COVID-19 and HIT:
Perspectives from a New York Metro Area Health System

Michael I. Oppenheim, MD, FAMIA
VP & Chief Medical Information Officer
Northwell Health
Attending Physician, Division of Infectious Diseases
North Shore University Hospital

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Northwell Health®

Operating Statistics

- 2 million+ patients treated annually
- Over 5.5 million patient encounters
- More than 39,200 births
- 301,608 hospital discharges
- 868,291 emergency visits

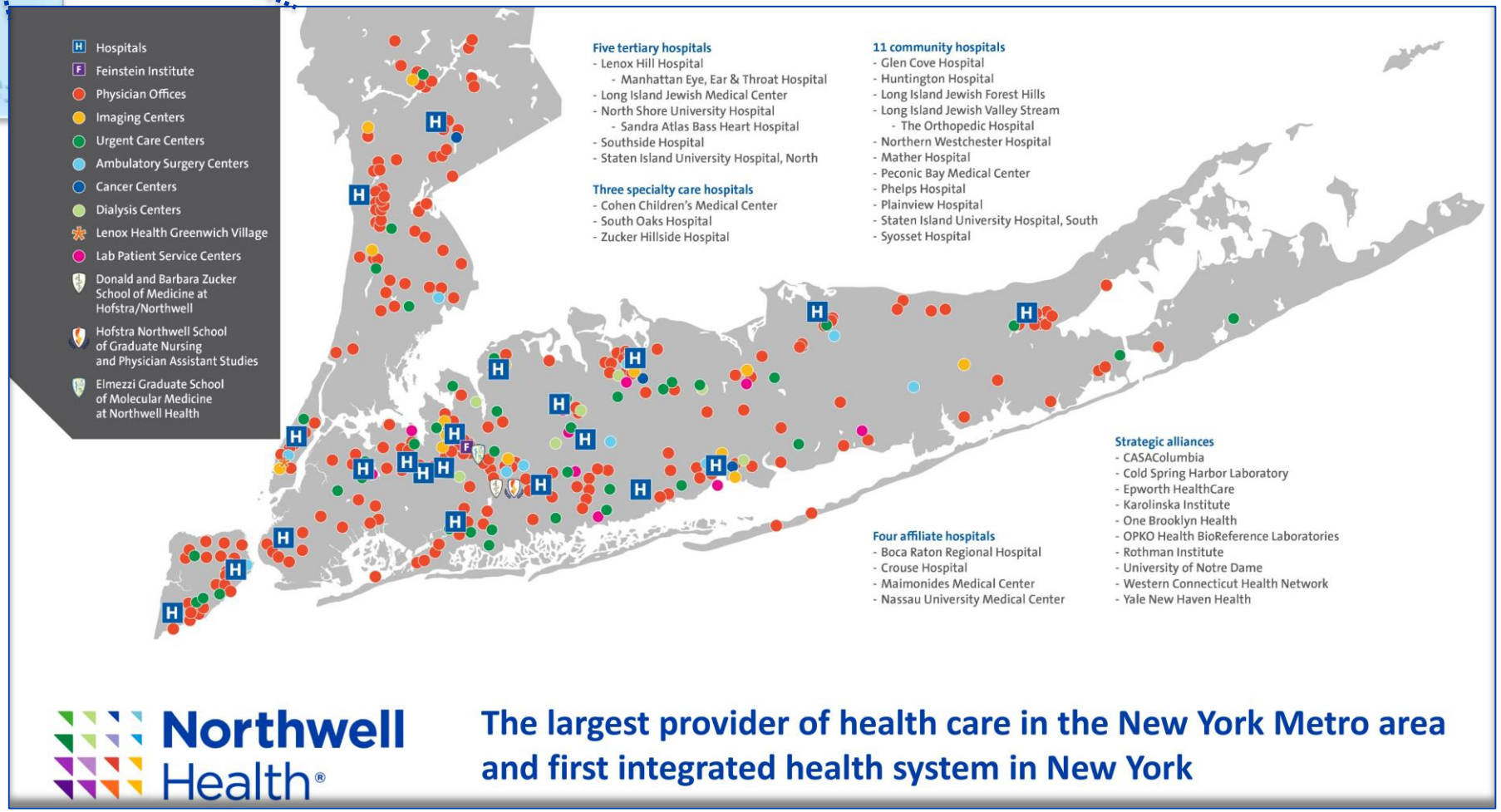
Operating Statistics Continued

- 924,990 home health visits
- 220,095 ambulatory surgeries
- 115,485 ambulance transports
- $12 billion annual operating budget
- $1.3 billion community benefit

