ORBCoN
Ontario Regional Blood Coordinating Network

Ontario

Ontario Immune Globulin (IG) Utilization Management Guidelines

Version 4.0

January 31, 2018

Table of Contents

Page

Disclaimer:

The Ontario IG Utilization Management Guidelines are not intended to replace sound clinical judgment concerning a patient's unique situation.

Furthermore, although the advice and information contained in these guidelines is believed to be true and accurate at the time of going to press, neither the authors nor the publishers can accept any legal responsibility for any errors or omissions that may have been made.

Introduction

The information in this document is version 4.0 of the Ontario Immune Globulin Management Guidelines Version 1.0 was first circulated November 5, 2009 with subsequent versions in March, 2012 and May 2016. The guidelines were also included in the Intravenous Immune Globulin Toolkit, published by the Ontario Regional Blood Coordinating Network in September 2010 and October 2015.

The information in this document is intended as a guideline document for clinicians seeking clarification on the common and clinically appropriate uses of Immune Globulin.

This summary of guidelines and information on IG Utilization has been prepared specifically for use in Ontario, based on the input from the Ontario IG Advisory Panel. In 2015, the Ontario IVIG guidelines were reviewed by physicians within each of the specialties with indications for IVIG following a literature review of current evidence. The guidelines for Rheumatology, Neurology, Hematology, and Solid Organ Transplantation were published in May 2016. No revisions were deemed necessary at that time for Infectious Disease conditions and review of Dermatology and Immunology were completed in July 2017.

Recommended Hematology Indications

	Medical Condition	Recommendations	Dose/Frequency of Administration
Specialty: Hematology	Fetal/ Neonatal alloimmune thrombocytopenia (F/NAIT) [1,2,38]	**Antenatal treatment**: IVIG (with or without corticosteroids) is recommended as first line treatment for women with a previously affected infant.	**Maternal dose** based on the following risk stratification: • Previous fetus with intracranial hemorrhage: Up to a total of 2 g/kg weekly starting as early as 12-16 weeks gestation. • No previous fetus with intracranial hemorrhage: Up to 1g/kg weekly, starting as early as 20-26 weeks current gestation.
		Newborn with F/NAIT: IVIG is recommended as adjunct to provision of platelets for infants with F/NAIT who have severe thrombocytopenia. Treatment should be administered in consultation with obstetrical medicine and transfusion medicine with expertise in F/NAIT.	**Infant dose:** initial dose of 1 g/kg, reassess following initial dose.
	Hemolytic Disease of the Fetus and Newborn (HDFN) [1,2,3]	IVIG is recommended in infants with HDFN and severe hyperbilirubinemia if total serum bilirubin (TSB) is rising despite intensive phototherapy/hydration, in consultation with experts in fetomaternal medicine and transfusion medicine.	0.5 g/kg over 4 hours.
	Immune thrombocytopenia (ITP) Adult [1,2,3,4]	**Acute ITP with or at risk for severe bleeding:** IVIG is recommended as part of multimodality therapy for patients with ITP, severe thrombocytopenia (platelets less than 30 x 10^9/L) and severe bleeding. **IVIG may be considered in the following situations:** • ITP in pregnancy: when platelets are less than 30 x 10^9/L, or in preparation for delivery. • Planned surgery: safe platelet threshold will vary with the nature of the surgery. • Treatment of ITP in patients with other concurrent risk factors for bleeding (e.g. concurrent anticoagulant therapy). **Chronic ITP:** IVIG may be considered as a possible adjunctive therapy as a steroid-sparing measure.	**Acute:** 1 g/kg as a single dose. Repeat if platelet count does not respond. I.e. still less than 30 x 10^9/L. **Chronic:** In consultation with a hematologist, as adjunctive therapy or where other therapies have failed or are not appropriate. Consider 1-2 g/kg. The use of regular IVIG as a treatment for chronic ITP should be considered as exceptional and alternative approaches (e.g. splenectomy, rituximab, thrombopoietin receptor agonists) should be considered.
	Immune Thrombocytopenia (ITP) Pediatric [1,2,3,4]	Acute: Children with no bleeding or mild bleeding only (mild bruising or petechiae) should be managed with observation alone regardless of platelet count. For children with moderate to severe mucosal and/or cutaneous bleeding and platelet count less than 30 x 10^9/L, IVIG can be used. Chronic: IVIG can be used in chronic ITP for previous responders.	For patients who require treatment, a single dose of IVIG may be considered a front-line treatment (0.8 to 1 g/kg). A second dose can be repeated if there is no clinical response. IVIG will result in a faster increment in platelet count compared with steroids. In emergent management, IVIG is recommended as part of multimodal therapy.
	Post-transfusion purpura (PTP) [1]	IVIG is recommended as standard first-line therapy for PTP.	Up to 2 g/kg divided over 2 to 5 consecutive days, repeat if necessary; for short term use.

