HIMSS

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Program Year 2023

Transforming the ED Fast Track to a Virtual Visit Track to Reduce Emergency Department Length of Stay

Stanford Medicine

Primary Contact Information:

Abishek Nair
Director, Software Applications
abisheknair@stanfordhealthcare.org

Hamed Barahimi
Director, Inpatient Systems & Services
hbarahimi@stanfordhealthcare.org

Leah Rosengaus, MS
Director, Digital Health Care Integration
Lrosengaus@stanfordhealthcare.org

Meagan Moyer, MPH, RD
Digital Health Operations Consultant
Mmoyer@stanfordhealthcare.org

Helena Findikaki
Sr. Manager, Information Technology
HFindikaki@stanfordhealthcare.org

Elizabeth Williams
Sr. Manager, Solution Architecture
ElWilliams@stanfordhealthcare.org

Clinical Project Leads:

Sam Shen, MD, MBA
Associate Chief Quality Officer, Stanford Health Care and Clinical Professor & Vice Chair, Clinical Operations, Dept of Emergency Medicine
Sshen01@stanford.edu

Ryan Ribeira, MD, MPH
Clinical Assistant Professor, Department of Emergency Medicine
rribeira@stanford.edu

Patrice Callagy, RN, MPH, MSN, CEN
Executive Director, Emergency Services
PCallagy@stanfordhealthcare.org

Loretta Matheson
Research Scientist, Emergency Medicine
Lorettam@stanford.edu

IT Project Leads:

Christopher Westphal
Manager, IT Clinical Applications
CWestphal@stanfordhealthcare.org

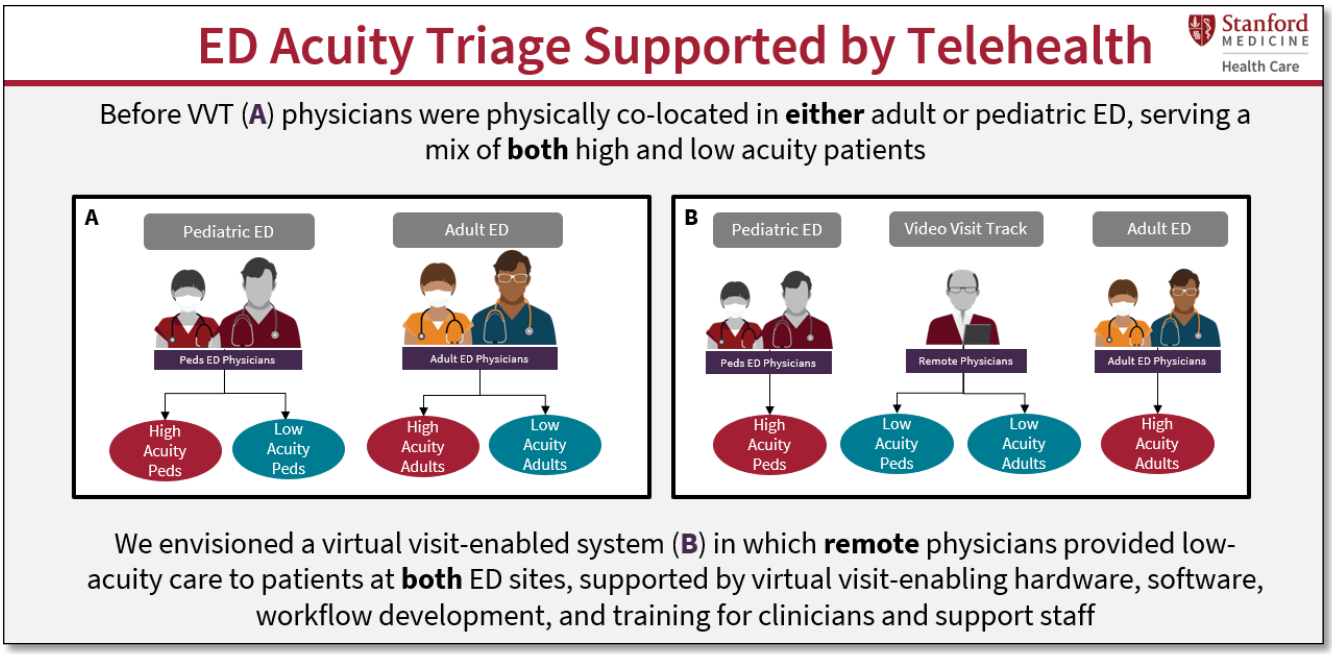
Lubna Qureshi
Manager, Digital Health Analytics
LQureshi@stanfordhealthcare.org

Nishanth Festus
Manager, IT Clinical Applications
nfestus@stanfordhealthcare.org

Executive Summary

Emergency department (ED) patients are prioritized for available beds by acuity, which can often mean lower acuity patients experience longer wait times for evaluation. In 2020, Stanford Medicine proposed a Virtual Visit Track (VVT) program to address ED wait times for lower acuity patients and to reduce ED overcrowding. The effort was accelerated by the COVID-19 pandemic, which created the additional risk of infection and need to minimize prolonged in-person contact in the waiting and examination rooms. The VVT targeted a similar patient population to a traditional Fast Track program, but had the added advantage of reducing personal protective equipment (PPE) utilization during critical shortages.[1]

Stanford Medicine converted the existing Fast Track care unit in the adult and pediatric EDs into a Virtual Visit Track (VVT). The goal was to accelerate the evaluation of lower acuity patients across multiple EDs, leveraging a centralized physician. This VVT "flips the script" of traditional telemedicine, with the physician working remotely and the patient located at the acute care facility with access to laboratory, radiology, specialty care consultations, and nursing services during the visit. The remote Stanford Medicine physician provided care across two ED sites, supported by virtual visit-enabling hardware, software, custom workflows, and specialized training for clinicians and support staff.



The processes, challenges, and outcomes of this program are poised to inform other ED and acute care programs in which physicians are not co-located with the patients they are treating. Examples include rural medical care, population and community health, and programs in which there are limitations to in-person evaluation or space. The physician resource extension benefit of the VVT can also serve as a template for programs experiencing shortages of clinical resources such as mental health providers.

Define the Clinical Problem and Pre-Implementation Performance

Both Stanford Medicine adult and pediatric EDs are level 1 trauma centers. The adult ED averages 68,000 patient visits per year and the pediatric ED averages 20,000 patient visits per year. Prior to VVT implementation, an internal team reviewed ED wait times and observed that lower acuity patients who arrived at the EDs between 2pm and 10pm were indeed experiencing longer ED lengths of stay (EDLOS). Acuity was based on the prospective Emergency Severity Index (ESI) scoring system that is commonly applied to ED patients during triage, before ED physician evaluation. The ESI is a 5-point scale that ranges from low to high (5 to 1) acuity, with low-acuity patients assigned ESI scores of 4 to 5, and a subset of those with a score of 3.[2,3] EDLOS is defined by the ED Benchmarking Alliance as the time interval in minutes between arrival time and physical departure of the patient from the ED treatment area (sum of the following: door to doctor time + doctor to disposition time + disposition to ED departure time).

High volume EDs across the country were experiencing longer patient EDLOS overall. A 2022 report by the Emergency Department Benchmarking Alliance* concluded that high volume EDLOS was 195 minutes in 2021, up from 184 minutes in 2019. It is expected that patient EDLOS will continue to increase over time[4]. It is thus important for organizations to implement programs and workflows to address patient throughput and timely care delivery. ED Fast track programs permit low-acuity patients to receive care more quickly and depart from the ED sooner than they would otherwise.[5,6]

Metrics of a successful VVT program were pre-determined based on whether the program could 1) consent enough eligible patients for evaluation to support the continuation of the program, 2) reduce patient EDLOS, 3) achieve favorable patient satisfaction, 4) equip physicians to feel they can complete a quality patient evaluation and execute an appropriate care plan without being physically co-located with the patient, and 5) would not result in increased return visits to the ED within 72 hours.