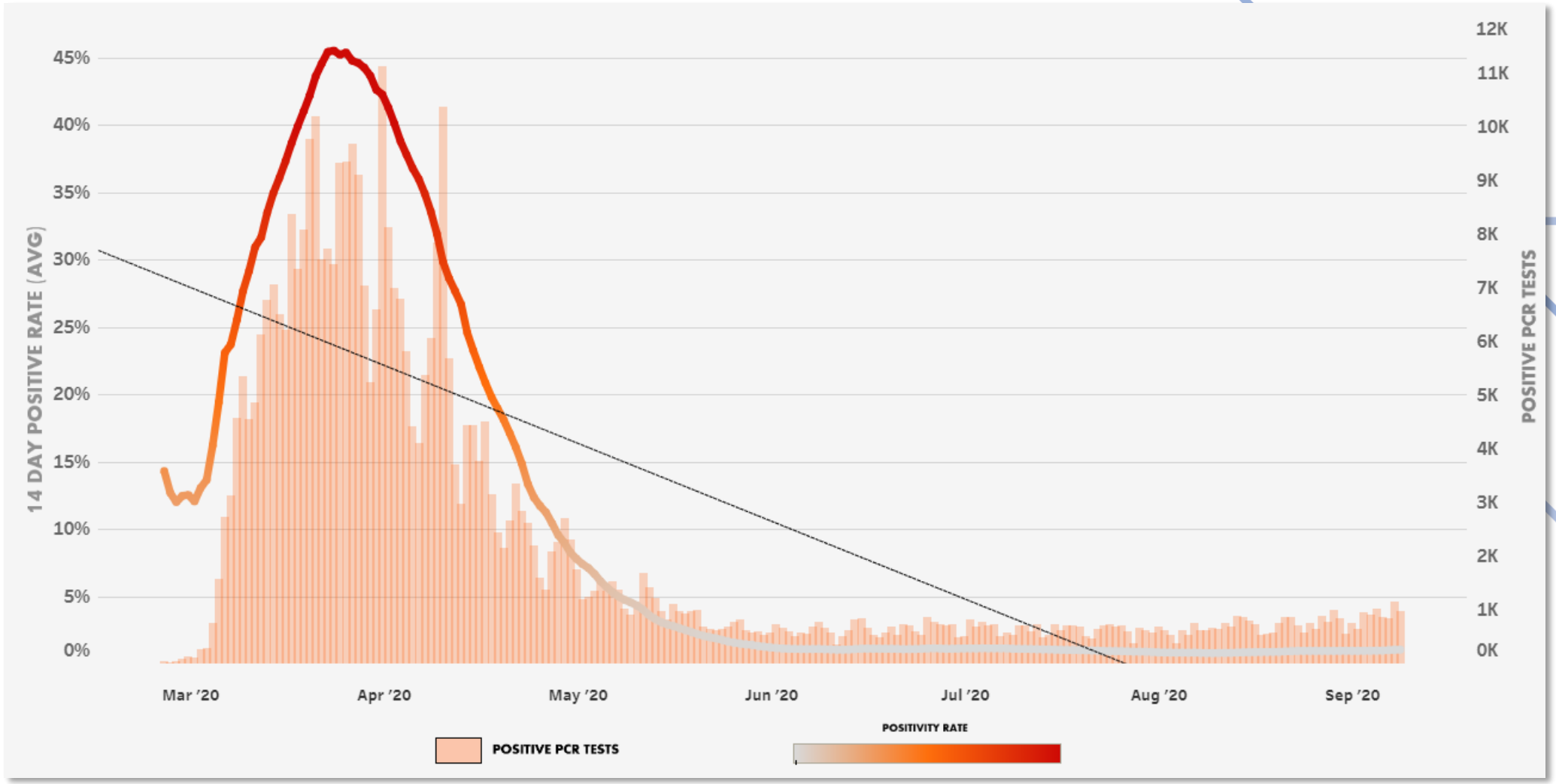
Northwell Health's Geography & Footprint

