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Review Article

Factors Associated with Scheduled Endoscopy Non-Compliance – A Literature Review

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Abstract

Non-Compliance with endoscopy appointments places a major burden on the healthcare system and can lead to delay in the diagnosis and treatment of potentially life-threatening conditions. Although several studies have investigated causes, trends, and interventions to improve compliance with endoscopy appointments, we present a comprehensive, high-quality, and focused literature review on this important topic. A search of the PubMed database revealed 72 papers that were screened for eligibility according to their title and text; among these 72, a total of 42 papers are focused on non-compliance with endoscopy, and 12 investigated ways to improve compliance. The average non-compliance rate for endoscopy was found 22.25%. Patients' age (younger than 60-year-old), low socioeconomic status, history of healthcare visits non-adherence, medical history, and season/month of the appointment all contribute to non-compliance with endoscopy appointments. On the other hand, decreasing scheduling lead time and some specific modes of appointment confirmations could improve appointment-keeping behavior.

Keywords: Endoscopy; Gastroenterology; Gastrointestinal (GI); Literature review; Non-compliance

Introduction

Endoscopy is an integral part of the care plan in the prevention, diagnosis and, treatment of gastrointestinal diseases. Scheduled but unperformed procedures due to non-compliance (also referred to as nonattendance, no-show, and missed/broken appointment) causes a major burden on the health care system and could adversely affect patients' health by missed screening and delayed disease detection. Non-compliance is an important factor in reducing the provider's productivity and efficiency, rising healthcare costs and, dissatisfaction of patients who keep their appointment due to delays and increased wait time to book an endoscopy appointment [1-3].

A number of studies in different parts of the world have documented non-compliance with gastrointestinal clinic appointments [4-7]. In one study, Corfield et al. in the colorectal clinic of St. Thomas' Hospital in London reported 21% "did not attend" [4]. However, a wide range has been reported for endoscopy non-attendance. While the rate of non-compliance with endoscopy in Tzias et al.study in IKA Hospital of Greece was reported 43% [5], in other studies at Royal Perth Hospital of Australia and Ulster Hospital of Northern Ireland, the reported rate of "no-show" was 12.2% and 14% respectively [6,7].

Some previous studies have examined multiple factors and demonstrated the impact of several determinants on non-compliance rates in endoscopy units. Review studies on the subject matter of non-compliance and no-show rates, in general, have demonstrated conflicting results using a non-uniform methodology. However, to date, no high-quality, comprehensive review has been published to demonstrate trends and underlying contributing factors for endoscopy non-compliance in particular, and areas of suggested improvement in keeping the medical appointments [2,8,9].

Historically, various standard review criteria methods have been utilized for review articles, such as MOOSE (Meta-Analysis of Observational Studies in Epidemiology), PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), AMSTAR, and AMSTAR2 (Assessing the Methodological Quality of Systematic Reviews)[10-12]. Social Science & Medicine recently adopted the PRISMA [11] reporting standards and guidelines for authors to use when developing their review manuscripts for publication. In this study, we targeted to provide best practice recommendations for our review article and as such considered "dos and don'ts" provided by the newest study in 2019 "Systematic reviews and meta-analysis in the health sciences" [13].

Material Content

This paper comprises a literature review of studies on non-compliance to a scheduled appointment with a special look at the endoscopy procedure appointments. We primarily leaned on qualitative, non-statistical tools for consolidating, evaluating, and interpreting results that are currently accessible in the literature [14]. In the following, by using the Cross-Step Synergy method provided by Johnson et al. we explain what strategy we used on our methodology for analyzing the existing studies [13].

Formulating the research problem

In this step, our team formulated the research problem and focused specifically on Non-compliance to the endoscopy appointment to provide more accurate results about only one particular type of appointment. In doing so we first engaged in most of the background work and piloting of screening before beginning the review process [11,15].

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Table 1: Keywords used for data collection.

