

## Sedation-risk-free colonoscopy for minimizing the burden of colorectal cancer screening

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conducted a literature review supplemented by our experience and expert commentaries to provide data to support the use of unsedated colonoscopy for colorectal cancer screening. Medline data from 1966 to 2009 were searched to identify relevant articles on the subject. Data were summarized and co-authors provided critiques as well as accounts of unsedated colonoscopy for screening and surveillance. Diagnostic colonoscopy was initially developed as an unsedated procedure. Procedure-related discomfort led to wide adoption of sedation in the US, although unsedated colonoscopy remains the usual practice elsewhere. The increased use of colonoscopy for colorectal cancer screening in healthy, asymptomatic individuals suggests a reassessment of the burden of sedation in colonoscopy for screening is appropriate in the US for lowering costs and minimizing complications for patients. A water method developed to minimize discomfort has shown promise to enhance outcomes of unsedated colonoscopy. The use of scheduled, unsedated colonoscopy in the US appears to be feasible for colorectal cancer screening. Studies to assess its applicability in diverse practice settings deserve to be conducted and supported.

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### Abstract

Unsedated colonoscopy is available worldwide, but is not a routine option in the United States (US). We

## INTRODUCTION

Optical colonoscopy is a necessary follow-up step of all positive colorectal cancer screening tests and is itself one of the recommended modalities for screening. Sedation is usual practice in the United States (US)<sup>[1]</sup>. Its burden includes escort requirement, time for recovery and activity restrictions<sup>[2]</sup>. Anecdotally, to obviate these limitations, busy, knowledgeable endoscopists, chiefs of gastroenterology divisions and medicine department chairs have requested scheduled, unsedated colonoscopy for their own screening and surveillance<sup>[3]</sup>, indicating that the option is not necessarily “inferior or inhumane”. When informed of the details (Table 1), patients have chosen scheduled, unsedated colonoscopy because they do not need to have an escort<sup>[4,5]</sup>. Reports of effective ways of presenting various options and improved techniques for performance of unsedated colonoscopy have been published in recent years<sup>[5,6]</sup>. This new knowledge is essential for paving the way towards more widespread application of these screening options and potentially enhancing participation. The purpose of this invited review is to raise awareness of the appropriateness of unsedated colonoscopy in reducing patient burden in screening.

## METHOD

Medline data from 1966 to 2009 were searched to identify relevant articles on the subject. Data were summarized and co-authors provided critiques as well as accounts of unsedated colonoscopy for screening and surveillance.

## RESULTS OF LITERATURE REVIEW

Flexible fiberoptic colonoscopy was developed as an unsedated procedure in the late 1960's<sup>[7]</sup>. Cecal intubation in difficult diagnostic cases for the pioneer expert colonoscopists was enhanced by sedation<sup>[8]</sup>. Sedation also improved the cecal intubation rates of less skillful colonoscopists<sup>[9]</sup>. A number of US clinicians have proposed options besides routine sedation<sup>[4-6,10-19]</sup>. Scheduled, unsedated colonoscopy is acceptable to patients who value communication with the colonoscopist, or when they lack an escort<sup>[4-6,10-19]</sup>. Nonetheless sedation remains the dominant practice<sup>[1]</sup> and for colonoscopists' efficiency and economic reasons<sup>[20]</sup> deep sedation is gaining support in the US<sup>[21]</sup>.

On the other hand, unsedated colonoscopy has continued to be practiced in many parts of the world<sup>[22-40]</sup> (see Table 2). The need to minimize sedation-related complications in healthy, asymptomatic, average risk individuals undergoing screening or surveillance colonoscopy has been emphasized by authors (mostly non US) who reported new devices for enhancing the performance of unsedated colonoscopy<sup>[41-45]</sup>.