For the following conditions, IVIG treatment is not recommended for routine use.
When screening requests for approval the following information may be taken into account as there is some evidence for IVIG to be considered as an option.

Specialty: Hematology	Medical Condition	Recommendations	Dose/Frequency of Administration
	Acquired hemophilia [1]	IVIG may be considered one option among adjunctive therapies, such as steroids, in urgent situations. Not recommended for routine use. Prescribed only in consultation with specialized hemophilia care centre.	Up to a total of 2 g/kg divided over 2 to 5 consecutive days, for short term use.
	Acquired red cell aplasia[1,3]	IVIG is an option for patients with immunologic pure red cell aplasia (PRCA) who have failed other therapies (e.g. prednisone or cyclosporin). IVIG should be considered first-line therapy for viral PRCA associated with parvovirus B19 in immunocompromised patients.	Up to 2 g/kg divided over 2 to 5 consecutive days; for short term use. Repeated on relapse.
	Acquired von Willebrand's disease (AvWD) [1,3]	IVIG should be considered part of multimodal therapy in emergent situations (together with desmopressin and FVIII/VWF concentrates) in patients who have not responded to other treatments. Prescribed only in consultation with specialized hemophilia care centre.	Initial therapy: Up to 2 g/kg divided over 2 to 5 consecutive days.
	Allogeneic bone marrow or stem cell transplantation[2,3,38]	IVIG is not recommended for routine use after HSCT. IVIG may be considered in exceptional cases: 1) Active CMV-induced pneumonitis following transplantation. 2) High risk allogeneic stem cell transplantation (e.g. If hypogammaglobulinemia) for prevention of GVHD.	1) No recommended dose or duration listed; use in conjunction with appropriate antiviral medication. 2) 0.4 g/kg weekly, starting one day before transplantation and continuing to day 100 post-transplant.
	Autoimmune hemolytic anemia[1,3] (AIHA)	May be considered one option among adjunctive therapies in urgent situations. Not recommended as routine.	No recommended dose or duration listed; however, expert panel recommends up to 2 g/kg divided over 2 to 5 consecutive days.
	Autoimmune neutropenia[1,3]	May be considered one option among adjunctive therapies in urgent situations.Not recommended as routine.	
	Hemolytic transfusion reaction in sickle cell disease[1] (HTRSCD)	IVIG may be considered among the options for treatment of serious, life-threatening, delayed hemolytic transfusion reactions in SCD patients.	
	Virus associated hemophagocytic syndrome[1] (VAHS)	IVIG is not recommended for routine use in the treatment of VAHS. IVIG may be considered among the options for treatment of severe life threatening VAHS.	
	Hemolytic transfusion reaction [1](HTR)	IVIG may be considered as an option among supportive therapies for urgent situations in this disorder.	Up to 2 g/kg divided over 2 to 5 consecutive days, short term up to 3 months.

