Anodyne Imagery: An Alternative to IV Sedation in Interventional Radiology

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> evaluated a nonpharmacologic method, which we call anodyne imagery (anodyne: able to soothe or relieve pain; soothing the feelings; relaxing), as an alternative to the use of drugs in interventional radiology. SUBJECTS AND METHODS. Anodyne imagery technique consists of conditioned relaxation, induction of a trance state, and guided processing of the patient's internal imagery. An intrapatient comparison of drug use was made in five patients who had equivalent procedures with and without anodyne imagery and an intergroup comparison was made between a group of 16 other patients undergoing anodyne imagery and a group of 16 control patients matched for factors affecting use of drugs and recruited from 100 interventional cases analyzed for patterns of drug use. For statistical analysis, drug unit scores (weighting: 1 mg of midazolam = 1 unit and 50 µg of fentanyl = 1 unit) were compared within patients by paired t-test and between groups of patients by analysis of variance in two-sided tests, with *p* less than .05 considered to

> OBJECTIVE. Pain and anxiety are to be expected in patients undergoing interventional procedures, and they are usually treated by IV conscious sedation. Insufficient

> treatment of pain and anxiety can cause cardiovascular strain and restlessness, which may jeopardize the success of the procedure. On the other hand, pharmacologic oversedation can provoke respiratory and cardiovascular depression, thereby increasing the procedural risks and delaying the patient's recovery. We therefore

> RESULTS. The 100 patients who did not have anodyne imagery received 0–6 mg of midazolam (median, 1.4 mg), 0–500 μ g of fentanyl (median, 80 μ g), and 0.5–9 drug units (median, 2.5). Drug administration was insignificantly affected by the physician conducting the procedure, the type of procedure, or the patient's age, but significantly increased with longer table times. Ten of the 21 patients undergoing anodyne imagery associated fear-provoking images with their interventional procedure that were generally intense, vivid, and dramatic. Intrapatient comparison showed significantly lower median drug use with anodyne imagery than without (0.1 vs 5.3 drug units, p = .01). Intergroup comparison also yielded significantly lower median drug use during procedures with anodyne imagery than without (0.2 vs 2.6 drug units, p = .0001).

CONCLUSION. Patients having interventional radiologic procedures frequently experience intense and frightening imagery related to the procedure. Our initial experience with anodyne imagery suggests that this alternative method of analgesia can mitigate patients' anxiety and fears and reduce the amount of drugs used during interventional radiologic procedures, and thereby has the potential to improve procedural safety and increase the speed of recovery.

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be significant.

Pain and anxiety are to be expected in patients undergoing interventional radiologic procedures, and they are usually treated by IV conscious sedation [1–4]. Insufficient treatment of pain and anxiety can cause cardiovascular strain and restlessness that may jeopardize the success of the procedure [5, 6]. Pharmacologic oversedation can provoke respiratory and cardiovascular depression, thereby increasing the procedural risks and delaying the patient's recovery [7, 8].

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We investigated the possible application of a nonpharmacologic alternative method, which we call anodyne imagery.

Anodyne (able to soothe or relieve pain; soothing the feelings; relaxing) imagery is based on techniques of interactive guided imagery that have been used successfully as an adjunct to conventional treatment of surgical pain, cancer, and a variety of medical problems [9, 10]. Anodyne imagery enhances awareness of unconscious "internal" imagery, helps the patient interact effectively with this imagery, and thereby counteracts anxiety and separates the physical pain sensation from its distressing emotional content.

We first applied and evaluated anodyne imagery in patients in whom there was an anticipated high use of drugs during interventional procedures, then in patients undergoing peripheral arteriography. To assess the overall impact of anodyne imagery, we then reviewed our customary use of drugs during interventional procedures, identified factors that affect use of drugs, and by taking these factors into account, compared use of drugs during procedures with and without anodyne imagery.