Considerations on Keywords used for finding and selecting studies	
"a"	Non-compliance, noncompliance, non-attendance, nonattendance, no-Show, no show, adherence, missed appointment, broken appointment, dropout appointment
"b"	Endoscopy, gastroenterology, gastrointestinal
"c"	Determinant, predictor, factor
"d"	All articles are in English
"e"	No gray literature

Find and select studies

For selecting studies, we conducted a systematic literature search by using PubMed database which is a widely used search engine, built and maintained by the United States National Center for Biotechnology Information (NCBI) at the US National Library of Medicine (NLM) to find as many qualified studies as possible [16,17]. To ensure that we considered every qualified research in our study we performed a keyword-driven search strategy (Table 1) and used available synonyms for "Non-Compliance" besides specifying in endoscopy appointments (see items "a" and "b" in Table 1). Furthermore, because our review focuses on a statistical analysis of determinants and predictor factors in non-compliance, synonyms for "determinant" and "predictor" were added to the query (see item "c" in Table 1). Lastly in this review article, we considered papers in English and not counting unpublished or gray literature (see items "d" and "e" in Table 1).

After finding relevant studies to our literature review, we manually screened studies that met the formulated inclusion criteria including i) non-compliance with the medical appointment in general ii) non-compliance with the appointment as a dependent variable iii) studies deal with non-compliance in the health department especially to the endoscopy appointment or gastroenterology procedures' appointment iv) studies consider interventional methods to improve non-compliance with the appointment.

Coding studies for important features

During this step, we specified relevant study components from which the following codes of analysis were selected: demographics of the patients, type of the appointment (endoscopy *vs.* other medical appointments), location and time zone of the studies, type of factors involved in non-compliance (individual factors *vs.* environmental factors *vs.* procedural dependent factors), predictors of non-compliance (e.g. prior healthcare visits adherence, previous endoscopy status, etc.) as well as the type of statistical method that used by the studies. A unique point about this review is by reviewing interventions that improve the outcome of endoscopic compliance, it also provides possible solutions to the problem.

Calculating effect sizes

Given that our study is a literature review, not a meta-analysis that focuses on outcome, qualitative descriptions of the results replace the pooling of effect sizes.

Analyzing the database

According to the scope of our study, this review conducts a qualitative analysis.

Interpretation and dissemination

Based on the fact that the present literature review is a qualitative evidence synthesis, for interpretation of the results of our article, we considered "CERQual" approach (Confidence in the Evidence from Reviews of Qualitative research) to increase the accuracy of findings and understanding the role of dissemination bias (Publication bias) [18].

Discussion

Our PubMed database search revealed a total of 102 papers about non-compliance with appointments. 72 papers, including three Literature Reviews/Systematic Reviews (SR), were screened for eligibility according to their title and text. Among these 72 a total of 42 papers were focused on non-compliance with gastroenterology procedures based on their complete text and/or abstract, 2 of these conducted studies were about pediatric endoscopy and 12 of these surveyed studies were about the ways to improve keeping appointments. We excluded duplicated studies and those that focused merely on barium enema or fecal occult blood test.

After performing a literature review in the first step, the following characteristics were examined in screened articles: the year of the study, the country of the study, endoscopic procedure type (Upper endoscopy *vs.* colonoscopy), number of cases that analyzed, average non-compliance rate and methodology for statistical analysis in each study. Of note, although the number of the cases in different studies varies considerably, this variation does not have an impact on the results of our review because we do not perform a statistical analysis of effect sizes in this qualitative study.

In this article we found the overall average non-compliance rate across all endoscopy-focused studies to be roughly 22.25% with a minimum rate of 2.6% and a maximum rate of 50% for a colonoscopy procedure [19,20]. However, the maximum rate for second no-show (non-compliance) after follow-up was reported higher (60%) in a Harvard Medical School study [21]. These percentages are in good agreement with reported previous non-compliance (no-show) rates which are ranging from 12-80 % depending on the type of procedure in different clinics [22-36].

The value of the average non-compliance rate also varied with regards to the center where the study was performed and the year the study developed. The highest average rate of non-compliance for endoscopy procedures was reported in 2005 at the University of Colorado (50%) followed by those in the IKA hospital of Athens-Greece in 2006 (43%) and Denver Health Medical Center in 2008 (41.7%) [5,20,37]. It is worthwhile to mention that more papers reported on studies performed in North America than in all other continents combined. Of note, while a minority of the endoscopy appointment studies consider all age groups we counted two relevant studies listed under "pediatrics" as well [38,39].