Recommended Neurology Indications

Specialty: Neurology	Medical Condition	Recommendations	Dose/Frequency of Administration
	Chronic Inflammatory Demyelinating Polyneuropathy (CIDP)[2,5,6,7]	IVIG is recommended as first-line therapy in CIDP. Immunosuppressive therapy in combination with IVIG can be considered in refractory cases. All patients receiving IVIG for chronic treatment of CIDP should be followed by a neuromuscular specialist.	Initial dose: 2 g/kg divided over 2 to 5 days Maintenance dose: 1g/kg every 3 weeks. Continued use should be based on objective measures of sustained effectiveness. Aim for minimum dose to maintain optimal functional status.
	Guillain-Barré Syndrome (GBS) including Miller-Fisher syndrome and other variants[2,5,8]	IVIG is recommended for symptoms of grade 3 severity (able to walk with aid) or greater; or symptoms less than grade 3 severity that are progressing. Treatment should be given within 2 weeks of symptom onset. Re-treatment for patients who do not respond may be considered.	Adult: Total dose of 2 g/kg divided over 2 to 5 days. Pediatric: Total dose of 2 g/kg divided over 2 days. Repeat treatment with IVIG at 2 g/kg divided over 2 to 5 days.
	Multifocal motor neuropathy (MMN)[2,5,9]	IVIG is recommended as first-line treatment for MMN.	Initial dose: 2 g/kg divided over 2 to 5 days. Maintenance dose: tailor to the lowest dose that maintains clinical efficacy, usually 1g/kg or less per treatment course. Some patients may require higher doses for efficacy, up to 2 g/kg every 4 weeks.
	Myasthenia gravis (MG)[2,5,10,11,12,13]	IVIG is recommended as first-line treatment in moderate-severe MG or in myasthenic crisis. IVIG in combinations with immunosuppressive therapy can be considered in refractory cases.	Initial dose: 2 g/kg divided over 2 to 5 days. If additional therapy is required, the dose should be adjusted depending upon response and titrated to the minimum effective dose.

For the following conditions, IVIG treatment is not recommended for routine use.
When screening requests for approval the following information may be taken into account as there is some evidence for IVIG to be considered as an option.

	Medical Condition	Recommendations	Dose/Frequency of Administration
Specialty: Neurology	Acute disseminated encephalomyelitis[3,5] (ADEM)	IVIG is an option for monophasic ADEM when first-line therapy with high-dose corticosteroids fails or when there are contraindications to steroid use, and for treatment of relapsing ADEM to eliminate steroid dependency or for those patients who fail to respond, or have contraindications, to steroids.	Adults: Total dose of 2 g/kg divided over 2 to 5 days. Pediatric: Total dose of 2 g/kg divided over 2 days.
	Lambert-Eaton Myasthenic Syndrome[3,5] (LEMS)	IVIG is an option for treatment of LEMS. Objective evidence of clinical improvement is needed for sustained use of IVIG.	Initial dose: Total dose of 2 g/kg divided over 2 to 5 days. Maintenance dose: a systematic approach should be taken to determine the minimum effective dose, and continued use of IVIG should be based on objective measures of its sustained effectiveness. The maximum dose of IVIG per treatment course should be 2 g/kg.
	Pediatric Autoimmune Neuropsychiatric Disorders Associated With Streptococcal Infections[3,5] (PANDAS)	IVIG is an option for treatment of patients with PANDAS. Diagnosis of PANDAS requires expert consultation.	Total dose of 2 g/kg divided over 2 days is recommended as a reasonable option.
	Rasmussen's encephalitis[3,5]	IVIG is an option as a short-term, temporizing measure for patients with Rasmussen's encephalitis. Not recommended for long-term therapy.	Adults: Total dose of 2 g/kg divided over 2 to 5 days. Pediatric: Total dose of 2 g/kg divided over 2 days.
	Stiff Person's syndrome[3,5]	IVIG is an option for treatment of Stiff Person syndrome if GABAergic medications fail or for patients who have contraindications to GABAergic medications.	Initial dose: Adults: Total dose of 2 g/kg divided over 2 to 5 days. Pediatric: Total dose of 2 g/kg divided over 2 days. Maintenance dose: A systematic approach should be taken to determine the minimum effective dose, and continued use of IVIG should be based on objective measures of its sustained effectiveness. Maximum dose of IVIG per treatment course should be 2 g/kg.
	N-methyl-D-aspartate (NMDA) encephalitis[14]	IVIG is an option for treatment of patients with NMDA. Diagnosis of NMDA requires expert consultation. IVIG is used in conjunction with immunosuppressive medications and/or plasmapheresis.	Initial dose: Total dose of 2 g/kg divided over 2 to 5 days in adults and children. Maintenance dose may be considered depending on response to treatment.

