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# Inequities in rates of variceal screening examinations

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## Abstract

**Background:** The role of esophagogastroduodenoscopy (EGD) in screening for varices in patients with cirrhosis is well established. However, it is unknown how insurance status impacts the rate of variceal screening. Therefore, we examined an at-risk population to determine the effect of insurance status on the rate of variceal screening.

**Results:** Data were available on 111 patients who had an EGD ordered for variceal screening over this 18-month period. Analysis showed that six of sixteen (37.5%) uninsured patients versus sixty-three of ninety-five (66.4%) insured patients underwent EGD for screening purposes. Comparing these rates revealed a significant difference ( $p < 0.05$ , 95% CI 0.0841, 1.034). There were no significant differences comparing gender or ethnicity among the two groups. The unadjusted odds ratio (OR) of completing screening dependent on insurance status was 3.28 (95% CI 1.09–9.84,  $p = 0.03$ ). These findings suggest that lack of insurance negatively affects EGD completion rates among the cirrhotic patient population.

**Conclusions:** This analysis suggests that lack of insurance adversely impacts variceal screening rates among patients with cirrhosis. Recognition of this disparity is an important first step in finding methods to deliver appropriate care to these patients, reduce avoidable adverse outcomes and decrease the high cost of hospitalization associated with this pathology.

**Keywords:** Esophagogastroduodenoscopy (EGD), Varices, Cirrhosis, Nonselective beta blocker therapy (NSBB), Transnasal endoscopy (TNE)

## Background

Patients with cirrhosis are at increased risk for the development and subsequent hemorrhage of esophageal and gastric varices. It is estimated that 30% of patients with compensated cirrhosis and up to 60% of patients with decompensated cirrhosis have esophageal varices at the time of their diagnosis (Vlachogiannakos et al. 2000). The current annual risk of a patient's first variceal hemorrhage is approximately 12% with a mortality of 15–20%, which represents an improvement over prior mortality rates as a result of advances in pharmacologic and endoscopic screening and treatment (Chalasani et al. 2003;

Garcia-Tsao et al. 2017). Prior to the development and implementation of these modalities, variceal hemorrhage carried a gravely high mortality rate estimated at 30–50% (Chalasani et al. 2003). However, if patients survive their initial bleed and if it remains untreated, then their risk of rebleed increases to 60% over the next 1–2 years with an associated 33% mortality (variceal hemorrhage). Given the morbidity and mortality of varices, esophagogastroduodenoscopy (EGD) screening has become a standard of care for primary prophylaxis alongside nonselective beta blocker therapy (NSBB).

It is important to note that the mantra of screening is evolving with a trend towards less frequent screening given the efficacy of NSBB, surrogate risk markers for varices (liver stiffness and platelet count), and its relative cost. However, in the appropriate clinical setting, screening endoscopy is warranted and recommended

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(Garcia-Tsao et al. 2017; De Franchis et al. 2021). Unfortunately, this screening can carry with it a significant cost that serves as a barrier to our uninsured and underinsured patients. The national average cost for an EGD before insurance is \$2750, although costs can be as high as \$10,000 depending on sedation requirements or endoscopic interventions (Additional file 1). Conversely, hospitalization for a variceal hemorrhage has an average length of stay of four days with an average cost of \$15,202 (Solanki et al. 2019).

At present, insurance status as a predictor for completion of EGD screening in patients with cirrhosis has not been well evaluated. Academic gastroenterology (GI) fellows’ clinics carry a higher proportion of uninsured or underinsured patients allowing for an ideal population to study whether insurance status impacts screening rates. The goal of this study was to identify a potential health care disparity in the form of EGD screening completion for cirrhotic patients in effort to improve patient care. We therefore examined the role of insurance status in completion of recommended screening EGDs in patients with cirrhosis within our GI fellows’ clinic.

