The Effects of COVID-19 on the Amount of Cancer Screenings Ordered/Performed

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Abstract

The outbreak of COVID-19 and the state mandated lockdown in March 2020 greatly hindered the access to healthcare; the purpose of this study was to examine the effect of COVID-19 on cancer screening in the United States during the lockdown as compared to before COVID-19 (using data from 2019 and before March 2020 as the pre-COVID period). PubMed and Web of Science were searched for published studies in 2021 that explored three routine cancer screenings: breast, colorectal, and cervical. All studies were examined by both investigators (R.H and H.B), and a total of 8 articles were included after being screened and proved fitting of our inclusion criteria. One article (12.5%) only covered cervical cancer screening, one article (12.5%) only covered colorectal cancer screening, and two articles (25%) covered breast cancer screening. Moreover, four articles (50%) covered two or all three cancer types. Seven of the articles included found a statistically significant difference in pre-COVID and COVID screening rates with a 95% confidence interval. The cancellation or delay of screening inevitably leads to missed or delayed diagnoses. Due to the progressive nature of cancer, this has implications on the worsening morbidity and mortality rates of those with cancer whose diagnosis timeline was affected by COVID-19.

Introduction

Breast cancer and colorectal cancer are amongst the most common types of cancer leading to death worldwide[1]. The prevalence of being diagnosed with breast cancer doubles when a patient has a mother, sister or daughter who has been diagnosed with breast cancer. Similarly, the familial risk of colorectal cancer is increased amongst family members who have a history of adenomatous polyps developing into colorectal cancer[2]. Furthermore, all women are at risk for cervical cancer, especially those 30 years of age or older. Cervical cancer used to be known as the leading cause of death in women overall due to its prevalence, however this has significantly declined due to early identification screening through pap smears[3]. Therefore, cancer screening is crucial to detect early signs of malignancy.

On March 19, 2020 the United States began issuing stay-at-home orders to prevent the spread of the pandemic. At the start of the COVID-19 pandemic, cancer screenings began to be delayed as in-person clinical visits were restricted. Additionally, many individuals were also hesitant to attend primary care appointments out of the fear of transmitting COVID-19. Therefore, cancer screenings were shown to have an overall decline in rates.

In the United States, there are deep rooted racial inequalities that affect nearly every aspect of life including education, socioeconomic class, and health status. In numerous studies, Black and Hispanic populations and those in the lower socioeconomic class are found to suffer significantly more complications and higher mortality from things such as cardiovascular disease, diabetes mellitus, cancer, and pregnancy as compared to their white[4]. Considering the necessity of routine cancer screenings for early detection and treatment, this research will serve the purpose of comparing the efficacy of telehealth-based services during the COVID-19 pandemic versus in-person clinic before COVID-19 to quantify the difference in screening rates. Ultimately, we hypothesize that the COVID-19 pandemic decreased the amount of cancer screenings ordered/performed in patients, which led to a decrease/delay in diagnosis in comparison to pre-COVID cancer screening rates.

Methods and Materials

- COVID-19 and cancer screening rates" was searched in PubMed, and that yielded 122 results. PubMed showed that there was a spike in publications on this topic in the year 2021, which also is after the peak of the pandemic and the initial period of quarantine, so as to allow proper analysis of retrospective data. Thus, the date of publication was limited to 2021, leaving 96 titles.
- From there, both investigators (R.H and H.B) individually reviewed the 96 titles to ensure they fit the research parameters. These parameters included routine cancer screenings limited to colonoscopies, pap smears, and mammograms which screen for colorectal, cervical, and breast cancers, respectively. Another parameter was that it could not concern comorbidity of cancer and COVID-19, cancer surgery, or have patients that were previously diagnosed with cancer because that can affect adherence to follow ups. Instead, our search is only limited to routine diagnostic screening procedures. Any titles found by the two investigators that did not overlap were discussed to see if they should be kept, and after this process and taking into consideration all the inclusion criteria listed above, 21 titles remained.
- The titles were placed in a table so as to ensure no repetitions and to keep track of all the data.
- The same process was conducted using Web of Science, where "COVID-19 and cancer screening rates" was searched, producing 224 sources. After narrowing it down to the publications in 2021, 144 titles remained.
- Further narrowing it down to primary literature sources, where the investigators conducted their own research rather than a review, 124 titles remained. After examining those titles, 27 remained relevant to our topic.
- Both PubMed and Web of Science gave a total of 48 titles, but after excluding repeats, 36 remained.
- These full 36 articles were examined for quality and to ensure it met our inclusion criteria listed above as well as being conducted in the US and including data during lockdown (March 2020). The articles were also examined thoroughly for bias and reliability. Out of these 36, only 8 remained and were included in our review.

