ORBCoN
Ontario Regional Blood Coordinating Network

Inspiring and facilitating best transfusion practices in Ontario.

Ontario Albumin Administration Recommendations

Our Sincere Appreciation to the Working Group

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Ontario Albumin Administration Recommendations

These albumin administration recommendations are offered as a possible treatment choice for some of the more common uses listed in this document. For many of these indications, albumin is not the sole treatment option. It is often used in conjunction with other substances, and in some situations, other treatment options may be considered before administering albumin. Although albumin is a relatively safe human blood product, it should be prescribed with caution. The reasons are two-fold: it is derived from human plasma and therefore carries some of the inherent risks associated with blood products and it is more costly when compared to crystalloids.

Albumin preparations are available in 5% and 25% preparations. The 5% solution has the same oncotic pressure as plasma and its uses are quite different than the hyperoncotic 25% solution. Therefore, this document is divided into 25% albumin indications and conditions treated with 5% albumin. These two solutions are very different in their scopes of use and are not interchangeable.

Note: There is a complete reference list at the end of this document. The reference content was abbreviated within the recommendation table in order to maintain a concise, user friendly format.

Disclaimer: The Ontario Albumin Administration Recommendations are not intended to replace sound clinical judgment concerning a patient's unique situation. No formal monitoring of albumin use in Ontario is being implemented at this time. Furthermore, although the advice and information contained in this document 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 occurred.

25% ALBUMIN ADMINISTRATION INDICATIONS

25% Albumin			
A. Liver Disease			
Indication	**Details**	**Suggested Dose**	**References/Other Information**
Hepatorenal syndrome type 1 (acute onset)	Eligible for liver transplant in conjunction with vasoactive drugs. Consider terlipressin	Day 1: 1g/kg Days 2-14: 100 – 200 mL/day	1. Sanyal AJ et al. Gastroent 2008;134:1360-1368. "Terlipressin is an effective treatment to improve renal function in HRS type 1" 2. Uriz J et al. J Hepatol 2000; 33:43-48. 3. Martin-Llahi M et al. Gastroent 2008;134(5):1352-1359. 4. Gluud LL et al. Cochr DB of Sys Rev 2006;4: CD005162. Cautions that although sample size is small, terlipressin may reduce mortality and improve renal function 5. Sagi SV et al. JGH 2010;25:880-885. "Terlipressin is effective in reversing HRS type 1"
Spontaneous bacterial peritonitis	All patients, in conjunction with antibiotics	Day 1: 1.5g/kg Day 3: 1g/kg	6. Nazar A et al. J Hepatol 2009; 50:S86 "The administration of albumin prevents renal failure, improves survival in patients with cirrhosis and spontaneous bacterial peritonitis" 7. Sort P et al. NEJM 1999; 341(6):403-409 "In patients with cirrhosis and spontaneous bacterial peritonitis, treatment with intravenous albumin in addition to an antibiotic reduces the incidence of renal impairment and death in comparison with treatment with an antibiotic alone" 8. Sigal SH et al. Gut 2007; 56(4): 597–599 Patients with a bilirubin greater than 68.4 umol/L and/or a creatinine greater than 88.4 umol/L, albumin may be of benefit

25% ALBUMIN ADMINISTRATION INDICATIONS

25% Albumin			
A. Liver Disease (continued)			
Indication	**Details**	**Suggested Dose**	**References/Other Information**
Spontaneous bacterial peritonitis (continued)			9. Fernandez J et al. Hepatol 2005;42:627-634. "Albumin but not hydroxyethyl starch improves systemic hemodynamics in patients with spontaneous bacterial peritonitis"
Paracentesis	Greater than 5 L withdrawal of fluid only. Consider oral midodrine or terlipressin	6-8g/L of fluid removed	10. Lata J et al. Hepato-Gastroenterology 2007; 54:1930-1933. "…terlipressin…was as effective as IV albumin in preventing hemodynamic changes in patients with tense ascites treated by paracentesis. The treatment was well tolerated" 11. Bernardi M et al. Hepatology 2011: manuscript accepted Nov 2011, ahead of print. Reduced morbidity and mortality with albumin for paracentesis 12. Alves de Mattos A. Annals of Hepat 2011;10:S15-S20. Albumin is the treatment of choice for tense or refractory ascites when large volume paracentesis are performed 13. Singh V et al. Am J of Gastroent 2008; 103:1399-1405. Midodrine may be as effective as albumin in preventing paracentesis induced circulatory dysfunction
Post liver transplant	Abide by hepatorenal and paracentesis guidelines	See above guidelines	See above references and information