Recommended Dermatology Indications

Specialty: Dermatology	Medical Condition	Recommendations	Dose/Frequency of Administration
	Pemphigus Vulgaris (PV) and Variants [2,3,39,40]	Consider IVIG when there is no response or a contraindication to corticosteroids, immunosuppressive agents or biologics (e.g. rituximab) in conjunction with one of the above. First line therapy: corticosteroids Second line: immunosuppressive agents Third line: IVIG	Total dose 2 g/kg divided over 2 to 5 days every 4 weeks. Dose every 6 weeks after 6 months of therapy.

For the following conditions, IVIG treatment is not recommended for routine use.
When screening requests for approval the following information may be taken into account as there is some evidence for IVIG to be considered as an option.

Specialty: Dermatology	Medical Condition	Recommendations	Dose/Frequency of Administration
	Toxic epidermal necrolysis (TEN) / Stevens-Johnson syndrome (SJS)[3,38,40]	IVIG is an option when other treatments are contraindicated, or when the condition is life-threatening. Early intervention is strongly recommended.	3 g/kg divided over 3-5 days.

Recommended Rheumatology Indications

	Medical Condition	Recommendations	Dose/Frequency of Administration
Specialty: Pediatric Rheumatolog	Juvenile Idiopathic Inflammatory Myopathy (J-IIM)[2,5,15,16,17] (Previously Juvenile Dermatomyositis)	IVIG is recommended when there is a lack of response or contraindication to corticosteroids, Methotrexate and/or Azathioprine therapy. 1st line: Corticosteroids and Methotrexate 2nd line: IVIG 3rd line: Cyclosporine	Initial dose: Total dose of 2 g/kg divided over 2 days. Maintenance dose: A systematic approach should be taken to determine minimum effective dose. Continued use should be based on objective measures of sustained effectiveness. Maximum dose should not exceed 2 g/kg.
	Kawasaki Disease [2,18,19,20,21,22]	IVIG is recommended when Kawasaki diagnosis confirmed.	2 g/kg for 1 day (second dose can be given for patients who fail to respond to initial dose).
Specialty: Adult Rheumatology	Idiopathic Inflammatory myopathy (IIM) [2,5,15,23,24,26,25] Includes Dermatomyositis and Polymyositis *does not include Inclusion Body Myositis (IBM)	IVIG is indicated in patients with IIM as adjunctive therapy to corticosteroids and/or a steroid sparing agent in patients with IIM who have failed 1st line therapy or as clinically indicated in the management of severe disease. *IVIG benefit has not been established in IBM. 1st line: Corticosteroids and Methotrexate and/or Azathioprine 2nd line: IVIG 3rd line: Cyclosporine or cellcept	Maximum dose is 2 g/kg to be given over 2 days initially monthly for 3-6 months and if effective to be continued at decreasing frequency (determine minimum effective dose) over approximately 2 years. Survival of patients with IIM has been shown to be substantially improved in patients given IVIG.

Recommended Infectious Disease Indications

	Medical Condition	Recommendations	Dose/Frequency of Administration
Specialty: Infectious Diseases	Staphylococcal toxic shock[2,3,15]	IVIG is recommended when evidence of systemic inflammation and end organ hypoperfusion with fever, tachycardia, tachypnea and hypotension.	1 g/kg on day one and 0.5 g/kg per day on days 2 and 3 **OR** 0.15 g/kg per day for 5 days.
	Invasive Group A streptococcal fasciitis with associated toxic shock[2,3,15,29,30]		