Our study also compared the type of dependent variables used by each study and considered how researchers defined these variables.

Table 2: Studies with significant/non-significant determinants for Endoscopy non-compliance.

Determinants	References with Significant determinants for non-compliance		References with Non-Significant determinants for non-compliance		Total
	N (%)	References	N (%)	References	
Age	6 (28.5)	[4,6,20,51,53,56]	15 (71.4)	[5,19,27,37,39,40,42-49,50]	21
Gender	7 (29.1)	[4,6,20,48,52-54]	17 (70.8)	[5,19,27,37,39,40,42-47,49,50,56,57,59]	24
Race and Ethnicity	7 (58.3)	[42,47,48,54-57]	5 (41.6)	[20,37,45,46,52]	12
Marital Status	6 (75.0)	[38,43,46,54-56]	2 (25.0)	[20,53]	8
Socioeconomic Status	3 (75.0)	[38,48,57]	1 (25.0)	[20]	4
Level of education	1 (100.0)	[44]	0 (0.0)	-	1
Health insurance	10 (83.3)	[20,21,37,43,44,46,48,51,53,54]	2 (16.6)	[42,47]	12
Type of Procedure	6 (40.0)	[21,37,43,51-53]	9 (60.0)	[19,27,39,45-49,54]	15
Waiting time(Lead time)	6 (60.0)	[5,6,27,45,55,56]	4 (40.0)	[19,39,44,52]	10
Source of referral	7 (77.7)	[5,6,19,27,46,56,60]	2 (22.2)	[45,49]	9
Day of the week	3 (37.5)	[6,21,59]	5 (62.5)	[4,5,19,27,57]	8
Season/month of the year	4 (100.0)	[21,38,56,59]	0 (0.0)	-	4
Time of the day	1 (33.3)	[53]	2 (66.6)	[19,59]	3
Language	1 (50.0)	[21]	1 (50.0)	[45]	2
Substance abuse	2 (66.6)	[45,56]	1 (33.3)	[42]	3
Psychiatric disorder	3 (100.0)	[44,45,56]	0 (0.0)	-	3
Medical history	3 (60.0)	[21,48,56]	2 (40.0)	[42,52]	5
Employment status	1 (50.0)	[55]	1 (50.0)	[45]	2
Previous endoscopy	1 (20.0)	[50]	4 (80.0)	[19,27,39,50]	5
Prior healthcare visits adherence	2 (66.6)	[40,48]	1 (33.3)	[47]	3
Primary Care Physician status	1 (100.0)	[55]	0 (0.0)	-	1
Weather	0 (0.0)	-	1 (100.0)	[4]	1
Prior history of missed endoscopy	3 (100.0)	[21,44,45]	0 (0.0)	-	3
Immigration status	0 (0.0)	-	1 (100.0)	[45]	1
Medication use	0 (0.0)	-	1 (100.0)	52	1
Distance to/from clinic	1 (33.0)	[38]	2 (66.6)	43,56	3
Transportation issues	1 (33.0)	[61]	0 (0.0)	-	1
Limited life expectancy	0 (0.0)	-	1 (100.0)	[56]	1

The definition of the dependent variable "non-compliance" was not consistent across studies. In most cases, non-compliance was defined as a missed appointment that was not canceled by the patient in the past [31,40,41].

With attention to the methodology for statistical analysis, major studies performed some type of univariate analysis and in most cases, a multivariate analysis eventuated. The most common type of univariate analysis that has been used for categorical variables was the chi-squared test and for continuous variables was the student's t-test. Over half of the surveyed studies carried out the multivariate analysis in different forms of Logistic Regression models.

Finally, we made a difference in reporting the determinants of non-compliance to the "endoscopy appointment", as well as a mini-review of the interventions that could improve compliance in endoscopy procedures.

Table 2 sums up our work findings regarding the determinants of non-compliance and a complete account of all factors assessed in the studies that we reviewed. The number of studies that figured each determinant to be significant or not significant with the corresponding relative percentage is given under the header "N (%)". The reference studies that found or did not find significance are provided under the header "References"; the last column shows the "total" number of studies that analyzed each determinant.