**Methods**

This study was approved by the local institutional review board (IRB00073602). We examined patients seen in our institution’s GI fellow clinic with a diagnosis of cirrhosis who also had an EGD ordered for screening purposes over an 18-month period (7/1/19–12/31/20). Demographic information, insurance coverage, clinical parameters, and EGD findings (if performed) were collected. We utilized R version 4.0.5 to perform the chi-squared test to analyze gender differences and the Fisher’s exact test to analyze the remaining parameters. Odds ratio

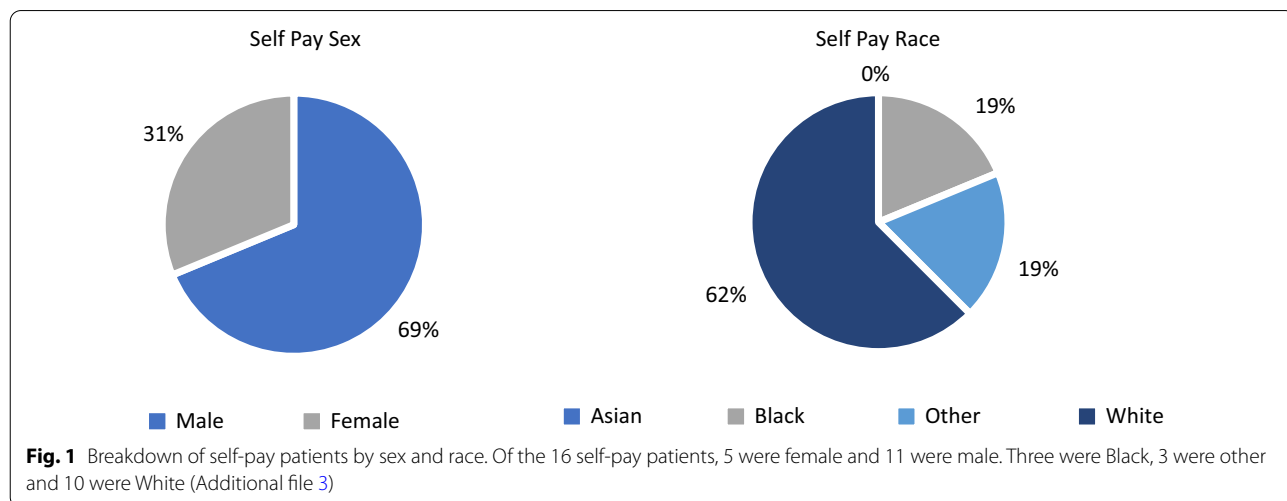
(OR) and additional statistical analysis were performed with R Core Team (Vienna, Austria).