25% ALBUMIN ADMINISTRATION INDICATIONS

25% Albumin			
B. Renal Disease			
Indication	**Details**	**Suggested Dose**	**References/Other Information**
Hypotension during dialysis	These are some other options: saline infusions, adjust antihypertensives, caffeine midodrine, extend dialysis duration	100 mL each episode of dialysis	14. Knoll GA et al. J Am Soc Nephrol 2004; 15:487-492. Saline just as effective as albumin 15. Fortin PM et al. Cochr DB of Systematic Reviews 2010; 11:CD006758. Sparse data. Only one clinical trial
Nephrotic syndrome	**NOT routinely used**	**NOT routinely used**	No albumin treatment indications found
C. Cardiac			
Cardiopulmonary bypass	**NOT routinely used**	**NOT routinely used**	25% albumin preparations are not routinely used for bypass. See 5% albumin section
D. Maternal/Obstetrical			
Ovarian hyperstimulation syndrome (OHS)- **prevention**	**NOT routinely used** Consider cabergoline	**NOT routinely used**	16. Youssef MAFM et al. Cochr BD of Systematic Reviews 2011; 2:CD001302. Little evidence of albumin preventing OHS although starch products decrease the severe OHS occurrences 17. Jee BC et al. Gynecol Obstet Invest 2010;70:47-54. Albumin does not prevent OHS and may decrease pregnancy rate 18. Venetis CA et al. Fertility and Sterility 2011; 95:188-196. No OHS reduction 19. Tehraninejad ES et al. J Assist Reprod Genet 2012;29:259-264. Cabergoline is more effective than albumin

25% ALBUMIN ADMINISTRATION INDICATIONS

25% Albumin			
D. Maternal/Obstetrical (continued)			
Indication	**Details**	**Suggested Dose**	**References/Other Information**
Ovarian hyperstimulation syndrome- **treatment**	May be used. Starch products may also be considered	50 g per 1000 mL of ascites fluid removed	20. Aboulghar M et al. (Cochrane review) Human Reproduction 2002;12:3027-3032. Suggestion of prevention benefit as well 21. Lovgren TR et al. Obstet Gynecol 2009;113:493-495 22. Sansone P et al. Intensive care treatment of OHS. Ann NY Acad Sci 2011; 1221:109-118. Albumin produces a fast collection of extravascular fluid. Also indicates albumin has an important role in prevention
E. Pulmonary			
Acute Lung Injury	Use with Lasix (furosemide)	25 g over 30 mins. Repeat every 8 hours for 3 days	23. Martin G et al. Crit Care Med 2002;30:2175-2182. Improves fluid balance, oxygenation and hemodynamics 24. Martin G et al. Crit Care Med 2005;33:1681-1687. Improves oxygenation, greater net negative fluid balance and hemodynamic stability
F. Pediatric			
Chronic PICU patients with hypoalbuminemia and edema	May be considered	3-4 mL/kg, once or twice a day	No good published data, but it is common practice throughout Canada with anecdotal positive outcomes

5% ALBUMIN ADMINISTRATION INDICATIONS

5% Albumin			
F. Intensive Care Patients			
Indication	**Details**	**Suggested Dose**	**References/Other Information**
Burns/thermal injuries	Use only for burns with greater than 50% BSA (body surface area) when unresponsive to crystalloid. After 24 hrs: Maintain albumin conc. of 2.5 +/- 0.5g/100 mL or a total serum protein level of 5.2g/100mL	All infusion days: 0.3-0.5 mL/kg/BSA, usually 50-100 mL/hour or 1-2 mL/min	25. Cooper A et al. Transfusion 2006; 46:80-89 "Treatment with 5% albumin from Day 0 to Day 14 does not decrease the burden of MODS in adult burn patients". Ringers' lactate is equally effective 26. Fodor L et al. Int J Care Injured 2006;37:374-379. Recommends protein based colloids like albumin and plasma 27. Faraklas I et al. J Burn Care & Research 2011;32:91-97. Albumin patients have longer hospital stays and took longer to resuscitate. However this patient group had larger and more severe injuries. Recommends further studies. 28. Alderson P et al. Cochr DB Syst Rev 2004;4:CD001208. No evidence that albumin reduces mortality in burn patients