According to "CERQual" approach (Confidence in the Evidence from Reviews of Qualitative research) [18] review findings graded as moderate confidence because of minor concerns regarding methodological limitations, relevance, coherence, and adequacy of the studies contributing to this review.

We begin the interpretation of the result by referring to factors related to patients' demographics like age, gender, race/ethnicity, marital status, SES (Socioeconomic Status), and level of education. The great majority of studies did not find age as a significant factor for non-compliance with the endoscopy appointment [5,19,27,37,39,40,42-

Table 3: Comparison of our work with 3 Review Articles for patients' non-compliance with a medical appointment.

Determinant	Our review study	Deyo et al. [8]	Garuda et al. [9]	Dantas et al. [2]
Year of the study	2020	1980	1998	2018
Appointment type	Endoscopy	Mostly Psychiatric and pediatric population	Healthcare institution	different medical specialties (not including endoscopy)
Type of the study	Literature review	Literature review	Review article	Systematic literature review
Number of studies considered for review	42	83	26	105
Common factors for non-compliance in all studies	Prior no-show history			
	Socioeconomic status			
	Lead time for appointment			
	Substance abuse			
Variables that have significant effect in non-compliance				
Younger age		✓		✓
Race	✓	✓		✓
Low educational level	✓	✓		
source of referral	✓	✓		✓
psychiatric disturbance	✓	✓		✓
form of payment for medical services	✓			✓
season/month of appointment	✓ (winter/Dec-Jan)			
distance from the clinic				✓

49,50]. In three studies that age was a statistically significant factor of non-compliance, patients were younger than 60 years old [6,20,51]. Most studies found gender as a statistically not significant predictor of non-compliance to endoscopy but in few studies with a statistically significant difference based on gender, reported that women were more likely to miss their appointment than men [20,48,52,53].

In regards to race/ethnicity, minority groups were associated with non-compliance were mostly non-white (especially Hispanics) or African Americans in the United States [42,47,48,54-57]. Few studies considered marital status in their report, mostly single patients have a higher risk of non-compliance; in the pediatric group, the unmarried parent was associated with non-compliance behavior [38,43,46,54-56].

Although socioeconomic status was not found to be a significant factor in most studies, some studies suggested that low socioeconomic status has an impact on non-compliance to the endoscopy appointment [38,48,57]. Only one study among the reviewed studies reported a significant association between non-compliance and level of education of the patients, in which the maximum level of education among the studied group was high School degree [44].

Next, we focused on the characteristics of the appointment, like lead time (number of days between the date of referral for the procedure or registering the appointment and actual appointment date), source of referral, prior history of missed endoscopy, prior healthcare visits adherence, history of the previous endoscopy, date and time of appointment and season/month of appointment. There were mixed reports about the effect of lead time on either keeping or missing the appointment, six out of ten studies concluded the significance of lead time on non-compliance [5, 6, 27, 45,55,56], while the opposite effect was observed in the remaining four studies [19,39,44,52]. Prior history of missed endoscopy was a strong predictor in four studies, patients who had a history of missed endoscopy appointment(s) were more likely to miss another appointment [21,44,45,58], but findings were not consistent with the specific number of previously missed appointments.

Although the day of the week [4,5,19,27,57], time of the day [19,59], as well as weather [4], were mainly not found to be significant factors of non-compliance, season/month has a significant impact on all studies that considered this item [21,38,56,59], so that winter/Dec-Jan were the most frequent season/month(s) for non-compliance to the appointment. In three studies [6,21,59] that found a significant difference for the day of the week, two of them [6, 59] reported "Monday" as a frequent day for non-compliance. We also identified there were mixed reports with regards to the effect of source of referral/primary care status on keeping or missing the appointment, some of the studies conducted higher missing rate of appointment among patients with a referral from specialist/gastroenterologist, general practitioner, outpatient department or community-based outpatient clinic [5,6,19,27,46,56,60]. Furthermore, we found that the type of procedure has an effect on compliance or non-compliance to the appointment. Attendance rates were significantly lower for Colonoscopy procedures compared to the Upper Endoscopy and Sigmoidoscopy, also a few numbers studies addressed the higher rate of non-compliance in screening colonoscopy than surveillance colonoscopy [21,37,43,51-53]. In the studies that considered patients' healthcare visits adherence or prior history of missed endoscopy in five studies out of six, these two factors had a direct significant impact on endoscopy appointment attendance [21,40,44,45,48].