Subjects and Methods

Use of Drugs During Interventional Procedures

To establish a basis for comparison, we retrospectively reviewed use of drugs in 100 consecutive interventional procedures of 1 hr or longer table time that were performed without anodyne imagery. Table time (t) was defined as the time the patient spent on the procedural table and was divided into three intervals: $1 \text{ hr} \le t < 1.5 \text{ hr}$ (26 cases), $1.5 \text{ hr} \le t < 2.5 \text{ hr}$ (53 cases), and $2.5 \text{ hr} \le t < 2.5 \text{ hr}$ (53 cases), and $2.5 \text{ hr} \le t < 2.5 \text{ hr}$ (26 cases), $1.5 \text{ hr} \le t < 2.5 \text{ hr}$ (53 cases), and $2.5 \text{ hr} \le t < 2.5 \text{ hr}$ (26 cases), $1.5 \text{ hr} \le t < 2.5 \text{ hr}$ (53 cases), and $2.5 \text{ hr} \le t < 2.5 \text{ hr}$ (26 cases), $1.5 \text{ hr} \le t < 2.5 \text{ hr}$ (53 cases), and $2.5 \text{ hr} \le t < 2.5 \text{ hr}$ (26 cases), $1.5 \text{ hr} \le t < 3.5 \text{ hr} = 0.5 \text{ hr} = 0.5 \text{ hr}$. Procedures included 91 vascular, five biliary, and four renal percutaneous interventions. With one exception, all patients were male. The patients were 33–89 years old (median, 66 years). The procedures were performed by a first- or second-year resident supervised by one of three faculty radiologists who had 1, 2, and 8 yr, respectively, of full-time-equivalent experience in interventional radiology. Patients were fully monitored throughout the procedure by ECG, pulse oximetry, and automated blood pressure tracing.

For each procedure, we determined individual drug doses, and because of the synergistic action and combined application of sedatives and narcotics, we assigned a total drug unit score by weighting 1 mg of midazolam as 1 unit, 50 μ g of fentanyl as 1 unit, and 75 μ g of meperidine as 1 unit. The units reflect our customary approach of administering these drugs in increments or fractions of these amounts. We usually alternate midazolam and a morphine derivative until the patient feels comfortable and then shift to a 2:1 morphine derivative preponderance under the assumption that, initially, anxiety (treated by midazolam) prevails, whereas later procedural pain and discomfort due to immobilization (treated by morphine derivatives) and the relatively longer elimination half-time of midazolam predominate. We are aware that the synergistic action of these drugs precludes a clear separation of their effects. We initiate conscious sedation only when patients respond positively to the question of whether they would like something to relax. Sedatives or narcotics are given only when the systolic blood pressure is 90 mm Hg or greater, oxygen saturation per pulse oximetry is at least 89%, the patient is alert, and an observation period of at least 2 min has passed since the last drug application.

To assess whether a previous interventional procedure may "desensitize" patients to pain and anxiety, use of drugs during successive procedures was compared in 12 additional patients who had three or more comparable procedures without anodyne imagery during a 3-year period.

Management of Pain and Anxiety with Anodyne Imagery

Anodyne imagery and hypnosis are similar in that they are not something done to a patient but rather induce a state of attentive, receptive concentration that allows the patient to explore his or her own capacity to interact with an uncomfortable or painful situation [11]. Anodyne imagery, a modification of interactive guided imagery [10], consists of conditioned relaxation with induction of a trance state (focused concentration), transformation of unpleasant and frightening imagery into neutral and manageable imagery, and enhancement of the patient's own pleasant imagery.

The attending radiologist asked the patients whether they would be willing to be guided through a relaxation exercise designed to make them feel more comfortable during the procedure. It was explained that regardless of whether they participated they could receive as much IV sedation as requested within the limits of safety. Of 22 patients asked, one refused.

The person administering anodyne imagery ("the therapist") introduced herself to the patient either just before or after entry into the radiology suite. Once on the procedure table, the patient was instructed to breathe deeply, to contract and relax successive muscle groups, to concentrate on the feeling of relaxation and uplifting associated with this exercise, and to envision an enjoyable place in nature. By repetitive association of the breathing sequence ("signal breath") with pleasantly experienced relaxation, the patient was taught to use rhythmic breathing as a signal eliciting and deepening a state of relaxation at any time desired. The patient was assured that he or she could regain the natural state of awareness at any time by counting from one to three. The patient was then asked to describe what he or she was experiencing. When feelings of discomfort, anxiety, or pain were expressed, the patient was told to allow an image to come up that best represented this experience. Then, this image and its components (e.g., color, spatial resolution, size) were transformed to a neutral content [10]. A positive image of the patient's choice was then evoked, enhanced, and maintained throughout the procedure. The therapist addressed new emotions and images if and when they arose. When painful stimuli were imminent (e.g., local anesthesia, injection of contrast medium bolus, tract dilatation), the patient was instructed to concentrate on a competing feeling such as fullness, coolness, or warmth. Suggestions were given to the patient to respond to instructions when addressed specifically (holding the breath, changing body position on command, indicating the degree of wall stretch caused by an angioplasty balloon) and to use all other sound as a stimulus for deeper relaxation.

