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**Research Article** 

# Rapid Adoption of Telemedicine for Pre-Operative Optimization during the COVID-19 Pandemic

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# <u>ABSTRACT</u>

**Background:** Despite the abundance of publications regarding the COVID-19 pandemic, there is little information regarding the pre-surgical optimization process and telemedicine visits in a large healthcare system. The purpose of this research is to report on the use of an automated algorithm to triage patients into virtual visits versus standard in person visits.

**Methods:** In order to triage appropriate patients to a virtual PACC visit, an algorithm was developed and embedded in our electronic health record (EHR). The algorithm was named the "PACC Triage Questionnaire" and takes into account the procedural risk as well as patient comorbidities. The surgeon's office completes this questionnaire within the patient's EHR and at completion a recommended PACC visit type is automatically generated. Thus the patient is triaged to a visit type of PACC in person visit, PACC virtual visit, or no PACC visit needed. This 'PACC Triage Questionnaire' replaced a far more tedious PACC questionnaire and maximized the use of our EHR technology by automating the triage process to a specific visit type.

**Results:** Overall, initial results from the triage tool recommended "No PACC visit" for 43% of patients, "In Person PACC visit" for 41% of patients, and "Virtual Visit PACC" for 16% of patients. Patient and caregiver acceptance has been high. In the 4 months period prior to the implementation of this questionnaire, approximately 33% of all PACC visits were performed virtually. In the 4 months period after implementation, approximately 30% of PACC visits were performed virtually. The disparity between the actual number of virtual visits and the recommendations from the questionnaire can be largely explained by the process of deploying the PACC questionnaire. Utilization began in selected departments then was expanded (but is not yet universal). Those services not yet using the questionnaire choose the appointment type they believe to be appropriate. Thus, over time, we expect the actual percentages to more closely align with the recommendation of the questionnaire. Additionally, the relatively high number of "No PACC" recommendations likely stems from the initial rollout including a higher proportion of healthy patients undergoing low risk procedures. As the questionnaire continues to be implemented, inclusion of more complex patients will likely lower the number of "No PACC" recommendations.

**Conclusion:** Having the algorithm embedded in the EHR and initiated in the surgeons' offices directed more patient traffic to a virtual visit which, in the time of a pandemic, benefits society as a whole. Reassessing triage recommendations over time as more patients are screened will allow refinement of the questionnaire. Future enhancements include deploying the PACC Questionnaire to our online patient portal (e.g. "MyChart") and further automating the scheduling process. This research did not receive any specific grant from funding agencies in the public, commercial, or not for profit sectors.

Keywords: Automated screening algorithm; Virtual visits and pre-anesthesia assessment; Telemedicine

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#### INTRODUCTION

Despite the abundance of publications regarding the COVID-19 pandemic, there is little information regarding the pre-surgical optimization process and telemedicine visits in a large healthcare system. Telemedicine visits allow 2-way audio-video mediated patient interactions over electronic devices and increase access to the healthcare system during times where there are concerns for social distancing for patients and caregivers alike. To align with enterprise goals, the decision was made in 2016 to increase telemedicine visits in our preoperative clinic system. The initial platform that was developed 4 years ago integrated video technology and wireless digital stethoscopes at fixed remote locations. Despite the institutional support and clinician acceptance, adoption stalled for multiple reasons including provider unfamiliarity and no obvious benefit of remote visits (because patients still had to travel to a site with the technology). The recent pandemic has highlighted the inherent need for and safety of telemedicine across many medical and surgical specialties. Multiple authors have also depicted reasons telemedicine has reached a "tipping point" in adoption of virtual visits in the setting of pre-anesthesia assessment [1,2]. A tertiary healthcare system serves patients from a variety of geographic locations and patient experience is enhanced with patient centered assessment supported by recent provisions made by US Centers for Medicare and Medicaid Services (CMS) regulations governing telehealth and telemedicine [2]. Although there are several reports of using telemedicine visits for pre-anesthesia evaluation in the literature, there are none using an algorithm to automatically triage patients into virtual visits versus standard in person visits [3].

