

Conscious Sedation in the Cath Lab: Should we use what GI uses?



MORTON KERN, MD

Clinical Editor
Professor of Medicine
Associate Chief Cardiology
University of California Irvine
Orange, California
mortonkern005@hotmail.com

This seemed to me, a simple cardiologist, like a lot of sedation and it certainly explained my unusual morning after the procedure.

How much is enough conscious sedation (CS) for a cardiac catheterization procedure? Each lab likely has its own regimen. In our lab, most of our patients receive preprocedural oral valium (5mg) and Benadryl (25mg). In the lab, before the vascular access, we give versed (1-2mg) and fentanyl (25-50mcg) intravenously. Our patient is generally comfortable, sleepy, but can be aroused and conversant enough to tell us about pain or other problems. If the patient is agitated or highly anxious, we give additional doses of versed and fentanyl.

However, for GI and other procedures, the doses of CS drugs are much greater and with greater residual effects. Forgive my "shaggy dog" story, but I learned this after my own GI procedure and reading the report in which the GI doctor gave me 6mg intravenous versed and 150mcg fentanyl. This seemed to me, a simple cardiologist, like a lot of sedation and it certainly explained my unusual morning after the procedure. After an hour in the recovery area, I was wheeled out to our waiting car. Still "under the influence" (of conscious sedation) unbeknownst to me, I asked my wife if I could drive home. After she stopped laughing, she said "no," but I could go to breakfast with her. At breakfast, I focused intensely on my identification wrist band and since I had no desire to be labeled as "recently hospitalized," I pulled and tugged the band to rip it off, succeeding with a jerk, and knocking the coffee cup in front of me into the air and all over my wife. Her jump and scream snapped me back to reality. I sat stunned. All I could do was say

Table 1. Informal Survey of Conscious Sedation in the Cath Lab

Location	Versed (mg)	Fentanyl (mcg)	Dilaudid (mg)
Group A*	1-2	25-50	n.u.
Chicago ²	0.5-1.0	25	n.u.
Pennsylvania	1-3	25-100	n.u.
Utah	3-5	25-100	n.u.
Texas, Atlanta ²	1-3	50	
Michigan	1	n.u.	1
Florida	0.5	n.u.	0.5-1
NYC ²	1-2	(+/-25)	n.u.
Edinburgh	2	n.u.	n.u.
Lausanne, Switzerland	None	n.u.	n.u.
France (I'm told)	unknown	25	n.u.
St. Louis ²	No premeds or CS		

n.u. = not used.

Number next to location indicates different lab in same state/city.

**Group A = NC, Philadelphia, Boston, Virginia (x2), NYC¹, Seattle, Springfield, IL, Atlanta¹, Rochester, St. Louis¹, Maine, Chicago¹, New Orleans, St. Louis¹*

continued on next page

EDITORIAL

MORTON KERN, MD
Clinical Editor
Clinical Professor of Medicine
Associate Chief Cardiology
University of California Irvine
Orange, California

LAURIE GUSTAFSON
Executive Editor

REBECCA KAPUR
Managing Editor

STEFANIE TULEYA
Special Projects Editor

BUSINESS

JEFFREY MARTIN
Vice President/Group Publisher
Cardiology Division

CARSON MCGARRITY
Associate Publisher

NICK OTRANTO
Account Manager

ERIN FEHR
Classified Sales Associate

MEGAN GOELLER
Inside Sales



HMP COMMUNICATIONS, LLC

BILL NORTON
President

MEREDITH CYMBOR-JONES
Controller

VIC GEANOPULOS
Creative Director

ELIZABETH MCTAMNEY
Layout/Production Manager

KATHY MURPHY
Production/Circulation Director

BILL MALRIAT
Audience Development Manager

ANITA DALLASTA
Human Resources

TRACY NOCKS
Meeting Planner

MARY BETH POLLART
Meeting Planner

TIM SHAW
Manager of Web Development

FRED KLUMPP
Manager of Information Services



HMP COMMUNICATIONS
HOLDINGS LLC

PAUL MACKLER
Chairman & Chief Executive Officer

JEFF HENNESSY
President & Chief Operating Officer

KEN FISHER
Chief Financial Officer

CIRCULATION:

