A large database analysis

This study estimated the prevalence of osteoporosis, osteoarthritis and bone fractures in haemophilia carriers and people with von Willebrand disease using a commercial database in the United States. Researchers identified 940 female haemophilia carriers and 19,580 people with von Willebrand disease and found the prevalence of osteoporosis, osteoarthritis and fractures were significantly higher in this group compared to controls. They also found the prevalence of vitamin D deficiency, obesity, hypothyroidism, smoking, diabetes mellitus, hypocalcaemia, corticosteroid use, malignancy, renal failure and use of nonsteroidal anti-inflammatory drugs (NSAID) were significantly higher among these cohorts.

Clinical application of extended half-life factor VIII in children with severe haemophilia A

This retrospective study examined the experiences of children with haemophilia A who were treated with extended half-life (EHL) factor VIII products. These products are designed to prolong the prophylactic effect, compared with clinical experience from standard half-life (SHL) products. The study was undertaken by researchers at a Greek children's hospital and demonstrated the successful transition of 23 children with haemophilia A from SHL to EHL factor concentrate. Researchers reported that prophylaxis with EHL products was safe, with no inhibitor development in any of the treated patients. Over all patients had fewer injections, better compliance, improved bleeding outcomes and lower bleeding rates.

Eradication of factor IX inhibitor in haemophilia B children using low-dose immune tolerance induction with rituximab-based immunosuppressive agent(s) in China

This study looked at the effectiveness of inhibitor eradication with lower dose immune tolerance induction in Chinese patients with haemophilia B. Researchers used prothrombin complex concentrate, combined with two successive rituximab-based immunosuppressive regimens to induce immune tolerance. Researchers reported that the therapy combined with immunosuppressive regimens achieved inhibitor eradication with similar efficacy to using high-dose immune tolerance induction.

Eptacog beta efficacy and safety in the treatment and control of bleeding in paediatric subjects (<12 years) with haemophilia A or B with inhibitors

This study assessed 'Sevenfact' (eptacog beta) efficacy and safety for the treatment of bleeding in children under 12 years of age with haemophilia A or B with inhibitors. Researchers found that Sevenfact provided safe and effective treatment with 75 or 225 µg/kg administered initially, followed by 75 µg/kg at predefined intervals. No thrombotic events, allergic reactions or treatment-related adverse events were reported, with nearly all bleeding episodes resolved within 24 hours.

Plasma-derived FVIII/VWF complex shows higher protection against inhibitors than isolated FVIII after infusion in haemophilic patients: A translational study

This study investigated the protection of von Willebrand factor (VWF) against FVIII inhibitors in haemophilia A (HMA). Mice with HMA were exposed to plasma derived FVIII, VWF or recombinant FVIII concentrates. Researchers found that plasma derived FVIII/VWF complexes offered higher protection against inhibitors when compared with FVIII products without VWF.

Clinical conditions and risk factors for inhibitor-development in patients with haemophilia: A decade-long prospective cohort study in Japan

This study analysed a Japanese registry for people with haemophilia to examine risk factors for inhibitor-development. Researchers included newly diagnosed patients with haemophilia A (PwHA) or haemophilia B (PwHB) without inhibitors after 2007, and with treatment records traceable from 0 to 75 exposure days. A total of 417 patients (340 PwHA, 77 PwHB) from 46 facilities were identified with 83 (76 PwHA, 7 PwHB) recorded as having developed inhibitors by July 2020.

The long-term clinical benefits and economic costs associated with increased use of prophylaxis among patients with haemophilia A in China: Population-based predictions from 2018 to 2033

Researchers predicted the long-term benefits and economic costs of the improvements in haemophilia care in China. Long-term predictions for 2033 suggested significantly improved bleed control and joint outcomes due to increased use of prophylaxis. The expected improvement in treatment also led to significant economic costs driven by predicted increases in clotting factor costs (more than 90%) with overall outpatient and hospitalisation costs expected to decrease.

CSL Behring Donates 500 million international units of coagulation factor replacement therapy to the World Federation of Hemophilia humanitarian aid program to help those living with bleeding disorders

CSL Behring has pledged 500 million international units (IU) of coagulation factor therapy to the World Federation of Hemophilia (WFH) as part of the WFH Humanitarian Aid Program. The donation is expected to provide access to treatment for people living with bleeding disorders in more than 60 developing countries.

2.3 Von Willebrand disease

Long-term prophylaxis cost-effective for von Willebrand disease

This study evaluated the cost-effectiveness of long-term prophylaxis and on-demand therapy among patients with low, medium, and high annual bleed rates (ABR). Researchers found that long-term prophylaxis against bleeds among patients with von Willebrand disease (VWD) was more cost effective than on-demand therapy.

Emicizumab enhances thrombus formation in vitro under high shear flow conditions in whole blood from patients with type 1 and type 3 von Willebrand disease

Researchers examined the effects of the haemophilia A treatment Hemlibra on thrombogenesis using blood samples from type 1 and type 3 von Willebrand disease (VWD) patients. They found that

Hemlibra promoted mechanisms of thrombus formation in both type 1 and type 3 VWD patients, suggesting the treatment could be considered for use in these patients.

Quantification of the relationship between desmopressin concentration and Von Willebrand factor in Von Willebrand disease type 1: A pharmacodynamic study

'Desmopressin' is an anti-diuretic factor that can be used to prevent bleeding in people with von Willebrand disease. In this study, 47 von Willebrand disease patients received a dose of .3 mcg/kg of desmopressin to examine the relationship of desmopressin concentration and von Willebrand factor activity. Von Willebrand factor activity aids in blood clotting and is normally reduced in this patient group. Researchers found that a maximum increase in Willebrand factor activity can be established with a capped dose of desmopressin.

2.4 Kawasaki disease

Analysis of age, sex, lack of response to intravenous immunoglobulin, and development of coronary artery abnormalities in children with Kawasaki disease in Japan

This study investigated the association between age, sex and unresponsiveness to intravenous immunoglobulin and the development of coronary artery abnormalities among patients with Kawasaki disease in Japan. Researchers analysed data from 2,414 patients with Kawasaki disease and found that the incidence rate of unresponsiveness to IVIg and the development of coronary artery abnormalities might differ among patients younger than 12 months.

2.5 Cold agglutinin disease

Long-term Enjaymo use in 4 women with CAD deemed safe, effective

A phase 1 open-label extension trial for 'Enjaymo' (sutimlimab) has shown increases in haemoglobin and lowered need for blood transfusions in four women with cold agglutinin disease (CAD). Trial data shows that treatment remained safe and effective for approximately three years.

2.6 Post-partum haemorrhage

Promptness of oxytocin administration for first-line treatment of postpartum haemorrhage: a national vignette-based study among midwives

The aim of this study was to investigate French midwives' practices regarding first-line oxytocin treatment and the factors influencing its delayed administration for postpartum haemorrhage (PPH). The study showed variations in the promptness of oxytocin administration for first-line treatment of immediate and severe PPH versus gradual but persistent PPH.

Incidence, mortality, and factors associated with primary postpartum haemorrhage following in-hospital births in northwest Ethiopia

Researchers investigated the incidence of PPH in Ethiopia. While the incidence of PPH appeared to be lower than in other studies in Africa, the associated maternal mortality rate was higher in Ethiopia. Researchers found two specific factors to be prevalent in Ethiopia births: the first being a delay in reaching the health facility and the second, a delay in receiving quality care.