Unsedated colonoscopy conveys the negative stigma that patients are deprived of medications to ensure relief

Table 1 Comparison of sedated and unsedated colonoscopy

	Sedated	Unsedated
Medication risks (hypotension, hypoxia, arrhythmia)	Very, very small	None
Success rate of cecal intubation	~ 90%	80% to 90%
Purge preparation	Mandatory	Mandatory
Escort	Mandatory	Not required
Driving immediately after colonoscopy	Not allowed	Allowed
Discomfort reduced by medication	Very likely	Not applicable
Remember discomfort	No	Yes
Remember discussion during and after colonoscopy	No	Yes
Need monitoring for 15 to 60 min after colonoscopy depending on type and dosage of sedation medications used	Yes	No
May require repeat with sedation	Not applicable	If examination is incomplete

and amnesia of the discomfort<sup>[46-49]</sup>. How can these options be presented to encourage their consideration by both colonoscopists and patients? We earlier proposed the term “sedation-risk-free” colonoscopy<sup>[50]</sup> for discussion. The term sedation-free colonoscopy was used to lessen the negative impact of no sedation<sup>[28,29]</sup>. It was used in describing a more tolerable examination performed with an upper endoscope in patients with low body mass index<sup>[26]</sup>, to assess patient factors predictive of pain and difficulty<sup>[24]</sup> or completion<sup>[23]</sup> of colonoscopy. We advanced the term sedation-risk-free colonoscopy to emphasize its significance in minimizing the burden of sedation-related complications<sup>[50]</sup>. In a recent editorial<sup>[5]</sup>, the implication has been extended to lessening the time burden<sup>[2]</sup> of screening for colorectal cancer.

One practical approach is to present the option as an extended sigmoidoscopy<sup>[14,15,51]</sup>. Sigmoidoscopy for colorectal cancer screening is supported by evidence from case controlled studies<sup>[52]</sup>, although it is not the preferred method in many countries because 40% of all colorectal neoplasia would be overlooked. A recent report of colonoscopy reducing death from left, but not right-sided colon cancer<sup>[53]</sup> suggests that sigmoidoscopy<sup>[54-56]</sup> does have a place in screening. Sigmoidoscopy is performed without sedation coverage. Extended sigmoidoscopy is performed with the aid of a colonoscope after full bowel preparation by oral purgative<sup>[15]</sup>. Without the use of medications, both extended sigmoidoscopy and unsedated colonoscopy obviate nursing cost for monitoring and recovery<sup>[4,5,15]</sup>, the risk of complications<sup>[57]</sup> and patient burden<sup>[2]</sup> inherent in sedation. Presentation, however, is dramatically different. In the former, reaching colonic segments proximal to the splenic flexure is added yield after completion of screening. In the latter, not reaching the cecum is a failure to complete screening. Extended sigmoidoscopy also leaves the option to accept full colonoscopy without sedation to the patient based on tolerable abdominal discomfort<sup>[15]</sup>. Until unsedated colonoscopy sheds its

