Rapid-Cycle Development and Operational Deployment of Telehealth Support Teams

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BACKGROUND

Each year, over 1 million domestic and international patients seek care at Mayo Clinic. In 2020, this abruptly changed over a matter of weeks. COVID-19 led to broad lockdowns on local, state, and international travel. However, the need for medical care was not diminished by the global pandemic. Although telehealth patient visits grew in popularity and availability in years leading up to the pandemic, large-scale adoption and utilization were constrained by licensing, reimbursement, technical, and logistical barriers. COVID-19 became the catalyst for licensing and reimbursement reforms, allowing for rapid and widespread adoption of virtual care by the healthcare industry.

When states began issuing stay-at-home orders at the start of the COVID-19 pandemic, Mayo Clinic leveraged telehealth solutions as an alternative to safely support patients. Video-enabled virtual appointments ("video visits") are one of Telemedicine's cornerstones, providing a bridge for patients and providers to continue receiving and delivering care safely and conveniently using video technology. During the first few months of the pandemic, video appointments peaked at 3,491 per day (over 11,000% of pre-COVID rates). Additionally, remote patient monitoring (RPM) – the use of digital applications and devices to collect, analyze, and record physiologic and medical data outside of a clinical setting – was leveraged to support patients with moderate- to high risk of decompensation due to the COVID-19 infection or underlying co-morbid conditions.

A critical role in supporting video appointments and RPM is virtual clinical assistants, who act as a critical link between the patient and the supporting care team by providing virtual rooming, patient onboarding, technical support, documentation services, and compliance monitoring. Rapid deployment and successful support of these services required new team models and data-driven techniques to match growth with clinical demand patterns.

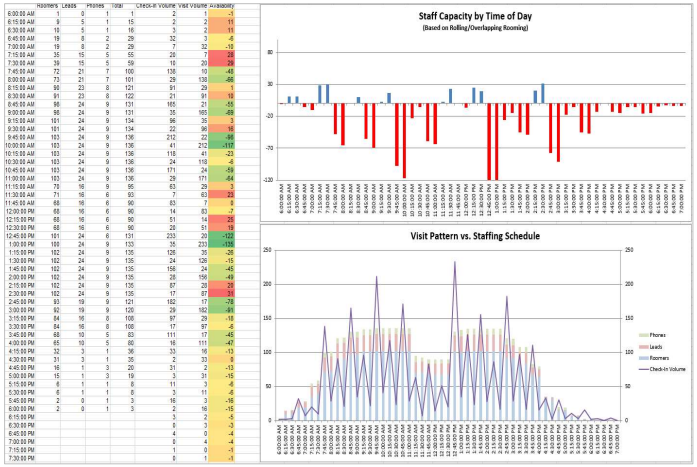
ASSESSMENT

Ongoing support of these telehealth programs required both the daily analysis of program needs, appropriate application of staff, and the operational transition of these support functions into frontline practice operations. Appropriate daily staffing-to-workload require cross-mapping of shift time, committed effort, level of patient need, and staff proficiency. The resulting "adjusted FTE" could then be applied as a daily staffing target. These data were evaluated relative to daily and weekly estimated demands and staff assignments were adjusted accordingly. To sustain this model, long-term partnerships were formed with temporary support staff progressively replaced with frontline staff along with transition of daily oversight and resource assignment.

METHODS

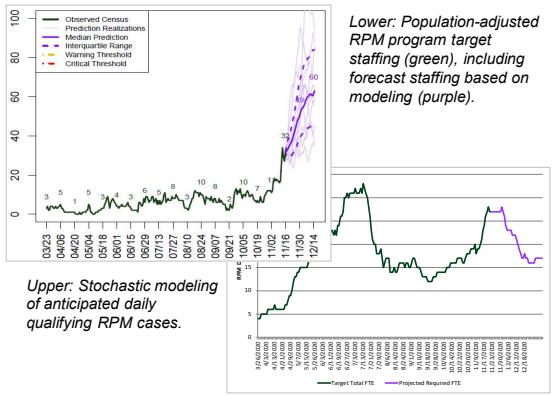
VIDEO TELEMEDICINE

Daily utilization and demand modeling were used to identify the optimal shift and team structures. Retrospective and real-time appointment data were abstracted from the electronic health record (EHR) and analyzed. Data visualization and heat mapping allowed for identifying peak load times and natural variations in visit volumes, both within a day and across a week. Analysis of patient arrival, check-in, and no-show procedures allowed for estimation of time-on-task relative to the appointment time, allowing for the translation of demand heat maps into resource plans. This model's application allowed for the successful alignment of over 450 FTE into over 40 rapid response "HUB" teams.



REMOTE PATIENT MONITORING

Utilization pattern analysis and predictive modeling were used to estimate COVID-19 case loads and peak support times. These data were used to inform optimal shift and team structures in a manner similar to video appointment support. A partnership was formed with data modeling experts from Mayo Clinic's Kern Center for the Science of Healthcare Delivery to develop estimates of both hospital and community cases of COVID-19 within the Mayo Clinic system in two-week intervals. These data were overlaid with early RPM and utilization data to estimate anticipated program enrollment rates, program "alert" trends, onboarding intensity, and patient time-on-program. Existing time-on-task data were combined with patient volumes and program intensity data to inform resource plans. Over 40 FTE were deployed across three HUB teams.



