

# AN OVERVIEW ON THE COST EFFICIENCY OF THERAPEUTIC PLASMA EXCHANGE IN TREATING GUILLAIN-BARRÉ SYNDROME

**TERUMOBCT**

K. Dierick,<sup>1</sup> MSC, MBA and N. Khalife,<sup>1</sup> MD  
1 Terumo BCT Europe, Belgium, Zaventem

RESEARCH POSTER PRESENTATIONS  
SESSION V  
Wednesday, 23 May 2018  
PMD 43

## Study Background

Guillain-Barré syndrome (GBS) is an acute, paralyzing, inflammatory peripheral nerve disease.<sup>1</sup> It is one of the most common causes of acute neuromuscular paralysis with an incidence of 1 to 2 patients per 100,000.<sup>2,3</sup> The disease causes rapid development of weakness and numbness of the limbs and often the facial, swallowing and breathing muscles. The weakness reaches its nadir within a few days or up to 4 weeks. Twenty-five percent of patients will require the use of mechanical ventilation.<sup>1</sup> Recovery takes several weeks or months. Many patients have persistent fatigue, 12% still require aid to walk 1 year after the onset, and 62% of patients experience impact on their daily life activities up to 3 to 6 years after remission.<sup>1</sup> GBS patients have a mortality rate of 2.8% to 12%.<sup>1,4</sup> The disease can be treated with therapeutic plasma exchange (TPE) or intravenous immunoglobulin (IVIg).<sup>1-3,5-16</sup> One randomized clinical trial demonstrated similar clinical outcomes and efficacy of both TPE and IVIG.<sup>17</sup> Subsequent other studies confirmed that IVIG and TPE have similar efficacy.<sup>1-3,8-10,12-16</sup>

## Objectives

GBS is a complex disorder for cost-effective care because of the various stages in the clinical course and diversity in clinical course between patients.<sup>15</sup> Among neurologists and hospital executives there is uncertainty about what is the most cost-efficient treatment for GBS. The intent of this research is to provide an overview on the cost-efficiency of TPE versus IVIG in the treatment of GBS.

## Methodology

A systematic literature review was performed on the cost-efficiency of TPE in GBS compared to IVIG in GBS by means of searches on PubMed as well as through the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) Scientific Presentations Database. Fifteen peer-reviewed publications<sup>1-3,5-16</sup> were identified between 1999 and 2017 that were specific to GBS and evaluated the outcomes and/or cost-efficiency of treatment by means of IVIG and/or TPE. All cost figures were compared based on saving percentages for TPE and IVIG: % saving (-) or % increase in costs (+) for TPE versus IVIG.\*

## Results

- In 11 out of the 15 publications,<sup>2,3,5-7,9-13,16</sup> TPE was more cost-efficient than IVIG. In 3 cases, the studies were undecided. In 1 case, IVIG was more cost-efficient than TPE (see Table 1).
- When TPE was more cost-efficient than IVIG (n = 11), hospital costs were 53% lower on average.
- Although differences in the cost per treatment were found for IVIG versus TPE, during a systematic review, authors agreed that the expected health outcomes were identical (see Table 2).<sup>1</sup>
- Depending on the publication, potential savings varied largely (see Figure 1).
- A weighted average across all 15 publications showed potential average savings of 38% in hospital costs.

## Results (Continued)

Table 1: Summary of literature review

	TPE More Cost-Efficient <sup>2,3,5,9-13,16</sup>	IVIg More Cost-Efficient <sup>14</sup>	TPE and IVIG Equally Cost-Efficient <sup>1,8,15</sup>	Total
No. of Publications	11	1	3	15
% of Publications	73	7	20	100
TPE versus IVIG (cost position: % -/+)	-53	11	0	-38
Minimal Cost Saving (%)	-15			-15
Maximal Cost Saving (%)	-83%	Not Applicable	Not Applicable	-83
Standard Deviation (%)	21%			31