In addition to the characteristics mentioned above, we figured out that the insurance status and the form of payment for the medical services are other challenges for patients' compliance with the endoscopy appointment. Insured patients were more likely to attend their appointments especially commercial insurance holders than

insured patients through social health programs funded by the US federal government like Medicaid/Medicare [20,21,37,43,44,46,48,51 ,53,54].

Few studies [43,38,56,61] analyzed the effect of transportation issues and distance to/from the clinic on non-compliance rate, two studies [38,61] concluded that distance to/from the clinic as well as transportation issues have a significant effect on patients' compliance with the appointment.

Factors such as medical history (especially chronic diseases like Diabetes Mellitus), psychiatric disorders, and active substance use (like opioids/benzodiazepines) were also found to influence non-compliance and not keeping the appointment for endoscopy [21,44,45,48,56].

Of note, the above explanation points out the most frequently analyzed determinants, but other factors were also considered in a limited number of studies. As we mentioned before Table 2 shows our findings regarding the determinants of non-compliance and a complete account of all factors assessed in the studies we reviewed.

Table 3 compares our findings with other previous review articles [2,8,9], although these reviews considered no-show medical appointments in different fields of medicine, not endoscopy focused but we believe that considering contributors on non–compliance in different medical fields would be a source of help to handle this issue in medical appointments/procedures in general. One of these review papers which is titling "Dropouts and broken appointments" was published in 1980 by Deyo et al [8]. In this review article, they explored factors and rate of no-show in 83 studies published between 1953 and 1979, mainly these articles focused on psychiatric and pediatric patients. Deyo et al. reported no-show rate is higher in young adults with low socioeconomic status and education level, psychiatric issues, alcohol and/or drug dependency as well as a positive history of missed appointments in their medical records.

The second review paper in our comparison is "Tackling no show behavior: a market-driven approach" that was published by Garuda et al. in 1998 [9]. In this review paper, they investigated 26 studies that had been published between 1985 and 1995 and evaluated thirteen determinants of No-Show Behavior (NSB) including waiting time, payer-type, number of visits, previous no-show behavior, day/ time of appointment, referral source, transportation, education/ socioeconomic status, personal illness, age, gender, race, and change of physician.

The third and most recent paper for comparison is a systematic literature review about "No-shows in appointment scheduling" which is almost a new study by Dantas et al. in 2018 [2]. In this study, contributor factors of no-show were assessed in a total of 105 articles in different medical specialties but not endoscopy appointments. Dantas et al. examined the influence of various aspects of patients and appointments characteristic in no-show rate including patient demographics, patient's medical history, substance abuse, lead time (number of days between the date of referral for the procedure or registering the appointment and actual appointment date), prior no-show history, date and time of appointment, source of referral, type of visit, the form of payment for medical services and distance to/ from the clinic.

Comparing findings of these three review studies [2,8,9] with our study reflects concordance with regards to the significance of prior no-show history in predicting non-compliance behavior. All reviews also agree on the influence of socioeconomic status, lead time, and substance abuse on non-compliance and missing appointment.

There is less consistency, however, in accounting for other influencer factors. For example, Deyo et al. [8] and Dantas et al. [2], reported that missed appointment is more frequent in younger adults than other age groups, a finding that is not consistent with Garuda et al. [9] and our study. Dantas's study, Deyo's study, and this work found race as a significant factor of non-compliance, unlike Garuda's study. Our work also suggests that the source of referral and psychiatric disturbance have an impact on non-compliance behavior, in accordance with Dantas and Deyo's studies. Moreover, the form of payment for medical services was not significant in Deyo et al. study, while Dantas' study and our work propose that insured patients are less likely to miss their appointment comparing to uninsured ones. In addition, our review is the only study that suggests season/month of appointment has a significant effect on non-compliance, in that winter/Dec-Jan were the most frequent season/month(s) for non-compliance to the appointment. Lastly, contradicting Dantas et al. our work besides Deyo and Garuda's studies did not find the distance from the clinic to be a significant determinant of non-compliance. Table 3 summarizes the comparison between our study and the other 3 review studies about non-compliance to medical appointments.