Recommended Immunology Indications

	Medical Condition	Recommendations	Dose/Frequency of Administration
Specialty: Immunology	Primary Immune Deficiency (PID)[2,31] Secondary Immune Deficiency (SID)[2,31]	IVIG is recommended in hypogammaglobulinemia (total IgG reduced or inadequate antibody production) with recurrent bacterial infections. Children and adults with a suspected immunodeficiency should be referred to an immunologist with expertise in the field of primary immunodeficiency ('expert' in PID). Ideally, this should be carried out in an academic centre with the capability of performing specialized diagnostic tests for immunodeficiency. Management should be performed by a specialized team including physicians, nurses and allied health care providers.	Adult: 0.4-0 .6 g/kg every 3-4 weeks Pediatric: 0.3-0 .6 g/kg every 3-4 weeks Doses or frequency to be adjusted by experts according to desired trough level (more than 500 mg/dL and ideally 700 mg/dL) and according to individual patient clinical needs.
	Hematopoietic Stem Cell Transplant in primary immunodeficiencies[3]	IVIG is recommended in PID patients undergoing stem cell transplant.	0.4 to 0.6 g/kg every 3-4 weeks; requirements may increase and should be based on clinical outcome.

Recommended Solid Organ Transplant Indications

	Medical Condition	Recommendations	Dose/Frequency of Administration
Specialty: Solid Organ Transplantation	Kidney transplant from living donor to whom the patient is sensitized[15,32]	IVIG is recommended to decrease donor-specific sensitization.	2 g/kg/month for 4 months.
	Pre-Transplant (heart)[32,33,34,35,36]	For desensitization in selected heart transplant recipients who are highly sensitized, medically urgent and unlikely to receive a transplant otherwise – this should be preceded by discussion at the transplant program level.	Suggested dose is up to 1 g/kg/month until transplant.
	Peri- Transplant (heart, lung, kidney, pancreas[31,33,34,35,36]	Solid-organ transplant recipient with donor-specific antibodies identified at time of transplant surgery (heart, lung, kidney, pancreas) on virtual crossmatch – first-line agent.	Suggested dose 1 g/kg, can give as divided doses if in association with a course of plasmapheresis.
	Post-Transplant [32,33,34,35,36,37]	Acute antibody-mediated rejection in a solid-organ transplant recipient – first-line agent. Chronic antibody-mediated rejection in a solid-organ transplant recipient.	1 g/kg/dose, can give as divided doses if in association with a course of plasmapheresis. 1 g/kg/month.

