CONSENSUS CONFERENCE REPORT

Second regional plasmapheresis conference and workshop for Southeast Asia (SEA) on the immunomodulatory role of plasma exchange in central and peripheral nervous system disorders, Kuala Lumpur, Malaysia, 9th December 2017

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In December 2017, 79 delegates attended the 2nd regional plasmapheresis conference and workshop for Southeast Asia (SEA) on the immunomodulatory role of plasma exchange in central and peripheral nervous system disorders in Kuala Lumpur, Malaysia. This meeting featured 6 plenary lectures, interactive sessions dedicated for experience sharing, case presentations, and a practical session for paramedics. Clinical experts and researchers from 7 SEA countries and India shared experience and challenges in treating autoimmune neurological disorders. While the spectrum of diseases and neurology practice remained largely similar, there was great disparities in accessibility of therapeutic plasma exchange (TPE) within SEA countries and between urban or rural settings. Costs, human resources, and healthcare policies are common challenges in providing sustainable TPE services. Novel techniques and innovative ideas in performing TPE were explored. A working consortium comprising of key opinion leaders was proposed to improve standards of TPE and enhance future research.

KEYWORDS
central nervous system demyelination, immunomodulatory therapy, peripheral nervous system demyelination, Southeast Asia, therapeutic plasma exchange

INTRODUCTION

In December 2017, neurologists from 8 countries in Asia; 7 Southeast Asian (SEA) countries and 1 from India attended...
the 2nd Annual Malaysian Conference and Workshop on the Immunomodulatory Role of Plasma Exchange in Central and Peripheral Nervous System Disorders in Kuala Lumpur, Malaysia. The objectives of this conference and workshop were to provide an overview on the practice of therapeutic plasma exchange (TPE) in SEA region and to share regional experience on its use in various autoimmune neurological disorders, primarily in resource limited settings. The speakers included in this conference were experienced neurology experts, researchers and representatives from the apheresis industry.

The treatment of autoimmune neurological conditions is a therapeutic challenge and neurologists are armed within their armamentarium to use corticosteroid, intravenous immunoglobulins (IVIG) or TPE.\textsuperscript{1–5} The use of TPE as an immunomodulatory treatment is an up and coming therapeutic option in the SEA region.\textsuperscript{6–8} Like elsewhere, it is used predominantly for autoimmune demyelinating disorders of the central and peripheral nervous system. However, accessibility and availability of this treatment modality in the developing SEA regions has thus far not been discussed or documented collectively. Furthermore, local or regional data on TPE services i.e., centrifuge or membrane technology, modified vs. conventional plasma exchange, protocol descriptions and long-term funding are not widely known. Thus far too, there has not been an establishment of any protocol or criteria for use of TPE in patients with central and peripheral demyelination in this region as in the developed nations.\textsuperscript{2}

With this in mind, the first “In house Neurology” driven TPE service in Malaysia was formed in 2015, culminating the development of a local hospital-based TPE committee at the Department of Neurology, Kuala Lumpur Hospital with members made up of neurologists and nurses with interest in the use of TPE in improving the outcomes of patients with neuroimmunological disorders. This endeavor was graciously supported by the Ministry of Health of Malaysia and the Head of Department of Neurology. The overarching objectives were to improve the standard of TPE services for various autoimmune neurological disorders in the country. Protocols, adoption of generic catheter care bundles, a local plasmapheresis registry and risk mitigation strategies were also developed. The first national level TPE conference was held in December 2016 in Kuala Lumpur, Malaysia, featuring distinguished speakers from the United Kingdom and SEA. Following this, we observed the need for a greater participation of representatives from SEA regions and beyond to better address the development and improvement of access, knowledge and methodology of service delivery. Therefore, the 2nd regional conference was organized, focusing on exploring the use of TPE in SEA and its challenges.

\section{OBJECTIVES OF A REGIONAL THERAPEUTIC PLASMA EXCHANGE CONFERENCE}

During the local scientific committee meetings, we identified several objectives for this regional collaboration. The primary objectives were to provide a practical approach on TPE and sharing of regional experiences on its use especially in resource limited settings. Through this meeting, we aimed to provide updates on evidence-based clinical practices in the use of TPE in both central and peripheral nervous system disorders. Secondly, we also aimed to understand the current standard of TPE practice in the SEA regions. Until today, there has not been any national database or registry of TPE available in SEA countries for autoimmune neurological disorders. Existing local data across various SEA countries was insufficient to provide representative data of TPE service in this region.\textsuperscript{6–8} To achieve this, we emphasized the need for regional collaborations with further focus into establishing local databases and regional expansion to provide a wider regional data set.