The current literature consists of a number of reports from both rural and urban settings [1,4,5] The largest and most recent study 1 highlights patient satisfaction, cost savings, and no negative effect on day of procedure cancellation rates. In all these cases, however, the visit type (in person or virtual) was either assigned by patient or surgeon choice or by randomization. No published work describes an individualized and automated triage process to assign patients to in person or telemedicine visits. In this brief report, we will detail our early experience using an algorithm based on patient and procedure risk stratification to determine level of appropriateness for PACC evaluation.

## **METHODS**

Because this was an initiative to enhance patient access and the quality of our clinical practice in the face of a global pandemic, there was no specific patient consent or Institutional Review Board (IRB) oversight required. Due to COVID-19 mandates implemented in March 2020, our clinic system switched to Google Duo or a Face Time platform for PACC telemedicine visits. Patients no longer had to go to a dedicated health care facility with appropriate technology; rather they could use their existing mobile platforms. In the last 6 months, these telemedicine visits have been further enhanced by incorporation of video technology directly into our EHR. Outpatient PACC virtual visits are completed and documented, providing there are no technical difficulties precluding a video portion of the visit. If there are technical difficulties then the visit simply becomes a telephone visit, and the physical exam portion of the visit is completed on day of surgery. At that time, the visit documentation is addended to include the physical examination. The information for billing of virtual visits during the early part of the COVID-19 pandemic was provided by our Institute's coding and billing specialists. The Public Health Emergency billing mandates, stipulated by CMS, have prevented any deduction in reimbursement or wRVU's for telemedicine visits. This has greatly facilitated the adoption of these visits for both patients and healthcare systems. Similar to traditional evaluation and management (E and M) coding, the patient visit is categorized as new or established. New patients are those that have not received any services from the Cleveland Clinic Anesthesiology Institute in past 3 years. The CMS requirements for documentation of video visits are available on a Medicare fee for service supplement published during the pandemic. In general, visits are coded based on elements in the note, unless the total time spent allows for a higher billing code [6]. PACC providers use a PACC preoperative note template, which includes required virtual visit elements such as total visit time (including the mode and location of patient and provider) and physical exam modifications appropriate for virtual evaluation. Virtual physical exams are different that traditional in person exams, but still include what is appropriate and medically necessary. For example, the respiratory system exam references observation of lip color, respiratory pattern, use of accessory muscles, audible wheezing or pursed lip breathing. Cardiovascular assessment includes directing patients to self-palpate radial pulse and count their pulse out loud. Patients are asked to comment on the rhythm. New onset atrial fibrillation has previously been identified in this manner [7]. A multispecialty team from internal medicine, anesthesiology, surgery and information technology (IT) developed an algorithm for triaging the necessary preoperative evaluation of patients. The workflow is shown in Figure 1.



#### Figure 1: Overall Triage Process

This workflow is designed to be overly cautious in triaging patients, thus defaulting to an in person visit if there is any concern about patient safety. The patients were stratified to PACC in person visits or PACC virtual visits based on (1) patient risk profile (first 5 questions) and (2) risk level of surgery. The surgical team determines the risk level of surgery at the time of scheduling. Examples of high risk cases that necessitated an in person visit included cardio-thoracic, multi-level spinal fusions, total joint revisions, vascular, major urologic, and most open major abdominal cases. Those patients who do not have a high patient risk profile (answered "no" to first 5 questions) and are not undergoing a high risk procedure, continue along the flow chart to determine if they should be seen in a PACC virtual visit or if no PACC visit is needed. Ten additional questions are used to triage between PACC virtual visit and no PACC visit. If patients respond "no" to the follow up questions, they are considered low risk and are triaged to no PACC visit. Any "yes" answer will generate a recommendation for a virtual visit. Overall, candidates for PACC virtual visits include complex patients undergoing low risk procedures and relatively healthy patients undergoing intermediate risk procedures. The multidisciplinary team met frequently during development of this algorithm and tested the PACC Triage Questionnaire against a prior lengthy questionnaire (with no provision for virtual visits) in select surgical clinics for 6 weeks in order to optimize the triage process.