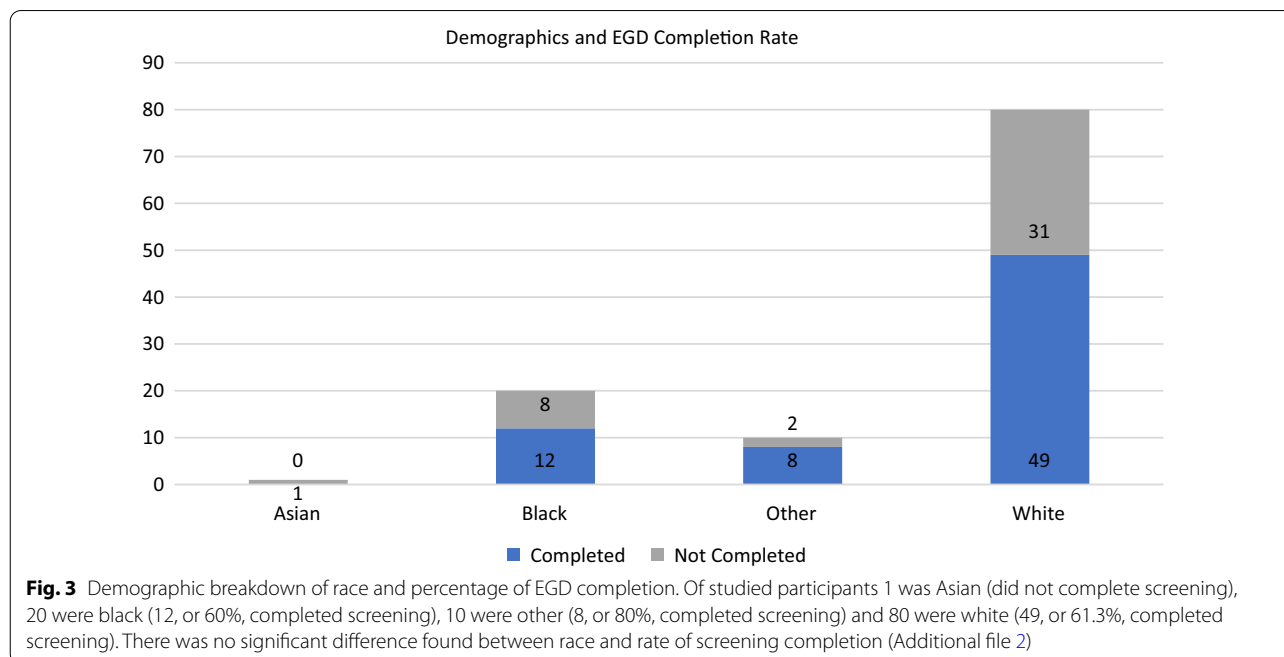
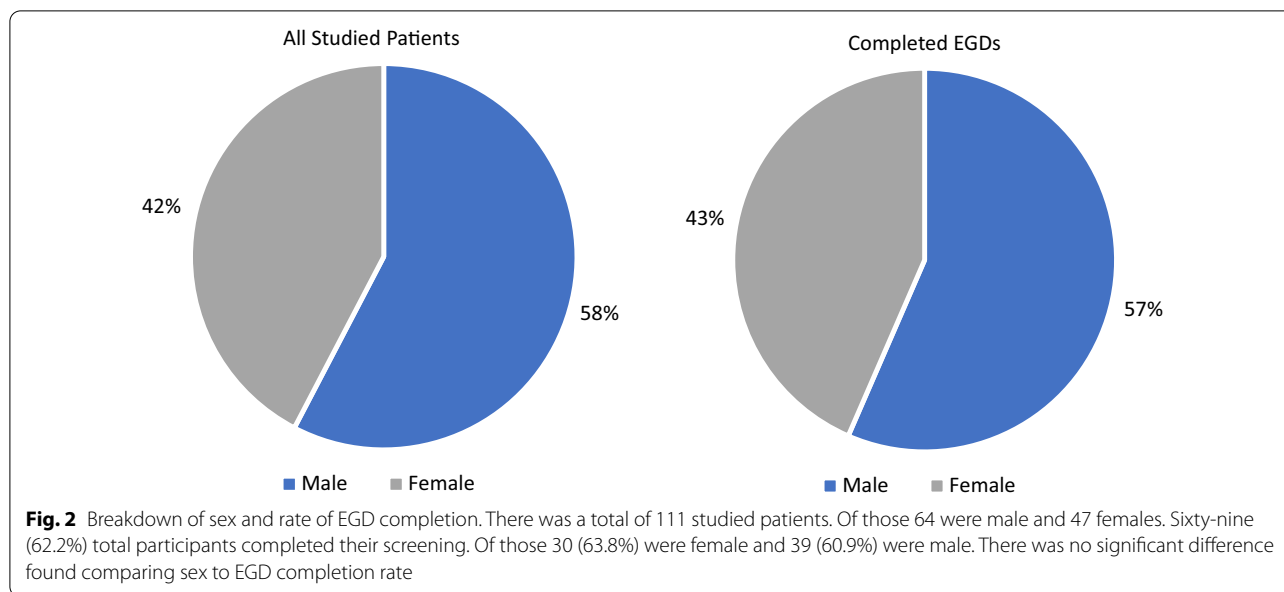
**Results**

A total of 111 patients were studied over the 18-month period with demographics of this group (sex: 47 female, 60 male; race: 1 Asian, 20 Black, 10 Other and 80 White) of patients described in Figs. 1 and 2. Of this sample it was found that 16 (14.4%) were uninsured compared to 95 insured patients. Six of 16 (37.5%) of the uninsured patients received their screening EGD compared to 63 of 95 (66.3%) insured patients ( $P < 0.05$ , 95% CI 0.0841, 1.034). There were no significant differences comparing gender and ethnicity among the two groups. The unadjusted OR of completing screening dependent on insurance status was 3.28 (95% CI 1.09–9.84,  $P = 0.03$ ) (Fig. 3).