Determining the incidence of postpartum haemorrhage among Ontario women with and without inherited bleeding disorders: A population-based cohort study

This study looked at the incidence of PPH in women in Ontario to identify the maternal factors associated with the risk of PPH among women with inherited bleeding disorders (IBD). A total of 601,773 women were included in the study with 2002 identified as having an IBD. Researchers found that PPH incidence was 1.5 times higher among women with IBD. On average, these women were slightly older, had higher rates of hypertension, previous PPH, and had labour induced. Women with

IBD were also more frequently diagnosed with anaemia and had lower haemoglobin levels at admission for delivery compared to women without IBD.

Does the quality of postpartum haemorrhage local protocols improve the identification and management of blood loss after vaginal deliveries? A multicenter cohort study

This study compared the effects of local, regional or national postpartum haemorrhage guidelines on the incidence of PPH in French women. Researchers observed a higher incidence of PPH and less frequent use of second-line treatments in maternity units with a PPH protocol that corresponded most closely to the national guidelines. Maternity units with a high-quality protocol were more likely to be aware of the importance of identifying and quantifying blood loss.

Impact of efforts to prevent maternal deaths due to obstetric haemorrhage on trends in epidemiology and management of severe postpartum haemorrhage in Japan: a nationwide retrospective study

This study, conducted using the national database of health insurance claims in Japan between 2012 and 2018, looked at trends in blood transfusion for women who experienced PPH. Researchers found that women that had a transfusion following a PPH increased from 0.35% - 0.55% of deliveries while the proportion of maternal deaths decreased.

2.7 Sickle cell disease

Phase 1 SCD Trial Supporting GBT601 as next-gen therapy to Oxbryta

In this Phase 1 trial, researchers investigated the effects of multiple daily doses of 'GBT601', an experimental oral therapy for sickle cell disease. Findings showed multiple daily doses were generally well tolerated and showed promising pharmacological and efficacy signals in six patients.

Comparative evaluation of efficacy and safety of automated versus manual red cell exchange in sickle cell disease: A systematic review and meta-analysis

This study evaluated the efficacy and safety profile of automated red cell exchange procedures over manual red cell exchange transfusion (MET) in sickle cell disease patients. Researchers found that automated red cell exchange did not significantly reduce the haemoglobin S and serum ferritin levels when compared with manual red cell exchange transfusion, with no significant increased risks relating to the procedure.

SCD therapy Tovinotrine shows no benefit; development to be halted

Pharmaceutical company Imara has ceased development of 'Tovinotrine' (IMR-687), an experimental oral therapy for sickle cell disease and beta-thalassemia, based on interim data from two Phase 2b clinical trials. Trials found that the patients treated with Tovinotrine experienced no significant clinical benefit when compared with patients that received a placebo.

Safety and efficacy of voxelotor in paediatric patients with sickle cell disease aged 4 to 11 years

Researchers looked at the treatment 'Oxbryta' (voxelotor) for use in children aged over three. They found that as a haemoglobin S polymerisation inhibitor, Oxbryta improved haemoglobin levels and markers of haemolysis. They concluded that voxelotor has the potential to mitigate sickle cell disease-related complications.

Organ dysfunction rare among children who underwent HSCT for sickle cell disease

Researchers investigated the prevalence of organ dysfunction among paediatric patients who underwent haematopoietic stem cell transplantation (HSCT) for sickle cell disease. Researchers used the registry of the Sickle Cell Transplant Advocacy & Research Alliance in the United States to review the results of 247 children who had undergone HSCT at least one year prior. They found that when dysfunction did occur, it was more common in transplant patients over 16 years old.

2.8 Thalassemia

Exa-Cel eliminates transfusions in transfusion-dependent thalassemia and vaso-occlusive crises in Sickle Cell Disease

Results from phase 2/3 trials of Vertex Pharmaceuticals' and CRISPR Therapeutics' gene therapy 'exa-cel' have shown that the treatment eliminated the need for transfusion in 95% of patients with transfusion-dependent beta-thalassemia for at least 12 months after treatment. Treatment with exa-cel also eliminated vaso-occlusive crises in all patients with sickle cell disease for a period of 12 months.

Blood exchange transfusion with corticosteroid and Tocilizumab for management of hospitalised patients with Sickle Cell Disease and severe COVID-19: preliminary evaluation of a novel algorithm

The authors propose a treatment algorithm for sickle cell disease patients hospitalised with severe COVID-19. The aim of the algorithm is to minimise the worsening of patients' outcomes related to corticosteroid therapy by proposing a prior blood exchange transfusion (BET); the drug 'tocilizumab' is considered an alternative when transfusion is not recommended due to immunisation against red blood cell antigens.

2.9 CAR-T therapy

CAR-T treatment moves earlier as FDA widens approval of Gilead's yescarta

The US Food and Drug Administration on Friday expanded approval for the use of the CAR-T therapy, 'Yescarta' (axicabtagene ciloleucel), in adults with large B-cell lymphoma when it is resistant to initial treatment or relapses within one year.

CAR-T shows 'remarkable' efficacy as first-line therapy for large B-cell lymphoma

Researchers have found that axicabtagene ciloleucel (axi-cel) induced positive responses in 89% of patients with high-risk large B-cell lymphoma in a phase 2 study. Researchers noted that 91% of patients treated with a single infusion of the T-cell therapy remained alive at 12 months.

2.10 Immune system and immunotherapy

Ceramide-induced integrated stress response overcomes Bcl-2 inhibitor resistance in acute myeloid leukaemia

Researchers from the University of South Australia and SA Pathology's Centre for Cancer Biology have discovered a way to suppress a specific protein that promotes resistance to drugs commonly used to treat acute myeloid leukaemia patients.

Immunoglobulin-free strategy to prevent HBV mother-to-child transmission in Cambodia (TA-PROHM): a single-arm, multicentre, phase 4 trial

In this study, researchers investigated replacing immunoglobulin treatment with early administration of 'tenofovir disoproxil fumarate' for the prevention of mother-to-child transmission of hepatitis B. Researchers found that the 227 women who received tenofovir disoproxil fumarate for more than 4 weeks before giving birth did not transmit hepatitis B to their child.

Efficacy and safety of intravenous immunoglobulin for treating refractory livedoid vasculopathy: a systematic review

Researchers determined the efficacy of using intravenous immunoglobulin in the treatment of livedoid vasculopathy (LV), a recurrent blood clotting disease. Researchers found that intravenous immunoglobulin therapy was effective in 95% of LV patients with a good clinical response for resolution of pain, skin ulcerations, and neurological symptoms.

Is intravenous immunoglobulin a risk factor for necrotising enterocolitis in neonates with haemolytic disease of the newborn? A retrospective cohort study

Researchers assessed whether the use of intravenous immunoglobulin (IVIg) in late-preterm and term newborns with haemolytic disease of the newborn (HDN) is associated with an increased risk of necrotising enterocolitis (NEC). In total, 1259 children were included in the study, with 192 receiving IVIg. NEC was diagnosed in 29 patients with five in the IVIg group and 24 in the non-intravenous immunoglobulin group. Researchers concluded that in late-preterm and term infants with HDN, there was no evidence that the early use of IVIg led to the development of NEC.

Immunoglobulin and monoclonal antibody therapies in Guillain-Barré Syndrome

This report summarised current research into treatments for Guillain-Barré syndrome including the use of intravenous immunoglobulin (IVIg) for adults. The authors note that while several treatments are in trials, the only effective treatment available at present is immunoglobulin. Due to the current cost and availability of immunoglobulins, many patients affected by remain untreated worldwide.