Key Facts

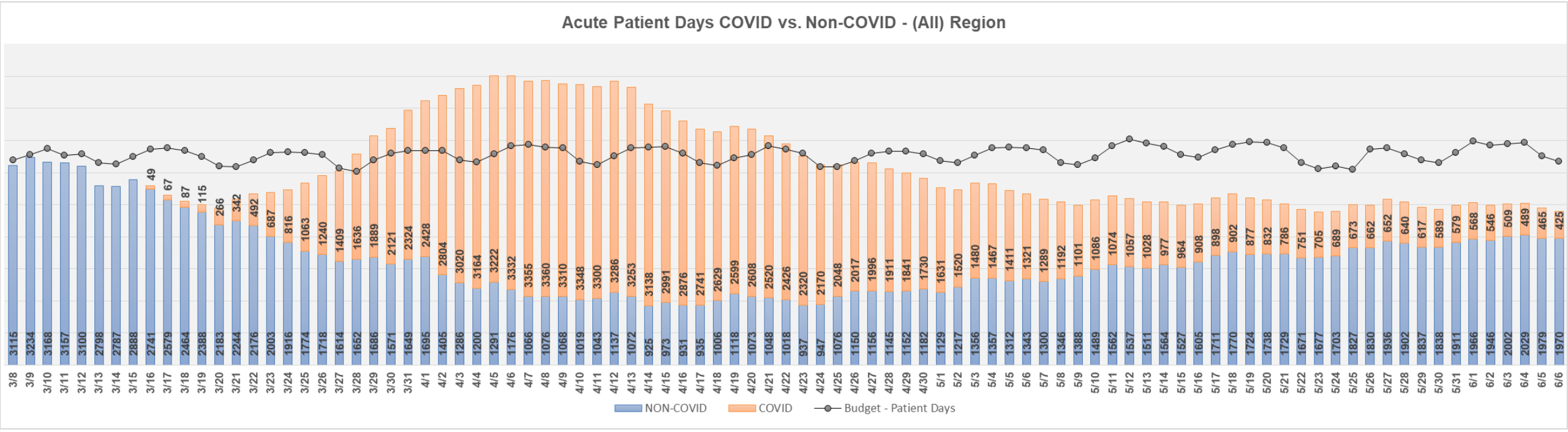
- More than 70,000 employees
- 23 hospitals
- 4,300 employed physicians
- 17,000 nurses
- 5,000 volunteers
- 750 outpatient facilities