**Discussion**

Our data suggest that lack of insurance adversely impacts variceal screening rates. Table 1 and Fig. 4 demonstrate a statistically significant increase in completion of screening among patients who were insured. As noted in Figs. 1, 2 and 3 there were no significant differences in demographics. The specific reason behind each patient being insured or not was not assessed, however traditionally and most commonly it is secondary to cost or ability to access/navigate the Affordable Care Act to obtain insurance. Recognizing this potential disparity is an important step in delivering the care that these patients require, decreasing adverse outcomes, and avoiding the high cost of hospitalization due to bleeding in the high risk, unscreened population (Chalasani et al. 2003; Garcia-Tsao et al. 2017; Solanki et al. 2019). Importantly, multiple studies have demonstrated reduction in mortality through primary prevention of esophageal varices with

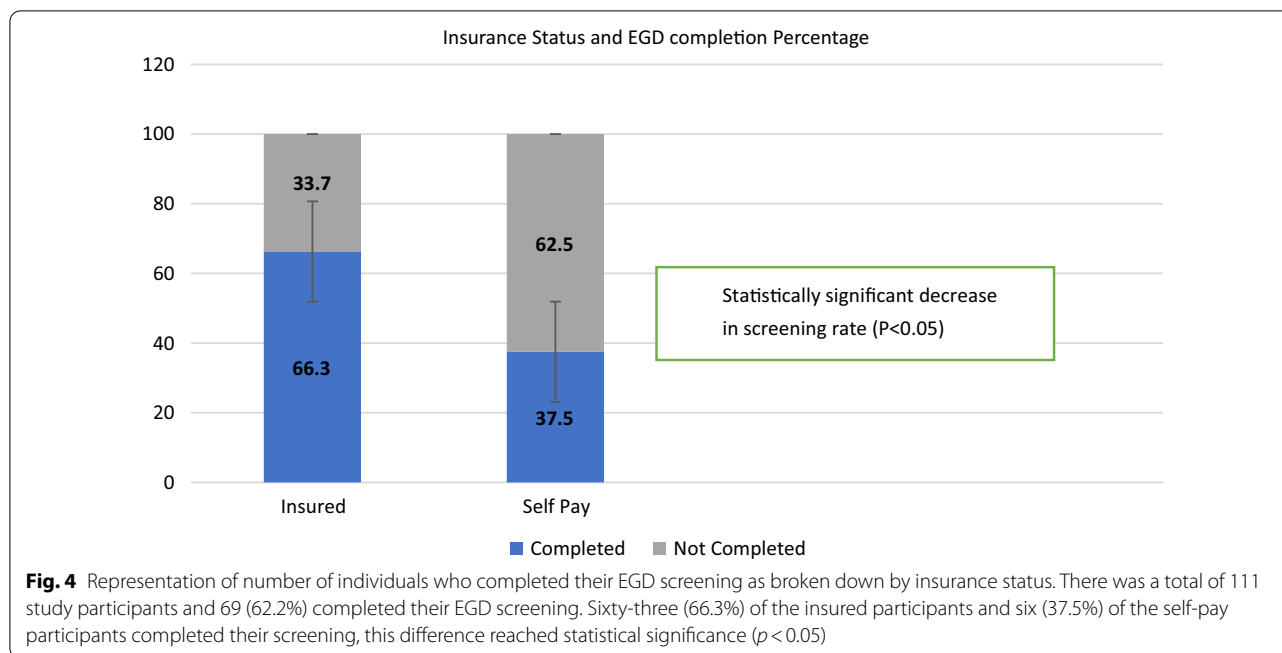




**Table 1** 63 of the 95 insured patients completed screening compared to 6 of the 16 uninsured patients, making for a 77% increase in screening completion among the insured patients (OR 3.28)  $p < 0.05$

	EGD completed	EGD not completed
Insured	63	32
Not insured	6	10

a number needed to treat between 4 and 7 (Imperiale and Chalasani 2001). Therefore, these data help identify insurance status disparities in the context of esophageal variceal screening and add to the data showing that insurance status not only increases the odds of patients not receiving routine preventative services but may impact all-cause mortality (Lines et al. 2014; Song et al. 2020).