3 Transfusion

This section includes published research and industry publications on transfusion procedures to improve patient outcomes and reduced wastage of blood products.

3.1 Paediatrics

Neonatal and paediatric transfusion practices and policies in India: A survey-based cross-sectional assessment of blood centres

Researchers conducted a survey-based cross-sectional assessment of blood centres in India supporting paediatric/neonatal transfusions to determine the variation in transfusion policies and practices. The survey highlighted significant variations in practices with regards to pre-transfusion testing, requirement of maternal samples, use of additive solutions, aliquoting for 'small volume' transfusions, special product modifications, quality control parameters and transfusion procedure.

Platelet transfusion could protect babies at risk of brain bleeds

Researchers have discovered a new way to help identify babies at high-risk of developing brain bleeds. Preclinical models have found brain bleeds occurred when platelet levels dropped to 10 per cent or below in newborns and foetuses. The research also indicates that babies may develop protection against brain bleeds two weeks after birth, with bleeding no longer triggered by very low platelet levels beyond this age.

A risk prediction model of perinatal blood transfusion for patients who underwent cesarean section: a case control study

Researchers analysed data for 71 perinatal blood transfusion patients and 170 controls, who underwent caesarean section in a Chinese general hospital, to identify patients with a high risk of perinatal blood transfusions. Researchers found the strongest risk factors included preeclampsia, abnormal placentation, maternal age, predelivery haemoglobin and predelivery fibrinogen.

3.2 Administration

Rate of D-alloimmunization in trauma does not depend on the number of RhD-positive units transfused: The BEST collaborative study

This study looked at injured RhD-negative patients between 18–50 years of age who received at least one unit of RhD-positive red blood cells or low titre group O whole blood during their resuscitation. Researchers found the rate of D-alloimmunization was not significantly different between those who received one RhD-positive unit and those who received multiple RhD-positive units.

Does training make a difference? Proficiency training in transfusion guidelines and its effect on red blood cell administration

Researchers in Israel performed a questionnaire-based assessment of physicians' knowledge of transfusion guidelines in a tertiary hospital, followed by an analysis of red blood cell administration six months before and six months after training was delivered. They found that proficiency training had no significant effect on the rates of red blood cell administration.

Hypersensitivity transfusion reactions to fresh frozen plasma: a retrospective analysis of the French haemovigilance network

Researchers in France looked at hypersensitivity transfusion reactions after exposure to fresh frozen plasma. They found that while the rate of hypersensitivity transfusion reactions to fresh frozen plasma is low in France, the risk of having such a reaction has steadily increased between 2000 and 2018.

Lack of alloimmunisation to the D antigen in D-negative orthotopic liver transplant recipients receiving D-positive red blood cells perioperatively

This study, performed at a single academic medical centre in the US, reviewed electronic medical records for 155 D-negative patients who underwent an orthotopic liver transplant from January 2007 to December 2017. They found that D-negative patients who were transfused perioperatively with D-positive red blood cells experienced alloimmunisation, suggesting that administrating D-positive red blood cells to D-negative patients was safe in liver transplant recipients.

Digitally enabled haemovigilance allows real time response to transfusion reactions

The study used computations to identify potential transfusion reactions, allowing for real-time intervention for affected patients. Dedicated haemovigilance nurses remotely monitored 3,856 patients receiving 43,515 transfusions in real-time to perform chart reviews, prioritised by risk score. Retrospective comparison data included 298,498 transfusions and showed that this model of digitally-enabled expert real-time review improved recognition of transfusion reactions. Findings suggest this approach could also be applied to other patient deterioration events such as early identification of sepsis.

Recovery of organ-specific tissue oxygen delivery at restrictive transfusion thresholds after fluid treatment in ovine haemorrhagic shock

This study aimed to assess utility of non-invasive tissue-specific measures to compare packed red blood cells transfusion with novel crystalloid treatments for haemorrhagic shock. Researchers conducted 27 experiments with sheep to determine if non-invasive clinical measures were reliable surrogates for invasive organ-specific measures. Whether packed red blood cells or two different crystalloid solutions were used to treat severe haemorrhagic shock, researchers found no apparent differences in outcomes.

Red blood cell alloimmunisation among recipients of blood transfusion in India: A systematic review and meta-analysis

This systematic review estimated the overall prevalence of alloimmunisation in India by looking at 44 RBC alloimmunisation studies with a cumulative sample size of 309,986 patients. Researchers found that alloimmunisation was higher in multiple transfusion patients (4.8%) than the hospital-based patients (0.5%) in India. Anti-E and anti-C were the most common red cell antibodies identified in multiple transfused patients.

The regional whole blood program in San Antonio, TX: A 3-year update on prehospital and in-hospital transfusion practices for traumatic and non-traumatic haemorrhage

The San Antonio Whole Blood Collaborative is working to provide low titer O whole blood (LTWOWB) across Southwest Texas, in the form of remote damage control resuscitation followed by in-hospital

trauma resuscitation. This paper describes how the program is being implemented and expanded to include to include paediatric trauma resuscitation, obstetric haemorrhage, females of childbearing potential, and non-traumatic haemorrhage.

Low titer Group O whole blood utilization in pediatric trauma resuscitation: A National Survey

This study looked at the utilisation of LTOWB transfusion in paediatric trauma resuscitation. Researchers surveyed American paediatric level 1 trauma centres to determine how many have implemented LTOWB program for inpatient resuscitation. Seven centres were already using LTOW and 3 were initiating an LTOWB program. There was substantial variability in LTOWB protocols from center to center, evident in both the characteristics of LTOWB available.

Receipt of at least 4 units of low titer group O whole blood with titer <100 does not lead to haemolysis in adult trauma patients

This study investigated whether multiple units of LTOWB resulted in haemolysis in adult trauma patients. The serological safety of transfusing LTOWB with an anti-A and anti-B titre of <100 was evaluated in group O and non-group O trauma recipients. Researchers found that use at least 4 units of LTOWB in was not associated with haemolysis in adult trauma patients.

Mortality among patients undergoing blood transfusion in relation to donor sex and parity

Previous studies have suggested that plasma and platelet transfusions from female donors may be associated with adverse clinical outcomes. This study looked at 368,778 patients undergoing red blood cell transfusion in Sweden to determine the 2-year survival differences between people receiving transfusions from females who have not had children, females who have had children and male donors. Researchers found that outcomes were not statistically significant, however receiving blood from female donors was associated with an increased risk of additional transfusions due to lower haemoglobin counts.

3.3 Management

Platelet transfusions in a mouse model of neonatal polymicrobial sepsis: Divergent effects on inflammation and mortality

Platelet transfusions are often used to treat septic preterm infants at high platelet count thresholds to reduce the risk of bleeding. A previous large, randomised trial had demonstrated higher mortality and/or major bleeding in infants occurred at higher thresholds. This study was conducted to understand the reason for higher mortality. Researchers found that in septic mice, transfused adult platelets are consumed faster than endogenous neonatal platelets and platelet transfusions can enhance or attenuate neonatal inflammation in a mouse model.

Discovery and quantification of plastic particle pollution in human blood

Researchers have demonstrated that human exposure to plastic particles results in absorption of particles into the bloodstream. The researchers noted that plastic particles in the bloodstream need to be studied further to determine the length of time they spend in the blood and accumulation in the general population. It was noted that environmental factors contributing to the exposure and human health effects may differ and that further research was needed to determine if plastic particles are present in the plasma or are carried by specific cell types.