Performance Metric Definitions

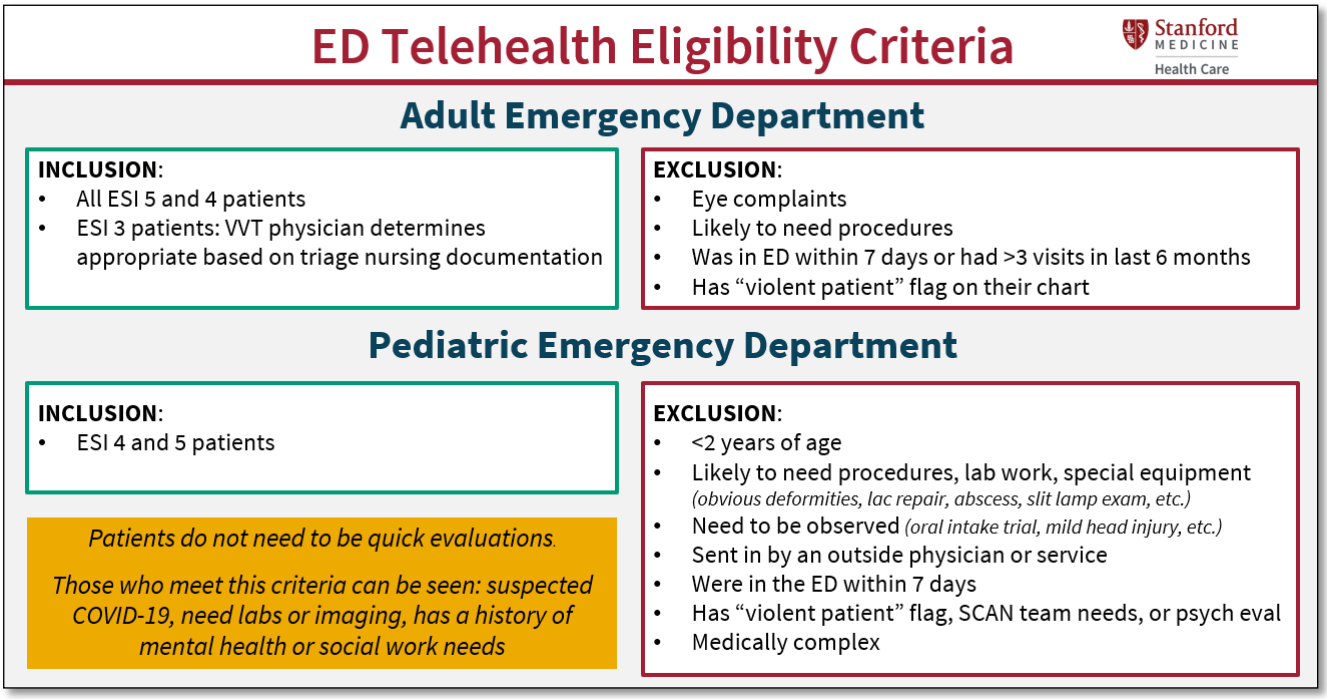
ED LOS calculation: median minutes between patient arrival at the ED and patient departure from the ED, stratified by video versus non-video

ED 72-hour bounce-back rate: percent of ED visits with a return ED visit within 72 hours, stratified by video versus non-video

**Not a publicly distributed resource*

Patient Eligibility

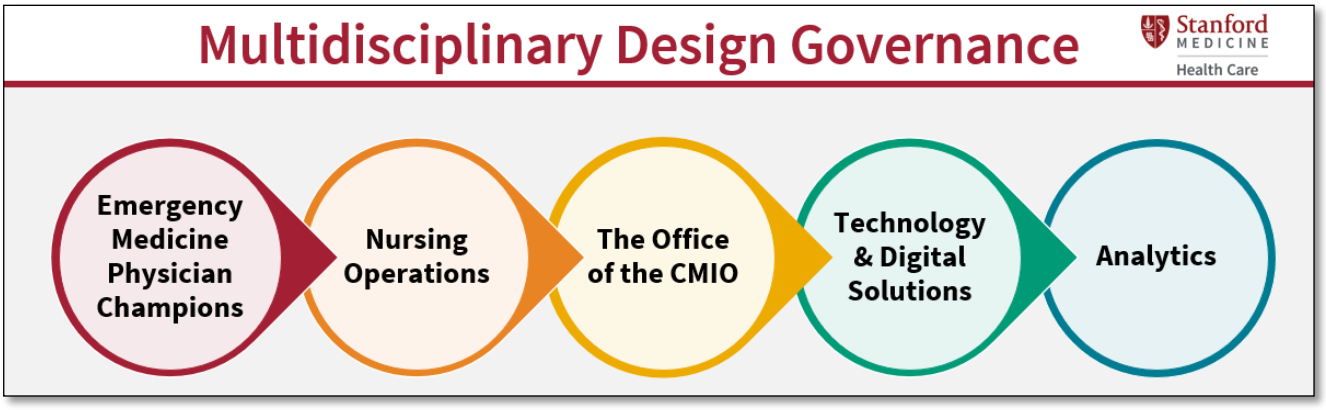
The VVT program model in the ED permitted broader patient eligibility criteria compared to most other virtual visit models. The criteria also allowed for patients found to be too sick for telemedicine to quickly transition to an in-person care team in another area of the ED, and to opt out of their virtual care at any point during their visit. In practice, however, these scenarios rarely occurred.



Design and Implementation Model Practices and Governance

The Team and Governance

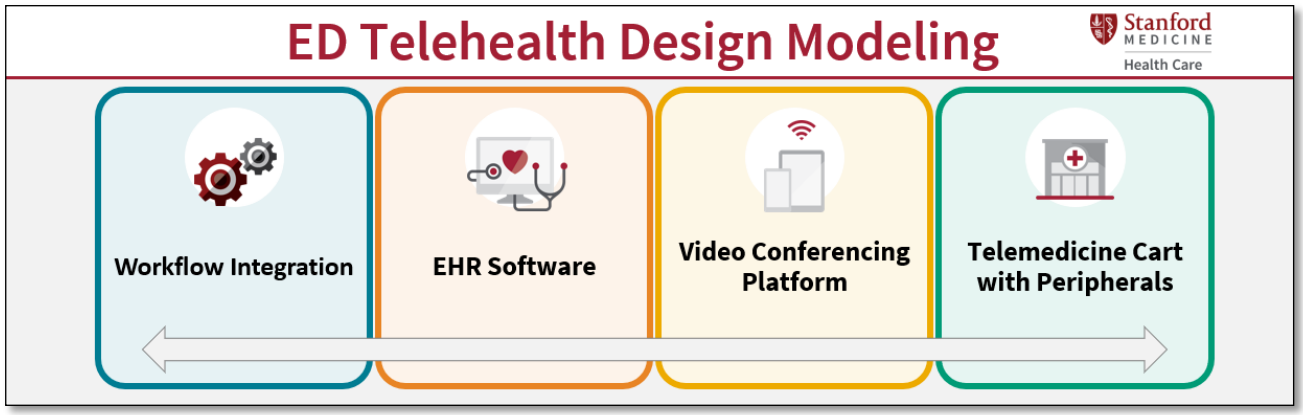
Given that this project involved new technology and workflows for physicians, nurses, and technicians, the launch of the VVT program required a broad, multidisciplinary team. Stanford Medicine digital health leadership managed the project through regular team meetings every month that progressed to weekly and finally to daily meetings as the launch date approached. Emergency medicine physicians with expertise in operations and informatics, as well as nursing operational leaders, were included in the core project team. Electronic health record (EHR) implementation specialists, software developers, hardware experts, network specialists, registration staff, revenue integrity specialists, and others were engaged on a rotating basis to ensure that pitfalls were identified, and workflows were clarified for all stakeholders.