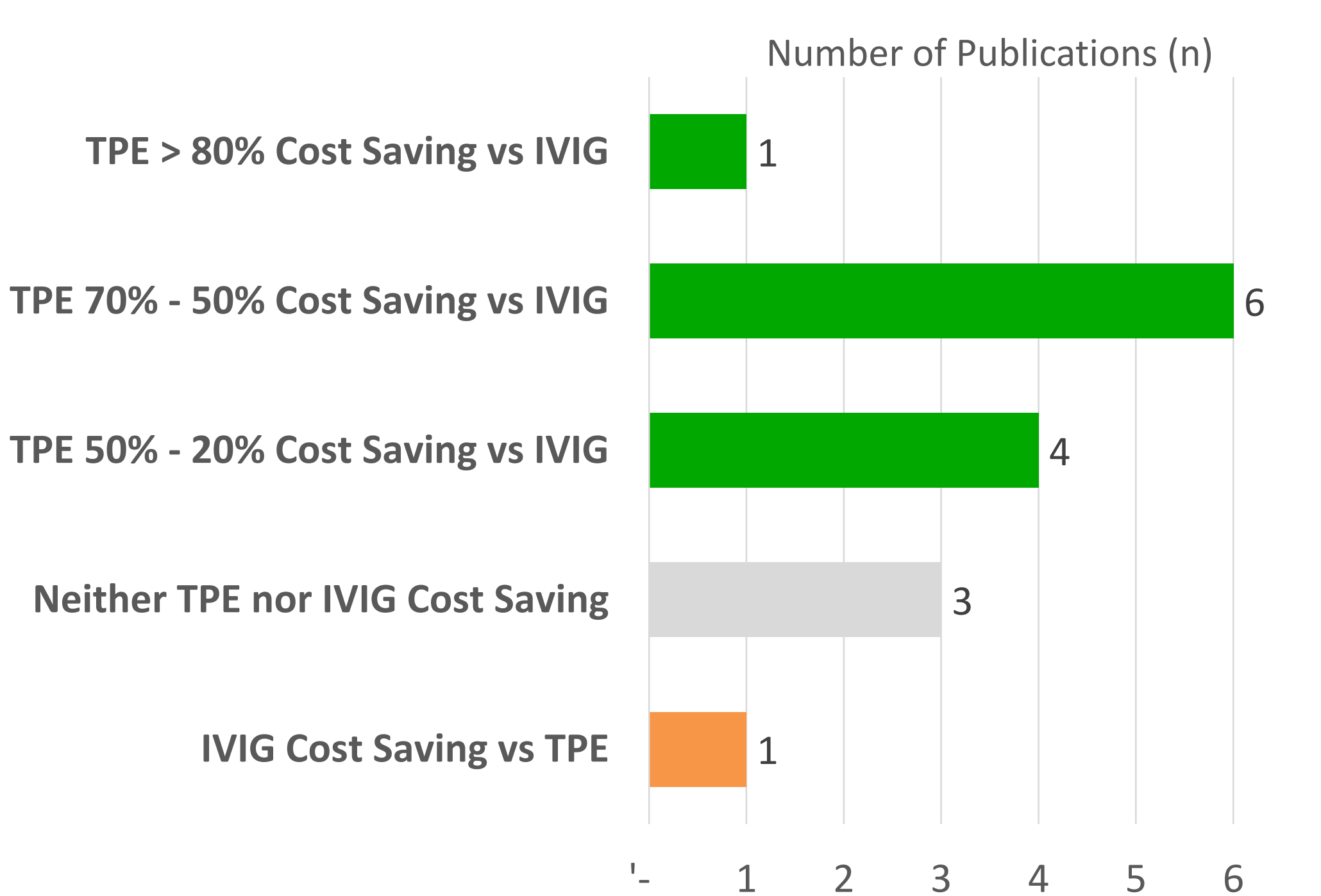
Table 2: IVIG versus TPE health outcomes

	TPE	IVIg
Mortality <sup>1,3,9,13,16</sup>	=	=
Safety <sup>1-3,5,8-10,12-16</sup>	=	=
Hospitalization time <sup>1,2,6-9</sup>	=	=
Recovery time <sup>1-3,6-10,12-16</sup>	=	=
Cost of treatment <sup>1-3,5-16</sup>		

Better performance  
 = Equal performance  
 Poorer performance

• TPE and IVIG have similar health outcomes<sup>1</sup> but can differ largely in terms of healthcare resource utilization.<sup>1-3,5-16</sup>

Figure 1: Variation in terms of potential cost-efficiencies\*\*



\*\*Potential savings varied widely per hospital, from more than 80% to no savings at all. In the majority of cases, cost saving was possible when TPE was favored over IVIG for GBS patients.

Of all determinants of cost of disease management in GBS, severity of disease upon hospital admission has the biggest impact. Most of the time, disease severity is correlated with the treatment type, the transfer of patients (within hospitals and between hospitals), the length of stay, the need for an intensive care unit (ICU), and the need for mechanical ventilation. Costs of treatment may be 40 to 70 times higher at the most severe level of disease versus at the lowest level.<sup>15</sup>

## Conclusion

Based on the analysis performed and assuming equality in terms of patient characteristics and hospital type, TPE is a cost-effective therapy when compared to IVIG as shown in most of the identified 15 publications. In terms of the total treatment costs, savings between 15% and 83% are possible when TPE is applied versus IVIG. Health systems that foresee an increased use of TPE versus IVIG in the treatment of GBS are likely to benefit from cost savings.

## Discussion

With healthcare policymakers trying to reduce the level of healthcare spending, processes are in place to provide a framework<sup>18</sup> for the acceptance or non-acceptance of a health technology into the health system. There are multiple scenarios possible, such as: (1) Compared to the existing best practice, a new technology is always accepted if it comes with a lower cost and better outcomes.<sup>18</sup> (2) At the same time, a new technology offering poorer outcomes and higher expenses is never accepted.<sup>18</sup> (3) When a product is cheaper but comes with poorer health outcomes, the product should not get accepted within the health system.<sup>18</sup> (4) When a healthcare technology provides better outcomes but also a higher cost, a cost-effectiveness analysis should be performed.<sup>18</sup> TPE provides the same outcomes as IVIG but potentially at a lower cost.<sup>1-3,5-16</sup> Therefore, from a health economics evaluation point of view, TPE is positioned favorably versus IVIG. For hospitals that receive a lump sum for the treatment of a GBS patient from a payer, TPE might provide a driver for saving costs or having more means available for the daily operations of the hospital.