**Table 2 Worldwide practice of sedation-risk-free colonoscopy**

Endoscopist (location) (N)	Cecal intubation (%)	Special technique	Incomplete/difficult intubation	Predictor(s) of pain	Ref.
GI (Taiwan) (176)	97.70	Colonoscopy	Intolerance ( <i>n</i> = 2), technical difficulty ( <i>n</i> = 1), poor preparation ( <i>n</i> = 1)	Female gender and the endoscopist	[22]
Surgeon (Taiwan) (109)	85.30		Previous gynecological surgery		[23]
GI (Italy) (510)	95.70	Oil, warm water <i>vs</i> air			[24]
GI (Korea) (426)	95.30		Older age, lower body mass index (BMI) and previous hysterectomy	Older age, lower BMI, hysterectomy, diarrhea, 1st time colonoscopy and anxiety	[25]
GI (Korea) ( <i>N</i> = 244) (Low BMI <i>n</i> = 77)	97.7 (UE) <i>vs</i> 79.4 (C) (low BMI)	Upper endoscope (UE) <i>vs</i> Colonoscope (C)	9.3% (UE) <i>vs</i> 32.4% (C) (low BMI)	Use of C rather than UE	[26]
GI (France) (502)	78	Music	Pain, poor bowel prep		[27]
GI (Japan) (848)	99.60		Lower BMI, female, preparation status, previous hysterectomy	Lower BMI, younger age, intubation time, preparation status, previous hysterectomy	[29]
GI (Japan) (287)	96	Ultrathin <i>vs</i> pediatric or standard scope	looping in the ultrathin group, angulations or stricture in the pediatric and standard groups		[30]
GI (Saudi Arabia) (503)	67		Incomplete due to inadequate bowel prep (14.3%), due to pain (9.5%)		[31]
GI (Turkey) (120)	88			Mean pain score: 2.0 for the nonsedated and 3.8 for the sedated patients ( <i>P</i> < 0.05).	[32]
GI (Croatia) (22)				2 of 22 patients in whom no sedation was used had oxygen saturation < 90 %	[33]
GI (Japan) (259)	95-96	Water instillation <i>vs</i> air insufflations		17.1% (water) and 33.3% (air) had abdominal pain ( <i>P</i> < 0.001)	[34]
GI (Italy) (124)		On demand sedation (66% required sedation)		34% reported moderate or severe pain and 22% unwilling to repeat	[35]
GI (Norway) (409)	82 (90 willing to repeat)			Overall cohort: 5% very, 45% moderately, 50% not uncomfortable; 63% women <i>vs</i> 41% men, very or moderately uncomfortable	[36]
GI (Greece) (173)	92 unsedated, 87.9 success			Male gender, segmental colonic resection predict success	[37]
GI (Finland) (120)				After the procedure: midazolam <i>vs</i> placebo group (30 <i>vs</i> 40 mm; <i>P</i> < 0.05; visual analog scale, 0 to 100 mm: 0 = not at all, 100 = extremely).	[38]
GI (Germany) (100)	95 (87 willing to repeat)	As needed sedation (5%)		On a scale of 1 to 9, barium enema and colonoscopy produced similar ratings of discomfort (3.1 <i>vs</i> 3.2)	[39]
Surgeons (Singapore) (40)	78 (93 willing to repeat)	As needed sedation	23% required intravenous sedation	Thirty percent had no pain, 55% minimal pain, 8% moderate pain and 3% severe pain	[40]
GI (Japan) (467)	98-99	Variable stiffness (VSC) <i>vs</i> standard (CC)		Lower mean pain score was noted in VSC patients compared with CC patients	[45]

negative image<sup>[46-49]</sup> or acceptance of sedation-risk-free options as a quality indicator<sup>[50]</sup> is achieved, discussions directed toward encouraging unsedated extended flexible sigmoidoscopy<sup>[14,15,51]</sup> appear to be a prudent approach to optimize screening and minimize burden. After detailed explanation, if patients and providers accept unsedated flexible sigmoidoscopy as the screening modality, any additional examination of the colon performed during the same session (extended flexible sigmoidoscopy) can benefit the patients. An experienced colonoscopist providing back up polypectomy support to several endoscopists, simultaneously performing screening by extended flexible sigmoidoscopy is a reasonable model for further health services research evaluation.

Other approaches such as sedation as-needed (de-

termined by the colonoscopist) and sedation on-demand (at the patient's request) have been reported in community<sup>[10,16]</sup> and Veterans Affairs (VA)<sup>[13,17]</sup> practice settings in the US. There is a lower likelihood of coercion with sedation on-demand, as the patient can request medications at any time. Neither, however, can obviate the need for nursing staff and an escort to be available as it cannot be predicted ahead of time which patient will require sedation. Nonetheless, for the patients who can complete without sedation the burden can be avoided. Twenty-eight percent of community<sup>[10]</sup> and 75% of VA<sup>[11]</sup> patients accepted the option of sedation on-demand. Amongst these, 77%<sup>[11]</sup> to 81%<sup>[10]</sup> completed without sedation and reported minimal discomfort<sup>[10,11]</sup>. With good bowel preparation, the success rate of cecal intubation

in unsedated colonoscopy provided in the form of as-needed or on-demand sedation is > 90% when attending staff performed the examinations<sup>[10,11,16,17]</sup>.

