

BACKGROUND

- Having the first contact with the health care system for a cancer diagnosis through the emergency room (ER) may be indicative of scarce proper screening or a patient that waited too long before seeking health care services.
- In Puerto Rico, the Government Health Plan (GHP) operates through a managed care delivery system since 1994. The objective of the GHP is to ensure access to health services for medically indigent citizens.
- Through the GHP, primary care physicians (PCPs) assumed the responsibility for coordinating the care of more than 40% of the Island's population (approximately 1.6 million). GHP beneficiaries are assigned to a PCP who determines if their health condition requires referrals to specialists, diagnostic tests, or medications.
- Thus, the entry point to the health care system is through a PCP, who provides services as part of a Primary Medical Group (PMG).
- Knowing the pattern of use of the ER for diagnosing colorectal cancer (CRC) and its impact on patient survival provides an understanding of the lack of use of appropriate primary care.
- Exploring the patient pathways to a cancer diagnosis can give us a better comprehension of what barriers affect access to cancer care among GHP enrollees.

OBJECTIVE

We examined the factors associated with the use of the ER as an entry point into the healthcare system to initiate CRC diagnosis among Puerto Rico's GHP patients and compared the one-year survival of GHP patients that initiated cancer diagnosis in the ER (ER Presentation), with those that initiated the diagnosis in a physician's office.

METHODS

Data Source and Inclusion Criteria

- Data for CRC patients diagnosed in 2012 was obtained from the Puerto Rico Central Cancer Registry (PRCCR) and linked to the Puerto Rico Health Insurance Administration (the administrative body of the GHP) database. We only selected GHP beneficiaries.
- The CRC cases with an in situ and invasive CRC diagnosis, excluding lymphomas and sarcomas, between 50-64 years (n=548) are included. We excluded:
 - patients under 50 years because screening is not recommended and patients over 64 years because most of them have Medicare and thus have a different insurance coverage;
 - patients reported to the PRCCR by the death certificate or autopsy;
 - patients with unknown method of confirmation and those with unknown stage at diagnosis;
 - patients who had another cancer diagnosis one year before the CRC diagnosis;
 - dual eligible beneficiaries (Medicare and Medicaid dual coverage);
 - patients not enrolled in the GHP for the 12 months prior to the cancer diagnosis.

A dichotomous variable was created to indicate if the patient's first contact with the health care system for a CRC diagnosis was through the ER (ER presentation vs. Non ER presentation). The first time the patient entered the health system was defined as the first office visit or ER visit with CRC symptoms prior to CRC diagnosis. In the absence of this type of claims, we selected the date of the visit previous to the first gastrointestinal investigation, before the CRC diagnosis.

Stage at diagnosis was dichotomized using the Derived SEER Summary Stage 2000 as: early stage (in situ and localized) and late stage (regional and distant).

Statistical Analysis

- We used χ^2 test (p-value <0.05) to assess the differences in the variables of interest.
- Adjusted odds ratio, and their 95% confidence intervals (CI) were reported.
- We used the Kaplan–Meier method to generate survival curves.
- Multivariate Cox regression analysis was performed to evaluate the association between ER presentation and one-year cause-specific survival.
- The proportionality assumption was evaluated using Schoenfeld residuals.

RESULTS

Table 1. Characteristics of GHP patients, by initial presentation of CRC diagnosis, Puerto Rico 2012

Characteristics	ER N (%)	Non-ER N (%)	Total N (%)	χ^2 p-value
Overall	71 (37.37)	119 (62.63)	190 (100.00)	-
Age Group (years)				
50-54	11 (15.49)	27 (22.69)	38 (20.00)	0.45
55-59	26 (36.62)	43 (36.13)	69 (36.32)	
60-64	34 (47.89)	49 (41.18)	83 (43.68)	
Sex				
Male	47 (66.20)	58 (48.74)	105 (55.26)	0.02
Female	24 (33.80)	61 (51.26)	85 (44.74)	
Marital Status				
Unmarried	38 (53.52)	56 (47.06)	94 (49.47)	0.39
Married	33 (46.48)	63 (52.94)	96 (50.53)	
Charlson Comorbidities Index				
0	19 (26.76)	31 (26.05)	50 (26.32)	0.36
1	15 (21.13)	36 (30.25)	51 (26.84)	
≥2	37 (52.11)	52 (43.7)	89 (46.84)	
Primary Site Location				
Colon	53 (74.65)	81 (68.07)	134 (70.53)	0.34
Rectum	18 (25.35)	38 (31.93)	56 (29.47)	
Stage at diagnosis				
Early	17 (23.94)	51 (42.86)	68 (35.79)	0.01
Late	54 (76.06)	68 (57.14)	122 (64.21)	
Type of Primary Center				
Non-FQHC	65 (91.55)	104 (87.39)	169 (88.95)	0.38
FQHC	6 (8.45)	15 (12.61)	21 (11.05)	
Region Gastroenterologist Rate (per 10,000)				
High rate (≥8.00)	11(15.49)	18 (15.13)	29 (15.26)	0.983
Medium rate (4.00-7.99)	24 (33.80)	39 (32.77)	63(33.16)	
Low rate (0-3.99)	36 (50.70)	62 (52.10)	98(51.58)	

FQHC: Federally Qualified Health Centers

Figure 1. Cancer-specific survival in GHP patients, by initial presentation of cancer diagnosis, Puerto Rico 2012