The therapist instructed the patients while other team members set up the monitoring equipment and the sterile preparation so that no extra time was needed. In only one case, the start of the procedure was delayed by 10 min to permit the therapist to establish a professional relationship with a patient who initially confronted her with distasteful jokes and attempts at touching.

The therapist was present throughout the procedures and interacted with the patients as needed. In general, patients became more relaxed with time and required increasingly less direct attention. This frequently enabled the therapist to move around in the room and provide assistance to other team members. During cut film runs or during digital subtraction imaging, the therapist left the procedure suite and observed the patient from the adjacent control room.

A total of 21 patients had anodyne imagery. Five of these (Table 1) had an earlier equivalent procedure without anodyne imagery. These five patients served as their own controls.

The other 16 patients, 15 men and one woman, did not have prior equivalent interventional procedures in our department and were compared with a matched control group. Fourteen had diagnostic arteriography for evaluation of vascular disease, one had a periph-

Case No.	Age (yr)	Interventional Radiologic Procedure	Drugs Used (Table Time)	
			Conventional Method (No Imagery)	Anodyne Imagery
1	38	Change of draining jejunostomy tube through mature tract	5 mg midazolam, 188 mg meperidine (30 min)	2 mg midazolam, 150 mg meperidine (30 min)
2	75	Percutaneous gallstone removal through mature tract	3 mg midazolam, 200 μg fentanyl (3 hr)	No drugs (3 hr)
3	49	Partial splenic embolization	3.5 mg midazolam, 300 μg fentanyl (3 hr)	No drugs (3 hr)
4	69	Arteriography and revascularization to prevent limb loss	1 mg midazolam, 50 μg fentanyl (2 hr)	No drugs (3.5 hr)
5	60	Lower extremity revascularization. First attempt aborted because of panic, hypertension	2 mg midazolam, 100 μg fentanyl (1 hr, aborted)	No drugs (3.5 hr)

TABLE 1: Drug Use During Procedures Without and With the Use of Anodyne Imagery

eral vascular recanalization, and one had embolization of a meningioma. Table times were 1 hr \leq t < 1.5 hr in seven cases, 1.5 hr \leq t < 2.5 hr in six cases, and t \geq 2.5 hr in three cases. The control group was selected from the 100 interventional procedures reviewed. A control pair was randomly drawn from a stack of cards matched for type of procedure and length of table time for each of the anodyne imagery patients, except for the meningioma embolization, which was matched with a diagnostic arteriogram of identical table time (3 hr). There was no significant difference in age distribution among test and control groups. Patients who used anodyne imagery were 46–77 years old (mean, 66 years); control patients were 56–80 years old (mean, 70 years).

Statistical Analysis

Because the distributions of drug use were heavily skewed to the right, and because logarithmic transformation adjusted the data to more normal-appearing distributions, statistical analysis was performed with logarithmically transformed data [12]. For comparison purposes, medians were used; they represent the antilogs of the logarithmic means.

The effects on drug use of table time, the physician conducting the procedure, the type of procedure, and prior procedures were evaluated by analysis of variance; the effect of age on drug use was assessed by linear regression analysis. Intrapatient comparison was done by paired t-test, and intergroup comparison was by analysis of variance. A commercial software program (StatView 512, Abacus Concepts Inc., Brain Power Inc., Calabasas, CA) was used for all tests. Results with p less than .05 in a two-sided test were considered significant.

Results

Factors Affecting Use of Drugs During Interventional Procedures

A retrospective review of 100 consecutive interventional procedures performed without anodyne imagery yielded the

TABLE 2: Effect of Table Time on Median Drug Use

Table Time	Midazolam (mg)	Fentanyl (µg)	Drug Units
1–1.5 hr	0.9	49	1.5
1.5–2.5 hr	1.3	76	2.7
≥2.5 hr	2.4	140	3.9

following amounts of drugs used in individual cases: 0-6 mg of midazolam (median, 1.4 mg), 0-500 µg of fentanyl (median, 80 µg), and 0.5-9 drug units (median, 2.5).