\section{METHODOLOGY AND PREPARATIONS OF THE WORKSHOP}

Prior to the workshop, we forwarded invitations to speakers from participating SEA countries to share their practical experience in using plasma exchange in various autoimmune neurological disorders. We included questions for discussion during the conference.

1. Overview of burden of various autoimmune neurological disorders, local practice and experience of diagnosis/treatment of central and peripheral nervous system disorders in SEA countries.
2. Overview of availability of infrastructure for TPE.
3. Availability of treatment guidelines for various neurological autoimmune disorders.
5. Challenges and accessibility to treatment, including TPE.
6. Outcome of TPE among patients with autoimmune neurological disorders, and
7. Discussions on how international collaboration would help in establishing a better TPE service.

\section{MEETING PROGRAM, SPEAKERS, AND PARTICIPANTS}

A total of 79 delegates attended the meeting with 9 key opinion leaders (KOLs) and neurologists from countries
including India, Singapore, Malaysia, Indonesia, Myanmar, Vietnam, Laos, and Cambodia. Experts on apheresis technology was represented by a representative from the apheresis industry (Terumo BCT, Belgium). The meeting was divided into two sections; a morning session made up of a disease specific plenary and the role of plasma exchange in central nervous disorders, in particular neuromyelitis optica spectrum disorders (NMOSD) and multiple sclerosis (MS), followed by peripheral nervous disorders such as Guillain-Barré syndrome (GBS), chronic inflammatory demyelinating polyneuropathy (CIDP), as well as neuromuscular junction disorders; myasthenia gravis (MG). The afternoon session was an interactive country-specific session with discussions by KOLs from Myanmar, Laos, Indonesia, and Vietnam on the spectrum of auto-immune disorders encountered in their countries and their experience with various immunotherapies including TPE.

Preconference survey of attendees suggested that all the regional (100%) and the majority of the local participants (84%) had not attended similar meetings in the region. This self-reported survey aimed to provide the organizing committee a better understanding of the overall awareness and knowledge of participants from around SEA regions on various autoimmune neurological disorders, available treatment guidelines, practice experience as well as local health facilities and resources available.

5 | CLINICAL DATA: CENTRAL DEMYELINATING DISORDERS

5.1 | The immunomodulatory role of therapeutic plasma exchange in Central and peripheral nervous system disorders: Najib Khalife, Belgium

After a short welcoming address and introduction on the objective of the conference and workshop by the conference chairperson, Najib Khalife (NK), medical liaison from Terumo BCT Global Medical Affairs, Belgium, provided an evidence-based summary of the immunomodulatory role of TPE and its latest updates in various central and peripheral auto-immune neurological disorders. NK emphasized on the effectiveness of plasma exchange via the elimination of antibodies in neurological autoimmune disorders such as MG, GBS, CIDP, and Stiff-person syndrome.2,9–11 Besides this, he also highlighted an interesting recent demonstration of favorable response of treatment with TPE in refractory forms of CIDP due to Neurofascin IgG4 antibody in a subgroup of CIDP patients.12 Various mechanisms of action of therapeutic plasma exchange were detailed in his presentation. Finally, NK shared the many available international guidelines and consensus on the use of therapeutic plasma exchange in various autoimmune related neurological disorders including the 2011 American Academy of Neurology guideline, the European Academy of Neurology (EAN), the American Society For Apheresis, Association of British Neurologists (ABN) guidelines, and the Myasthenia Gravis Foundation of America guidelines (MGFA).2,13

5.2 | Plasma exchange: Immunotherapy in neuromyelitis optica spectrum disorders (NMOSD) and relapsing remitting multiple sclerosis (RRMS): Metha Apiwattanakul, Thailand