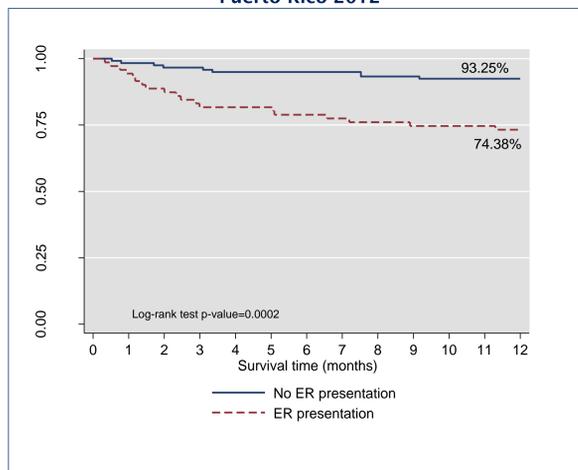
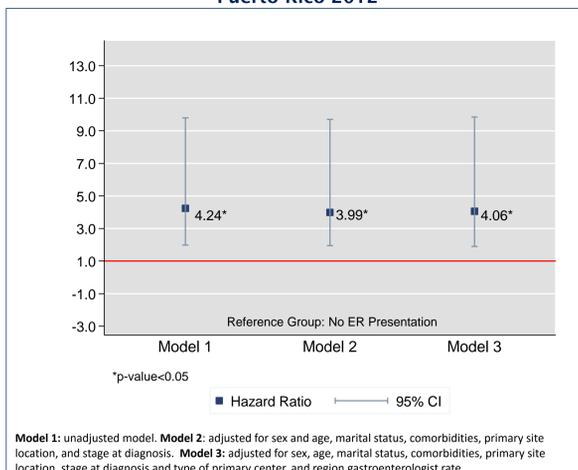


Table 2: Logistic Regression Model of factors associated to ER presentation among GHP CRC patients, Puerto Rico 2012

Characteristics	Multivariate AOR (95%CI)	χ^2 p-value
Age Group (years)		
50-54	1.00 [Ref.]	-
55-59	1.84 (0.74-4.61)	0.19
60-64	2.13 (0.86-5.28)	0.10
Sex		
Male	1.00 [Ref.]	-
Female	0.47 (0.25-0.90)	0.02
Marital Status		
Unmarried	1.00 [Ref.]	-
Married	0.69 (0.37-1.31)	0.26
Charlson Comorbidity Index		
0	1.00 [Ref.]	-
1	0.61(0.25-1.49)	0.28
≥2	1.16 (0.53-2.54)	0.71
Primary Site Location		
Colon	1.00 [Ref.]	-
Rectum	0.88 (0.43-1.77)	0.71
Stage at diagnosis		
Early	1.00 [Ref.]	-
Late	2.59 (1.29-5.22)	0.01
Type of Primary Center		
Non-FQHC	1.00 [Ref.]	-
FQHC	0.71 (0.24-2.05)	0.54
Region Gastroenterologist Rate (per 10,000)		
High rate (≥8.00)	1.00 [Ref.]	-
Medium rate (4.00-7.99)	1.08 (0.41-2.83)	0.88
Low rate (0-3.99)	0.95 (0.37-2.39)	0.91

Figure 2. Hazard ratios for survival after one-year of CRC diagnosis for GHP patients with ER presentation, Puerto Rico 2012



SUMMARY

- From a total of 548 cases of CRC that were diagnosed in Puerto Rico between the ages of 50-64 years in 2012, 190 patients were eligible for the study. Of these patients, 37.37% had an ER presentation.
- Among CRC patients with ER presentation, 66.20% were males and 76.06% were diagnosed in late stage.
- In the adjusted model, compared to males, females had half the possibility of an ER presentation (AOR 0.47, 95%CI: 0.25 to 0.90).
- Meanwhile, patients diagnosed at late stage had 2.59 times the possibility of an ER presentation, compared to patients diagnosed at early stage (p-value<0.05). No significant differences were found in other variables analyzed (p-value>0.05).
- When stratified by ER presentation, one-year survival for Non-ER presentation patients was 93.25% and 74.38% for ER presentation patients.
- The hazard ratios for survival after CRC diagnosis for patients with ER presentation are shown in Figure 2. In the unadjusted model (Model 1) ER presentation patients had 4.24 times higher mortality risk than Non-ER presentation patients (p-value <0.05).
- When we evaluated the other two adjusted models, we found similar results than the unadjusted model. Model 2 was adjusted for the individual characteristics. Meanwhile, Model 3 was adjusted for both the individual and health system characteristics.

Limitations

- The use of claims data that is collected for reimbursement purposes and have inherent limitations when used in research studies.
- The study sample size was limited since only 2012 data was available for analysis.
- We were not able to obtain the CRC screening patterns before the cancer diagnosis.

DISCUSSION

- Late presentation for CRC diagnosis through an ER visit is a significant concern for the GHP and influences negatively on the patient's outcome.
 - Having their first contact with the health care system for a cancer diagnosis through the ER may be indicative of deficient use of appropriate primary care among GHP beneficiaries.
 - Investigating the pathway of any clinical interaction occurring prior to the ER presentation will be helpful in order to understand this issue.
 - If cancer screening and adequate treatment are available through GHP, why are they not being utilized in a timely manner? Although more research is needed to understand this fact, improving the continuity of care and the communication between physicians and GHP patients could prove to be important for increasing the likelihood of CRC screening.
 - The GHP of Puerto Rico should focus its attention on not only improving access to CRC screening, but also changing attitudes about the importance of screening.
 - We can conclude that providing coverage of cancer screening alone has not been sufficient to remove barriers to health care among the GHP population.
 - These findings can be fundamental to implementing effective policies that can reduce inequity and improve the efficiency of the GHP.
- ### Future Directions
- Future research includes extending the study period and to include other clinical and health system variables in the analyses.
 - Evaluate primary care and screening patterns before the CRC diagnosis.
 - Although we assume that patients enrolled in the GHP have similar treatments available, it may be important to evaluate treatment patterns in future studies.

DISCLAIMER

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