With table time divided into three intervals, use of drugs increased significantly with room time (p = .0001, Table 2). Without correction for table time, there was a significant difference in use of drugs among the three physicians conducting the procedures (p = .03). However, when a comparison among the three physicians was done separately for each of the three table time intervals, use of drugs was not significantly different. Nor was use of drugs significantly different among vascular, percutaneous biliary, and percutaneous renal procedures. There was a weak negative, clinically negligible relation between age and use of drugs (p = .05, $r^2 = .04$).

A trend toward increased median use of drugs was observed for the 12 patients in whom successive procedures were compared (p = .045). Patients received 1.6 drug units (range, 0.5–9) during the first procedure, 2.0 drug units (range, 0.5–7.5) during the second procedure, and 2.1 drug units (range, 0.5–7) during the third procedure.

Management of Pain and Anxiety with Anodyne Imagery

Ten of the 21 patients who used anodyne imagery associated fear-provoking imagery with their interventional procedure. Anxiety or pain was experienced in scenes depicting limb loss or in frightening imagery such as "a huge chunk of raw red meat with a butcher knife all the way through it" (case 1, Table 1); "a silver dragon with sharp metal scales bending over me to pierce me" (case 3, Table 1); "being wrapped tightly in a carpet, unable to see and move in the dark" (case 5, Table 1); "being hog-tied like a cow"; and "two huge vultures circling over me and coming down to get me."

Depending on the presenting imagery, the following anodyne techniques were used. One patient (case 1, Table 1) was guided by the therapist to transform the butcher knife in the red meat into a toy knife and to remove it from the meat. The components of this image were changed until an acceptable image resulted: a small, black and white, upsidedown picture, framed, off in the distance. The patient then chose to focus on a bright light in the center of his abdomen, which provided him with a feeling of control over his anxiety and anticipated pain. This intervention alone greatly reduced the need for narcotics, and the patient was delighted with his new ability to control pain and anxiety.

Another patient (case 4, Table 1) was horrified; all he could see was his leg being sawed off. Asked what image he would prefer if given the choice, he said, "to see myself walking." The therapist guided him to a pleasant day outside in nature. The next thing the patient reported was that he was in a foot race with Carl Lewis (the Olympic runner) and that he, the patient, was ahead. By the end of the procedure he had won the race. It was suggested to the patient haunted by the vultures to imagine himself standing up, being able to fly and growing bigger. He did this and reported that he thus scared the vultures away.

Eleven of the 21 patients participating in anodyne imagery concentrated from the beginning on their preferred imagery, which ranged from sitting in a reclining chair and watching television, to taking one deep drag after another of an imaginary cigarette, to visiting a fishing hole in the company of the entire interventional team.

During their postprocedure checks, all patients expressed great appreciation and gratitude for the imagery process. One patient wrote a complimentary letter. As a side effect, anodyne imagery created a pleasant atmosphere for the personnel in the interventional suite. In particular, one procedure (case 4, Table 1) was technically extremely challenging, and the quiet, contented composure of the patient greatly helped the interventional radiologist proceed successfully.

Effect of Anodyne Imagery on Use of Drugs

The five patients who underwent equivalent interventional procedures with and without anodyne imagery (Table 1) had a significantly lower median drug score with anodyne imagery (0.1 drug units) than without (5.3 drug units) (p = .01).

Twelve of the other 16 patients who used anodyne imagery had no sedatives or narcotics at all; the remaining four received 2–2.5 drug units. Control patients were given 0.5-8drug units. Patients who had anodyne imagery had a significantly lower median drug score (0.1 drug units) than did matched control patients (2.7 drug units) (p = .0001).

There were no complications that required treatment or premature termination of procedures in the group of patients

who used anodyne imagery. In the group of 100 patients who did not use anodyne imagery, one patient aspirated during recovery on the ward and required admission to an intensive care unit for 3 days. Three other procedures had to be terminated prematurely because of arrhythmia and cardiovascular instability; they recovered without sequelae.

Discussion

Advances in diagnostic and interventional radiology have been driven predominantly by technologic refinement. Although patients may want "all that modern medicine can deliver, they also fear it" [13]. Recent publications describe heightened anxiety, emotional distress, and frank panic in about one third of patients anticipating purely diagnostic CT or MR imaging [14-17] and in more than half of patients undergoing lower extremity arteriography [2]. In our study, half of the patients who received anodyne imagery related images of fear or anxiety in anticipation of their interventional procedure. The imagery some patients associated with their interventional procedure was, at least for the radiologists involved, surprisingly vivid and dramatic. We do not think that the degree of anxiety displayed is specific to our department; rather, we hypothesize that the intensity (and prevalence) of the patients' anxiety might be underestimated by the interventional community.

