



# Awake! The Effect of Unsedated Colonoscopy on Adenoma Detection Rate

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## Introduction

Sedation is routinely used during colonoscopy procedures, and use of deep sedation is increasing. However, sedation is associated with complications, including risks of aspiration<sup>1</sup> and perforation<sup>2</sup>, as well as lengthened recovery times and return to full activity. Anesthesia was associated with an increase of perforation, hemorrhage, abdominal pain, complications secondary to anesthesia, and stroke<sup>3</sup>.

Colonoscopy without sedation is feasible, effective, and well tolerated in a typical U.S. population<sup>4</sup>. Although it is associated with psychological distress, the short duration of psychological impact and low colonoscopy complication rate seems reassuring<sup>5</sup>.

The effect of sedation on measures of colonoscopy quality has not been thoroughly investigated. This study aims to determine whether unsedated colonoscopy is associated with adenoma detection rate (ADR). ADR is an established measure of quality associated with reduced risk of interval colorectal cancers. ADR is determined by the number of patients found to have colonic adenoma(s) in every 100 colonoscopies performed by an endoscopist.

## Statement of the Problem

This study aimed to answer the following questions:

1. Is unsedated colonoscopy associated with ADR?
2. Is there a significant difference on the ADRs under no sedation (NS), moderate sedation (MS), and deep sedation (DS) according to age, gender, body mass index (BMI), and indication?
3. What is the overall difference on the ADRs under NS, MS, and DS?

## Method

This is a nonrandomized study utilizing data collected prospectively in our UCI Colonoscopy Quality Database (UCICQD) and included all colonoscopies performed in our outpatient facilities between June 2012 and May 2016. The UCICQD Database collected data included polyp detection rate (PDR), ADR, cecal intubation rate (CIR), intubation time (IT), withdrawal time (WT), and level of sedation categorized as DS (including general anesthesia and monitored anesthesia care), MS, NS among others. For the purpose of this study, the primary endpoint was to compare ADR between NS, MS, & DS. We also stratified these groups by age, gender, BMI, and indication. Significance was determined by two-proportion Z-test.

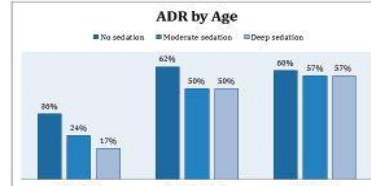
### Reference

- (1) Cooper G, Rex D, et al. Complications following colonoscopy with anesthesia assistance. *JAMA Intern Med.* 2013; 173(7): 551-556
- (2) Adayama A, Waswaya H, et al. Does sedation type affect colonoscopy perforation rates? *Dis Colon Rectum.* 2014 Jan; 57(1): 110-4
- (3) Wernell K, et al. Colonoscopy risk increases with anesthesia. *2015. Gastroenterology.* 2016 Apr; 150 (4): 888-894

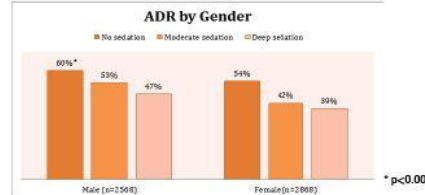
- (4) Petrii J, Egan JI, Hahn WJ. Unsedated colonoscopy: patient characteristics and satisfaction in a community-based endoscopy unit. *2009. Gastrointestinal Endoscopy.* 2009 Mar; 69 (3): 567-572
- (5) Vermeer NCA, Sajders HS, et al. Colorectal cancer screening: Systematic review of screen-related morbidity and mortality. *Cancer Treatment Reviews.* 2017 Mar; 54: 67-98

## Results

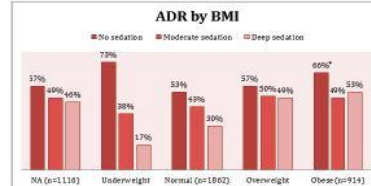
Of the 5436 colonoscopies included in analysis, 4284 (79%) were performed with MS, 788 (14%) with DS and 364 (7%) with NS. The NS group was weighted towards male gender ( $p<0.001$ ) and screening indication ( $p=0.003$ ), whereas the DS group was weighted towards BMI $>29.9$  ( $p<0.001$ ).