Cold storage alters the immune characteristics of platelets and potentiates bacterial-induced aggregation

Cold-stored platelets are currently under clinical evaluation and have been approved for limited clinical use in the United States. This study examined changes to the immune function of platelets that undergo cold storage. Researchers found that cold storage alters the immune phenotype of platelets,

reducing the abundance of pathogen recognition receptors on the surface membrane and exhibiting increased aggregation in response to stimulation by *E. coli* and *S. aureus*.

Autologous red blood cell transfusion does not result in a more profound increase in pulmonary capillary wedge pressure compared to saline in critically ill patients: A randomized crossover trial

This study investigated the effect of autologous red blood cell (RBC) transfusion versus saline on pulmonary capillary wedge pressure change. Researchers sought to determine which factor contributed most to transfusion-associated circulatory overload and found that transfusion of autologous RBCs did not result in a more profound increase in pulmonary capillary wedge pressure compared to saline. However, RBC transfusion did result in a decrease of extra-vascular lung water and pulmonary vascular permeability compared to saline, suggesting that transfusing autologous RBCs may lead to less pulmonary oedema than saline.

Understanding the experiences of plasma donors in Canada's new source plasma collection centres during COVID-19: A qualitative study

The Canadian Blood Services (CBS) initiated a proof-of-concept program to demonstrate a cost-effective way to increase plasma collection in Canada and reduce dependence on commercial product from the United States. Interviews were carried out with plasma donors in three plasma centres in Canada to determine motivation for donating plasma products. Researchers suggest that blood donors are more open to plasma donation when collection agencies promote the effect of donation on the community.

Haemoglobin S testing using HEA BeadChip technology: Lifeblood comparison with clinical diagnosis

Researchers compared haemoglobin S results achieved using 'HEA BeadChip technology' at the Australian Red Cross Lifeblood with conventional high-performance liquid chromatography (HPLC) to determine its effectiveness in detecting sickle cell disease and thalassaemia. Researchers found that the HEA BeadChip technology gave zero false positive or negative readings and suggested that use of the technology could improve donor management.

How do we obtain and maintain patient blood management certification?

A team of American subject matter experts in patient blood management (PBM) formed a working group to develop a structured approach to guide PBM programs through the PBM certification process. Facilities that have achieved PBM certification have seen significant reductions in transfusions and considerable cost savings.

Implementation of a dual platelet inventory in a tertiary hospital during the COVID-19 pandemic enabling cold-stored apheresis platelets for treatment of actively bleeding patients

Researchers in Norway looked at methods to increase preparedness and mitigate the risk of platelet shortage without increasing the number of collections. Researchers introduced cold-stored platelets (CSP) with 14-days shelf life for actively bleeding patients during the COVID-19 pandemic, in addition to 7-day shelf-life platelet concentrates. They found that CSP were a feasible alternative for the treatment of actively bleeding patients but noted that implementation of a dual platelet inventory requires thorough planning, including information and training of clinical and laboratory staff, continuous follow-up of practice and patients as well as an easy-to-follow algorithm for use of CSP units.

Gamma and X-ray irradiation do not affect the in vitro quality of refrigerated apheresis platelets in platelet additive solution

This study investigated if processing modifications, such as irradiation, may further improve the safety and alter the quality of cold-stored platelets as there was no data assessing the effect irradiation has following cold storage. Researchers found that platelet concentration decreased by approximately

20% during 21 days of storage. However, they found that irradiation did not affect platelet metabolism, and the pH was maintained above the minimum specification (>6.4) for 21 days.

3.4 Research

Controlling infectious risk in transfusion: Assessing the effectiveness of skin disinfection in blood donors

This study aimed to verify the effectiveness of skin disinfection of a blood donor's needle entry site. Post-disinfection, a 100% reduction in microbial load was observed in 84.4% of blood donors, highlighting the importance of the correct application of skin disinfection to ensure blood safety.

Prediction of outcome in anaemic critically ill patients in intensive care unit: A retrospective observational study

Researchers in Egypt aimed to evaluate the prevalence of critically ill patients with anaemia and to detect predictors of outcomes. It was found that while anaemia in critically ill patients is common and associated with poor outcomes, blood transfusion was not associated with a better outcome.

Development of the Chinese Haemovigilance Network and reporting of adverse transfusion reactions from 2018 to 2020

This report describes the development of the Chinese Haemovigilance Network (CHN) and evaluates its role by analysing reported adverse transfusion reactions (ATRs) from 2018 to 2020. During this period, a total of 3061 ATRs were reported through the CHN online reporting system. When analysed by year, the incidence rate showed an increasing trend from 2018 to 2020 suggesting reporting mechanisms in place to capture data were effective.

Antioxidants in single methylene-blue-treated plasma units cannot be used to predict pathogen inactivation treatment success

This study investigated the effectiveness of antioxidant power (AOP) technology in validating pathogen inactivation in plasma units treated with the 'Theraflex' (agent methylene blue). AOP was tested on Theraflex treated plasma units with various non-complete treatment scenarios. Researchers found that AOP measurements do not reliably report pathogen inactivation in plasma treated with Theraflex and concluded that AOP was unable to properly assess the effectiveness of the Theraflex plasma treatment.

Application of salvage autologous blood transfusion for treating massive haemorrhage during ectopic pregnancy

This single centre study looked at patients who suffered massive haemorrhage during surgery for an ectopic pregnancy. Patients were treated with either salvage autologous (recovery of lost blood), allogenic (from a donor) or a combination of both salvage autologous/allogenic blood transfusions. Researchers found that 30 minutes after transfusion, each group had improved blood pressure, oxygen saturation and heart rate with some variance in outcomes. At 24 hours no statistical difference was observed between the three groups. The findings support the use of salvage autologous blood transfusion for treating massive haemorrhage occurring during ectopic pregnancy, which can save blood resources without impacting patient outcomes.

Patterns and determinants of blood transfusion in intensive care in Sweden between 2010 and 2018: A nationwide, retrospective cohort study

This study looked at intensive care unit (ICU) related transfusions in Sweden between 2010 and 2018. Researchers found that transfusion was administered in 32% of cases, although the number of patients who were transfused throughout the study period decreased. The authors noted that despite

continuous decrease in utilisation, transfusions remain common among Swedish ICU patients, with considerable variation in transfusion rates.

Effects of freshly irradiated vs irradiated and stored red blood cell transfusion on cerebral oxygenation in preterm infants: A randomised clinical trial

This study examined whether transfusion of freshly irradiated red blood cells improved cerebral oxygen delivery in preterm infants with anaemia when compared with irradiated and stored red blood cell components. Forty-two infants were enrolled in the trial and underwent 64 transfusion episodes. The results showed that transfusion of freshly irradiated red blood cells conferred a small advantage in cerebral oxygenation for at least 5 days after transfusion compared with transfusion of irradiated and stored RBC components.

Research may reveal why people can suddenly become frail in their 70s

Researchers at Cambridge University in the UK have discovered a process that drives a change in the composition of blood in older age, increasing the risk of blood cancers and anaemia and impairing the effectiveness of white blood cells to fight infection.