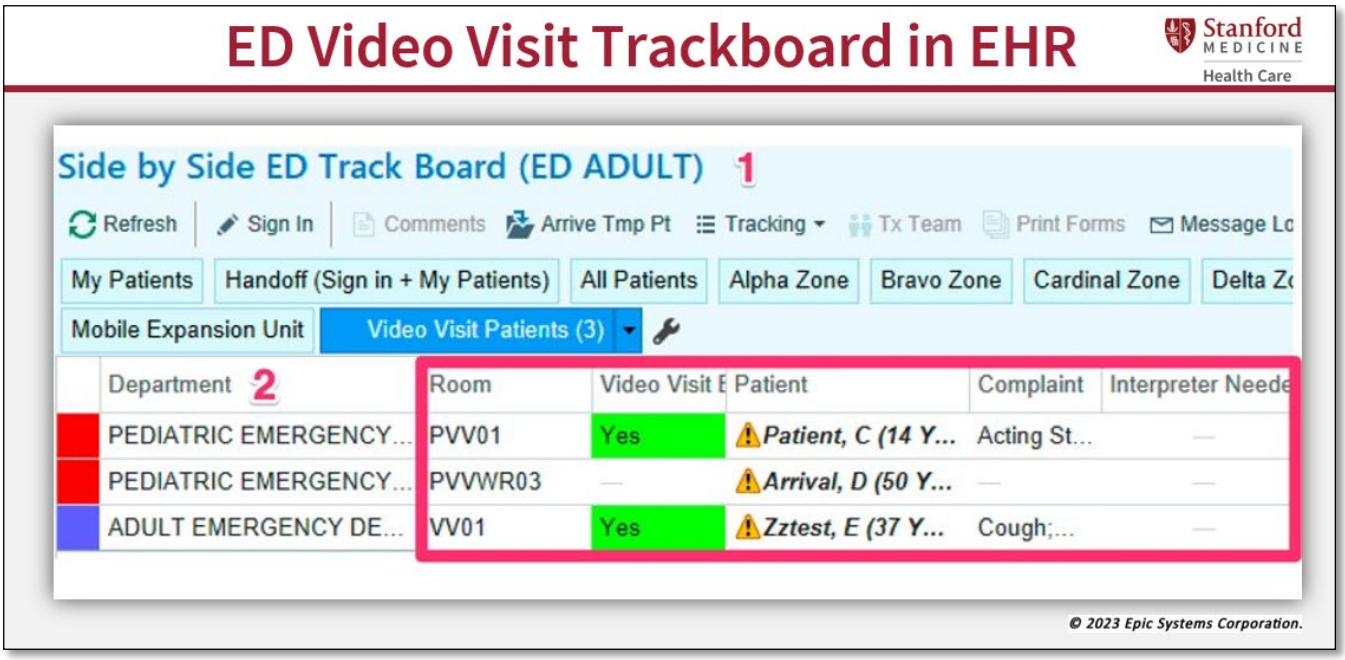
After the VVT program was launched, the core team huddled daily to stabilize workflows, then progressed from weekly to monthly to quarterly check-ins to review program metrics, resolve concerns, and discuss opportunities for improvement.

Program Design and Implementation

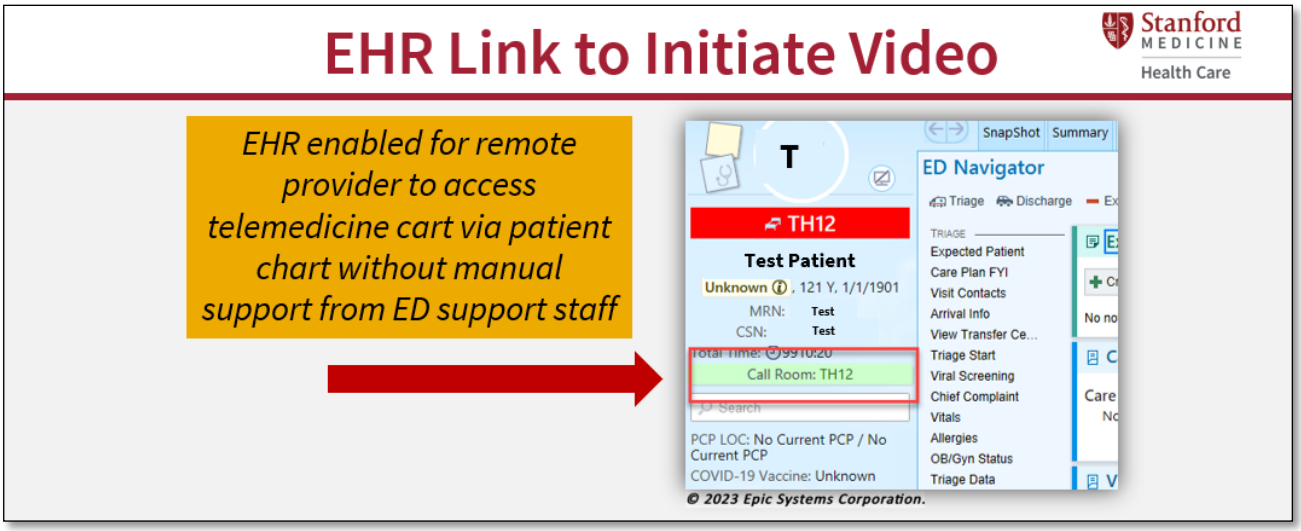
After executive leadership approval, a six-month technology request for proposal (RFP) process for telemedicine hardware and EHR software integration to facilitate the virtual patient-physician encounter was initiated. The ED, hospital, and nursing leadership attended pitches, handled hardware, rated presentations, and discussed the pros and cons of each solution. After reviewing all solutions, factoring in the requirement of an integrated solution, a decision was made to utilize the existing video platform. This platform was used in the ambulatory practices, but required workflow development in order to be fully integrated into the EHR system. The Inpatient Systems team and Software Design and Development team worked together to showcase a fully integrated EHR solution that enabled connectivity to any video hardware on the other end. A telemedicine cart with peripheral physical examination devices, such as a digital stethoscope, a scope with lens attachments for ear nose & throat, dermatology, and general examinations, as well as camera was selected as the hardware solution for this program.



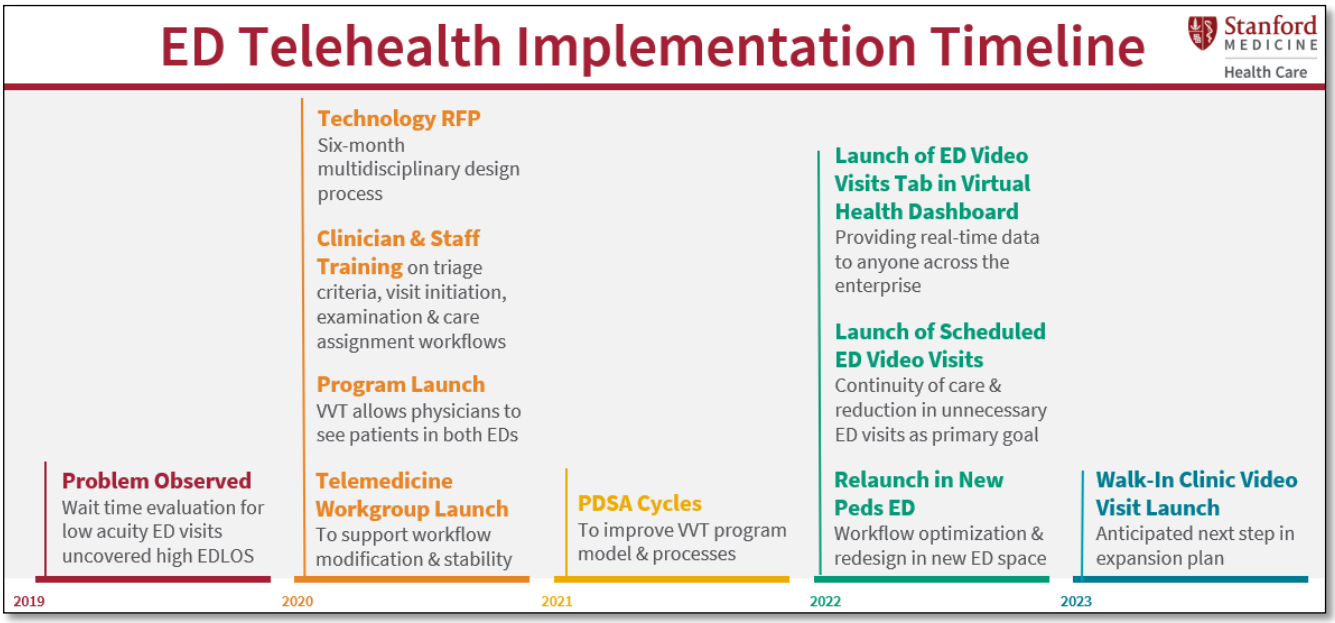
The next phase of the implementation was a three-month process to design the EHR workflows to support the program. One of the major challenges was ensuring the process flow was maintained such that the VVT physician could see patients at multiple ED sites as part of a common workstream. This was further complicated by the use of different EHR patient trackboards at each ED site. A method where patients from each ED would be flagged by a triage nurse onsite and appear on a single ED Video Visit trackboard viewed by the VVT physician was developed. Patients would be visible on the trackboard as soon as the triage nurse put them on the virtual "bed".