## References

- [1] Hughes RA, Swan AV, van Doorn PA. Intravenous immunoglobulin for Guillain-Barré syndrome. Cochrane Database Syst Rev. 2014;(7):CD002063.
- [2] El-Bayoumi MA, El-Refaei AM, Abdelkader AM, El-Assmy MM, Alwakeel AA, El-Tahan HM. Comparison of Intravenous immunoglobulin and plasma exchange in treatment of mechanically ventilated children with Guillain-Barré syndrome: a randomized study. Crit Care. 2011;15(4):R164.
- [3] Winters JL, Brown D, Hazard E, Chainani A, Andrzejewski C. Cost-minimization analysis of the direct costs of TPE and IVIG in the treatment of Guillain-Barré syndrome. BMC Health Serv Res. 2012;11:101.
- [4] van den Berg B, Bunschoten C, van Doorn P.A., Jacobs B.C. Mortality in Guillain-Barré syndrome. Neurol. 2013 Apr 30;80(18):1650-4.
- [5] Atikeler K, Tuna E, Kockaya G. Comparing cost of therapeutic plasma exchange and intravenous immunoglobulin infusion in treating Guillain-Barré syndrome. Value in Health. 2012;15(7):A548.
- [6] de Britto A, Maciel PP, Ferreira MAP, Moreira LB. Cost-effectiveness analysis of intravenous immunoglobulin and plasma exchange therapies for the treatment of Guillain-Barré syndrome in a university-based hospital in the south of Brazil. Value in Health. 2009;12(7):A525.
- [7] de Britto A, Pires Ferreira M, Panazzolo Maciel P, Beltrami Moreira L. Economic analysis of intravenous immunoglobulin and plasma exchange therapies for the treatment of Guillain-Barré syndrome in a university-based hospital in the south of Brazil. Clin Biomed Res. 2011;31(3).
- [8] Gaebel K, Blackhouse G, Campbell K, et al. Intravenous immunoglobulin for chronic inflammatory demyelinating polyneuropathy: clinical- and cost-effectiveness analyses. Canadian Agency for Drugs and Technologies in Health, Ottawa, 2009. Technology report number 117.
- [9] Gajjar MD, Shah SD, Shah MC, Bhatnagar NM, Soni S, Patel T. Efficacy and cost-effectiveness of therapeutic plasma exchange in patient of Guillain-Barré syndrome—a prospective study. SEAJCRR. 2013;2(4):218-228.
- [10] Jivraj F, Dranitsaris G, Nicole M. Cost utility analysis of immunoglobulins (IVIg) versus plasma exchange (PE) for the treatment of Guillain-Barré syndrome (GBS). Value in Health. 2003;6(3):278-279.
- [11] Nagpal S, Benstead T, Shumak K, Rock G, Brown M, Anderson DR. Treatment of Guillain-Barré syndrome: a cost-effectiveness analysis. J Clin Apher. 1999;14(3):107-113.
- [12] Robinson J, Eccher M, Bengier A, Liberman J. Costs and charges for plasma exchange (PLEX) versus intravenous immunoglobulin (IVIg) in the treatment of neuromuscular disease. Neurol. 2012;78(Suppl. 1):PD6.008.
- [13] Saad K, Mohamad IL, Abd El-Hamed MA, et al. A comparison between plasmapheresis and intravenous immunoglobulin in children with Guillain-Barré syndrome in upper Egypt. Ther Adv Neurol Disord. 2016;9(1):3-8.
- [14] Tsai CP, Wang KC, Liu CY, Sheng WY, Lee TC. Pharmacoeconomics of therapy for Guillain-Barré syndrome: plasma exchange and intravenous immunoglobulin. J Clin Neurosci. 2007;14(7):625-629.
- [15] van Leeuwen N, Lingsma HF, Vanrolleghem AM, et al. Hospital admissions, transfers and costs of Guillain-Barré syndrome. PLoS One. 2016;11(2):e0143837.
- [16] Vijayanarayana K, Beena AS, Anuvrinda C, Bhumika M, Sreedharan N, Shivashankar KN. Guillain-Barré syndrome: clinical presentation, treatment pattern and outcome. Value in Health. 2015;18(7):A659-A660.
- [17] Plasma Exchange/Sandoglobulin Guillain-Barré Syndrome Trial Group. Randomised trial of plasma exchange, intravenous immunoglobulin, and combined treatments in Guillain-Barré syndrome. Lancet. 1997;349(9047):225-230.
- [18] Tan-Torres Edejer T, Baltussen R, Adam T, et al., eds. Making Choices in Health: WHO Guide to Cost-Effectiveness Analysis. Geneva: World Health Organization; 2003.