Pharmacologic treatment of pain and anxiety during interventional procedures might follow a fairly uniform pattern of drug administration in an institution. In our retrospective study of 100 adult patients, overall use of drugs increased significantly with table time but was relatively unaffected by the individual physician performing the procedure, the type of procedure, and the age of the patient. This places elderly patients particularly at risk, as they may receive similar total amounts of drugs as younger patients do, despite their decreased tolerance of psychotropic medication [18]. Problems can also arise when larger or repeated doses are used during long procedures, when the desired clinical effect of a drug is markedly shorter than its biological half-life (e.g., 30-45 min vs 4 hr for fentanyl), and when accumulation and recirculation of the drug elicits adverse effects [18]. Different institutions use a wide variety of practices: some interventional radiologists use sedation only when the patient becomes restless [19], others titrate IV sedation until the patient develops slurred speech or ptosis [2, 20], and a few use general anesthesia for restless patients. There are justifications for all these practices, and, as stated in our introduction, there are risks of oversedation and risks of undersedation. In addition, the perception of pain and distress, which governs treatment more than the painful stimulus itself, depends largely on the patient's specific situation [21]. This makes it even more difficult to develop a standard drug schedule.

We attempted to overcome the limitations of drug therapy for anxiety and pain by means of anodyne imagery. In a group of 16 patients subjected to anodyne imagery, median use of drugs was significantly lower than in a matched control group. Five other patients who had prior equivalent interventions required reduced amounts or no sedatives or narcotics during the procedure when anodyne imagery was used. It is unlikely that familiarization with the procedure accounts for this latter result. The analysis of patients who

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had several equivalent procedures in our institution without anodyne imagery did not show a decline, but rather a mild increase of median use of drugs during subsequent visits.

The numbers are too small for comparison of the rates of serious complications between patients who had anodyne imagery and those who did not. Although we were able to manage cardiovascular reactions without sequelae during the procedures, one patient who had IV conscious sedation aspirated after he left the radiology department, most likely in relation to incomplete recovery from the drugs. Therefore, significant concern exists about the condition of patients not only during the procedure but also after they leave the fully monitored environment of an interventional suite. In a double-blind study evaluating the efficacy of fentanyl and midazolam in 25 patients undergoing femoral arteriography, one patient had congestive heart failure during sedation before arteriography and required transfer to an intensive care unit, another was too sleepy to answer questions after the procedure and therefore had to be excluded from the study, and seven patients complained of prolonged drowsiness after the procedure [2]. An investigation of midazolam and fentanyl use during upper gastrointestinal endoscopy found that recovery was incomplete 2 hr after the examination [22].

Psychological interventions during procedures are difficult to randomize in a blinded study. The presence of the therapist makes it known to the interventionalist which patients are using anodyne imagery. Also, patients who once learned to manage their fears with anodyne imagery can apply this coping mechanism during recurrent procedures or other fear-provoking situations. This precludes unbiased intrapatient randomization. To overcome these limitations in the present study, we performed an intergroup comparison. In the subgroup of 16 patients subjected to anodyne imagery, median use of drugs was less than one twentieth that in the matched control group. Although the number of patients in this study is small, the large difference in use of drugs for patients who did and did not make use of anodyne imagery yielded a p of .0001 in the interpatient comparison. This would not likely have been meaningfully improved by a larger sample size.

Because patients' attribution to anodyne imagery was not random, we first analyzed factors affecting the use of drugs to aid in the selection of an appropriately matched control group from 100 interventional patients. The objection could arise that the difference in use of drugs might have been achieved by having anodyne imagery patients endure more distress or by medicating control patients unnecessarily. Whereas this is possible, it is unlikely, as all patients, whether subjected to anodyne imagery or not, were told that they had free access to IV medication on demand and were given drugs only if they answered positively when asked whether they would like medication to relax or alleviate pain. The administration of drugs to some patients undergoing anodyne imagery also indicates that medication was not systematically withheld. It should be noted, however, that once psychotropic medication is administered, the patient's ability to concentrate and to generate imagery becomes impaired.

The goal of this study was to explore the potential use of anodyne imagery in interventional radiology. The results are sufficiently encouraging to warrant further investigation. To provide data free of the potential bias introduced by the nonrandom and nonblinded nature of this pilot study, we are planning a study in which patients are randomly assigned to anodyne imagery or to conventional medical therapy; in which the patients determine drug use by pushing the button of a patient-controlled analgesia unit with preset lock-out times; and in which numeric rating of anxiety and pain, as well as physiologic parameters (heart rate, blood pressure, oxygen saturation), are compared.