Modifications to the specific questions were made in order to best capture each patient's individual risk profile, while still maintaining a fairly fast and simple data collection process. Once the questions were optimized, the IT team transferred the PACC Triage Questionnaire into the EHR so it can be opened in individual patient encounters. The underlying algorithm for triaging patients was embedded in the EHR's logic behind each question, allowing the completed questionnaire to automatically generate the recommended visit type. The screen shots in **Figure 2** shows the questionnaire and answer selections which will lead to a recommended PACC visit type (recommendation shown at the bottom of questionnaire). **Figure 3** shows the algorithm directing the patient to an in person visit. Significant patient conditions were identified in the initial stages of the decision tree.



#### Figure 2: Virtual Visit Consult



Figure 3: In-person PACC Visit

#### **RESULTS AND DISCUSSION**

Since our clinic began offering virtual visits in March 2020, 12,941 patients have been seen virtually. This represents approximately 30% of patients seen by our clinic during that period. The PACC questionnaire was brought online in September 2020. The tool has recommended "No PACC visit" for 43% of patients, "In Person PACC visit" for 41% of patients and "Virtual Visit" for 16% of patients. In the 4 months period prior to the implementation of this questionnaire, approximately 33% of all

PACC visits were performed virtually. In the 4 months period after implementation, approximately 30% of PACC visits were performed virtually. The disparity between the actual number of virtual visits and the recommendations from the questionnaire can be largely explained by the process of deploying the PACC questionnaire. Utilization began in selected departments then was expanded (but is not yet universal). Those services not yet using the questionnaire choose the appointment type they believe to be appropriate. Thus, over time, we expect the actual percentages to more closely align with the recommendation of the questionnaire. Additionally, the relatively high number of "No PACC" recommendations likely stems from the initial rollout including a higher proportion of healthy patients undergoing low risk procedures. As the questionnaire continues to be implemented, inclusion of more complex patients will likely lower the number of "No PACC" recommendations.

Cleveland Clinic patient and caregiver acceptance of this PACC triage process has been high. The daily patient footprint at our PACC clinics has been able to decrease by moving a substantial portion of these patients to virtual visits, and this has facilitated our ability to maintain social distancing within our clinics. Similarly several other innovative pre-anesthesia clinics also document high patient and provider acceptance with no increase in same day cancelation rate for surgeries [4,5] In general, our experience has shown more enthusiasm from patients and providers to embrace virtual visits. This is in contrast to a recent, prospective study where patients were divided in their acceptance of virtual visits. This study included comments from patients worried about privacy and not wanting to be videotaped [8]. As technology and security for virtual visits continue to improve and the process becomes more routine, some of these reservations may be mitigated. Ongoing improvement to our PACC triage process should allow for even greater ease of use moving forward. Our IT team is working to create a patient facing edition of the PACC Triage Questionnaire that can be sent to patients through their EHR MyChart account. Therefore, if surgery is already anticipated, this will allow patients to complete the questionnaire in advance of their appointment. Ideally, this proactive data collection can minimize patient visits to the clinic and hospital even further by allowing surgical consultation to be coordinated with an in person PACC visit (if this visit type is necessary). Additional improvements include automated completion of the several questions based on past medical and surgical history that is already documented in the patient's record. Finally, revision of the questions asked of patients may become necessary over time in response to patterns in the results as well as feedback from patients and surgeons. There are, however, limitations to this triage process. Although the physical examination conducted via a virtual visit is able to identify significant cardiac, pulmonary, or airway abnormalities, auscultation is not yet possible. Consequently, the telemedicine model used at our institution supplements the examination with in person auscultation of heart and lung sounds on the day of surgery by the attending anesthesiologist prior to starting the case. Further, while we are unaware of any untoward delays or patient harm stemming from "improper" triage utilizing the algorithm, we await longer term follow up. Despite these issues, we have successfully introduced a screening tool to triage preoperative patients to virtual visits at a large academic medical center.

# CONCLUSION

Our experience illustrates that telemedicine incorporating an

embedded screening algorithm can be successfully used as a platform to evaluate patients in the perioperative setting. Prior to using the screening tool, our preoperative clinic providers (physician assistants and nurse practitioners) would spend time manually assigning patients to virtual or in-person PACC visits. With the triage algorithm in place, this decision is automated based on reproducible risk centered logic built into the system. As such, the widespread adoption of virtual visits represents an advantage to society as a whole given the risks that exist during a pandemic.

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# **CONFLICT OF INTEREST**

Authors declare no conflict of interest

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