Contact the Subscription Dept

Tel: (800) 237-7285, ext 5

Or (610) 560-0500 ext. 5

E-mail: subscriptions@hmpcommunications.com

SUBSCRIPTION INFORMATION

CATH LAB DIGEST IS FREE TO QUALIFIED CATH LAB PERSONNEL WORKING IN THE UNITED STATES. ALL OTHER SUBSCRIPTION RATES ARE AS FOLLOWS: UNITED STATES: \$50.00, INTERNATIONAL: \$100.00. SINGLE OR REPLACEMENT COPIES ARE SUBJECT TO AVAILABILITY-U.S. \$10.00; INTERNATIONAL \$13.00. SINGLE COPIES OF ARTICLES MAY BE PURCHASED FOR \$8.00. IF YOU ARE NOT RECEIVING CATH LAB DIGEST AND WOULD LIKE TO, OR HAVE AN ADDRESS CHANGE, CALL 1-800-237-7285, EXT 5 FOR THE SUBSCRIPTION DEPT. OR E-MAIL: SUBSCRIPTIONS@HMPCOMMUNICATIONS.COM.

POSTMASTER

Send address changes to:

Cath Lab Digest

83 General Warren Blvd., Suite 100
Malvern, PA 19355

PRINTED in the U.S.A.

Editorial Correspondence: Rebecca Kapur, Managing Editor, HMP COMMUNICATIONS
Cardiology Editorial Offices, 7427 Winding Way, Brecksville, OH 44141
Tel. (800) 459-8657 Fax: (216) 393-0445 Email address: RKapur@hmpcommunications.com

Circulation: Bonnie Shannon, BShannon@hmpcommunications.com, tel. (800) 237-7285, ext. 246

Advertising: Jeffrey Martin, Vice President/Group Publisher, tel. (800) 237-7285, ext. 238,

Email: jmartin@hmpcommunications.com

Carson McGarrity, Associate Publisher, tel. (800) 237-7285, ext. 234, Email: cmcgarrity@hmpcommunications.com

Nick Otranto, Account Manager, tel. (800) 237-7285, ext. 270, Email: notranto@hmpcommunications.com

Megan Goeller, Sales Associate, tel. (800) 237-7285, ext. 211, Email: mgoeller@hmpcommunications.com

Advertising address: HMP COMMUNICATIONS, 83 General Warren Blvd., Suite 100 Malvern, PA 19355 Tel. (800) 237-7285.

Cath Lab Digest (ISSN# 1073-2667) is issued 12 times per year by HMP COMMUNICATIONS, 83 General Warren Blvd., Suite 100, Malvern, PA 19355. Periodicals postage paid at Malvern, Pennsylvania and additional mailing offices. Printed in USA at Publisher's Press, 100 Frank E. Simon Ave., Shepherdsville, KY 40165

Table 2. List of common medications used for conscious sedation. Source: http://www.massmedboard.org/pca/pca_intravenous.shtml

Medication	Dose	Comments
Sedatives		
Chloral Hydrate	50-100 mg/ kg p.o. or p.r.	Up to 1 gram/ single dose Max dose = 2 grams
Diazepam	0.1 mg/ kg IV slowly (over 3 min.) 0.15-0.3 mg/ kg p.o.	
Droperidol	0.02-0.05 mg/ kg IV slowly (over 3 min.)	Onset: 3-10 min. Peak: 30 min. Duration: 2-4 hrs.
Midazolam	0.05 mg/ kg slowly (over 3 min.) 0.1-0.3 mg/ kg IM 0.5-0.7 mg/ kg p.o.	
Narcotics - (not in infants less than 3 mos.)		
Meperidine	1 mg/ kg IM, SQ, or IV (slowly)	
Morphine	0.1 mg/ kg IM, SQ, or IV (slowly)	
Butorphanol	0.01-0.02 mg/ kg IV (slowly)	
Fentanyl	1-3 mcg/ kg (0.001-0.003 mg/ kg)	Diminished sensitivity to CO ₂ stimulation may persist longer than depression of resp. rate
Antagonists		
Naloxone (for narcotics)	0.01-0.10 mg/ kg IV to desired effect	Brief duration of action (30 to 45 min.)
Physostigmine (for anticholinergic syndrome)	0.015-0.025 mg/ kg to desired effect	Watch for cholinergic side effects (bradycardia, emesis, cramping, salivation)
Flumazenil (for benzodiazepines)	0.1-0.2 mg (partial antagonism) 0.4-1.0 mg (complete antagonism)	Benzodiazepine withdrawal-induced seizures; residual sedation/ hypoventilation
	Pediatric dose not yet established	