In the US unscheduled, unsedated colonoscopy has been offered to about 1%-2%<sup>[58,59]</sup> of patients without an escort. Scheduled, unsedated colonoscopy has been requested by about 6%-7%<sup>[16,60]</sup> of patients who are educated professionals with independent knowledge of the feasibility of the option. A nursing shortage at the Sepulveda VA led to the introduction of scheduled, unsedated colonoscopy in recent years<sup>[4]</sup>. The pros and cons of sedation and no sedation (Table 1) are provided to the patient during the pre-endoscopy visit. The colonoscopist will minimize the air insufflated into the colon and keep the length of the colonoscope inside the patient short to decrease discomfort due to distension or stretching of the colon, respectively<sup>[61]</sup>. During the examination, the colonoscopist will repeatedly inquire about abdominal discomfort, not to remind the patient that the examination should hurt, but to give the colonoscopist a head-start on implementing maneuvers to avert the up-coming discomfort. The patients are also told about the potential need for changing positions and for abdominal compressions to facilitate advancement of the colonoscope. Unsuccessful unsedated colonoscopy may warrant a repeat with sedation. The patients choose either the sedated or unsedated option<sup>[4]</sup>. The program is an attempt to restore access to the colonoscopy service which was discontinued due to nursing shortage<sup>[4]</sup>, emphasizing patient-centered care and informed choice<sup>[12]</sup>. Without sedation backup the success rate is only around 80% when usual air insufflation is used<sup>[4,5]</sup> comparable to that reported overseas<sup>[31,36,40]</sup>. When a water infusion method in lieu of air insufflation is used, the cecal intubation rate is enhanced to > 90%<sup>[5]</sup>.

Scheduled, unsedated colonoscopy was acceptable to 25%<sup>[11]</sup> to 30%<sup>[4,5]</sup> of patients who were interested in communication with the colonoscopist when the option was offered at two VA facilities, one with<sup>[11]</sup> and one without<sup>[4,5]</sup> on-site capability to sedate patients. Ninety-eight of 145 patients indicated that the absence of escort requirement was one of the main reasons for their choice of no sedation<sup>[4]</sup>. Many reflected that had it not been for the option, they would not have been able to participate in screening by colonoscopy or the follow up of the finding of occult blood in their stool<sup>[6]</sup>. A hypothesis suggested by the latter comment that scheduled, unsedated colonoscopy enhances the effectiveness of other screening modalities deserves to be evaluated. Indeed this approach can complement the solution of arranging escorts proposed to solve the issue of lack of escorts in an inner city screening program with low compliance<sup>[62]</sup>. The experience of scheduled, unsedated colonoscopy<sup>[4,5,12,13]</sup> cannot be generalized to the US screening population at large since the data are derived from veterans (> 95% men) without complex pelvic anatomy, pathology and pain threshold. Another view opposing scheduled, unsedated colonoscopy is

that the emphasis on practice efficiency and economics in the US<sup>[20]</sup> dictates that the endoscopist should not be spending extra time talking to the patient in spite of the positive gains from having no sedation. We propose unsedated colonoscopy as an option that patients can accept or decline, without coercion from the colonoscopist. For diagnostic colonoscopy, any and all potential burdens of sedation<sup>[2,57]</sup> are acceptable. The definition of screening involves application of a test in asymptomatic and otherwise healthy individuals. The potential burden of sedation<sup>[2,57]</sup> may not be justifiable if an individual is willing to accept unsedated colonoscopy for screening.

As described above, in US patients who choose the options, the success rate is high. A strategy that will permit individuals with the potential ability to complete colonoscopy without sedation to access unsedated or sedation on-demand colonoscopy will translate into many who can avoid the direct and indirect costs of sedation. A cost-effectiveness analysis based on the proper perspective, however, remains to be performed and reported. The real challenge is to convince practicing colonoscopists in the US to consider a "less burdensome approach" for patients willing to undergo unsedated colonoscopy. Data can then be collected to compare the cost and the effectiveness of sedated and unsedated colonoscopy.

In unsedated patients, a limitation to cecal intubation is discomfort<sup>[4,36]</sup>. Complementary alternative medicine approaches to minimize discomfort include hypnosis<sup>[63]</sup> and listening to music<sup>[64]</sup>. Mechanical techniques including magnetic endoscopic imaging<sup>[43,65]</sup> and small caliber over tube-assisted<sup>[66]</sup> colonoscopy can attenuate discomfort in the unsedated patients. Water immersion<sup>[24,67,68]</sup> and warm water infusion in lieu of air insufflation<sup>[5,13,69-71]</sup> techniques have shown promise in minimizing discomfort and the need for sedation. The efficacy, acceptance by patients and colonoscopists, and the practicality of trainee education<sup>[68]</sup> should be evaluated to determine the feasibility of implementation by future practitioners.