Further software development enabled the remote provider to open the patient's chart, click on a link on the storyboard, and seamlessly connect to the telemedicine cart without any manual intervention on the other side. The creativity and innovation of the technical build allowed the program operationalization to progress and ultimately to successfully launch.



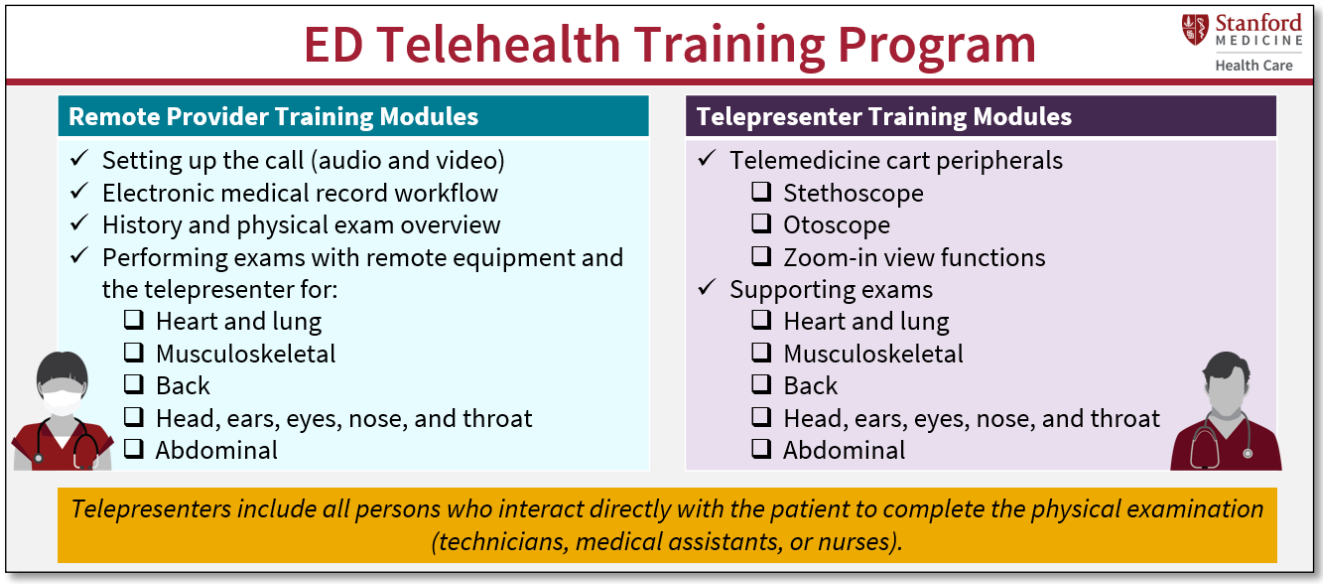
The volume of low-acuity ED visits at each of the sites was not large enough to justify adding an extra physician shift for a dedicated Fast Track program in one ED. However, the patient volume of the VVT model permitted having a single physician see patients across multiple locations.[7,8] The program launched on December 15, 2020 and currently runs yearlong between the hours of 12pm and 8pm, Monday through Friday.



Clinician and Staff Training

As part of the VVT program rollout, registration staff, ED techs, nursing, and physicians received education around the triage criteria, visit initiation, examination, and care assignment workflows. In-person training was provided to leadership from each group (i.e., physicians, nurses, and technicians) to establish a group of "super-users." To support retraining, video training modules that could be easily accessed via computer or mobile

phone were created. All materials were developed based on a literature review to identify best practices for each provider type. Topics covered in the educational modules can be seen below. Provider feedback was elicited after each shift through the initial four months after program launch to monitor quality and identify additional training needs.