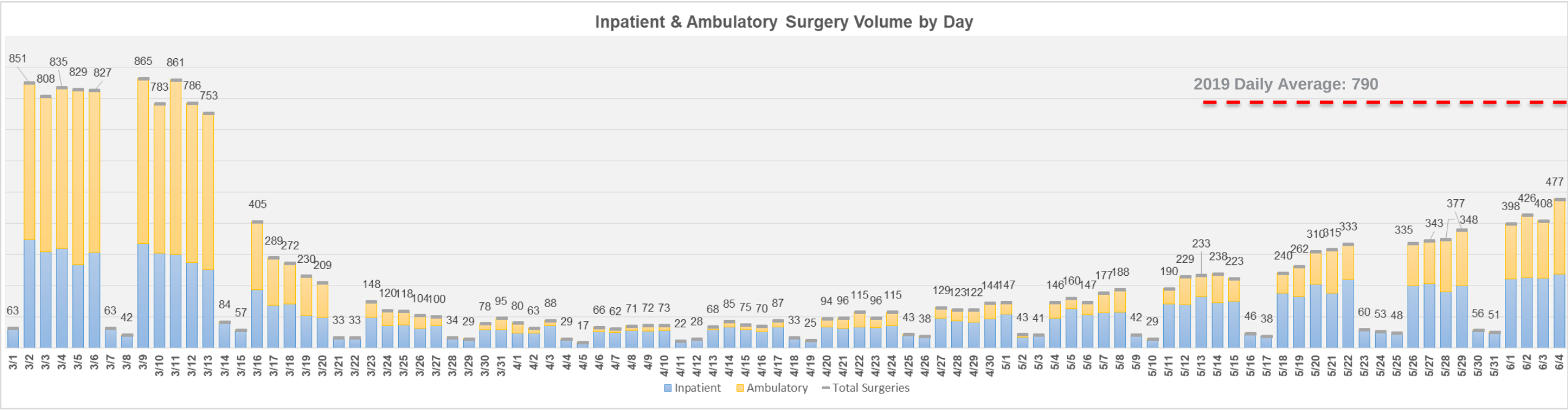
Pandemic Peak



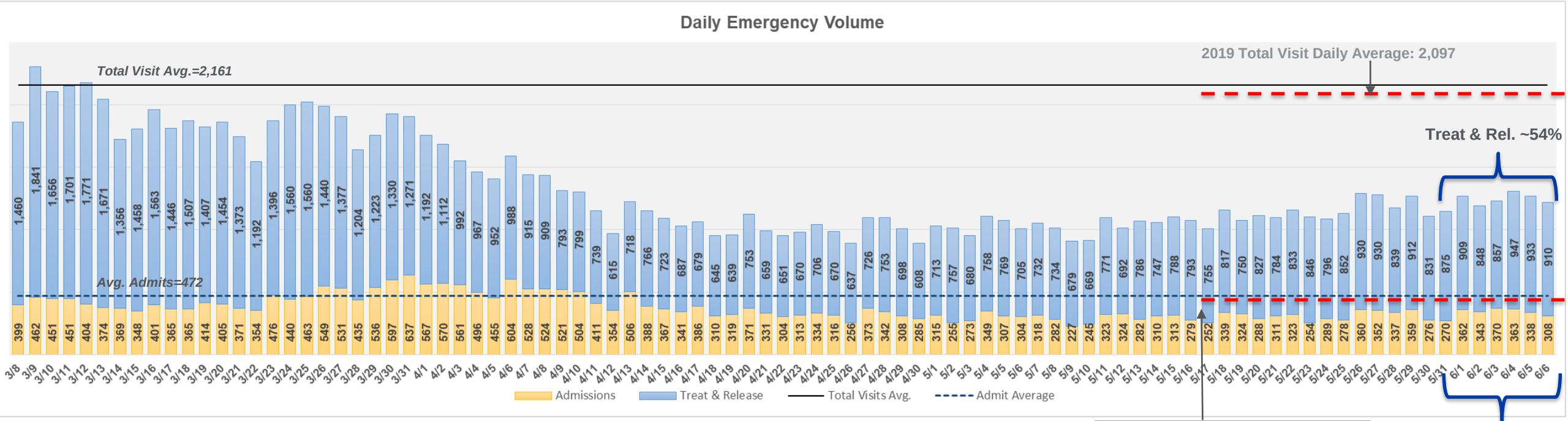
Acute Patient Days COVID vs. Non-COVID



Daily Inpatient & Ambulatory Surgery Volume

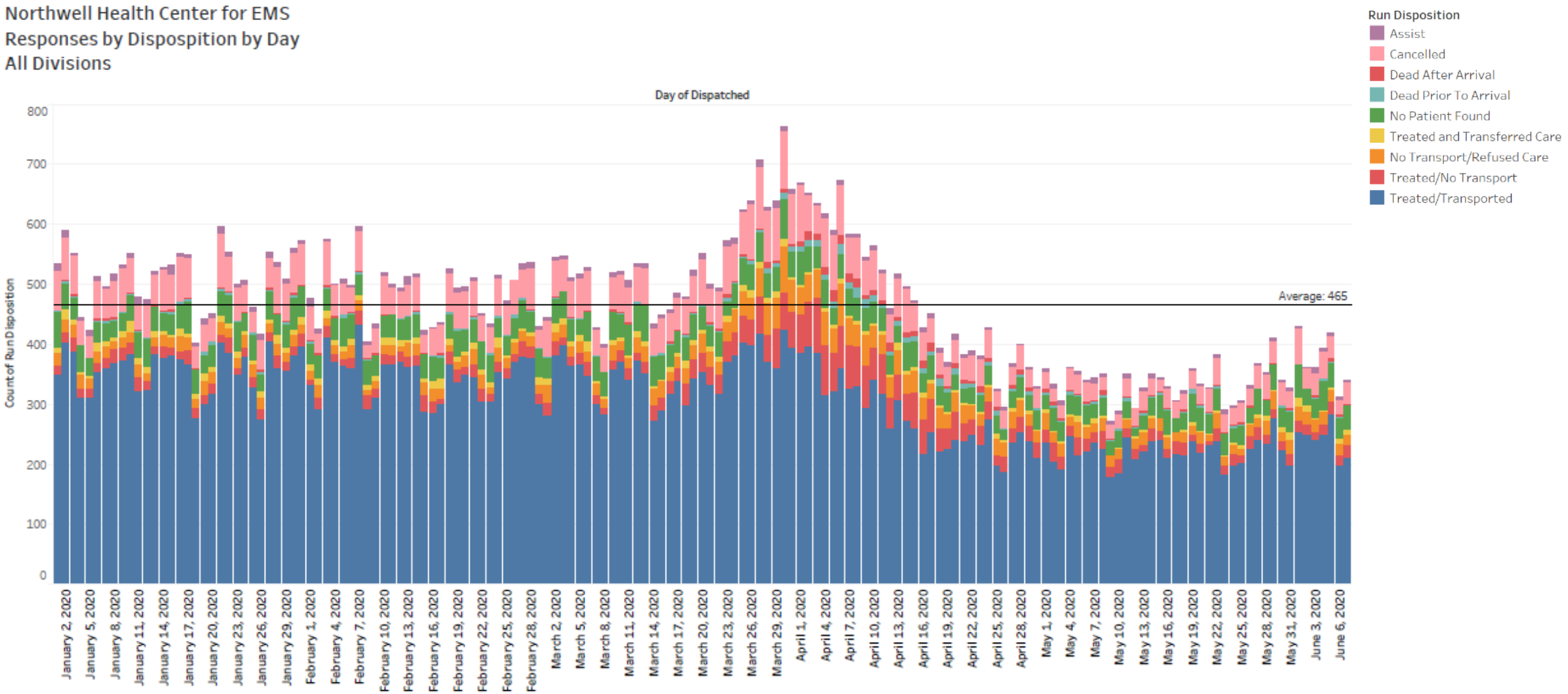


Emergency Visits by Day

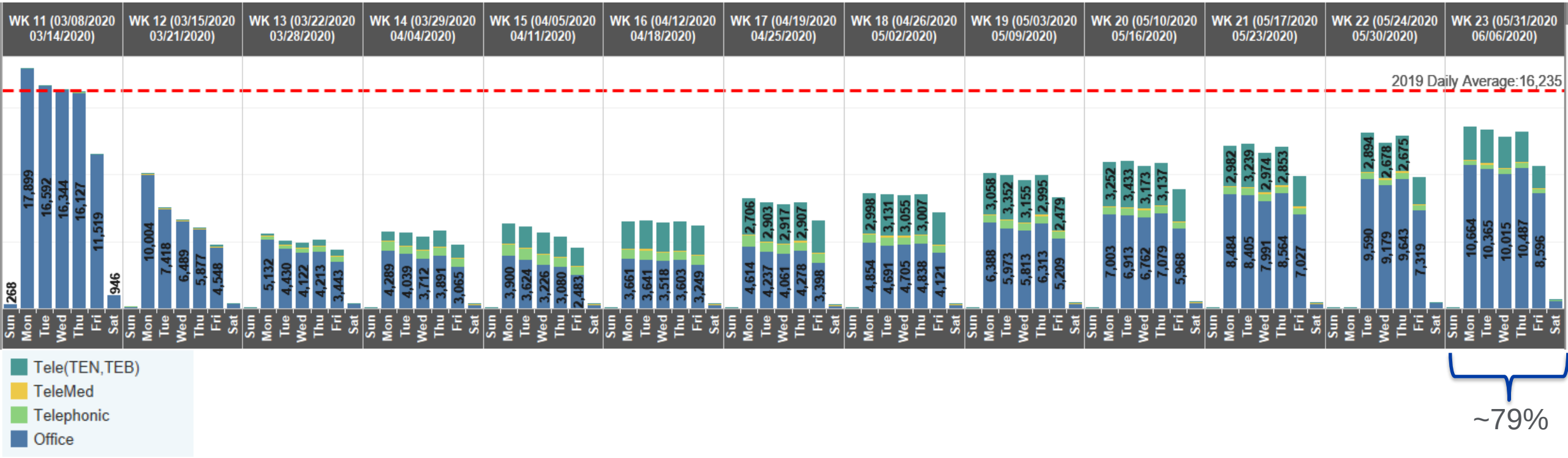


Excludes PHELP, NWEST, Mather & Peconic

CEMS – Responses by Disposition by Day



Daily Physician Appointments



Northwell Pandemic Response

Situational Awareness

- Enable Emergency Operations at both facility and central levels to understand supply/demand for facilities, equipment and services

Physical Capacity Expansion ("Surge")

- Rapid buildout of non-clinical space and popup-locations to create general and intensive care beds necessitated by patient volumes

Care Efficiency & Throughput

- Streamline provider and hospital administrative processes to focus on patient care and optimizing beds/resources

Staff and Patient Safety

- Minimize staff exposure to infectious patients without compromising patient monitoring and safety

Patient Engagement

- Maintain interactions with patients despite increasing scale of calls for information and services

