The Public Perception of CT Colonography versus Colonoscopy via Sentiment Analysis of Social Media

Jefferson C. Chen MD; Christina A. LeBedis MD, MS; Kevin J. Chang MD

Department of Radiology, Boston Medical Center, Boston University School of Medicine, Boston, MA
Disclosures

The authors have no financial disclosures relevant to the content of this exhibit.
The purpose of our study is to understand the public perception of CT colonoscopy in comparison to optical colonoscopy as a colorectal cancer screening technique.

**Target audience:**

- Practicing radiologists and their trainees.
- Health policy analysts, data scientists, and researchers.
Introduction

• A major limitation of colorectal cancer screening in the United States is low uptake by patients; around 2 in 5 adults are not up to date with screening.¹

• Negative attitudes towards optical colonoscopy are well documented in the literature as barriers towards its uptake.²

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Introduction

• CT colonography (CTC) has been proposed as a less invasive alternative with the potential benefit of assessing extracolonic structures.³

• While the use of CTC has increased in recent years, its utilization remains limited in comparison to optical colonoscopy.⁴
• We aim to quantify the public discourse on social media surrounding colonoscopy and CT colonography (CTC) in order to better understand the public perception of the two screening modalities.

• We utilize an informatics-based approach to analyze the sentiment on Twitter of both colonoscopy and CTC.
Methods and Materials: Data

• All English-language tweets from 1/1/2015 until 9/1/2021 containing "colonography" or "CT colon cancer screening" or "virtual colonoscopy" were collected to represent CTC using snscreaper.\textsuperscript{5}

• Over the same time period, all English-language tweets containing “colonoscopy” not previously collected were used to represent colonoscopy.

• The text from each Tweet was cleaned using the clean-text Python library.\textsuperscript{6}
Methods and Materials: Language Model

• RoBERTa is a transformer based deep-learning language model first proposed by Facebook AI Research in 2019.\(^7\)
• The model used was Twitter-roBERTa-base for Sentiment Analysis.\(^8\)
  • Published by researchers at Snap and Cardiff University
  • RoBERTa model trained on 58 million Tweets and finetuned for sentiment analysis with the TweetEval benchmark
  • Achieves state-of-the-art results on the TweetEval benchmark, including the sentiment analysis task

"Twitter" by clasesdeperiodismo is licensed under CC BY-SA 2.0.
Methods and Materials:
Comparative Analysis

• Tweets were given sentiment scores using Twitter-RoBERTa-base-sentiment.

• The sentiment scores were then used to classify Tweets into positive, neutral, and negative categories.

• The number of negative, positive, and neutral Tweets were tabulated. Pearson’s chi-square test was used to compare the CT colonography and colonoscopy categories.
Results: Data Collection

<table>
<thead>
<tr>
<th></th>
<th>CT Colonography</th>
<th>Colonoscopy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tweets</td>
<td>4,709</td>
<td>445,969</td>
</tr>
<tr>
<td>Users</td>
<td>2,194</td>
<td>261,209</td>
</tr>
</tbody>
</table>

- A total of 450,678 tweets about CT colonography and colonoscopy were collected.
- No significant differences were detected in the percentage of tweets from Verified accounts: 3.5% in CTC and 3.1% in colonoscopy.
  - Verified accounts indicate users that are notable and authentic, typically accounts held by public figures or organizations.
Results: Sentiment and Comparative Analysis

- Tweets about CT colonography
  - 9.8% were negative, 68.5% were neutral, and 21.6% were positive.

- Tweets about colonoscopy
  - 31.8% were negative, 51.3% were neutral, and 16.9% were positive.

- Tweets about colonoscopy were significantly more likely to be negative when compared to CTC (p-value is < .00001).
Conclusion

• The public awareness of CT colonography remains limited in comparison to colonoscopy, with Twitter volume relating to CTC being around 1/100th the volume of colonoscopy.

• However, there appears to be an overall positive public perception of CTC and an overall negative perception of colonoscopy.

• The lack of negative attitude towards CTC may be helpful in encouraging its use as an alternative to colonoscopy with the aim of increasing uptake of colorectal cancer screening.
References


Author Contact Information

• Corresponding Author: Jefferson Chen
• Department of Radiology, Boston University School of Medicine, Boston, MA
• Email: Jefferson.Chen@bmc.org