3.5 Technology

Robots can improve the flow of blood donations

Swinburne University researchers have developed a method to automate the folding and centrifuge-tube loading process in blood product handling. Researchers built a proof-of-concept robot arm that can be used to fold whole blood collection packs with a built-in image recognition for quality inspection, data recording and anomaly detection.

A robust autonomous method for blood demand forecasting

Researchers designed a forecasting system to help blood supply chain management with a focus on determining possible changes in blood demand and how that may affect prediction performance.

Changes in glycans on platelet microparticles released during storage of apheresis platelets are associated with phosphatidylserine externalization and phagocytosis

Platelets shed microparticles when activated or stored. The aim of the study was to investigate the role of complex sugars found on the surface of microparticles in their removal from stored platelet components. Researchers found subtle changes that occur during platelet storage and may affect the uptake and procoagulant function of platelet microparticles.

Beyond the thrombus: Platelet-inspired nanomedicine approaches in inflammation, immune response and cancer

This review provides insight into the involvement of platelets and platelet-derived extracellular vesicles, beyond haemostasis and thrombosis. The article discusses current practice in the development of platelet-inspired therapeutic technologies, with an emphasis on future opportunities.

The burden of cyberattacks on blood management and conservation efforts

This article outlined the risks and effects of cyberattacks on the Ontario Regional Blood Coordinating Network (ORBCoN) website since 2006. The system experienced nine cyberattacks in a 15-year period with the mildest attacks having little effect on the ORBCoN website while major incidents resulted in severe resource outages.

FDA clarifies cybersecurity recommendations for device makers in new guidance

The US Food & Drug Administration has issued cybersecurity draft guidance which provides a framework for how medical device makers should consider security measures throughout a device's

lifecycle. The guidance includes recommendation that manufacturers build in the ability for devices to be updated.

Blocking human protein C anticoagulant activity improves clotting defects of haemophilia mice expressing human protein C

A potential therapy pathway to improve clotting defects in haemophilia has been identified by scientists testing on mice. Scientists tested the therapeutic potential of a monoclonal antibody, HAPC1573, that selectively blocks the anticoagulant activity of human activated protein C. They found that selectively blocking the anticoagulant activity of human activated protein C may be an effective therapeutic or prophylactic approach for bleeding disorders lacking FVIII, FIX, or other clotting factors.

Vitestro launches autonomous device for blood collection

Dutch medical robotics company Vitestro has created an autonomous blood drawing device that uses ultrasound reconstruction to determine the optimal insertion point when collecting blood. The company plans to begin clinical trials of the device in 2023.

AI, ultrasound fuel device to quickly find blood vessels

Researchers at the MIT Lincoln Laboratory (MIT LL) and Massachusetts General Hospital in the US have developed a device to help reduce fatal blood loss in emergency settings. The handheld device, called the 'Artificial Intelligence-Guided Ultrasound Intervention Device' (AI-GUIDE), detects blood vessels so that it can safely insert a needle and a guidewire, reducing the chance of human error in locating insertion sites.

4 Gene therapies

This section includes industry updates and research on the progress of gene therapies though regulatory bodies as well as gene therapy safety.

4.1 Blood related gene therapies

Haemophilia gene therapy: Update on new country initiatives

This review summarises the current approach to gene therapy treatment and research for haemophilia patients around the world.

BioMarin's haemophilia gene therapy recommended for approval in Europe

The European Medicine Agency has recommended conditional marketing authorisation in the European Union for BioMarin's Roctavian for the treatment of severe haemophilia A.

BioMarin delays planned FDA filing for haemophilia gene therapy

Pharmaceutical company BioMarin has delayed plans to resubmit an approval application to the US FDA for its haemophilia gene therapy, Roctavian, as the FDA has requested additional information be included in its filing.

Gene therapy for haemophilia A, ASC618, placed on FDA's fast track

The US Food and Drug Administration has given fast track designation to 'ASC618', an investigational one-time gene therapy for haemophilia A. ASC618 is designed to deliver a shortened, but optimised version of the gene F8, which codes for the blood clotting factor VIII, to liver cells, and is expected to work better than the full version.

FDA lifts clinical hold on Pfizer's haemophilia gene therapy

The Food and Drug Administration has cleared Pfizer to resume dosing patients with experimental haemophilia gene therapy 'affine' that was put on hold last year because of the risk of blood clots. Pfizer will keep the drug in a voluntary pause until they have met the conditions needed to continue the trial safely, including gaining approval for updated study protocols by regulatory authorities.

Long-term correction of haemophilia B through CRISPR/Cas9 induced homology-independent targeted integration

Researchers have investigated the potential of modified CRISPER/Cas9 genome editing to treat haemophilia B. The method permanently integrates high-specificity-activity Factor IX variant in a novel haemophilia B rat model.

FDA starts clock on review of CSL, UniQure gene therapy

The US FDA has accepted an application to review the haemophilia B gene therapy, 'EtranaDez' (etranacogene dezaparvovec). The gene therapy is currently under review by the European Medicines Agency. The therapy uses a non-infectious virus to deliver a copy of the gene that encodes for the clotting protein Factor IX, the replacement gene allows the cells to produce Factor IX on their own.

CRISPR trial: Children with sickle cell disease and beta thalassemia to get gene editing treatment

CRISPR Therapeutics and Vertex Pharmaceuticals are extending the trial of its gene-editing therapy Exa-cel include children under the age of 12. Researchers are trying to determine if they can treat children early enough to prevent them getting lasting damage from these sickle cell disease and beta thalassemia.

CRISPR gene editing reveals biological mechanism behind common blood disorder

Scientists at the University of NSW have used CRISPR gene editing to investigate how the deletion of certain genes affects sickle cell disease and beta thalassemia.

Beta-Thalassemia gene therapy gets ringing endorsement from FDA advisers

The US FDA's Cellular, Tissue, and Gene Therapies Advisory Committee has recommended that gene therapy Beti-cel be approved for use in patients with transfusion dependent beta-thalassemia. The therapy, developed by Bluebird Bio, has resulted in 90% of phase III trial participants achieving transfusion independence up to seven years after treatment.

4.2 Regulatory and industry developments

The experiences of people with haemophilia and their families of gene therapy in a clinical trial setting: regaining control

The aim of this study was to capture real-life experiences of gene therapy in people with haemophilia and their families in the United Kingdom. Sixteen participants with severe haemophilia (11 haemophilia A, five haemophilia B) took part in a single qualitative interview. The authors found that participants had several concerns relating to gene therapy and suggested that people with haemophilia needed a greater understanding of the processes and implications of gene therapy through ongoing education and the adequate provision of psychosocial support.

Even FDA's Peter Marks is worried about the commercial viability of gene and cell therapies

Pharmaceutical company Bluebird has withdrawn its beta-thalassemia gene therapy, 'Zynteglo' (betibeglogene autotemcel), from the European market with the company stating that they did not believe they were offered a fair price for the one-time treatment.

5 COVID-19

This section contains news articles, peer reviewed papers and industry publications on the changing COVID-19 pandemic and management of the virus across the world including effects on blood and related services.

5.1 COVID-19 news

The Australian Technical Advisory Group on Immunisation (ATAGI) has recommended the use of the Pfizer vaccine in adolescents aged 12-15 years and has expanded the recommended use of booster doses of COVID-19 vaccines to include people aged 16-64 who are immunocompromised or living with complex health issues. The Australian Therapeutic Goods Administration (TGA) has provisionally approved the use of the Moderna Spikevax vaccination for children six months to five years old and the Nuvaxovid Novavax vaccine as a booster for Australians aged 18 and above.

