Dispensing and Administration Guidelines for CIN (Contrast Induced Nephropathy)

NAC (N-acetylcysteine) + Hydration

Oral NAC dosing	Hydration
Give NAC 600mg liquid (3ml of 20% solution) in 9ml ginger ale or cola	0.9% sodium chloride IVF at 1ml/kg/hr 12hrs pre and post catheterization (normal saline preferred, but 0.45% has also been used with success)

IV Sodium Bicarbonate (154 meq/L)

IV Sodium Bicarbonate 154 meq mixed in 1 liter of D5W			
	3ml/kg IV bolus over 1 hour	**1ml/kg/hr x 6 hours IV infusion**	**Total ml infused**
60 kg	180 ml	360 ml (60 ml/hr)	**540 ml**
70 kg	210 ml	420 ml (70 ml/hr)	**630 ml**
80 kg	240 ml	480 ml (80 ml/hr)	**720 ml**
90 kg	270 ml	540 ml (90 ml/hr)	**810 ml**
100 kg	300 ml	600 ml (100 ml/hr)	**900 ml**
≥ 110 kg	330 ml	660 ml (110 ml/hr)	**990 ml**

(JAMA 2004;291(19): 2328-34)

IV N-Acetylcysteine

IV N-Acetylcysteine dosing for CIN		
	150 mg/kg IV bolus over 30 minutes	**50 mg/kg IV infusion over 4 hours**
60 kg	9,000 mg / 500 ml NS	3,000 mg / 500 ml NS
70 kg	10,500 mg / 500 ml NS	3,500 mg/ 500 ml NS
80 kg	12,000 mg / 500 ml NS	4,000 mg / 500 ml NS
90 kg	13,500 mg / 500 ml NS	4,500 mg / 500 ml NS
≥ 100 kg	15,000 mg / 500 ml NS	5,000 mg / 500 ml NS

(The RAPPID Study-J Amer Coll Card 2003;41(12): 2114-8)

UMMC Pharmacy Cost Comparisons with treatment regimens for CIN

Regimens	Cost
600mg NAC x 8 doses (oral)	$ 5.82
2 liters NS	$ 1.60
Sodium bicarbonate 154 meq/liter D5W	$ 1.32 (drug only)
70kg patient- 10,500mg/500ml NS BOLUS IV NAC	$ 183.00 (drug only)
70kg patient- 3,500mg/500ml NS infusion IV NAC	$ 61.00 (drug only)

REFERENCES:

Sodium Bicarbonate

1. Merten GJ, Burgess WP, et al. Prevention of Contrast-Induced Nephropathy with Sodium Bicarbonate. **JAMA 2004;291:2328-2334.**

Normal Saline

2. Mueller C, Buerkle G, et al. Prevention of Contrast Media-Associated Nephropathy: Randomized comparison of 2 hydration regimens in 1620 patients undergoing coronary angioplasty. **Arch Intern Med. 2002;162: 329-336.**

IV N-Acetylcysteine

3. Baker CSR, Wragg A, et al. A Rapid Protocol for the Prevention of Contrast-Induced Renal Dysfunction: The RAPPID Study. **J Am Coll Cardiol 2003; 41(12):2114-8.**
4. Webb JG, Pate GE, Humphries KH, et.al. A randomized controlled trial of intravenous N-Acetylcysteine for the prevention of contrast-induced nephropathy after cardiac catheterization: Lack of effect. **Am Heart J 2004;148: 422-9.**
5. Rashid ST, Salman M, Myint F, et.al. Prevention of contrast-induced nephropathy in vascular patients undergoing angiography: A randomized controlled trial of intravenous N-acetylcysteine. **J Vasc Surg 2004;40: 1136-41.**

Oral N-Acetylcysteine

6. Tepel M, Giet MVD, et al. Prevention of Radiographic-Contrast-Agent-Induced Reductions in Renal Function by Acetylcysteine. **N Engl J Med 2000;343: 180-4.**
7. Briguori C, Manganelli F, Scarpato P, et.al. Acetylcysteine and Contrast Agent-Associated Nephrotoxicity **J Am Coll Cardiol 2002;40: 298-303..**
8. Durham JD, Caputo C, Dokko J, et.al. A randomized controlled trial of N-acetylcysteine to prevent contrast nephropathy in cardiac angiography. **Kidney International 2002;62(6): 1102-07.**

9. Briguoir C, Colombo A, Violante A, et.al. Standard vs double dose of N-acetylcysteine to prevent contrast agent associated nephrotoxicity. **Euro Heart J 2004;25: 206-11.**
10. Oldemeyer JB, Biddle P, Wurdeman RL, et.al. Acetylcysteine in the prevention of contrast-induced nephropathy after coronary angiography. **Am Heart J 2003;146: 1-6.**
11. Miner SES, Dzavik V, Nguyen-Ho P, et.al. N-acetylcysteine reduces contrast-associated nephropathy but not clinical events during long-term follow-up. **Am Heart J 2004;148:690-5,**
12. Shyu KG, Cheng JJ, Kuan P. Acetylcysteine protects against acute renal damage in patients with abnormal renal function undergoing a coronary procedure. **J Am Coll Cardiol 2002;40:1383-8.**
13. Fung JWH, Szeto CC, Chan WWM, et.al. Effect of N-acetylcysteine for prevention of contrast nephropathy in patients with moderate to severe renal insufficiency: A Randomized Trial. **Am J Kidney Dis 43:801-808.**
14. Ochoa A, Pellizzon G, Addala S, et.al. Abbreviated dosing of N-acetylcysteine prevents contrast-induced nephropathy after elective and urgent coronary angiography and intervention. **J Interv Cardiol. 2004;17(3): 159-65.**
15. Goldenberg I, Shechter M, Matetzky S, et.al. Oral acetylcysteine as an adjunct to saline hydration for the prevention of contrast-induced nephropathy following coronary angiography: A randomized controlled trial and review of the current literature. **Euro Heart J 2004;25: 212-18.**
16. Kay J, Chow WH, Chan TM, et.al. Acetylcysteine for prevention of acute deterioration of renal function following elective coronary angiography and intervention: A Randomized Controlled Trial. **JAMA 2003;289: 553-58.**
17. Diaz-Sandoval LJ, Kosowsky BD, Losordo DW. Acetylcysteine to prevent angiography-related renal tissue injury (The APART Trial). **Am J Cardio 2003;89: 356-58.**

Meta-Analysis

18. Liu R, Nair D, et al. N-Acetylcysteine for the Prevention of Contrast-Induced Nephropathy: A systematic Review and Meta-analysis. **J Gen Intern Med 2005; 20: 193-200.**
19. Kshirsagar AV, Poole C, et al. N-Acetylcysteine for the Prevention of Contrast-Induced Nephropathy: A Meta-Analysis of Prospective Trials. **J Am Soc Nephro 2004; 15(3): 1-19.**
20. Birck R, Krzossok S, et al. Acetylcysteine for prevention of contrast nephropathy: meta-analysis. **Lancet 2003; 362: 598-603.**

Other

21. Freeman RV, O'Donnell M, Share D, et.al. Nephropathy requiring dialysis after percutaneous coronary intervention and the critical role of an adjusted contrast dose. **Am J Cardiol 2002;90:1068-73.**