Although TPE has been proven to be effective in patients with acute relapses of NMOSD, the role of TPE in RRMS is also gaining ground.14–17 Metha Apiwattanakul (MA), Consultant Neurologist from the Prasat Neurological Institute, Thailand summarized the complex, but ground breaking immunopathogenesis of NMOSD and multiple sclerosis (MS).18–20 He explained in detail the role of pathogenic auto-antibody Aquaporin 4 (AQP4)-IgG binding in NMOSD and its effect on astrocytic death after gaining entry through the human blood brain barrier (BBB). He also provided the encouraging high-quality trial data on the role of TPE in treating acute central nervous system inflammatory demyelinating diseases, particularly in patients with acute presentation NMOSD, Optic Neuritis and transverse myelitis.15–17 Although no pathogenic auto-antibody had yet been identified in patients with MS, evidence is available recommending the use of TPE in patients with acute exacerbations after failing to response to corticosteroid first-line treatment. Current evidence does not support the use of TPE in patients with chronic progressive or secondary progressive MS.2

5.3 | Autoimmune encephalitis: Management and the role of TPE—Suhaila Abdullah, Malaysia

Suhaila Abdullah (SA) from University Malaya, Malaysia provided updates on Autoimmune Encephalitis and the role of TPE. This immune-mediated encephalitis results from antibodies against neuronal cell surface or synaptic proteins, gives rise to various neurocognitive dysfunction, autonomic dysfunction, seizures as well as movement disorders.21 The role of auto-antigen and mechanisms of neuronal dysfunction was explained, followed by the historical aspect of various neuronal antibodies discovery. SA presented local and global data on the efficacy and tolerability of TPE in autoimmune encephalitis.22,23 Based on current treatment recommendations, IVIg or TPE should be initiated in addition to first-line corticosteroid therapy in patients diagnosed with autoimmune encephalitis regardless of the presence of an identifiable tumor. She also shared with the conference audience the clinical spectrum of autoimmune encephalitis presenting in...
the local setting, as well as the outcome of patients treated with various first and second-line treatment regimens using both conventional and unconventional therapies including anti-CD20 Rituximab (Abdullah S et al. Unpublished data). She concluded that plasma exchange results in moderate to marked clinical improvement in patient with autoimmune encephalitis with good tolerability.

6 | CLINICAL DATA: PERIPHERAL DEMYELINATING DISORDERS

6.1 | The treatment of Guillain-Barre syndrome: The role of plasma exchange, review of current literature—Umapathi N Thirugnanam, Singapore

Umapathi Thirugnanam (UT) discussed the evidence of therapeutic plasma exchange in GBS, supported by Cochrane Systematic Reviews (CSR). Available evidence supports the use of TPE in GBS patients with significant improvement compared to supportive treatment. TPE improves various outcomes in GBS: walking with aid at 4 weeks, dependency on ventilation at 4 weeks and muscle strength recovery at 1 year. However, patients treated with TPE had higher risk of relapse within 1 year. Although TPE is generally safe and well tolerated, the discontinuation rate has been reported to range from 0% to 14%. Comparison between treatment outcome of GBS with TPE and IVIg shows equal efficacy. UT emphasized the importance of timing of TPE treatment in GBS, the frequency of exchanges and other technical considerations including type of replacement fluids and plasma exchange techniques.

Considering the objectives of the conference; to also establish widespread TPE service availability in SEA region, UT focused his discussion on cost benefit of TPE and emphasized the need of a more sustainable and affordable TPE methods. He shared many of the available international guidelines and consensus on the use of corticosteroids, IVIg and TPE in GBS, MG, Chronic inflammatory demyelinating disease (CIDP), Neuromyelitis optica (NMO) and Multiple Sclerosis (MS) in this region is largely unknown. In addition, data is lacking on the treatment and outcome of these disorders. Although TPE is a proven treatment for CIDP, its use is often reserved to severely disable patients not responding to other conventional first-line treatments. He also highlighted a subset of CIDP patients with Neurofascin 155 (NF-155) IgG4 antibody, which often refractory to conventional therapies, resulting in progressive functional impairment. The use of TPE in these refractory CIDP patients have shown favorable response. FLH also shared experience of using various treatment strategies in CIDP patients from the local perspectives.