It is important to address developing guideline suggestions that not every compensated cirrhotic requires EGD screening (low risk patients with a Liver Stiffness of  $< 20$  kPa and platelet count greater than 15,000). Otherwise EGD is recommended at the diagnosis of cirrhosis to screen for gastroesophageal varices. After initial EGD in patients with compensated cirrhosis repeat screening should be done in 3 years unless there are signs of decompensation in which case it should be done yearly. Furthermore, the role of non-selective beta blockade has evolved and appears to be able to provide protection against first variceal hemorrhage and future bleeding in patients. Notably, this therapy does not appear to be beneficial in patients without varices and with early compensated cirrhosis and mild portal hypertension (Sharma et al. 2019; Garcia-Tsao et al. 2017). Currently, there are no criteria for the discontinuation of EGD screening and to meet these guidelines and provide adequate patient care insurance coverage would clearly be beneficial. Potential limitations from our study include small population of uninsured patients studied during this time point (14.4% of total patients studied) as well as assumption of cost as the primary barrier. Our uninsured population is traditionally underserved due to a multitude of socio-economic barriers leading to increased negative sequela from disease, and our analysis is unadjusted for these factors. The 18-month period was deemed to be reasonably sufficient to allow for scheduling of screening or potential rescheduling due to unforeseen circumstances; however, the studied period included the beginning of the COVID

pandemic, which led to cancellation and screening delays amongst all fields. This may have affected our screening rates and is unclear whether it would have affected both groups equally. One study among 451 sites found that there was a 33.4% decrease in monthly EGD volume during the pandemic, though insurance status was not tracked (Calderwood et al. 2021).

With the known benefits of endoscopic screening in patients with cirrhosis, these data identify a stark inequality and should serve as an impetus to ensure access to care for all patient’s regardless of insurance status. With cost as an important consideration, it will be important to continue to expand role of adjunct and non-invasive measures to protect against variceal screening. Furthermore, recent evidence suggests transnasal endoscopy (TNE) may play a potential role in the evaluation of a multitude of symptoms and conditions including variceal screening. Importantly, TNE demonstrated a reduced cost of approximately 50% as compared to EGD with anesthesia (Nguyen et al. 2022).

**Conclusions**

These data confirm a significant disparity in care delivered to patients with cirrhosis based on healthcare coverage as evidenced by rates of completed EGD screening. A notable limitation of this study was the limited sample size of uninsured patients. This could be secondary to uninsured patients having difficulty affording or accessing specialty follow up. Future aims will focus on outcomes of the failure to screen patients with cirrhosis—both

economic and health related, as well as cost-conscious efforts to mitigate the screening inequities. Mitigation of this disparity is paramount to ensure equitable care is delivered to our uninsured and underinsured patients.

#### Abbreviations

EGD: Esophagogastroduodenoscopy; NSBB: Nonselective beta blocker therapy; CI: Confidence interval; OR: Odds ratio; TNE: Transnasal endoscopy.

### Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s42269-022-00941-7>.

**Additional file 1.** Cost data.

**Additional file 2.** Insurance Data.

**Additional file 3.** Demographic data.

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#### Author contributions

LW and CH collected and analyzed the patient data regarding EGD screening as it relates to insurance status. JR, TL, CH and LW interpreted the patient data. JR and TL were the major contributors in the writing of the manuscript. All authors read and approved the final manuscript.

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#### Availability of data and materials

The authors confirm that the data supporting the findings of this study are available within the study and in the supplemental material with personal health identifying information removed.

#### Declarations

##### Ethics approval and consent to participate

Wake Forest University Health Sciences IRB Ethical Statement IRB00073602. This research study qualifies for expedited review under the Federal Regulations (45CFR46.110). These regulations allow an IRB to approve certain kinds of research involving no more than minimal risk to human subjects. The risks of harm anticipated in the proposed research are not greater than those ordinarily encountered by the general population in daily life or during the performance of routine physical, laboratory, or psychological examinations or tests (45CFR46.102(i)). Upon review of the research, the IRB finds that this study is classified as Expedited Category 5. This research meets the criteria for a waiver of consent entirely according to 45 CFR 46(d). This research meets the criteria for a waiver of HIPAA authorization according to 45 CFR 164.512.

##### Consent for publication

No identifiable images or other personal/clinical details of participants that would compromise anonymity were used in the creation of the figures/tables in this manuscript nor in the writing of the manuscript. Consent to publish is not applicable.

##### Competing interests

All authors have no competing interests to disclose.

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