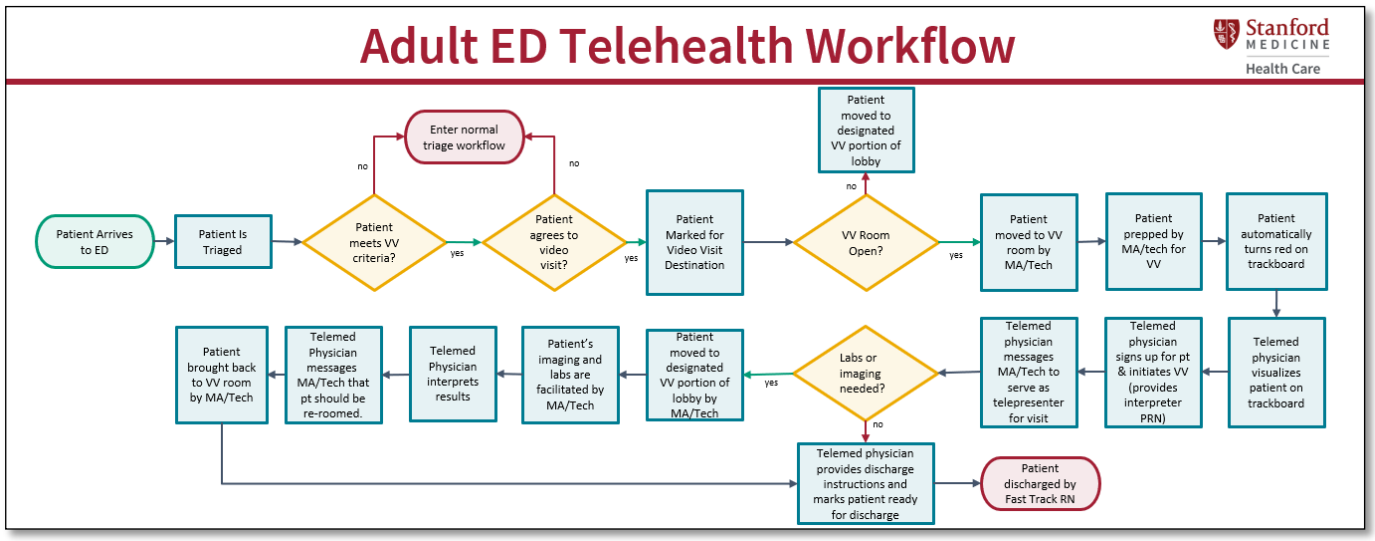


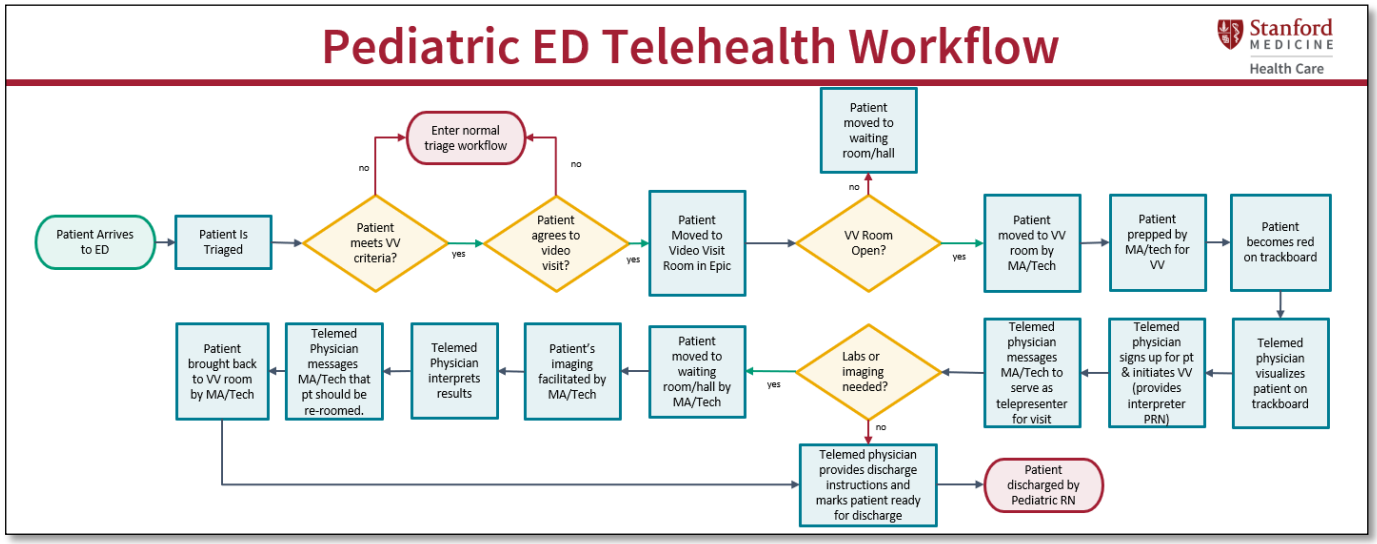
Process Improvement

Several plan-do-study-act (PDSA) cycles to improve the VVT program model and processes were conducted. To support the PDSA iterations, telemedicine workgroups for each provider type were established, i.e., physicians, nurses, technicians. For instance, the nurse workgroup was comprised of six to seven nurses who were scheduled to staff the VVT shifts 80% of the time. This approach drastically improved the ability to deliver in-depth training and workflow compliance. Similarly, physician staffing of the VVT program was limited to a core group of 14 physicians who had demonstrated comfort and facility with the telemedicine technology. The use of small, nimble workgroups allowed for rapid modification of workflows to improve throughput that led to a stable VVT program post-implementation.

Clinical Transformation enabled through Information and Technology

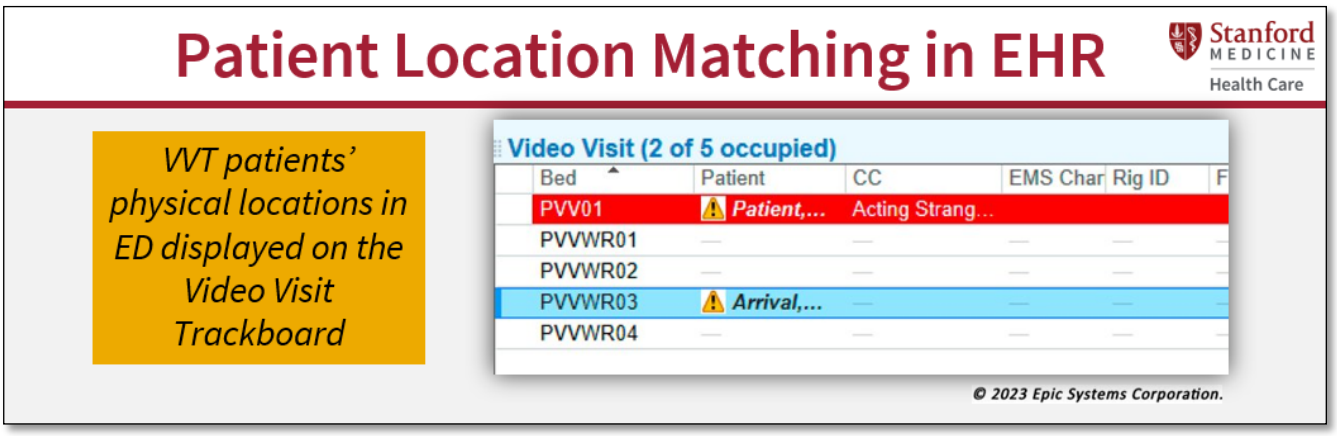
A vertical flow model was developed in which patients were roomed in a bed in front of the telemedicine cart. These fixed carts were located in private rooms and did not compromise patient privacy. As these patients are registered ED patients, a medical screening exam per EMTALA was required. Due to the public health emergency, a waiver existed that allowed the MSE to be performed remotely by a video visit physician off-campus. History and physical exams were performed in these private patient rooms. If patients were awaiting lab or imaging results, they would do so in the waiting room and later be re-roomed in the VVT room for a private discussion of the results with the VVT physician. Please see the vertical workflow models below for further detail.





Virtual Patient and Physician Location Matching

The next challenge was to match VVT patients' physical locations on the ED Video Visit trackboard and main ED trackboard at that site. The video conferencing platform required a patient to be roomed in the EHR before a video visit could be initiated. In anticipation of future space challenges, a flexible model was pursued in which the patient-facing telehealth connection was mobile, but without disruption to the telemedicine physician's workflow. This location-flexible model came to the program's benefit during the winter of 2022, when the patient telemedicine location was moved to meet patient care needs during a COVID-19, influenza, and RSV volume surge. Below is an EHR screenshot of the video visit location build that facilitates virtual location matching.



Patient Evaluation and Physician Documentation

VVT physicians were trained on virtual history-taking and examination. ED technicians were trained to be telepresenters[9] who would assist with the physical examination and positioning the patient on camera as needed for short periods of time. Orders and tests were integrated into the typical ED workflow. A portion of ED tech and nurse time was assigned to VVT patients, which was comparable to two additional room assignments within the ED. Typically, no more than three patients at a time were seen at either ED site. To facilitate physician documentation, a dedicated note template was built that prompted components of a virtual physical examination and allowed providers to quickly document the clinical and billing requirements for these lower acuity encounters.

Billing

There were initial concerns about billing for the VVT program, given historical challenges with pay parity for telemedicine.[10] However, the model identified patients for virtual evaluation and care after registration on site in the ED. Because these were ED patients, visits were billed as equivalent to typical ED visits.

Expanding Beyond the Walls of the ED

The success of the VVT program inspired the expansion of telemedicine offerings within the ED, as well as in the inpatient care setting. Having a single video platform integrated into the EHR allowed incorporation of additional virtual care workflows, such as scheduled ED video visits and virtual rounding for inpatient. These workflows could be layered onto the existing clinical and technical infrastructure. Scheduled ED video visits were launched in February 2022 with the goals of closing care gaps, improving continuity of care, fewer unnecessary ED visits, and readmission/bounce-back reduction. For appropriate patients, this new workflow created a virtual touchpoint with an ED physician to review any signs of deterioration and adjust the care plan as needed. In April 2023, Stanford's Walk-In Clinic will reopen and offer telemedicine visits with the same physician resource that staffs the VVT. Thus, physician resources will be extended to serve three locations during the same shift.

Improving Adherence to the Standard of Care

Over the first 24 months of the program, 3,508 patients received care through the VVT. The resource investment break-even point of 12 patients seen during an 8-hour shift was met on day six after go-live, but this patient volume was not sustained until 7.5 months into the program.