Upper: Stochastic modeling of anticipated daily qualifying RPM cases.

Lower: Population-adjusted RPM program target staffing (green), including forecast staffing based on modeling (purple).

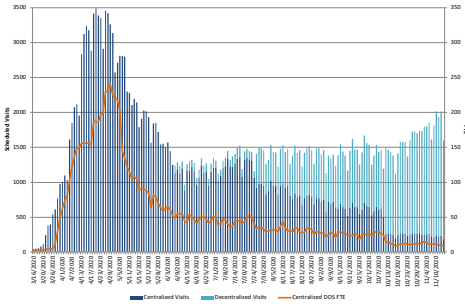
Master FTE for Remote Patient Monitoring

Program	Nov 2, 2020 Wed	Nov 2, 2020 Thur	Nov 2, 2020 Fri	Week of Nov 9, 2020 Mon	Tue	Wed	Thur	Fri	Week of Nov 16, 2020 Mon	Tue	Wed	Thur	Fri	Week of Nov 23, 2020 Mon	Tue	Wed	Thur	Fri
COVID Complex Care RPM Only (FTE)	4	4	3	4	4	4	4	3	4	4	5	7	9	4	4	3	0	3.75
COVID & Non-COVID Complex Care RPM (FTE)	4	4	3	3	4	4	4	3	3	4	4	3	2	3	4	3	0	3
COVID & Non-COVID Complex Care RPM, COVID ICP (FTE)	11.875	11.875	10.5	11.5	12.75	12.875	11.875	11.5	15.25	15.625	16	15.25	15.5	15	15	15	8.375	14
Misc. work																		
Total FTE	19.875	19.875	16.5	18.5	20.75	20.875	19.875	17.5	22.25	23.625	25	25.25	26.5	22	23	21	8.375	20.75
Total Daily volume COVID Complex Care	442	450	469	438	449	466	508	539	625	657	713	749	778	680	646	650	650	650
Total Daily volume non-COVID Complex	267	254	235	223	213	201	188	167	153	146	137	127	123	113	106	100	100	100
Target FTE COVID Complex Care (30:1)	14.7	15.0	15.6	14.6	15.0	15.5	16.9	18.0	20.8	21.9	23.8	25.0	25.9	22.7	21.5	21.7	21.7	21.7
Target FTE Non-COVID Complex Care (60:1)	4.5	4.2	3.9	3.7	3.6	3.4	3.1	2.8	2.6	2.4	2.3	2.1	2.1	1.9	1.8	1.7	1.7	1.7
Total target FTE	19.2	19.2	19.6	18.3	18.5	18.9	20.1	20.8	23.4	24.3	26.1	27.1	28.0	24.6	23.3	23.3	23.3	23.3
Target staff to release	0.7	0.6	-3.1	0.2	2.2	2.0	-0.2	-3.3	-1.1	-0.7	-1.1	-1.8	-1.5	-2.6	-0.3	-2.3	-15.0	-2.6
Target weighted average ratio	36.96	36.60	36.01	36.09	35.75	35.32	34.68	34.02	33.27	33.00	32.63	32.34	32.20	32.30	32.27	32.14	32.14	32.14
Actual weighted average ratio	35.67	35.42	42.67	35.73	31.90	31.95	35.02	40.34	34.97	33.99	34.00	34.69	34.00	36.05	32.70	35.71	89.55	36.14

RESULTS

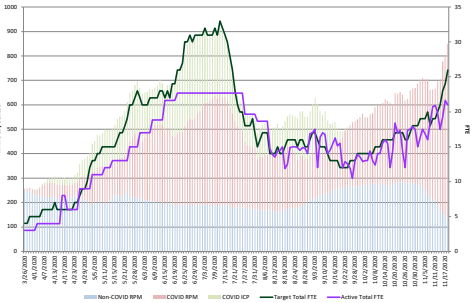
Since the outset of the pandemic, nearly 300,000 video visits have been successfully conducted and now average approximately 1,800 per day (over 5,000% of pre-COVID rates). Additionally, over 8,000 patients with COVID-19 were supported during this period through Mayo Clinic's remote monitoring solutions. Both programs were able to successfully respond and apply appropriate staffing-to-workload based on changing demand and patient acuity.

FIGURE 1: VIDEO VISIT RESPONSE



Daily video visit volumes after the onset of the pandemic. Centralized staffing-to-workload was applied as visits support was steadily transitioned to frontline staff within their respective practice area.

FIGURE 2: RPM RESPONSE



Daily census within remote patient monitoring programs after the onset of the pandemic. Stochastic modeling was used to estimate case loads and daily enrollment rates. Adjusted FTE ratios (based on program patient mix) were then used to forecast and achieve appropriate staffing-to-workload.