6.3 | The role of plasma exchange in myasthenia gravis: An update and review of current literature—Vinay Goyal, India

Vinay Goyal (VG) provided an overview of the evidence of TPE in the treatment of patients with MG in crisis. In the beginning he gave a brief overview of the clinical findings in a typical case of MG and the key differences between anti-muscle-specific tyrosine kinase (MuSK-MG) and acetylcholine receptor antibody-MG (AChR-MG). The potential therapeutic implications of these antibodies were discussed. He shared many of the available international guidelines and consensus on the use of corticosteroids, IVIg and TPE in MG crisis. VG also shared his vast experience in using TPE in MG patients in his center in India. With years of experience running one of the largest TPE centers in India, VG provided valuable advice and suggestions on setting up and running of plasma exchange center to clinicians from SEA countries.

6.4 | Southeast Asia (SEA) countries experience in management of patients with autoimmune Central and peripheral nervous system disorders

The SEA region is made up of nearly 600 million population and the member countries are Brunei Darussalam, Cambodia, Laos, Vietnam, Thailand, Philippines, Myanmar, Indonesia, Malaysia, and Timor Leste. The prevalence and incidence of peripheral and central nervous system disorders such as GBS, MG, Chronic inflammatory demyelinating disease (CIDP), Neuromyelitis optica (NMO) and Multiple Sclerosis (MS) in this region is largely unknown. In addition, data is lacking on the treatment and outcome of these disorders. More importantly, many patients in some under developed rural areas have limited access to basic hospital facilities. This interactive discussion session aimed to explore the many challenges in the SEA regions from the neurologists representing their countries.
Representatives from SEA; Thailand, Cambodia, Laos, Myanmar, Vietnam, Indonesia, Singapore, and Malaysia participated in the country-specific discussion session. Other SEA member countries were unable to attend due to various reasons of scheduling conflicts and timings, but future plans include collaborative efforts to re-engage all stakeholders in SEA depending on convenience. KOLs from 4 SEA countries (Myanmar, Vietnam, Laos, and Indonesia) presented their local experience and data on various aspects of autoimmune neurological disorders including the use of immunotherapies and the challenges they face in their respective countries. Local Malaysian experience and clinical data was presented as a poster.

### 6.4.1 Representatives from SEA countries

Professor Dr Seinn Mya Mya Aye (Myanmar)  
Dr Le Tri Si (Vietnam)  
Dr Saysavath Keosodsay (Laos)  
Dr Riwanti Estiasari (Indonesia) (Table 1)

### 6.5 Autoimmune neurological disorders and TPE in Indonesia

Indonesia is the largest nation in SEA by geography and population, with over 260 million people, more than half residing in Java island. From a single urban tertiary neurology center in Jakarta, Indonesia demonstrated NMOSD and MS contributed to the majority of central nervous system demyelinating diseases in the capital city. Data from January 2014 to July 2016 showed number of MS cases was 23 and NMOSD 21 cases. The number of GBS between January 2010 to December 2014 was 38 cases. GBS showed upward trend of 20–30 new cases per year. Myasthenia gravis cases were more common with >70 cases per year (unpublished data).

National treatment guideline for MS, with inclusion of NMOSD, is available in Indonesia. For GBS and MG, only local hospital guidelines are available. These guidelines incorporated various immunotherapies including corticosteroids, IVIg, TPE, and immunosuppressants. However, IVIg and TPE are available mainly in major urban hospitals. In Cipta Mangunkusumo Hospital, Jakarta, TPE service is managed by the hemato-oncology division of internal medicine department. However, 84% of the total 100 TPE procedures performed from January to November 2017 was for autoimmune neurological conditions: MG 30%, GBS 28%, CIDP 10%, NMOSD 9%, inflammatory myopathies 5%, and transverse myelitis 2%.

Despite having TPE facilities running in some tertiary hospitals, the cost of running a plasma exchange service is the main obstacle to expanding its availability in Indonesia. This include recruitment and training of special staffs to perform TPE. Its practical use is also restricted by its high cost per treatment.