Results

- The findings of all 6 studies concerning breast cancer screening, which all showed a statistically significant overall decrease in breast cancer screening rates with a 95% confidence interval. All the sources except one source, Drescher et al., found a decrease in screening rates, while Drescher found a 14.3% decrease in breast cancer *diagnosis* and an overall cancer *case* decline of 7.3% which is likely attributed to the decrease in screenings and regular check ups.
- The five studies that cover colorectal cancer screening, and out of these five, four of them (excluding Mason, Matthew C et al. (2021)) found a statistically significant decrease in colorectal cancer screening rates during the COVID-19 outbreak, with a 95% confidence interval. The results in Mason's were significant, but not reported with a confidence interval. Moreover, Drescher found a 7.8% decrease in colorectal *diagnosis rates* rather than screening rates, yet this difference in diagnosis rates is most likely attributed to the difference in screening rates between 3/2019-2/2020 to 3/2020-3/2021.
- The two studies that cover cervical cancer screening, and of those two, both found a statistically significant decrease in cervical cancer screening during the peak of COVID-19, with a 95% confidence interval.
- In relation to the demographics studied, the findings are inconsistent. Some sources found that there is no significant difference with socioeconomic class (SES) or race/ethnicity and others finding that non-whites had fewer screenings than whites (Amornsiripanitch, Nita, et al. (2021)). Also, some say that those in higher SES class have lower screening rates (Chen RC, Haynes K, Du S, Barron J, Katz AJ. (2021)) while others found that they have higher screening rates (Fedewa, Stacey A et al. (2021)).

Table 1. Breast Cancer

Source	Pre-COVID Period	COVID Period	Difference in Pre-COVID and COVID Rates of Screening	Demographics
Amornsiripanitch, Nita, et al. (2021)	6/2019-8/2019	3/2020-6/2020	9% inc in cancellation rates*	Whites: 8% inc* Non-whites: 13% inc*
Chen RC, Haynes K, Du S, Barron J, Katz AJ. (2021)	01/2019-07/2019	01/2020-07/2020	-28.1% dec in screening*	Lowest SES: -26.1%* Highest: -30.0%*
Drescher, Charles W et al. (2021)	3/2019-3/2020	3/2020-3/2021	-14.3% dec in breast cancer cases diagnosed *	No statistical significance corresponding to race and region
Fedewa, Stacey A et al. (2021)	01/2019-07/2019	07/2019-07/2020	Overall 8% dec in screening rates from 2019-2020*	9.3% decrease in low income uninsured* 1.4% decrease in high income uninsured*
Marcondes, Felippe O et al. (2021)	04/2019-03/2020	03/2020-11/2020	Screening rate plummeted from 3/2020-5/2020*	Latinx vs non: latinx lower in 2020 than in 2019; there is a significant difference in mammography rates among Blacks, Asians and Latinx individuals compared to whites pre-covid but no significant worsening in racial disparities after recovery from COVID surge
McBain, Ryan K et al. (2021)	1/2020-2/2020	3/2020-4/2020	-96% by April 2020*	No Statistical Significant difference between race and income