The most serious problem of respiratory depression with oxygen desaturation may require reversal of sedation. Naloxone is a competitive antagonist of the opioid receptors; it is used for reversal of narcotic analgesics. Use 0.001 mg/kg IM/IV titrated to effect. Be aware that the duration of naloxone is less than the duration of action for most opiates. Be prepared to re-bolus the naloxone, or use a naloxone drip at .01-.05 mg/min.

Flumazenil is a pure benzodiazepine antagonist and can be used for reversal of benzodiazepine sedation. Like naloxone, it has a shorter duration of action than the benzodiazepine agents it reverses. Prepare to re-bolus with flumazenil, or run a flumazenil drip at 0.1 mg/min. Use 0.2 mg IV every 2-5 minutes titrated to effect, or up to 2-3 mg in total if needed.

It should be clear why there is such a difference between GI and cardiac cath

(like an oaf), "Wow, you've got great reflexes." She said to me, "You're still zonked. Finish your eggs and let's get you home." I didn't think I was so affected for so long after the procedure. I slept the rest of the day. I now better understand and in a very personal way why labs insist on having someone accompany the patient to any procedure in which conscious sedation is used and having them drive the patient home.

After considering how much medication the GI team used, I wanted to see what the variance of the cath lab conscious sedation practice was. I polled some of my friends in cath labs around the country and the world. My survey involved 30 cath lab doctors, two in Europe. Needless to say, they were entertained by my index event. Their regimens are summarized in Table 1.

The survey also indicated several things: 1) Most labs give nearly the same versed/fentanyl doses; 2) It is highly variable if valium and Benadryl are routinely given. Few reported this practice; 3) Morphine (2mg) was occasionally used in only one lab; 4) Other medications are infrequently required, e.g., Zofran for nausea (4mg IV); 5) Two labs

used no conscious sedation (Switzerland and St. Louis2).

The definition of CS is worth remembering. CS is a minimally depressed level of consciousness that retains the patient's ability to maintain a patent airway independently and continuously, and respond appropriately to physical stimulation and verbal commands. Conscious sedation should be distinguished from two other levels of consciousness: deep sedation and general anesthesia. Deep sedation is a controlled state of depressed consciousness or unconsciousness from which the patient is not easily aroused, accompanied by a partial or complete loss of protective reflexes, including the ability to maintain a patent airway independently and respond purposefully to physical stimulation or verbal command. Patients must be suitable to receive CS according to the five classes of patients categorized by the American Society of Anesthesia guidelines:

Class I: Normally healthy

Class II: Patient with mild systemic disease (e.g., hypertension)

Class III: Patient with severe systemic disease (e.g., congestive heart failure), non-decompensated

Class IV: Patient with severe systemic disease, decompensated

Class V: Moribund patient, survival unlikely

Procedural sedation is appropriate for patients in Classes I, II and III. Patients in classes IV and higher are better suited for general anesthesia. There are several contraindications to CS, which include:

1. Recent (<2 hr) ingestion of large food or fluid volumes
2. Physical class IV or greater
3. Lack of support staff or monitoring equipment
4. Lack of experience/credentialing on part of clinician

Common drugs used for CS are listed in Table 2.

lab conscious sedation. When you get a GI procedure, you don't want to feel anything and you don't have to do or say anything. When you get a cardiac cath, you still don't want to feel anything but you may have to cough, talk or hold your breath. You may be asked if you are having any discomfort or chest pain or to move your toes (CVA?). Cardiac cath operators need patient feedback at times, unlike the GI doctors who need you to relax, deeply. It is reassuring that the margin of safety with higher doses of commonly conscious sedation medications used in cardiac catheterization is so large. As one who has first-hand experience, the best part of CS for any of these procedures is the amnesia and knowing the procedure is over when you see the nurses' and your wife's smiling faces wheeling you out to the car. ■

Conscious sedation is a minimally depressed level of consciousness that retains the patient's ability to maintain a patent airway independently and continuously, and respond appropriately to physical stimulation and verbal commands.