### 6.6 Autoimmune neurological disorders and TPE in Myanmar

With a population size just over 50 million population, Myanmar has 5 neurology centers, 3 located in the capital city Yangon. Having just 24 adult neurologists in the country, the ratio of neurologist to patient was 1:1.64 million. No national data registry or treatment guidelines are currently available for autoimmune neurological disorders. Treatment of autoimmune neurological disorders are based on local hospital protocols. Single center local data from Yangon General Hospital, the largest hospital in Myanmar with 2000 beds, MG, GBS and NMOSD are the 3 commonest disorders seen (Seinn Mya Mya Aye, 2017 unpublished data). Reported GBS cases from 2012 to 2016 ranged from 32 to 46 new cases per year. From 2014 to 2016, an average of 60 new cases of MG being diagnosed per year. An average of 20 cases of NMOSD were seen in the same period of time. However, challenges exist in terms of lack of awareness among health care personnel and patients, as well as limited diagnostic facilities in the majority of the hospitals. Encouragingly, efforts are ongoing to improve this.

Before 1995, only corticosteroids were available for treatment of any autoimmune disorders in Yangon General Hospital. Limited plasma exchange service was subsequently introduced in Myanmar for treatment of myasthenic crisis in intensive care unit (ICU). This modified plasma exchange protocol was subsequently adopted by the neurology team in 2010, expanding its use to also include other neurological condition such as GBS and NMOSD. The use of IVIg for neurological diseases in Myanmar is still limited (estimated <5%) due to its high cost. Full TPE service was recently introduced in 2016 with future plan of expansion.

### 6.7 Autoimmune neurological disorders and TPE in Vietnam

Vietnam is a developing country in SEA with almost 95 million people. Ho Chi Minh City is the most populous city with 8.4 million. Similar to Myanmar, no national data registry or treatment guidelines are currently available for autoimmune neurological disorders. In this conference, only autoimmune peripheral nervous system disorders were discussed. Data from an urban tertiary teaching hospital in Ho Chi Minh City from January to October 2017 showed a total of 46 patients admitted for GBS. Less than half (40%) of cases were treated with either TPE (15%) or IVIg (24%). Cost of treatment remains the main determining factor for choice of therapy. On average, the cost of TPE is estimated
<table>
<thead>
<tr>
<th>Country</th>
<th>Populations (Million)</th>
<th>Predominant Spectrum of Demyelinating disorders (% for overall proportion)</th>
<th>Available treatment options</th>
<th>Guidelines</th>
<th>Indications for TPE (% for proportion from total TPE procedure)</th>
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<td>CNS (NMOSD)</td>
<td>PNS (MS, ON, TM, AE, ADEM)</td>
<td>GBS, CIDP, MG, IM</td>
<td>Corticosteroids</td>
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Indications for TPE: AD, acute disseminated; AE, autoimmune encephalitis; CIDP, chronic inflammatory demyelinating polyneuropathy; GBS, Guillain-Barré syndrome; IM, inflammatory myopathies; MS, multiple sclerosis; MG, Myasthenia gravis; NMOSD, neuromyelitis optica spectrum disorders; N/A, not available; ON, optic neuritis; TM, transverse myelitis.

**Notes:**
- Based on all plasma exchange procedures (Centrifugal and membrane filtration) for neurological disorders in the neurology department and Intensive Care Unit.
- CNS and PNS immune disorders of uncertain etiology (including paraneoplastic syndromes) not responding to standard treatment.

ADEM, acute disseminated encephalomyelitis; AE, autoimmune encephalitis; CIDP, chronic inflammatory demyelinating polyneuropathy; GBS, Guillain-Barré syndrome; IM, inflammatory myopathies; MS, multiple sclerosis; MG, Myasthenia gravis; NMOSD, neuromyelitis optica spectrum disorders; N/A, not available; ON, optic neuritis; TM, transverse myelitis.
at 7000 USD and for IVIg 10,000 USD per course of treatment. This is a substantial amount for the Vietnamese citizen earning an average income of 200 USD per month. In addition, the availability of immunomodulatory treatment is limited to major urban tertiary centers.

6.8 | Autoimmune neurological disorders and TPE in Laos

Laos is a less densely populated developing SEA country with estimated population of 6.6 million. There are challenges in terms of limited healthcare database or treatment guidelines currently available for autoimmune neurological disorders. The incidence and prevalence of most neurological disorders are largely unknown. The availability of healthcare resources and facilities are lacking with ongoing efforts for improvement. Thus making a diagnosis and treatment of neurological disorders remains challenging. Commonly seen autoimmune neurological conditions such as GBS and MG are diagnosed on clinical ground. In terms of immunomodulatory therapy, IVIg and TPE are not available in major hospitals. Similarly, the availability of immunosuppressive drugs is very limited. Treatments are generally based on supportive care and basic rehabilitation. Other health support services such as neurology specialty nurse, neuroimaging, neuro-rehabilitation, and pathology services are under developed with ongoing concerted efforts for improvement.