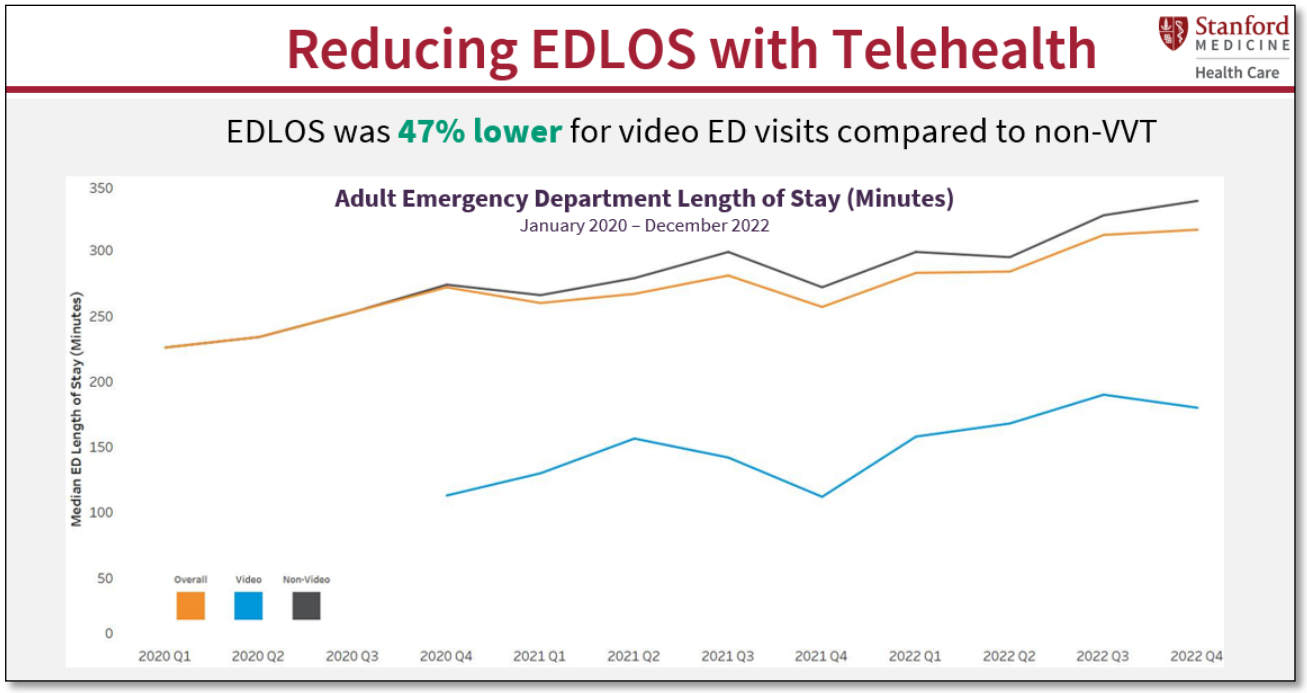
Evolution of data analysis

In order to analyze the impact of the VVT as compared to the non-VVT in-person pathway, the team determined criteria to subset both VVT and non-VVT cases into an analysis cohort that would provide a fairer, more apples-to-apples comparison of VVT and similar non-VVT patients. This subset criteria were first used in an in-depth study of the first 11 months of the program. To create this analysis cohort, the following inclusion and exclusion criteria were applied to both the VVT and non-VVT cases:

- Restricted to the Adult ED and patients 18-94 because in the early months there were very few Peds VVT patients, and the EDLOS adult versus pediatrics can vary.
- Restricted to only patients that arrived at the ED between 12pm and 8pm.
- Restricted to ESI 3, 4, and 5
- Excluded a few chief complaints and post-ED care dispositions that that rarely occurred in VVT cases or were known to indicate particularly short or long EDLOS (e.g., Covid-19 testing only, violent patients, toxicology, psychiatric patients, transfer to outside facility/hospital, sent to labor and delivery, placed in outpatient procedure, and expired)

For the first 11 months of the program, within this matched analysis cohort, the median ED length of stay (EDLOS) for VVT patients was 118 minutes (IQR: 79-173) compared to 278 minutes (IQR: 195-375), Wilcoxon $p<0.0001$.

To support the ongoing program operations, a custom dashboard was developed to track real-time data. Similar criteria as above was added to allow filtering the data to a matched analysis cohort. The results from the filtered custom dashboard are shown below.



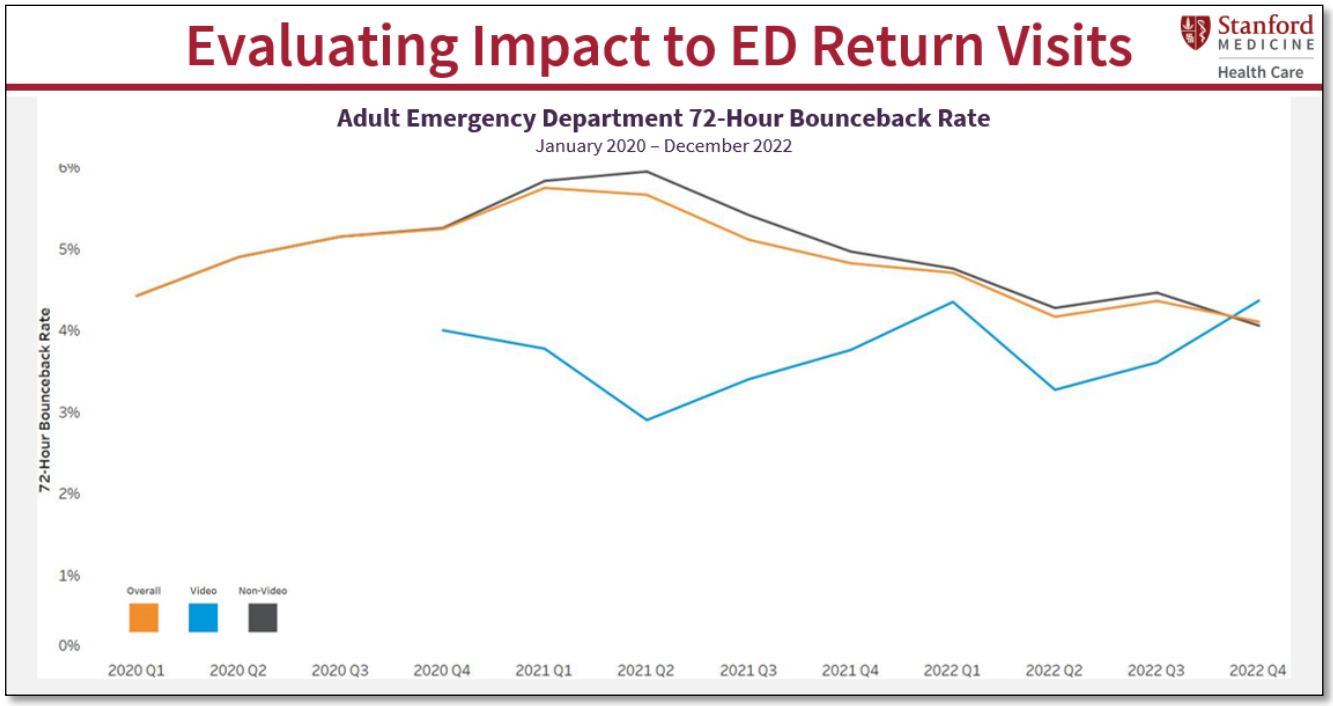
In an end-of-shift feedback survey, VVT physicians rated their ability to deliver a comparable level of care to in-person consultation on a 5-point scale. VVT physicians provided a rating of "excellent" (score = 5; 33%) or very good (score = 4; 67%).

It was observed that VVT patients were overall younger than main ED patients. For example, in the study of the first 11 months of the VVT program, within the matched analysis cohort, 18–25-year-olds represent just 14.4% of main ED patients, yet 23.1% of VVT patients. At the other end of the age spectrum, 76–94-year-olds represent 11.4% of main ED patients, but only 1.7% of VVT patients.

Improving Patient Outcomes

From the in-depth study of the first 11 months of the program, within the matched analysis cohort, the percent of 72-hour revisits among VVT patients was lower than those in the main ED (4.4% vs 5.8%, Chi-Square p=0.10). Although the differences were not statistically significant, this suggests that VVT visits did not experience a higher percentage of 72-hour revisits compared to those in the main ED care for similarly low acuity patients.