- Therapeutic Goods Administration approves Moderna COVID-19 vaccine for young children
- FDA halts Vir, GSK antibody use in response to COVID subvariant's spread
- Global prevalence of long COVID 'substantial,' researchers say
- FDA authorizes booster dose of Pfizer and BioNTech's COVID-19 vaccine in 5- to 11-year-olds
- ATAGI expands COVID-19 booster access to allow more people to get a fourth dose
- Individuals with long COVID may be at greater risk for abnormal blood clotting
- U.S. FDA advisers overwhelmingly back Moderna COVID vaccine for ages 6-17
- FDA decision on Novavax's COVID shots could be delayed
- ATAGI recommendations on first booster dose in adolescents aged 12-15 years
- AHPPC Statement on the Removal of Mask Mandates in Airports

5.2 COVID-19 effect on blood, blood diseases and related services

Impact of COVID-19 on the efficacy of meeting the transfusion demand by a Brazilian blood banks network

This study aimed to describe the impact of the COVID-19 pandemic on the capacity to meet the demand for different types of blood components by a Brazilian blood centre in 2020. The study compared results to the years 2016–2019 and discussed the measures adopted to mitigate the effects of the pandemic.

Low numbers of COVID-19 in Swedish pediatric oncology patients during the first pandemic year despite an open society

In a multicentre retrospective study, researchers gathered patient data and COVID-19 data through a survey of six Swedish childhood cancer centres. Researchers found that without a strict lockdown in Sweden, the number of paediatric oncology patients with verified infection was low, and the majority of children who were infected had mild symptoms.

No apparent association between mRNA COVID-19 vaccination and venous thromboembolism

Researchers did a literature review on rates of venous thromboembolism after mRNA vaccination in adults. Researchers identified six 'robust studies' including an analysis of over 27 million doses which found that mRNA vaccines were not statistically associated with venous thromboembolism.

Cerebral venous thrombosis due to vaccine-induced immune thrombotic thrombocytopenia after a second Oxford/AstraZeneca COVID-19 dose

Researchers aimed to determine the incidence of cerebral venous thrombosis (CVT) (a severe manifestation of vaccine-induced immune thrombotic thrombocytopenia, VITT) after administration

of the second dose of the Oxford/AstraZeneca COVID-19 vaccine. Researchers found 202 cases of CVT reported in 24 countries of which four cases were reported after a second dose. This confirmed that CVT (VITT) can occur after both doses.

Safety of intramuscular COVID-19 vaccination in patients with haemophilia

This study assessed the safety of intramuscular COVID-19 vaccination in patients living with haemophilia. Current World Federation of Haemophilia (WFH) guidelines recommend patients with haemophilia should receive vaccination subcutaneously. Researchers found that the rate of injection site bleeding was low in mild haemophilia, while patients with moderate and severe haemophilia had lower bleeding rates after receiving factor prophylaxis.

COVID-19 vaccine response and rate of breakthrough infection in patients with haematological disorders

This Spanish cohort study conducted from December 2020 to December 2021 analysed the relationship between antibody response at 3–6 weeks after full vaccination (2 doses) with breakthrough COVID-19 infection in 1,394 patients with haematological disorders. They found that 37 out of the 1,394 participants developed breakthrough COVID-19 infection at a median of 77 days after full vaccination.

5.3 COVID-19 policies, and industry

Early outpatient treatment for COVID-19 with convalescent plasma

In this multicentre trial, researchers evaluated the efficacy and safety of COVID-19 convalescent plasma, as compared with control plasma, in adults who had tested positive for severe acute COVID-19. Researchers found that the administration of convalescent plasma within 9 days after the onset of symptoms reduced the risk of disease progression leading to hospitalisation.

Freeze-dried plasma: From damage control resuscitation to coronavirus disease 2019 therapy

This study aimed to determine if the haemostatic and immunological properties of plasma can be retained after freeze drying. Researchers found that that freeze dried plasma and COVID-19 convalescent fresh frozen plasma retained their same haemostatic and antibody functional activities relative to their initial plasma sources.

Statement on the eleventh meeting of the International Health Regulations Emergency Committee regarding the coronavirus disease (COVID-19) pandemic

The World Health Organization's International Health Regulations (2005) Emergency Committee met to discuss the COVID-19 pandemic. The committee stated that the unpredictable behavior of the COVID-19 virus and insufficient national responses were contributing to the continuation of the pandemic.

5.4 COVID-19 research and treatment

Relationship between acute-phase symptoms and immunoglobulin G seropositivity up to eight months after COVID-19

Researchers analysed the relationship between the occurrence of acute-phase COVID-19 symptoms and infection-induced immunoglobulin seropositivity up to 8 months post-symptom onset. Six-hundred and sixty-one unvaccinated healthcare workers (HCWs) were interviewed about the presence of symptoms during the acute phase of COVID-19 and were tested for specific IgG. A total of 551 (83.4%) HCWs showed seropositivity while 110 (16.6%) HCWs were seronegative. Researchers found clinical manifestation of the acute phase of COVID-19 predisposes patients to the development of infection-induced antibody responses. These findings can be applied for assessing the long-term protection by IgG, and thus, for creating effective surveillance strategies.

Effect of antiplatelet therapy on survival and organ support–free days in critically ill patients with COVID-19: A randomised clinical trial

This study aimed to determine if antiplatelet therapy improved outcomes for critically ill adults with COVID-19. The trial included 1557 patients enrolled between 30 October 2020, and 23 June 2021, from 105 sites in 8 countries. Antiplatelet therapy of aspirin or a P2Y12 inhibitor was administered to 1030 of the participants with 529 participants receiving no anti-platelet therapy. Researchers found that for critically ill patients with COVID-19, treatment with an antiplatelet agent, compared with no antiplatelet agent, had a low likelihood of providing improvement in the number of organ support–free days within a 21-day period.

Cardiac complications after COVID-19 infection and mRNA COVID-19 vaccination

An increased risk of cardiac complications has been seen in patients following infection with COVID-19 or after receiving an mRNA COVID vaccine. Looking at data from 40 health care centres, researchers in the US found that the risk of heart complications was considerably higher following infection compared to vaccination.

COVID-19 Pfizer vaccine and COVID-19 infection-induced thrombotic thrombocytopenic purpura in adolescents

This study identified three patients at the Texas Children's Hospital Hematology Center who reported reactions to the Pfizer COVID-19 vaccine and COVID-19 infection. Researchers sought to determine if the COVID-19 virus and Pfizer vaccine were immunological triggers for the development of both acquired and congenital thrombotic thrombocytopenic purpura. They concluded that both immunisation and infection could trigger the development or relapse of both congenital and acquired thrombotic thrombocytopenic purpura.

Association of prior Pfizer COVID-19 vaccination with symptomatic COVID-19 infection in children and adolescents during Omicron predominance

Researchers evaluated the association of symptomatic COVID-19 Omicron variant infection in patients who received Pfizer-BioNTech vaccination. A total of 74,208 child subjects between 5 to 11 years of age and 47,744 adolescents aged 12 to 15 were included in the analysis. Among children and adolescents, the estimated effectiveness of two doses of Pfizer-BioNTech against symptomatic infection was modest and decreased rapidly. Among adolescents, the estimated effectiveness increased after a booster dose.