Several nonpharmacologic methods have been used to counteract pain and fear. Explaining the technical aspects and anticipated sensations of an examination or procedure [17, 23-26] or playing music [27, 28] yielded mixed results in patients undergoing MR imaging and medical interventions. Videotapes promoting relaxation have been shown to reduce narcotic use during dental surgery [29], gastrointestinal endoscopy [30], and femoral angiography [28]. Relaxation alone, however, may fail to alleviate anxiety and may even exaggerate the cardiovascular response if a patient becomes startled during the procedure [31]. Hypnosis has been applied successfully to reduce anxiety during MR imaging [32]. For this approach, a clinical psychologist obtained a complete psychological history, induced an initial trance state outside the examination room, and maintained physical contact with the patient throughout scanning. This routine would be impractical for most interventional practices.

Descriptions of pleasant scenes in nature have been shown to reduce pain when combined with distraction in children undergoing lumbar puncture [33], and when combined with relaxation during MR imaging [17]. Whereas such exterior imagery (presented to the patient by someone else) can alleviate anxiety and pain, the use of internal imagery (generated spontaneously by the patient) is more effective: it takes the patient's individuality into account and thereby empowers the patient to control rather than to avoid fears [34]. During anodyne imagery, the therapist induces relaxation, enhances the patient's awareness of his or her own internal imagery, and assists the patient in converting frightening imagery to acceptable imagery.

Anodyne imagery is based on techniques of interactive guided imagery [10]. The method can be seen as similar to hypnosis in that a state of focused concentration is achieved. The requirements for successful performance are, however, less stringent for guided imagery. Whereas hypnotic pain reduction (or dissociation of pain and its awareness) is believed to require in the patient the trait of hypnotizability and therefore would be expected to preclude successful treatment in as many as one third of patients [35], proponents of interactive guided imagery claim acceptance and success for management of pain independent of this trait [10]. The therapist in our study had a background in radiology technology and hypnosis and developed her anodyne imagery technique after participating in a course on interactive guided imagery [10]. Because our technique does not require full exploration of the patient's underlying psychology, we believe it can be learned and applied by one of the members of the interventional team already present. Costs for establishing anodyne imagery are expected to amount to a onetime fee for training of \$300-700 and, if an additional team member is needed, an extra hourly expense at the equivalent of

the rate of a special-procedure technologist or nurse. This is significantly less than costs associated with a fully trained nurse anesthetist or an anesthesiologist.

A cost analysis should consider several factors. Use of narcotics and sedatives in dosages that could lead to oversedation requires a full-time observer, usually a highly trained intensive care nurse, during the interventional procedure and afterward [36]. Most interventional teams, therefore, include two radiologic technologists, one registered nurse, and occasionally an interventional physician's assistant [37]. For patients who have incompletely recovered from sedation, a monitored environment is mandated. This requires supervisory personnel for every patient leaving a procedure room. Particularly when patients are treated on an outpatient basis and do not require prolonged bed rest because of femoral artery puncture, the request that "every outpatient who has had sedation must be kept under observation for 4-6 hours" [38] necessitates the availability of a holding area and personnel at considerable expense. Therefore, patients who are not fully recovered are sent to either a staffed ambulatory care unit (locally, flat fee of \$450 for up to 6 hr), a recovery room (locally, \$400 per 0.5 hr), or a medical ward. On the ward, sedated patients require additional nursing supervision and assistance: vital signs need to be taken more frequently, food intake may need to be postponed because of risk of aspiration (which complicates the care of diabetic patients), patients may need assistance when getting up to prevent orthostatic collapse, or patients may not be allowed to stand and therefore might require more direct service at the bed side. In addition, an alert patient is able to participate in his or her care by recognizing immediately untoward side effects such as bleeding complications. Patients who have minor procedures under IV sedation may not be able to drive or work for the rest of the day. Many of these costs and inconveniences could be reduced or eliminated if pharmacologic sedation could be replaced by an alternative nonpharmacologic approach, such as anodyne imagery.

Our initial experience with anodyne imagery suggests that this alternative method of analgesia can mitigate patients' anxiety and fears and reduce drug use during interventional radiologic procedures, and thereby has the potential to improve procedural safety and increase the speed of recovery.

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