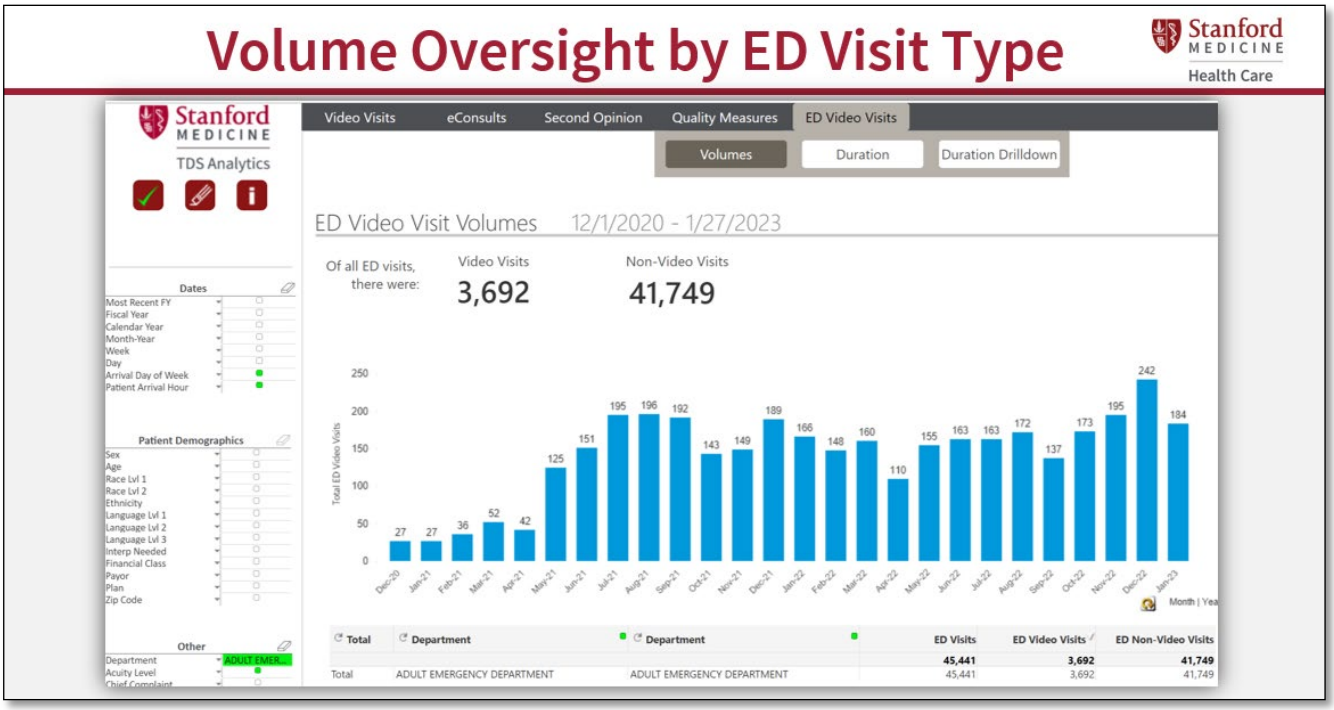
The custom dashboard to track real-time data shows a similar finding for the matched analysis cohort. The results from the filtered custom dashboard are shown below.

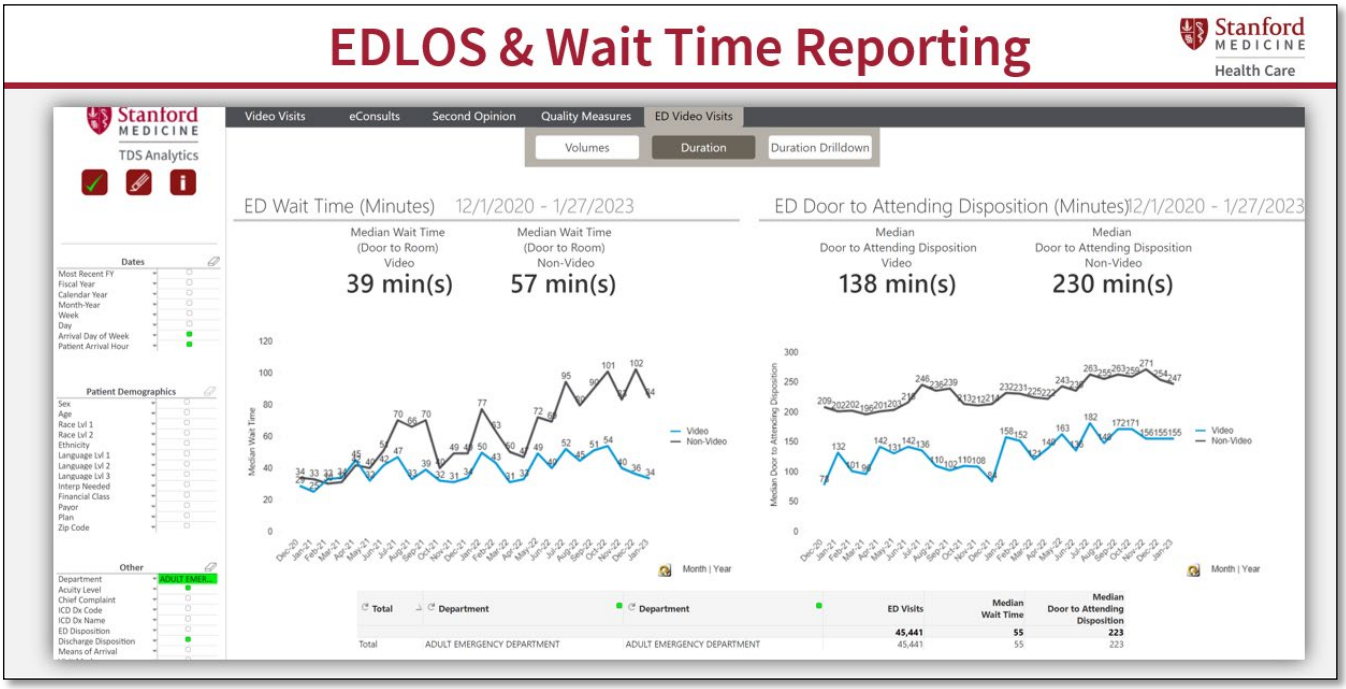


VVT patient satisfaction scores were not captured in the overall patient experience survey reporting system; however, a separate QR-code based satisfaction survey was created and deployed. Due to the manual nature of the survey, only 26 responses were recorded. 84.6% of respondents rated the overall visit experience as "excellent" and 15.4% rated the overall visit experience as "good". Patients were also asked how likely they would again participate in a VVT visit if offered the choice, with 65.4% responding "extremely likely" and 0% responding "not likely at all". An enterprise patient experience survey is currently in development to capture similar data for the full patient cohort.

Accountability and Driving Resilient Care Redesign

A centralized reporting and analytics dashboard was created to facilitate availability of standardized, accurate, and up-to-date information to leaders across the organization. The dashboard was built with 30+ filters to support dynamic, self-service reporting for participating clinicians and the program team. Dashboard data was refreshed daily to enable real-time decision making as the novel program progressed and responded to external factors such as ED volume surges exacerbated by seasonal flu and COVID-19 variants.





After the initial launch of VVT, we held regular meetings between ED physician and nursing leadership to assess the progress of the program. There was consistent feedback provided to front line nursing and physicians to address concerns and issues with the VVT. In addition to the triage nurses identifying appropriate video visit patients, we encouraged our physicians to also pull appropriate patients to the VVT. Over time, there was greater

awareness and comfort with the program that contributed to higher volumes through the VVT.

Conclusion

Emergency department patient flow and throughput is key to successfully managing capacity and timely care. This includes having the capability to provide the right level of care at the right time and the right place. The program leverages health technology to help deliver quality care while also positively impacting operational workflows. It is uniquely innovative in that it enables physician resources to be extended using digital technologies. The processes, challenges, and outcomes of this program can inform other ED, acute care settings in which physicians are not co-located with the patients they are treating. Examples include rural medicine, population and community health, and facilities limited in space for in-person evaluations.