Anticoagulants for people hospitalised with COVID-19

Researchers in Brazil sought to assess the benefits and harms of using anticoagulants versus active comparator, placebo or no intervention in people hospitalised with COVID-19. They found that higher-dose anticoagulants resulted in similar outcomes compared to lower-dose anticoagulants in people hospitalised with COVID-19 up to 30 days. Researchers found limited evidence that anticoagulants reduced all-cause mortality, when compared with no treatment.

COVID-19 vaccination can elicit a CD8 T-cell dominant hepatitis

This study follows the case of a 52-year-old male, presenting with episodes of acute hepatitis, 2-3 weeks after Pfizer COVID-19 vaccination. Researchers found that the vaccine triggered highly activated T cells which then accumulated in the liver, resulting in a distinct T cell-dominant immune-mediated hepatitis.

COVID-19 oral treatment 'Paxlovid' listed on PBS from 1 May 2022

A prescription-only oral treatment, 'Paxlovid', will be available through the Pharmaceutical Benefits Scheme (PBS) for Australians at high risk of developing severe COVID-19. The treatment has been found to be effective in treating mild to moderate COVID-19 in adults aged 18 years of age and older,

who do not require supplemental oxygen, and who are at increased risk of progressing to hospitalisation.

Early combination therapy with immunoglobulin and steroids is associated with shorter ICU length of stay in Multisystem Inflammatory Syndrome in Children (MIS-C) associated with COVID19: A retrospective cohort analysis from 28 U.S Hospitals

This study reviewed the effects of combination immunoglobulin and steroids therapy on 356 hospitalised children with multisystem inflammatory syndrome from March 2020 to September 2021. Researchers found that combination therapy with IVIg and steroids initiated in the first two days of admission favorably impacted ICU admission duration, but not the overall hospital length of stay for children with multisystem inflammatory syndrome.

Reduced neutralising antibody potency of COVID-19 convalescent vaccinated plasma against Omicron variant

Researchers assessed whether vaccinated COVID-19 convalescent plasma (CCP-V) collected before November 2021 could neutralise Omicron by comparing neutralising antibody (nAb) titres of 63 samples against Omicron and earlier strains. Researchers found that Omicron neutralising antibody titres were significantly lower than titres in vaccinated COVID-19 convalescent plasma (CCP-V) collected before November 2021. This suggests that anti-Omicron activity may require collecting CCP from vaccinated donors who have recovered from an Omicron infection.

Effectiveness, immunogenicity, and safety of COVID-19 vaccines for individuals with haematological malignancies: a systematic review

Researchers conducted a multinational review of 57 studies to assess the effectiveness, immunogenicity, and safety of COVID-19 vaccines in patients with haematological malignancies. While they were unable to determine effectiveness due to limited reporting, they did find that the creation of antibodies and cellular immunity in haematological malignancy patients, was lower than healthy participants in all studies. The researchers note that for high-risk individuals such as patients with haematological malignancies new approaches to prevent infections and severe or prolonged disease courses are urgently needed.

COVID-19 Comirnaty vaccination temporarily impairs semen concentration and total motile count among semen donors

This study investigated the effect of the COVID-19 Comirnaty (Pfizer) vaccine on semen parameters among donors. Thirty-seven donors from three sperm banks provided 216 samples prior and post receiving complete vaccination with Comirnaty. Researchers found a selective temporary decline of sperm concentration and total motile count 3 months post-vaccination followed by recovery. The authors confirm previous reports regarding vaccines' overall safety and reliability despite minor short-term side effects.

COVID-19 mRNA vaccine booster during pregnancy increases maternal and foetal antibodies

Researchers investigated the effect of vaccination on maternal antibodies during pregnancy. They found that women who received a booster of the COVID-19 Comirnaty vaccine during their second trimester developed higher antibody levels than those who received the second shot in their primary vaccine series during the same trimester. Infants in the booster group also had higher antibody levels at birth than those in the 2-dose group.

6 Other items of interest

This section contains general industry and regulator updates as well as developments in non-blood and non-COVID related diseases that may have flow on affects to the blood industry.

6.1 National Blood Authority funded research - National Blood Sector Research and Development Program

Variation in the management of Kawasaki disease in Australia and New Zealand: A survey of paediatricians

The final grant from Round 1 of the NBA's grant program, an Ig Project led by Prof David Burgner at the Murdoch Children's Research Institute, is now complete. The project investigated current management practices for Kawasaki disease (KD) in Australia and New Zealand. The study found consensus among clinicians in recognizing when intravenous immunoglobulin and aspirin was required for the management of acute KD. However, the study also found varied approaches relating to the dose of these products and long-term management of the disease. Future studies should confirm whether this reported variation occurs in real-world practice and assess potential impacts on patient outcome.

Recovery of organ-specific tissue oxygen delivery at restrictive transfusion thresholds after fluid treatment in ovine haemorrhagic shock

This recently completed Patient Blood Management Project from Round 3 of the NBA's grant program was led by Prof John Fraser at the University of Queensland. It looked at novel fluid alternatives to blood transfusion to treat acute and chronic blood loss. Researchers assessed the utility of non-invasive measures when comparing packed red blood cell transfusion with transfusion of novel crystalloid treatments for haemorrhagic shock. The novel treatment supported delivery of oxygen to organs following a massive haemorrhage. Further research into blood alternatives and non-invasive measuring techniques could reduce the need for transfusion of fresh blood products in Patient Blood Management.

6.2 Government, industry and development news

New work upends understanding of how blood is formed

Researchers at Boston Children's Hospital in the US have found that blood cells may originate from two types of mother cells, rather than a single mother cell. The study found two independent sources for blood cells in a mouse model. If replicated in humans could have implications for blood cancers, bone marrow transplant, and immunology.

NHS Blood and Transplant launches £20m research units

The National Health Service in the UK has announced creation of five new units for blood and transplant research. One of these units, Donor Health and Behaviour, will partner with the University of Queensland and Lifeblood to develop an understanding of user behaviour, motivation and challenges.

Medtech survey finds widespread cybersecurity noncompliance despite rising investment

In a global survey conducted by security company Cybellum, more than half of the medical device companies questioned stated they are unsure if they are compliant with cybersecurity regulations, standards and guidelines.

"Perfect storm" could lead to lower drug prices, says Takeda CEO

The chief executive of pharmaceutical company Takeda has suggested that drug manufacturers may cut prices in the near term, stating the risk of recession, political instability and the growing impact of inflation as significant factors on global budgets.

More program cuts ahead as Sanofi CEO Paul Hudson continues to reshape the company

Pharmaceutical company Sanofi is reducing the products produced by its general medicines unit with reports confirming that the company aims to reduce its product families from 350 to 125 by the end of 2022, either by divesting or discontinuing programs.

6.2.1 Australia

Australian Bureau of Statistics: Snapshot of Australia, 2021

Data from the 2021 Australian census has been released by the Australian Bureau of Statistics (ABS), showing changing demographics in the Australian population. The release showed an overall population increase of around 2 million people since 2016, mostly based in metropolitan areas and for the first time, included information on ten common long-term health conditions in Australia.

The University of Queensland: Deadly snakes could save your life

Scientists at the University of Queensland have found a protein in the venom of two snakes (Australia's eastern brown and scaled viper) that could be used as an accelerant in the body's natural blood-clotting process. The research team are currently working on a gel that could stop bleeding in emergency situations.

Beta version of the Database of Adverse Event Notifications (DAEN) for medicines launched

The Therapeutic Goods Administration has released a beta version of their planned update to the Database of Adverse Event Notifications for medicines which will include tables, filters and graphs to improve data visualisation.