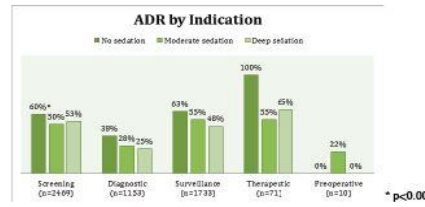
The chart compares ADR by age in three categories (<50, 50-70, and >70). The study included 920 (17%) patients who were younger than 50 years old, 3535 (65%) were between the ages 50-70, and 981 (18%) were older than 70. Among patients whose ages are <50, ADR is 12% higher than MS and 19% higher than DS. In patients between the ages 50-70, ADR with NS is higher at 62% compared to MS and DS which were both at 59%. For patients above 70 years old, ADR with NS only showed 3% difference compared to MS and DS. However, the trend shows that ADR with NS is generally higher than MS and DS.



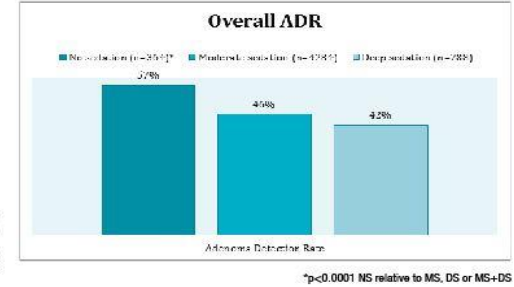
The chart compares ADR by gender (male and female). The study included 2568 (47%) males and 2868 (53%) females. Among the male population, ADR is 7% higher than MS and 13% higher than DS. On female population, NS is 12% higher compared than MS and 15% higher than DS. This comparison shows that ADR under NS is superior in both male and female patients.



The chart compares ADR by BMI in five categories (underweight, normal, overweight, obese and NA). A total of 169 (3%) fell under the BMI of 18.5, 1862 (34%) were normal between the BMI of 18.5-24.9, 1375 (25%) were overweight with the BMI of 25.0-29.9, and 914 (17%) were over the BMI of 29.9. The ADR of underweight group with NS was 35% higher compared to MS and 56% to DS. The trend continues with the normal group with NS having 10% higher ADR compared to MS and 23% to DS. In the overweight group, ADR with NS was 7% higher than MS and 8% higher than DS. The ADR in the obese group with NS was 17% higher than MS and 13% higher than DS. Finally, NA group under MS is 8% higher than MS and 11% higher than DS. The trend shows a high ADR with NS.



The chart compares ADR by indication in five categories (screening, diagnostic, surveillance, therapeutic, and preoperative). The study included 2469 (45%) colonoscopies indicated for screening, 1153 (21%) for diagnostic, 1733 (32%) for surveillance, 71 (1%) for therapeutic, and 10 (0.2%) for preoperative. The ADR of screening group with NS was higher by 10% compared to MS and 7% to DS. The trend continues with the diagnostic group with NS having 10% difference compared to MS and 13% to DS. In the surveillance group, ADR with NS was 8% higher than MS and 15% higher than DS. In the therapeutic group, NS was 45% higher than MS and 35% higher than DS. The preoperative group was only done with MS. Overall the table shows a consistent high ADR with NS compared to MS and DS.



The chart compares ADR by level of sedation in three categories (NS, MS, and DS). The study included 364 (7%) procedures that were done with NS, 4284 (79%) with MS, and 788 (1%) with DS. ADR with NS is significantly higher by 11% than MS and 15% than DS.

Overall, ADR was higher among NS compared to MS (57.42% vs 46.30%,  $p<0.0001$ ), to DS (57.42% vs 42.38%,  $p<0.0001$ ) or to those under MS + DS (57.42% vs 45.70%,  $p<0.0001$ ). There was a marginal increase in ADR when comparing NS to DS (46.30% vs 42.38%,  $p=0.045$ ). Multivariate analysis including all 26 collected variables continued to show a trend towards improved ADR in NS cases compared to MS and DS [OR=1.07 (95% CI 0.96-1.22)].

## Discussion

In our institution, unsedated colonoscopy consistently shows superior ADR whether it is based on age, gender, BMI, and indication. The overall ADR was notably highest when compared with sedation cases and the reason for this difference is not explained by other factors known to affect ADR in our dataset. Our results suggest that detection of adenomas is enhanced when patients are awake, engaged and observing the performance of their colonoscopy. These data encourage use of unsedated colonoscopies to reduce interval cancers, complications associated with moderate and deep sedation, recovery time and return to full activity.



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