Family practice programs in the US have embraced the teaching of unsedated colonoscopy<sup>[72]</sup>. However, they constitute only a small fraction of such trainee procedural education. Paradoxically, the education of gastrointestinal (GI) trainees in unsedated colonoscopy has been deemed impractical<sup>[16]</sup>. Serendipitously, the incorporation of unsedated colonoscopy into our training program revealed that the involvement of GI trainees in routine unsedated colonoscopy was feasible<sup>[4]</sup>. These observations suggest that the appropriateness of the US Accreditation Council for Graduate Medical Education 2005<sup>[73]</sup> in continuing to exclude the learning of unsedated colonoscopy from the GI trainee curriculum deserves to be reexamined. The hypothesis that teaching the superior skills needed for "unsedated colonoscopy" at the trainee stage deserves to be evaluated further<sup>[6]</sup>. Whilst more challenging at that time, this should become a very good investment in the longer-run - likely to

reduce complications, increase accuracy, and lower the burden of sedation for individual patients.

## EXPERT COMMENTARIES

The next section is devoted to commentaries from around the world (arranged in alphabetical order of co-authors) provided by expert colonoscopists who have reported on their experience of providing unsedated colonoscopy to their patients or themselves accepted the option and underwent unsedated colonoscopy.

### **Dr. Aljebreen (Riyadh, Saudi Arabia)**

Although the feasibility of unsedated colonoscopy is well established, it's not uncommon to hear that "it is inhumane" when this issue is discussed among colleagues. There are many reasons why some patients prefer to undergo colonoscopy without sedation. In our experience<sup>[31]</sup>, no escort requirement, fear of the usual sedation-related complications and restrictions on activities for almost one full day are the common reasons why patients choose unsedated colonoscopy. There is a subset of patients who feels the risk of perforation might be higher with sedated colonoscopy because of the absence of the warning sign of pain. They prefer unsedated over sedated colonoscopy to avoid this risk. Whether this difference is real or not deserves to be evaluated in future studies. There is another group of patients who want to know the result of their colonoscopy on the spot and who don't want to feel anxious waiting for their next visit. On the other hand, in addition to fear of pain one of the most common reasons for choosing sedated over unsedated colonoscopy is the embarrassment associated with the endoscopist being of a different gender. Contrary to the belief of many endoscopists, the time to reach the cecum is comparable in sedated and unsedated colonoscopy (12 min and 11.7 min, respectively). There is, however, a big difference in the total time from admission to discharge (83 min and 21 min, respectively) (our unpublished data). When time is taken to address these differences with the patients, many would consider unsedated colonoscopy.

### **Dr. Brocchi (Bologna, Italy)**

The evidence discussed above suggests colonoscopy without routine sedation is a plausible approach. Its application does vary widely among countries and cultures, ranging from routine to an uncommon practice. In non-sedated patients, procedure-related discomfort limits cecal intubation when traditional air insufflation is used. Various methods including water-related adjunct techniques contribute to overcoming this limitation. Less or no sedation are possible when these water-related techniques are used, even in settings where sedation is routine, without compromising patient satisfaction or quality of the examination (e.g. cecal intubation rates, adenoma detection rates, complication rates). In our

experience, whether unsedated colonoscopy is employed or not depends on a variety of endoscopist and patient factors. In the endoscopists' view, major favourable points are the lack of sedation-related complications, the gaining of time in the turn-over of patients and the lack of adjunctive nurse requirement for the recovery room (with decreased institutional costs). On the other hand, endoscopists have to spend some time to reassure patients that the unsedated examination is not too unpleasant and that sedatives or analgesics may be given at any time during the examination in case of discomfort or pain. Furthermore, the possibility of losing an unsatisfied patient may play in favour of sedation in the mind of endoscopists. The major patient argument against no sedation is the fear of discomfort or pain during the examination, making the possible advantages after a sedation-free examination (e.g. no need for an escort and no activity restrictions, in particular driving) less important from their point of view.