Since non-attendance is a common source of inefficiency in health services, wasting time and resources and potentially lengthening waiting lists, our team also investigated common interventions that have been attempted in different medical facilities in order to guide improvement in compliance related to endoscopy. In summary, various studies used different ways in this regard but the most popular ways to reduce missed appointments are reminders [62-70] including mail, cell phone voice message, or text message. For example, in patients attending a general medical clinic, Shepard et al. [63], and Hashim et al. [64] found mailed reminders are more cost-effective than telephone reminders because several telephone calls may be needed in attempting to make a single contact. Schroeder et al. [70] reported lower broken appointments in patients notified of scheduled appointments by postcard comparing to telephone by nurses/physicians (13.7% *vs.* 19.5%/17.6%).

Parikh et al. [66] reported the clinic staff reminder, significantly reduces the no-show rate compared with an automated appointment reminder system (13.6% *vs.* 17.3%). An RCT (Randomized Controlled Trial) evaluated text message reminders on clinic appointments in three different specialties (General Medicine, Neurology and OB/ GYN) and reported SMS text message reminders are effective in reducing the nonattendance rate in outpatient General Medicine and Neurology clinics though may not be effective in OB/GYN clinic [67].

Additionally, the timing of sent notices was found to affect the rates of no show, independent of the mode of notices used. Short notices (a week's notice or less) compared with longer notice were found to be inadequate and led to more non-attendance [68].

Few studies focused on other types of interventions in reducing non-compliance includes a study in 1999 [71] in which providers changed their outpatient follow-up guidelines, replaced routine

follow-up with a self-referral clinic, which led to a 30% reduction in non-attendance [71]. An RCT (Randomized Controlled Trial) by Hamilton et al. [72] assessed the effect of giving a copy of referral letter to patients on hospital outpatient attendance rate evaluation and they found out no significant difference between the copy and control groups for the attendance rate.

Lastly, in a study by Reid et al. providers validated a "Predictive Overbooking System" in preventing endoscopy clinic no-show. In this method, they identified patients at high risk for missing scheduled GI endoscopy procedures by searching in Electronic Health Record (EHR) data and offered their appointments to other patients on short notice. This study reported, "Predictive Overbooking" improves the ratio of completed appointments to capacity on a given day [58].

Conclusion

In this review article, we focused on "Endoscopy Non-Compliance," in particular. Our article endeavored to merge and summarize the findings of prior studies dealing with determinants of non-compliance with the endoscopy appointments, and to provide a mini-review of potential avenues to decrease "Endoscopy Non-Compliance".

The overall average non-compliance rate across all endoscopy focused studies were found to be 22.25% with a minimum rate of 2.6% and a maximum rate of 50% for colonoscopy procedure and the maximum rate for second no-show (non-compliance) for colonoscopy after follow up, was reported as high as 60%.

In the majority of surveyed studies in our review, the most important factors with significant impact on non-compliance with endoscopy appointments were found to be level of education, health insurance, marital status, socioeconomic state, source of referral, season/month of the year for the appointment, psychiatric disorder, prior healthcare visit adherence, primary care physician status, prior history of missed endoscopy and lead time for endoscopy appointment. Based on the mini-review sounds reducing the impact of non-compliance could be best accomplished by longer (more than a week before the appointment) mailed reminders than telephone notices and the "Predictive Overbooking System" is a useful method in preventing endoscopy no-shows.

Non-compliance with medical appointment(s) in general and endoscopy procedures specifically are not random occurrences and multiple contributing factors is likely present. This study, by gathering and organizing up-to-date knowledge of the underlying determinants that influence non-compliance, could result in increased efficiency, improved patient care, less wait time for integral procedures and improved quality performance. Our findings would be useful to researchers, practitioners and administrators by providing guidance about specific factors which could affect non-compliance behavior suggestions for modifications in endoscopy schedule policies to improve compliance.

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