TGA grants provisional approval to Gilead Sciences Pty Ltd to extend the use of the COVID-19 treatment, VEKLURY (remdesivir)

The Therapeutic Goods Administration (TGA) has granted provisional approval to extend the use of the COVID-19 treatment, 'Veklury' (remdesivir) to adults and paediatric patients (at least 4 weeks of age and weighing at least 3 kg) who have pneumonia due to COVID-19 and require supplemental oxygen as well as adults and paediatric patients (weighing at least 40 kg) who do not require supplemental oxygen but are at high risk of progressing to severe COVID-19.

Use of priority and provisional approval pathways by the Australian Therapeutic Goods Administration in approving new medicines: a cross-sectional study

This study assessed new medicines approved by the TGA between 1 January 2018 and 18 October 2021. It looked at how frequently priority and provisional approval pathways are being used, the conditions which the medicines are being approved to treat and the additional therapeutic value of the medicines being approved. Researchers found that these pathways are now being used by the TGA for about one-third of all new medicine approvals. While medicines approved in these ways are moving through the review process more quickly, researchers noted the many of these medicines, for which an evaluation of therapeutic value is available, do not offer any substantial additional therapeutic value over existing medicines.

Australians urged to get vaccinated against influenza

The Australian Government are encouraging all Australians to get vaccinated against influenza, with free seasonal influenza vaccines available for groups with higher risk of complications.

Innovative augmented reality joint scanner unveiled at Westmead Children's Hospital to support young people with haemophilia

An Australian-designed, first-of-its-kind Augmented Reality technology has been unveiled at the Children's Hospital at Westmead (CHW). The technology will enable young people living with haemophilia to view the potentially irreversible impact of disabling joint disease. The scanner utilises a 'leap motion' 3D camera attached to a computer to scan and map a person's hand when placed under the device. Specially designed software then overlays imagery onto the user's hand to replicate normal ageing and the impact of joint disease.

ASCIA National immunodeficiency strategy

ASCIA has released its *Immunodeficiency Strategy for Australia and New Zealand* focusing on primary immunodeficiencies, a diverse group of more than 400 potentially serious, chronic illnesses due to inherited absence or dysregulation of parts of the immune system, that can lead to reduced quality of life and life expectancy.

6.2.2 United States of America

Biopharma M&A deal hits antitrust delay

CSL Behring's acquisition of Swiss pharmaceutical company Vifor has been delayed awaiting antitrust reviews from the U.S. Federal Trade Commission, the European Competition Commission and the Swiss Takeover Board.

Meta hit with class action suit alleging it mined providers' patient data

Social media company Meta has been named in a privacy lawsuit after it was alleged that the company received patient data from at least 644 hospital systems to create targeted advertising both on and off of Facebook's website.

Proactively preventing shortages: New FDA guidance spells out which drugs require risk management plans

The US Food & Drug Administration has published new draft guidance relating to manufacturing processes and supply chains to reduce the risk of drug shortages, particularly drugs for the treatment of rare diseases.

6.2.3 The world

War in Ukraine may require significant trial changes, EMA says in new guidance

The conflict in Ukraine has prompted the European Medicines Agency to issue new guidance for medical trials. While some trials continue in Ukraine at various recruiting and enrollment stages, the EMA has made clear that the safety of study participants is its top priority, regardless of any potential consequences for an ongoing trial.

Focus switches from plasma to Vifor as CSL closes in on takeover

Pharmaceutical and blood product manufacturer, CSL Behring's, stock price appears to be stabilising as it reaches the final stages of its acquisition of the Swiss pharmaceutical company Vifor and plasma becomes more available at collection centres in the United States.

Global leaders unite in urgent call for international pandemic treaty

The World Health Organization is encouraging participation in new international treaty for pandemic preparedness and response which would align and dictate how national governments would respond to future global pandemics.

World Health Assembly re-elects Dr Tedros Adhanom Ghebreyesus to second term as WHO Director-General

The Director-General of the World Health Organisation, Dr Tedros Adhanom Ghebreyesus, has been elected to a second five-year term at a meeting of WHO members states in Geneva.

6.3 Other diseases and developments

6.3.1 Monkeypox

An outbreak of monkeypox in Europe has spread to multiple countries where the disease is not endemic, including Australia. The virus, typically with mild symptoms, spreads through close contact with infected individuals and is not considered to be a significant health threat at present.

- Map: Where has monkeypox been detected so far?
- Australian Government Department of Health - Monkeypox
- Monkeypox: What are the symptoms, how does it spread, and how worried should we be?
- Monkeypox outbreak needs united global response, World Health Organization says
- Second case of monkeypox identified in NSW

6.3.2 Malaria

New research into malaria and the anopheles mosquito that carries the disease have revealed new opportunities for developing lasting treatments for malarial infection and methods to reduce the number of infections that occur.

- Fighting malaria by manipulating the amount of serotonin mosquitos obtain from blood
- Mosquitoes bite more during the day than previously thought
- Artificial light may become a new weapon in the fight to control malaria
- The new weapon against malaria's drug resistance
- 'You get goosebumps from the data': hopes rise for new malaria vaccine

6.3.3 Dengue

Research into the effects of dengue are assisting medical practitioners in the treatment of infected individuals. The World Health Organisation has announced an initiative to combat the spread of dengue, yellow fever, chikungunya and zika, in different parts of the world called the Global Arbovirus Initiative.

- Machine learning model improves clinical prediction of severe dengue progression
- Takeda's dengue vaccine candidate delivers continued protection
- Cardiovascular sequelae of dengue fever: A systematic review
- Targeting mosquito spit to halt Yellow Fever, Dengue and Zika
- UN health agency launches bid to stop a new global pandemic

6.3.4 Avian influenza outbreaks

The H5N1 bird flu epidemic continues to spread throughout the United States, with one case of human transmission, but widespread transmission unlikely. In China 20 human cases of the H5N6 variant of bird flu has been reported as well as one case of the H3N8 variant.

- New insights on avian influenza spillover and global spread
- China finds first human H3N8 bird flu case
- First human case of H5N1 avian flu in the U.S. reported in Colorado
- China reports 20th human case of H5N6 bird flu this year
- China: Two human H9N2 avian influenza cases reported in Hunan & Guizhou Provinces

6.3.5 Japanese Encephalitis

An outbreak of Japanese Encephalitis continues to be monitored by the Australian government and health departments in each state and territory. There have been 39 reported cases of infection and five reported deaths due to Japanese Encephalitis.

- Australian Government Department of Health: Japanese encephalitis virus (JEV)
- Regional research collaborations fighting dengue fever
- Timor-Leste: Dengue cases top 4,000, Indonesia reports the most dengue deaths year to date
- Australia records fifth Japanese encephalitis death
- Japanese encephalitis death in Queensland confirmed amid quiet spread

6.3.6 Hepatitis

A hepatitis outbreak of unknown origin affecting children, continues to spread with over 1000 infections reported worldwide.

- Hepatitis symptoms: Mystery outbreak inches closer to Australia as cases pass 450
- What's sending kids to hospitals with hepatitis—coronavirus, adenovirus, or both?
- Multi-Country – Acute, severe hepatitis of unknown origin in children
- CDC identifies adenovirus infections in 45% of acute hepatitis cases in children
- WHO: Severe acute hepatitis of unknown aetiology in children