Note: * indicates statistical significance

Table 2: Colorectal Cancer

Source	Pre-COVID Period	Post-COVID Period	Difference in Pre-COVID and Post-COVID Rates of Screening	Demographics
Chen RC, Haynes K, Du S, Barron J, Katz AJ. (2021)	01/2019-07/2019	01/2020-07/2020	-37.3% dec in screening*	Lowest SES: -25.6%* Highest: -30.2%*
Drescher, Charles W et al. (2021)	3/2019-3/2020	3/2020-3/2021	-7.8% dec in cancer cases diagnosed *	No statistical significance corresponding to race and region
Marcondes, Felippe O et al. (2021)	04/2019-03/2020	03/2020-11/2020	Overall decline*	there is a significant difference in colorectal screening rates among Blacks, Asians and Latinx individuals compared to whites pre-covid but no significant worsening in racial disparities after recovery from COVID surge
Mason, Matthew C et al. (2021)	N/A	01/2021-04/2021	30.8% canceled routine screening during covid; 37.5% of those canceling is due to fear of contracting COVID* 16.7% canceled symptom indicated screening*	N/A
McBain, Ryan K et al. (2021)	1/2020-2/2020	3/2020-4/2020	-95% by April 2020*	Highest-income quartile: -3 fewer screenings *

Table 3: Cervical Cancer

	Pre-COVID Period	COVID Period	Difference in Pre-COVID and COVID Rates of Screening	Demographics
Miller MJ, Xu L, Qin J, et al. (2021)	1/2019-9/2019	1/2020-9/2020	78% lower screening than precovid*	NA
Marcondes, Felippe O et al. (2021)	04/2019-03/2020	03/2020-11/2020	Overall decrease *	There is a significant difference in cervical screening rates among blacks, asians and latinx individuals compared to whites pre-covid but no significant worsening in racial disparities after recovery from COVID surge

Discussion

- Screening for cancer is crucial in detecting early onset metastases. And any delay in diagnoses is estimated to result in an increase in 5-year breast cancer mortality rate of up to 9.6%[5].
- Factors such as minority race/ethnicity were independently associated with a higher risk of screening mammogram cancellation for breast cancer after reopening from lockdown during COVID-19[5]. During this study, it was shown that there was a higher rate of cancellation amongst non-whites versus white patients. This could be due to the fact that minorities face significantly elevated rates of comorbidity when compared with whites, therefore making them more susceptible to disease.
- Prior to COVID-19, healthcare disparities put those in the lower socioeconomic class at a disadvantage. However, in two sources[6,7], it was found that COVID-19 had a worse effect on those that are insured and in the higher SES class, causing the gap in screening disparities to close. However, another source[8], found that lower income uninsured had a lower rate of cancer screenings as compared to their uninsured higher income counterparts. So while these sources appear to contradict each other, they both suggest that once insurance is not in play, the results are as expected: those in lower SES suffer lower rates of screening due to deep rooted disparities in healthcare accessibility.

Conclusions

In conclusion, our hypothesis was supported in that the COVID-19 pandemic contributed to a decrease in fulfillment of the amount of breast, colorectal, and cervical cancer screenings ordered/performed in patients in comparison to cancer screenings pre-COVID in the United States. As the coronavirus pandemic progressed, public health was elucidated and the effects of this virus further challenged the accessibility of healthcare to populations. When comparing various socioeconomic statuses and racial and ethnic groups, it is clear that the COVID-19 pandemic negatively affects the minority cohort in seeking cancer screenings. Therefore, there is a projected rise in cancer mortality due to the lack of early detection. As the pandemic continues, it is crucial to address these disparities in order to prevent further metastasis as a result of delayed diagnosis. Ultimately, through public health interventions, there will be a decrease in advanced cancers by increasing cancer screening rates.

Limitations

Limitations of our study correlate to the study design and the nature of a literature review. One limitation of this study is that it lacks raw data, and only reports the analyzed data, with many of the sources citing their results in different formats. This did not allow for a pooled result of the overall decrease in screening rates. However, the paper does give a concise insight on the different findings that all agree on the statistical significance of decreased cancer screenings during the first wave of COVID-19, and is thus still confident in the results reported

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