7 | DISCUSSION

The spectrum of autoimmune central and peripheral neurological disorders appears similar among SEA member countries. Commonly encountered disorders were MG, NMOSD, multiple sclerosis, GBS, CIDP, transverse myelitis (TM), autoimmune encephalitis, and inflammatory myopathies. Comparison of disease burden across countries was not possible due to limited official data presented at the conference. The choice of immune therapy for these neurology disorders was determined by various factors; the availability of immunomodulatory therapy (Corticosteroids, IVIg, TPE services and immunosuppressants), affordability, immunopathogenesis of disease, as well as accessibility and delivery logistics.

7.1 | Availability

The availability of TPE varies greatly between countries in SEA. In developed nation such as Singapore, and some other countries such as Malaysia, Thailand, Indonesia, and Vietnam, full TPE services are available in most tertiary neurology centers located in main cities. In most hospitals, full plasma exchange service was established and managed by either the hematology (Singapore, Myanmar), ICU (Vietnam) or internal medicine team (Indonesia). Dedicated neurology centers in Malaysia (Kuala Lumpur Hospital, Kuala Lumpur) and Thailand (Prasat Neurological Institute, Bangkok) have full TPE facilities managed by a dedicated plasma exchange team led by neurologists and qualified plasma exchange specialty nurses. However, access to TPE across the region is not uniform.

7.2 | Immunopathogenesis of diseases

Clinical response to conventional immunomodulatory therapies (corticosteroids, IVIg and TPE) varies depending on underlying immunopathogenesis of the disease. In GBS, IVIg, and TPE have been shown to have similar efficacy, and are the preferred first-line therapies in many centers. However, corticosteroid use has not been shown to be beneficial, although the actual explanation to this is still unknown. For patients with MG in crisis, response to treatment varies with different antibody responsible for the clinical manifestation; anti muscle-specific tyrosine kinase (MuSK-MG) and acetylcholine receptor antibody-MG (AChR-MG).42 Patients with IgG4 MuSK antibody generally demonstrate better clinical response to TPE and to anti-CD 20 rituximab than to IVIg.42 This is due to the lack of complement activation by IgG4 MuSK antibody. Similar pathogenesis and treatment response is observed in patient with CIDP due to underlying IgG4 neurofascin 155. Majority of the patients demonstrate poor response to IVIg, but partial response to corticosteroid. Favorable clinical outcome is seen with IV rituximab.

7.3 | Affordability

This remains the most important challenge in treating autoimmune neurological disorders in SEA regions. IVIg is a costly treatment modality and is beyond reach of majority of the populations earning below average incomes in their respective countries. Full TPE, although cheaper than IVIg, remains unaffordable to many. Developing countries such as Myanmar adopted innovative methods such as a modified plasma exchange which provides comparable efficacy to full TPE but at a much lower price. The concept of modified plasma exchange, although with differing methods, has been used with success in other parts of developing world such as Sri Lanka and Bangladesh. More importantly, it provides a greater affordability to larger populations. Small volume plasma exchange for GBS introduced in Bangladesh is currently undergoing feasibility tests.

7.4 | Accessibility and delivery logistics

TPE in SEA as discussed earlier, is available mainly in urban tertiary centers (urban bias). Hospitals in rural areas in less developed countries do not have access to TPE. While costs and healthcare allocation remain an on-going challenge, efforts are needed to establish a continuous and sustainable TPE services.
In majority of the SEA countries, TPE services have been a standard treatment for many nonneurological disorders by clinician from other specialties such as hematology, nephrology, and ICU. In most tertiary hospitals, full TPE infrastructures are available in many nephrology unit for patients undergoing hemodialysis. However, these facilities were not widely utilized by neurology colleagues due to various reasons including local practice policy, health budget distribution and patient burden. It was also evident that neurologists are largely dependent on practical support from other specialties for TPE procedures. In some facilities in Malaysia and Thailand, TPE infrastructure were set up in the neurology department to provide better accessibility and efficient TPE therapy. With increasing recognition of many autoimmune neurological disorders in the developing world, more effective resource sharing and distribution of health care services are needed.