To take full advantage of the opportunities offered by this new approach, in our Endoscopy Unit<sup>[24]</sup> we have adopted a policy of starting colonoscopy without sedation, but with an intravenous catheter always inserted. Patients are reassured regarding the possibility of receiving drugs at any time during the examination, in case of discomfort or pain. This simple approach, in our experience, reassures and calms the patient, making them more cooperative during the examination. We always employ the warm water method with minimal air insufflation. Intravenous drugs are given, at the discretion of the endoscopist, when patients show signs of substantial pain or when significant technical difficulties are encountered (e.g. in cases of an angulated colon). Patients are sometimes asked to bear some pain for a short time. In this way, we have decreased significantly the number of patients requiring conscious sedation and the amount of sedatives used. Notably, we performed our study mostly on unselected patients, thus the results are largely applicable to our daily endoscopic practice. In our opinion, this approach could be a good balance between an over- or under-use of drugs during colonoscopy. Lastly, we wish to underline another practical point as we have noted a tendency towards an increase in colonoscopy requests (now in our Unit the requests ratio for endoscopies -gastrosopies versus colonoscopies - is about 1:3/1:4). This is probably due to an increasing awareness of the importance of colorectal cancer screening. If this is confirmed in the near future, endoscopy units will face increasing demand for their services. The hypothesis that the use of colonoscopy without routine sedation combined with water-related techniques may enhance performance and productivity deserves to be tested.

### **Dr. Liao (Taipei, Taiwan, China)**

In Taiwan, the costs of screening colonoscopy and sedation are US\$75 and US\$100 respectively and are not reimbursed by insurance. Besides being expensive,

sedation significantly increases the demand on medical resources and personnel, limiting the use of colonoscopy in Taiwan. In a prospective evaluation of the feasibility of primary screening with unsedated colonoscopy, we found that it was well accepted in nine-tenths of examinees who chose this option<sup>[22]</sup>. If this knowledge can become more widely known through adequate education and counseling and, as a result, sedation is not administered routinely, screening colonoscopy may become more affordable and available in Taiwan. We have also noted a significant association between the individual endoscopist and the pain and need for sedation during colonoscopy<sup>[22]</sup>, a finding that is generally well recognized but has not been proven. Therefore, more attention to unsedated colonoscopy in endoscopy training may increase its acceptance and use. This will be necessary to make unsedated colonoscopy more widely accepted.

**Dr. Mizukami (Yokohama, Japan)**

I believe that sedation is not necessary for routine colonoscopy except in patients with severe mental illness. The collapse-submergence method for insertion described by us<sup>[68]</sup> causes hardly any pain in most unsedated patients in Japan. Almost 100% of the colonoscopy in our hospital (Yokohama Municipal Citizen's Hospital, Japan) has been performed without sedation. I believe that pain during colonoscopy indicates the risk of perforation and that sedation masks this important warning. I think that a painless unsedated colonoscope insertion technique is essential for patient safety. The collapse-submergence method minimizes colonic distension by water infusion and allows complete removal of air when the tip of the colonoscope is in the rectosigmoid location. These maneuvers straighten the rectosigmoid colon to enable the colonoscope to be inserted without causing looping of the colon<sup>[68]</sup>. The volume changes in the colon during colonoscopy were measured. The total volume of residual gas removed from the rectum and sigmoid colon in our subjects was 205 ± 28 mL (mean ± SD, *n* = 3). The average volume of water infused was 234 ± 19 mL (*n* = 11), and that of the fluid aspirated during the scope insertion was 441 ± 62 mL. This negative balance is considered favorable for the examination. We asked 21 patients to report their discomfort just after the colonoscopy using the following scale: grade 1, nothing wrong; grade 2, strange feeling; grade 3, distension of the abdomen; grade 4, tolerable pain; and grade 5, intolerable pain. The median self-reported score was grade 2 [grade 1, grade 3, (25%, 75%, respectively)]. In our experience even trainees can perform painless unsedated colonoscopy from the outset. We have demonstrated the ease of mastering of the technique by trainee endoscopists, as follows. Under my supervision, 6 novices with only experience in upper gastrointestinal endoscopy inserted the colonoscope by this method in 1 patient per week. As long as the patients did not complain of pain they were allowed 10 min to accomplish the insertion. The first cecal

intubation within 10 min was accomplished after an average number of 3.3 patients. The average success rate of cecal intubation during the first 3 mo was 59%.