References

1. Anderson D, Ali K, Blanchette V, Brouwers M, Couban S, Radmoor P et al . Guidelines on the Use of Intravenous Immune Globulin for Hematologic Conditions.Transfusion Medicine Reviews.2007; 21:S9- S56.
2. IVIG Utilization Management Guidelines: British Columbia Provincial Blood Coordinating Office, August 2011.
3. United Kingdom Department of Health, Clinical Guidelines for IVIG Use, 2nd edition update, November 2011.
4. Neunert C, Lim W, Crowther M, Cohen A, Solberg L, Crowther M. The American Society of Hematology 2011 evidence-based practice guideline for immune thrombocytopenia.Blood.2011; 117(16):4190-4207.
5. Feasby T, Banwell B, Benstead T, Bril V, Brouwers M, Freedman M et al . Guidelines on the Use of Intravenous Immune Globulin for Neurologic Conditions. Transfusion Medicine Reviews.2007; 21:S57-S107.
6. Hughes R, Donofrio P, Bril V, Dalakas M, Deng C, Hanna K et al . Intravenous immune globulin (10% caprylate-chromatography purified) for the treatment of chronic inflammatory demyelinating polyradiculoneuropathy (ICE study): a randomised placebo-controlled trial. The Lancet Neurology. 2008; 7(2):136-144.
7. Merkies I, Bril V, Dalakas M, Deng C, Donofrio P, Hanna K et al . Health-related quality-of-life improvements in CIDP with immune globulin IV 10%: The ICE Study.Neurology.2009; 72(15):1337-1344.
8. Kuitwaard K, de Gelder J, Tio-Gillen A, Hop W, van Gelder T, van Toorenenbergen A et al . Pharmacokinetics of intravenous immunoglobulin and outcome in Guillain-Barre syndrome. Annals of Neurology.2009; 66(5):597-603.
9. Baumann A, Hess C, Sturzenegger M. IVIg dose increase in multifocal motor neuropathy. Journal of Neurology.2009; 256(4):608-614.
10. .Zinman L, Ng E, Bril V.IV immunoglobulin in patients with myasthenia gravis: A randomized controlled trial. Neurology. 2007; 68(11):837-841.
11. Gajdos P. Treatment of Myasthenia Gravis Exacerbation with Intravenous Immunoglobulin. Arch Neurol. 2005; 62(11):1689.
12. Barth D, Nabavi Nouri M, Ng E, Nwe P, Bril V. Comparison of IVIg and PLEX in patients with myasthenia gravis.Neurology.2011; 76(23):2017-2023.
13. Barnett C, Wilson G, Barth D, Katzberg H, Bril V.Changes in quality of life scores with intravenous immunoglobulin or plasmapheresis in patients with myasthenia gravis. Journal of Neurology, Neurosurgery & Psychiatry.2012; 84(1):94-97.
14. Titulaer M, McCracken L, Gabilondo I, Armangué T, Glaser C, Iizuka T et al. Treatment and prognostic factors for long-term outcome in patients with anti-NMDA receptor encephalitis: an observational cohort study. The Lancet Neurology.2013; 12(2):157-165.
15. Callum J et al. Bloody Easy 3: Blood Transfusions, Blood Alternatives and Transfusion Reactions: A Guide to Transfusion Medicine, 3rd Edition.2011; pages 110-118.
16. Lam C, Manlhiot C, Pullenayegum E, and Feldman B. Efficacy of intravenous Ig therapy in juvenile dermatomyositis. Annals of the Rheumatic Diseases.2011; 70(12):2089-2094.
17. STRINGER E, BOHNSACK J, BOWYER S, GRIFFIN T, HUBER A, LANG B et al . Treatment Approaches To Juvenile Dermatomyositis (JDM) Across North America: The Childhood Arthritis and Rheumatology Research Alliance (CARRA) JDM Treatment Survey. The Journal of Rheumatology.2010; 37(9):1953-1961.
18. Newburger J, Takahashi M, Burns J, Beiser A, Chung K, Duffy C et al . The Treatment of Kawasaki Syndrome with Intravenous Gamma Globulin. New England Journal of Medicine.1986; 315(6):341-347.
19. Barron K, Murphy D, Silverman E, Ruttenberg H, Wright G, Franklin W et al . Treatment of Kawasaki syndrome: A comparison of two dosage regimens of intravenously administered immune globulin. The Journal of Pediatrics.1990; 117(4):638-644.
20. Newburger J, Takahashi M, Beiser A, Burns J, Bastian J, Chung K et al . A Single Intravenous Infusion of Gamma Globulin as Compared with Four Infusions in the Treatment of Acute Kawasaki Syndrome. New England Journal of Medicine.1991; 324(23):1633-1639.