5% ALBUMIN ADMINISTRATION INDICATIONS

5% Albumin			
F. Intensive Care Patients-continued			
Indication	**Details**	**Suggested Dose**	**References/Other Information**
Cardiac bypass, circuit priming	Possibly, depending on circuits used. Also institution/patient population specific **NOTE**: some reports indicate the use of 20-25% albumin for this purpose. However, it is diluted with non-colloid solutions to approximately 5%	Pediatric: weight dependent Adult: 1200 – 2000 mL	29. Wilkes MM et al. Ann Thorac Surg 2001;721:527-534 "Postoperative blood loss is significantly lower in cardiopulmonary bypass patients exposed to albumin than HES" 30. Riegger LQ et al. Crit Care Med 2002;30: 2649-2654. 5% albumin prime may reduce wait gain by attenuating the decrease in COP and serum albumin levels in young children after CPB. Transfusion rate may increase. Further study required. 31. Tomi T et al. Anesth Analg 2006; 102:998-1006 "The greatest impairment in hemostasis was seen after hydroxyethyl starch administration, whereas albumin appeared to have the least effect on hemostatic variables" 32. Ernest D et al. Crit Care Med 2001; 29:2299-2302 "In post-op cardiac surgical patients, infusion of 5% albumin is approx. 5X as efficient as a PV expander" but is comparable to saline with effects on changes in ISFV and oxygen delivery 33. Kuitunen A et al. Sc J of Surg 2007; 96:72-78 Albumin group of patients had better pulmonary capillary wedge pressure and hemostasis

5% ALBUMIN ADMINISTRATION INDICATIONS

5% Albumin			
F. Intensive Care Patients-continued			
Indication	**Details**	**Suggested Dose**	**References/Other Information**
Volume resuscitation for hypovolemia	**NOT routinely used May produce harm in the critically ill**	**NOT routinely used**	34. Delaney AP et al. Crit Care Med 2011; 39:386-391. Recommend albumin until further trials conducted although albumin patients had a lower mortality rate 35. Vincent JL et al. SOAP (Sepsis Occurrence in Acutely ill Patients) study. Crit Care 2005; 9:745-754. Indicate albumin is associated with decreased survival in acutely ill 36. Bunn F et al. Cochrane Database of Systematic Reviews 2011;3: CD001319. No colloid solution is preferable. More clinical trials required 37. Finfer S et al (SAFE study investigators). NEJM 2004;350:2247-2250. 38. Cook D. NEJM 2004;35:2294-2296.
Volume resuscitation: Brain injury	**Evidence suggests patient harm-death**	**Evidence suggests patient harm**	39. The SAFE Study Investigators. New Eng J Med 2007;357:874-884. Albumin resuscitation in traumatic brain injured patients demonstrated a high mortality rate
Mild acute lung injury and ARDS	**NOT routinely used**	**NOT routinely used** See 25% albumin	24. Martin GS et al. See'Hypoalbuminemia'
Sepsis	Possible benefit including pediatric patients	Patient dependent	40. Finfer S et al (SAFE study investigators). Intensive Care Med 2011; 37:86-96. Albumin compared to saline did not impair renal or other organ function and may decrease risk of death 34. Delaney AP et al. See 'Volume Resuscitation'

5% ALBUMIN ADMINISTRATION INDICATIONS

5% Albumin			
G. Other Indications			
Indication	**Details**	**Suggested Dose**	**References/Other Information**
Plasma exchange, neurology	5% albumin **ONLY**	Between 1 – 1.5 plasma volume exchanges, every other day. Length of treatment patient dependent (5 – 15 exchanges)	41. Llufriu S et al. Neurology 2009;73:949-953. Demonstrates clinical improvement in 63% of the patients at 6 months 42. Balogun R et al. J of Clin Aph 2010;25:250-264. Used 5 exchanges 43. Polenakovic M et al. Nephrol Dial Transplant 2001;16:99-100. Recommends 3 – 9 exchanges 44. Lehmann HC et al. Arch Neurol 2006;63:930-935. Discusses 3 – 5 exchanges of a 1 to 1.5 plasma volume exchange; some patients require additional exchanges

5% ALBUMIN ADMINISTRATION INDICATIONS

5% Albumin			
G. Other Indications-continued			
Indication	**Details**	**Suggested Dose**	**References/Other Information**
Hypoalbuminemia	**NOT routinely used**	**NOT routinely used**	45. Yuan XY et al. Amer J of Surgery 2008;196:751-755. No benefits were observed when compared to the saline arm 46. The Albumin Reviewers (Alderson P et al). Cochr DB Syst Rev 2004;4:CD001208. "There is no evidence that albumin reduces mortality in critically ill patients with burns and hypoalbuminemia" 47. Finfer S et al (SAFE Study Investigators). BMJ 2006;333:1044. "The outcomes of resuscitation with albumin and saline are similar irrespective of patients' baseline serum albumin concentration"

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38. Cook D. Is albumin safe? NEJM 2004;35:2294-2296.
39. The SAFE Study Investigators. Saline or Albumin for Fluid Resuscitation in Patients with Traumatic Brain Injury. New Eng J Med 2007;357:874-884. Albumin resuscitation in traumatic brain injured patients demonstrated a high mortality rate
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