**Dr. Triantafyllou (Athens, Greece)**

In Greece, up to 20% of the colonoscopies are performed on totally unsedated patients. However, sedation on patient demand or when judged necessary by the endoscopist is given in the majority of cases, leaving only a small percentage of scheduled, sedated examinations. In 2000, Professor Ladas showed, in his private facility, a colonoscopy completion rate of just below 90% with small amounts of sedation given to less than 10% of the patients. He proposed that male gender and segmental bowel resection are good predictors of successful sedationless colonoscopy<sup>[57]</sup>. Eight years later we performed a quality assurance audit in our academic center, where sedation was given in only 40% of the patients. When we excluded cases with organic bowel obstruction, the total colonoscopy completion rate was 88.2%. Moreover, in colorectal cancer prevention cases (index or surveillance examinations) this rate was 92.4%. Use of sedation - analgesia was associated with a 3.8% increase in the colonoscopy completion rate but this benefit was compensated by a significant increase of adverse reactions, which were all mild<sup>[74]</sup>. Therefore, we are in the process of setting up a study for patients in such a way that they will have the option of receiving sedation. Colonoscopy will start with no sedation but medication can be given either on patient demand during the examination or if the endoscopist decides to continue the exam with the patient sedated. The study's primary endpoint will be the percentage of patients achieving colonoscopy to the cecum without sedation in the two groups of patients: conventional instrument insertion with air vs. water assisted insertion. We shall compare our results with those of others with comparable designs in different locations around the world. The results will shed light on similarities and differences in diverse cultural settings.

**Dr. Chang (Chicago, IL, United States)**

I have now had about four colonoscopies, all unsedated, following the finding of a malignant polyp. Each was uneventful and easily tolerated. In every instance, the procedure was performed by a skilled colonoscopist who was judicious with insufflation and navigation. The duration of the entire procedure was in fact shorter than sedated colonoscopy because detailed preparation and recovery periods were not required. I was able to return to work immediately. My positive experience with unsedated colonoscopy can be attributed to two factors. First, each procedure was performed by a skilled endoscopist. Second, my state of mind - I knew what to expect and experienced minimal anxiety during the procedure.

**Dr. Schapiro (Encino, United States)**

Due to my strong family history of colon cancer I

have had eight colonoscopies during the past 30 or so years and seven of these have been unsedated. I have also performed many thousands of colonoscopies, a small percentage of which have not used sedation. I am a firm believer that unsedated colonoscopy is a safe and effective approach that is vastly underutilized. However, the primary problem resides at the beginning training level where (at least in this country) sedated colonoscopy is the standard of practice. Not only does this hinder the unsedated approach, but does not allow the early development of “painless” colonoscopy as technique (loop removal) is less emphasized. The vast number of community colonoscopists get over discomfort by forming larger loops than are required for unsedated colonoscopy. I feel that the concept of unsedated colonoscopy needs to be part of the early training experience and then patients can be offered this as the primary alternative by physicians who believe in their ability to offer “painless” colonoscopy. There are of course other obstacles mostly related to patient’s preconceived fear of rectal intubation. I feel that will be overcome with proper education of the lay population.

## DISCUSSION

The above review indicates that sedation-risk-free colonoscopy adequately depicts the potential of unsedated colonoscopy to minimize patient burden due to sedation in screening examinations. It is feasible not only worldwide, but also in the US. Colonoscopists describe the pros and cons and offer it as an option that the patient can accept or decline without coercion, based on their needs and preferences. A water method developed to minimize discomfort has shown promise in enhancing outcomes of unsedated colonoscopy.

No colonoscopist, particularly those who are against or uncomfortable with sedation-risk-free colonoscopy, should feel compelled to offer this option to his/her patients in the US. By the same token, she/he should not stand in the way of progress towards patient-centered care focused on minimizing patient burden. Our first-hand experience is that the requirements (escort, time commitment) of sedation for colonoscopy clearly preclude patients with limited resources (lack an escort, cannot afford to take time off from work) from participation in screening colonoscopy. Our opinion, backed by data in the literature and expert commentaries, is that even in the US, unsedated colonoscopy is an option that can close the gap between disparity subgroups. It is also an option that patients can reject if it does not meet their needs. On the other hand, it is an option that some patients can use to allow them to participate in the screening that we recommend. Since the unsedated option is non-standard practice in the US, we included commentaries by expert colonoscopists from around the world provided. They have reported on their experience of providing unsedated colonoscopy to their patients or accepted the option for their own screening. The technique received endorsement in both cases.

In conclusion, the use of scheduled, unsedated colonoscopy in the US appears to be feasible for colorectal cancer screening. Studies to assess its applicability in diverse practice settings deserve to be conducted and supported.

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