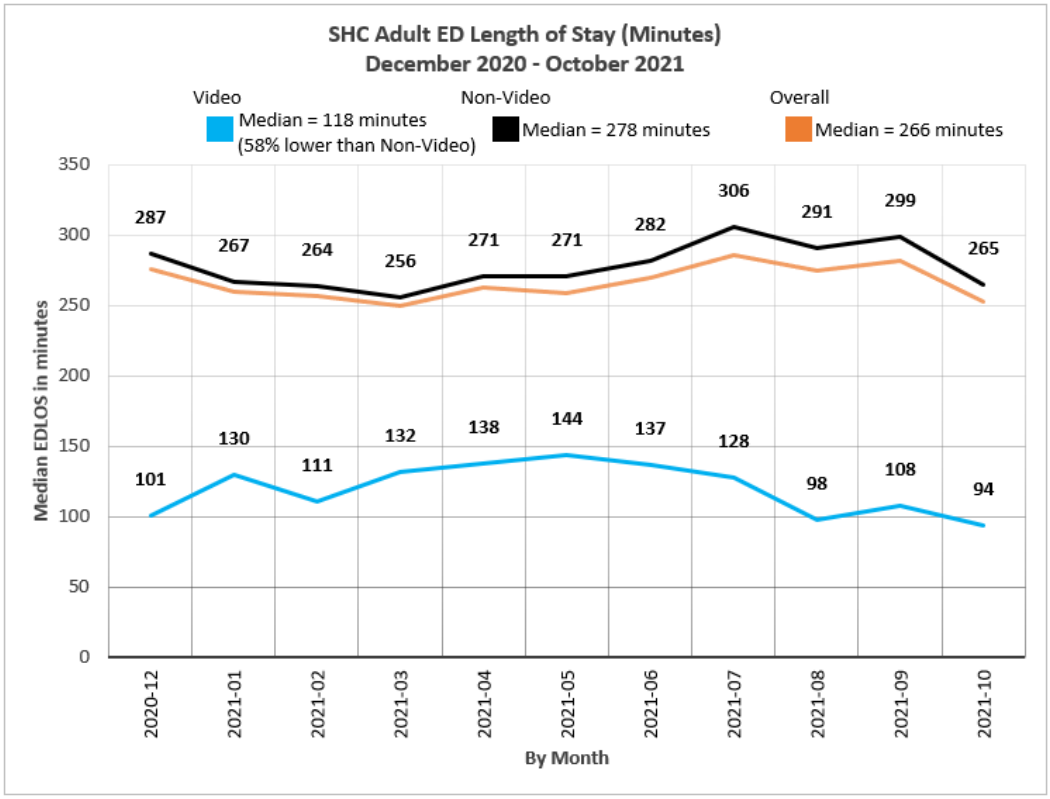
The ED Virtual Visit Track has become engrained in the workflows within the organization and positively benefits the communities served. During the highest surges of COVID-19, this program allowed increased access to emergent care for those who presented at the ED doors. The program team continues to evolve virtual care delivery to remain at the forefront of digital innovation.

Exhibits

Exhibit 1.

For matched cohorts -- restricting both Video and Non-Video patients to:

Age 18 - 94 years
Adult ED only
ED arrival within buffered time window on TM shift days (M-F, 11:45am - 8pm)
ESI 3,4,5 only
ED Dispo only: Discharge or Condidtional Discharge
Chief Complaint excludes "AGGRESSIVE", "ALCOHOL INTOX", "HOMICID", "PROBLEM PSYCH", "DRUG OVERDOSE", "SWAB ONLY"



Over the 11 Months, EDLOS Median and IQR

	N	Median	25th Pctl	75th Pctl
In Minutes				
Among Video patients:	837	**118**	79	173
Among Non-Video patients:	9,793	**278**	195	375
Overall:	10,630	**266**	180	366

58%

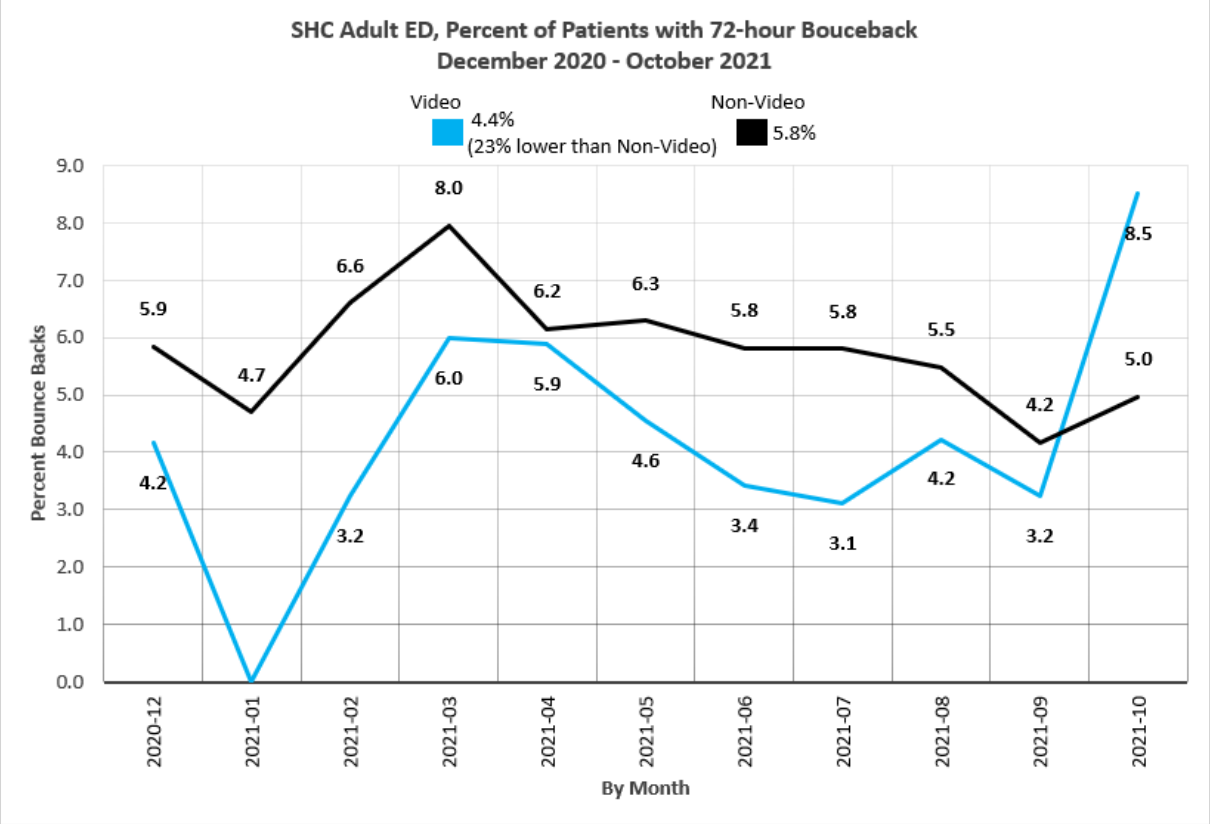
Wilcoxon, p = <.0001

Note, EDLOS is ED arrival time to ED departure time.

Exhibit 2.

For matched cohorts -- restricting both Video and Non-Video patients to:

Age 18 - 94 years
Adult ED only
ED arrival within buffered time window on TM shift days (M-F, 11:45am - 8pm)
ESI 3,4,5 only
ED Dispo only: Discharge or Condidtional Discharge
Chief Complaint excludes "AGGRESSIVE", "ALCOHOL INTOX", "HOMICID", "PROBLEM PSYCH", "DRUG OVERDOSE", "SWAB ONLY"



Over the 11 Months, Percent of Patients with 72 hour Bouncback		
	N	% Bounceback
Among Video patients:	837	4.4%
Among Non-Video patients:	9793	5.8%

23%

Chi square, p = 0.1051

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HIMSS Global Conference Audience – Main 3 Relevant Topics

1. Telehealth
2. Healthcare Applications and Technologies Enabling Care Delivery
3. Improving Quality Outcomes