

Impact of Distance from Healthcare Facilities and Quality of Hospital Care on Patient Healthcare Travel: A Study of Oncological Surgery for Colon Cancer in Italy

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INTRODUCTION

Colon cancer surgery is a complex and essential procedure in the treatment of this disease, requiring advanced medical infrastructure and highly specialized personnel to ensure optimal patient outcomes [1,2]. The geographic distribution of healthcare resources shapes accessibility to critical interventions such as colon cancer surgery, and greater distance from treatment centers has been associated with more advanced stage at diagnosis and higher mortality among patients with this carcinoma [3,4,5]. Furthermore, hospital- and provider-related factors—such as high procedure volumes and greater specialization—also influence patient outcomes [1,2,6,7]. All of these factors can affect patients' decisions to travel for care. In Italy, the uneven distribution and variable quality of centers performing colon cancer surgery may impact equity in service delivery. Analyzing disparities in access to care is crucial for understanding how regional variations in infrastructure and service quality influence patient mobility [8].

OBJECTIVES

To assess the impact of hospital care quality and distance from healthcare facilities (both hospitals and specialist outpatient oncology centers) on patient healthcare travel among those undergoing colon cancer surgery, and to identify any territorial inequalities in access to services.

METHODS

This study examines the interaction between geographic accessibility and hospital quality in shaping patient healthcare travel for colon cancer surgeries across Italy, using maps to visually represent spatial dynamics of access to care and quality [9]. Two primary distance metrics were calculated: the actual travel time from each patient's municipality of residence to the hospital where surgery was performed, and the potential travel time from each municipality to the nearest capable facility. These metrics quantify the geographic impedance patients face when seeking specialized oncological surgery. Geographic coordinates of all Italian hospitals and municipal centers were used, and car travel times were computed via the OpenStreetMap Routing Machine [10] and the R statistical software. To gauge the phenomenon at the health district level, we computed both a "healthcare escape index" (indicating the propensity to travel outside one's area for care) and an "outpatient oncology service supply index" (for chemo- and radiotherapy services) [8,11].

The cohort was identified through the National Repository of Hospital Discharge Records (SDO), linked to the Tax Registry Information System for vital status and follow-up data, and includes all patients aged 15–100 years, resident in Italy, diagnosed with colon cancer and undergoing elective partial or total colectomy in any public or accredited private hospital from 1 January 2015 to 30 November 2023 [12].

Facility-level quality indicators were integrated into the analysis according to the National Outcomes Program (PNE)

classification framework, with particular focus on the Treemap tool's classification for colon cancer surgery quality, which employs the 30-day postoperative mortality indicator under a predefined protocol [13].

RESULTS

To capture geographic disparities at a finer granularity than prior Italian healthcare travel studies (which were limited to regional or ASL levels), we performed detailed mapping at the level of individual ASL health districts. In addition to care quality, we examined the healthcare escape index—measuring the tendency to seek care outside one's area relative to local health needs. We also developed a local outpatient care network indicator, based on the distribution of chemo- and radiotherapy centers and their distance from patient residences, to assess the effectiveness of the territorial oncology outpatient network, given that these treatments form an integral part of the oncological care pathway alongside surgery. Both indicators provided a more granular understanding of how the oncology care network and patient care travel dynamics operate across the territory.

CONCLUSIONS

This study explores the complex relationship between geographic accessibility to healthcare services, the quality of those services, and patient healthcare travel, focusing on colon cancer surgery across Italy. We map the distribution of surgical centers and the broader network of linked outpatient oncology services, offering a detailed visual representation of the national geographic landscape of care provision and its association with patient healthcare travel. The findings can serve as a key tool to identify determinants leading patients to forego local healthcare services.

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