21. Terai MShulman S.Prevalence of coronary artery abnormalities in Kawasaki disease is highly dependent on gamma globulin dose but independent of salicylate dose. The Journal of Pediatrics.1997; 131(6):888- 893.
22. Shulman ST. Recommendations for the use of intravenous immunoglobulin therapy in Kawasaki disease. Pediatric Infect Dis J 1992; 11:985.2016.
23. Tansley S, Gunawardena H. The Evolving Spectrum of Polymyositis and Dermatomyositis—Moving Towards Clinicoserological Syndromes: A Critical Review. Clinical Reviews in Allergy & Immunology. 2013; 47(3):264-273.
24. Van der Meulen M, Bronner I, Hoogendijk J, Burger H, van Venrooij W, Voskuyl A et al.Polymyositis: An over diagnosed entity. Neurology.2003; 61(3):316-321.
25. Current Opinion in Rheumatology 2010 22; 623-626
26. Dalakas M, Illa I, Dambrosia J, Soueidan S, Stein D, Otero C et al . A Controlled Trial of High-Dose Intravenous Immune Globulin Infusions as Treatment for Dermatomyositis. New England Journal of Medicine.1993; 329(27):1993-2000.
27. Gambini S, Marinangeli L, Morariu R, Gabrielli A, Danieli M. FRI0503 Influence of Treatment on the Outcome of Polymyositis and Dermatomyositis . Annals of the Rheumatic Diseases.2014; 73(Supple 2):569.2-569.
28. Kampylafka E., Clinical and Experimental Rheumatology 2012; 30: 397-401
29. Kaul R, McGeer A, Norrby-Teglund A, Kotb M, Schwartz B, O'Rourke K et al . Intravenous Immunoglobulin Therapy for Streptococcal Toxic Shock Syndrome—A Comparative Observational Study.Clinical Infectious Diseases.1999; 28(4):800-807.
30. Darenberg J, Ihendyane N, Sjolin J, Aufwerber E, Haidl S, Follin P et al . Intravenous Immunoglobulin G Therapy in Streptococcal Toxic Shock Syndrome: A European Randomized, Double-Blind, Placebo-Controlled Trial.Clinical Infectious Diseases.2003; 37(3):333-340.
31. Shehata N, Palda V, Bowen T, Haddad E, Issekutz T, Mazer B et al . The Use of Immunoglobulin Therapy for Patients with Primary Immune Deficiency: An Evidence-Based Practice Guideline. Transfusion Medicine Reviews.2010; 24:S28-S50.
32. Shehata N, Palda V, Meyer R, Blydt-Hansen T, Campbell P, Cardella C et al . The Use of Immunoglobulin Therapy for Patients Undergoing Solid Organ Transplantation: An Evidence-Based Practice Guideline. Transfusion Medicine Reviews.2010; 24:S7-S27.
33. Peraldi M, Akposso K, Haymann J, Flahaut A, Marlin C, Rondeau E et al.LONG-TERM BENEFIT OF INTRAVENOUS IMMUNOGLOBULINS IN CADAVERIC KIDNEY RETRANSPLANTATION.Transplantation. 1996; 62(11):1670-1673.
34. Casadei D, del C.Rial M, Opelz G, Golberg J, Argento J, Greco G et al . A RANDOMIZED AND PROSPECTIVE STUDY COMPARING TREATMENT WITH HIGH-DOSE INTRAVENOUS IMMUNOGLOBULIN WITH MONOCLONAL ANTIBODIES FOR RESCUE OF KIDNEY GRAFTS WITH STEROID-RESISTANT REJECTION.Transplantation.2001; 71(1):53-58.
35. Staak A, Renner F, Suesal C, Dietrich H, Rainer L, Kamali-Ernst S et al . Immunoglobulin Induction Therapy in Renal Transplant Recipients: Effects on Immunoglobulin and Regulatory Antibody Levels. Transplantation Proceedings.2006; 38(10):3483-3485.
36. Jordan S.Evaluation of Intravenous Immunoglobulin as an Agent to Lower Allosensitization and Improve Transplantation in Highly Sensitized Adult Patients with End-Stage Renal Disease: Report of the NIH IG02 Trial. Journal of the American Society of Nephrology.2004; 15(12):3256-3262.
37. Roberts D, Jiang S, Chadban S.The Treatment of Acute Antibody-Mediated Rejection in Kidney Transplant Recipients—A Systematic Review. Transplantation Journal.2012; 94(8):775-783.
38. Criteria for the Clinical Use of Intravenous Immunoglobulin in Australia, July 2012.
39. Feldman RJ, Christen WG, Ahmed AR. Comparison of immunological parameters in patients with pemphigus vulgaris following rituximab and IVIG therapy. British Journal of Dermatology. 2012; 166(3):511–7
40. Enki AH, Hadaschik EN, Eming R, European Guideline (S1) on the use of high-dose intravenous immunoglobulin in dermatology. Journal of the European Academy of Dermatology and Venereology. 2016; 30 (10): 1657-1669