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TITLE:**Rapid Decline in Telestroke Consults in the Setting of COVID-19****Authors:**

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No internal or external funding was used for this study.

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Abstract

Background and Purpose:

As coronavirus disease 2019 (COVID-19) continues to be a global pandemic, there is a growing body of evidence suggesting that incidence of diseases which require emergent care, particularly myocardial infarction and ischemic stroke, have declined rapidly. The objective of this study is to quantify our experience of telestroke (TS) consults at a large tertiary comprehensive stroke center during the COVID-19 pandemic.

Methods:

We retrospectively reviewed TS consults of patients presenting to our neuroscience network. Those with a confirmed diagnosis of acute ischemic stroke or transient ischemia attack were included. Data was compared from April 1, 2019 until April 30, 2020 which includes consults pre-pandemic and during the crisis.

Results:

A total of 1,797 TS consults were provided in one year. Pre-pandemic, the mean monthly consults was 148. In March 2020, 115 patients were evaluated (22% decline). In April 2020, 59 patients were seen (59% decline). Mobile Stroke Unit consults decreased by 72% in April. The 30-day moving average of patients seen per day was between 5 and 6 pre-pandemic and declined to between 2-3 during. The mean percentage of patients receiving IV-tPA was 16% from April 2019 until March 2020 and increased to 31% in April 2020. The mean percentage of patients receiving endovascular therapy was 10% from April 2019 until March 2020 and increased to 19% in April 2020.

Conclusions:

At our large tertiary comprehensive stroke center, we observed a significant and rapid decline in TS consults during the COVID-19 pandemic. We cannot be certain of the reasons for the decline but a fear of contracting coronavirus, social distancing, and isolation likely played a major role. Further research must be done to elucidate the etiology of this alarming decline.

Rapid Decline in Telestroke Consults in the Setting of COVID-19

Introduction

As coronavirus disease 2019(COVID19) continues to be a global pandemic, there is a growing body of evidence suggesting that the incidence of diseases which require emergent care particularly myocardial infarction and ischemic stroke has declined rapidly.¹⁻³ This is in contrast to reports of increasing risk of stroke in patients who are hospitalized with COVID-19, including those deemed to be low risk, such as young patients with minimal comorbidities.⁴⁻⁶ At our institution, we have a well-established telestroke(TS) network of 28 spoke hospitals linked to one hub hospital. Telemedicine robots reside in the emergency rooms of all spoke hospitals. TS consults are focused primarily on timely delivery of appropriate urgent stroke care, including administration of IV tissue-plasminogen activator(tPA) and determination of eligibility for endovascular therapy(ET). In August of 2019, we incorporated a mobile stroke unit(MSU) to our neuroscience telenetwork to further reduce tPA administration and transfer times. The MSU houses a full standing CT scanner and a robot to allow for rapid telehealth consultations. The objective of this study is to quantify our experience of TS consults at a large tertiary comprehensive stroke center during the COVID-19 pandemic.

Methods

We retrospectively reviewed all consecutive TS consults of patients presenting to our neuroscience network in the Philadelphia,PA region. The study was approved by the institutional review board for Thomas Jefferson University. Those with a confirmed diagnosis of acute ischemic stroke or transient ischemia attack were included. Data was compared from April 1,2019 until April 30,2020 which includes consults pre-pandemic and during the crisis. MSU data from August 2019-April 2020 were included. Thirty day moving average was calculated by a simple moving average over the previous 30 days of daily consults.

Results

Within a network of 28 spoke hospitals and 1 central hub hospital, a total of 1,797 TS consults were provided. Prior to the pandemic (April 2019-February 2020), monthly consults ranged from 115-177 with a mean of 148(Table 1). In March 2020, 115 patients were seen signifying a 22% decline. In April 2020, we noted a 59% decline(59 patients)(Figure 1). A total of 90 MSU consults were provided. In March 2020, 7 patients were seen signifying a 39% decline. In April, this declined even further to 3 patients(72% decline). The mean percentage of patients receiving IV-tPA pre-pandemic was 20%. Despite a dramatic decline in the number of consults in April, the rate of IV-tPA administration increased to 31%. Similarly, in April the number of ET increased to 19% from 10%. The 30-day moving average of patients seen per day had consistently been between 5 and 6 pre-pandemic(Figure 2). This number declined to between 2-3 during late March and the entire month of April.

Discussion

The results of this study demonstrated a large decrease in the number of telestroke consults our system received during March and April of 2020. The 59% monthly decline seen in April is disturbing given unchanged cardiovascular risk factors in our local population. The decline in number of average coincided with the Pennsylvania stay-at-home order issued on March 8, 2020.

Declines have been reported by other institutions with similar telenetworks and comprehensive stroke centers.²

During the COVID-19 pandemic, it is reasonable to assume that rate of ischemic stroke and TIA would be unchanged or perhaps increased due to the association between the infection and cerebrovascular disease. It is now well-established that COVID-19 produces a proinflammatory and prothrombotic state^{6,7} which is likely heavily contributing to the emerging cases of large vessel occlusion particularly in young patients⁸ and those without traditional cardiovascular risk factors. The precipitous drop in our region raises many questions that are left unanswered but primarily: *Where are all the strokes?*

Although social distancing is decreasing the spread of COVID-19, we are now experiencing the unexpected side effects of isolation. Elderly individuals who remain highest risk for acute ischemic stroke have presented days after onset of symptoms due to fear of hospital evaluation but particularly due to lack of recognition of symptoms as they are often in isolation. Perhaps the more important issue leading to a decline in stroke evaluations in patients of all ages is the fear of contracting COVID-19 in the hospital setting, fueled by misinformation and heresay. Two of the five patient cases of large vessel occlusion strokes treated by Oxley et. al delayed activating emergency services out of fear of hospitalization during the pandemic.⁸ Similar cases have been reported internationally including Italy and China where as high as a 50% decreased in thrombectomies was reported.^{9,10} Other possibilities for the decline in consults may be patients underreporting severity or extent of symptoms to avoid admission or inadequate medical attention for patients presenting with minor stroke symptoms due to a focus on the critically ill infected patients. This may explain our sudden increase of patients receiving IV-tPA and endovascular therapy in the month of April compared to prior months. Referring physicians may have only requested consultations on patients who were presenting with clear cut severe stroke symptoms leading to more patients receiving thrombolytics and ET despite a smaller number of total consults.

We anticipate that while the pandemic continues and until COVID-related public health initiatives launch and improve, our number of telestroke consults will remain low. Social distancing, isolation, and fear may be the citing factors for our decline but these issues as well as possible medical explanations need to be investigated further. Our study has several limitations including retrospective analysis and geographic limitation to a single large urban city in the United States.

Conclusion

At our large tertiary comprehensive stroke center with a telenetwork of 28 hospitals, we observed an abrupt decline in telestroke consults during the COVID-19 pandemic. It is unclear why this decline continues but it is likely that patient fears of hospitalization and infection, social distancing, isolation, and underreporting of severity of symptoms are playing a major role in the decline of telestroke evaluations for acute ischemic stroke and TIA. In hopes of solving this public health crisis, further research must be done to better understand the multifactorial nature of this international drastic decline in stroke admissions.

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