In areas without full TPE infrastructures, options should be explored for alternative methods in conducting TPE. We discussed the potential of limited TPE and small volume plasma exchange above. In Myanmar, mobile TPE services was recently proposed with collaboration between local clinicians and TPE provider from the industry. This is to explore to possibility of bringing TPE services to more remote regions with no basic infrastructure for this procedure. This is made possible by using the most cost effective TPE technology whether centrifugal or membrane tailored for that country based on local stratification of logistics, human resources and infrastructure availability. A dedicated plasma exchange team comprising doctor and nurses will be trained to provide the service and to manage potential complications.

### 7.5 Other important challenges in management of autoimmune neurological disorders in SEA

The lack of electrophysiology, neuroimaging services and availability of auto-antibody detection in majority of less developed SEA countries makes diagnosis of autoimmune disorders challenging. Most of the cases were based on clinical presentations and classical physical signs with diagnosis being purely observational relying on individual neurologist’s clinical acumen. Funding is needed urgently for these countries to develop various aspects of their healthcare including human resource development and improving basic healthcare facilities.

There is a need for a local and regional databases on the frequency of various autoimmune disorders and extensive baseline clinical and diagnostic data in defining the need for TPE services. Without these important data, clinicians will face challenges in justifying the establishment of this treatment. In addition, outcome data is needed to further support the use of TPE as an alternative treatment to a more expensive immunomodulatory therapy such as IVIg.

### 7.6 Consensus on further steps

The discussion of the conference included three major future development plans.

1. Annual regional plasma exchange conference for neurological disorders
2. Setting up local and regional databases of plasma exchange for neurological disorders
3. To develop innovative techniques in TPE for resource limited settings.
4. An initiative toward developing a sustainable long-term commitment toward creating a Southeast Asia (SEA) consortium for TPE.

The annual regional plasma exchange conference will involve the participation of local experts from SEA countries and key supporters from the apheresis industry. We constantly explore the opportunity for other SEA countries to host the annual conference to provide participating members a better overall picture of local healthcare setting and challenges. This however, is governed by local healthcare policies and approval by local health authorities.

The availability of local and regional SEA databases on TPE in various neurological disorders are very limited. Only isolated case series and cross sectionals studies on the use of TPE in number of countries such as Thailand, Malaysia, Indonesia, and Philippines were available but similar reports from other member countries are lacking.6-8 Due to limited resources, TPE registry in many countries is very challenging to implement. However, we proposed in our future meeting a consensus on core set of baseline data or protocol for TPE data collection. This will promote future research and to improve standard of TPE services in this region.

The proposed Southeast Asia (SEA) consortium on plasmapheresis aimed to exchange and gain new knowledge as well as to develop innovative techniques in TPE for resource limited settings. Through the formation of this consortium, we aimed to gain recognition from regional and international neurological organizations for future collaboration. All members unanimously agreed to support this initiative. The proposed consortium would address the disparity in accessibility and availability to TPE for various autoimmune neurological disorders, allow for development of sustainable and affordable methods of TPE especially for resource limited settings, disseminate vital information on TPE to member countries and improve stratification of patients for TPE based on the resources available. Further workplan for this consortium will commence in early 2018 in terms of planning for the 3rd Annual regional TPE meeting and moving forwards with the consortium.
8 | SUMMARY AND CONCLUSIONS

The 2017 regional plasmapheresis conference in Kuala Lumpur gathered regional TPE experts from SEA countries and India to discuss the current status of TPE in the region as well as the numerous challenges that exist today and in the future. Both plenary and country specific sessions provided critical insights into the need of improving the availability and affordability of TPE in this region. While costs remain an on-going challenge, efforts should be made to explore novel techniques and innovative ideas in performing TPE. It was also clear that the only way forward would be to form a dedicated working consortium comprises of KOLs from around the region that serve to continuously providing evidence-based TPE practice knowledge, promoting research and improving the standard of TPE practices. We hope to achieve this in the near future through active participation and engagement with all countries within the SEA region.

ACKNOWLEDGMENT

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CONFLICT OF INTERESTS

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