Clinical Knowledge Dissemination

- Assure rapid delivery of latest treatment protocols and recommendations to clinicians

Research / New Knowledge Discovery

- Participate in clinical trials
- Leverage accumulated clinical data to enable better patient monitoring and treatment

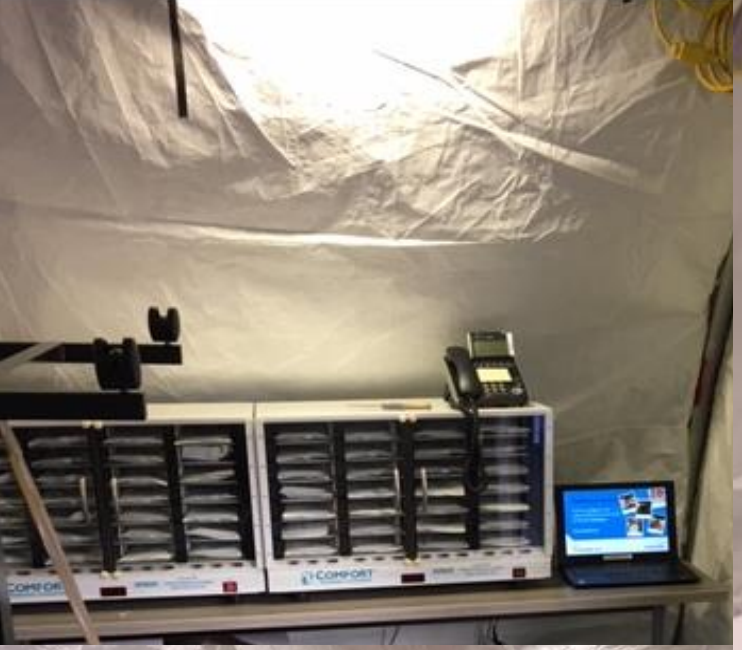
Situational Awareness

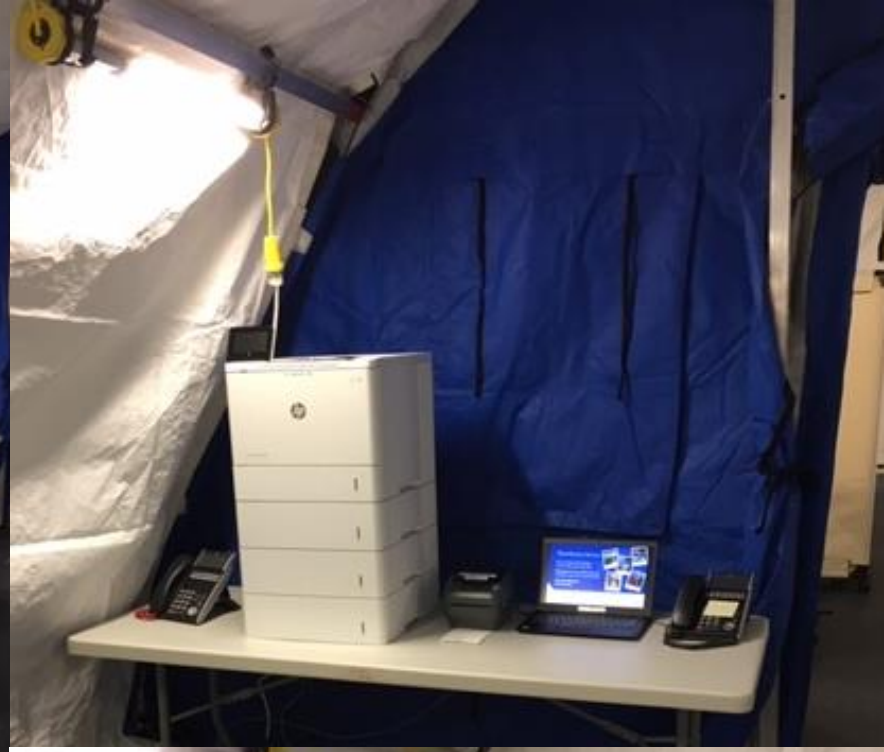
- Built COVID-19 specific Data Mart to enable data analytics throughout organization.
- Developed Enterprise and facility-level dashboards to understand hospital-occupancy, patient acuity and determine resource needs.
- Developed and monitored leading indicators to identify regions with surge need and overall bed and ventilator requirements.

Physical Capacity Expansion (“Surge”)

Northwell “Network in a Bag” (“Flight Pack”)

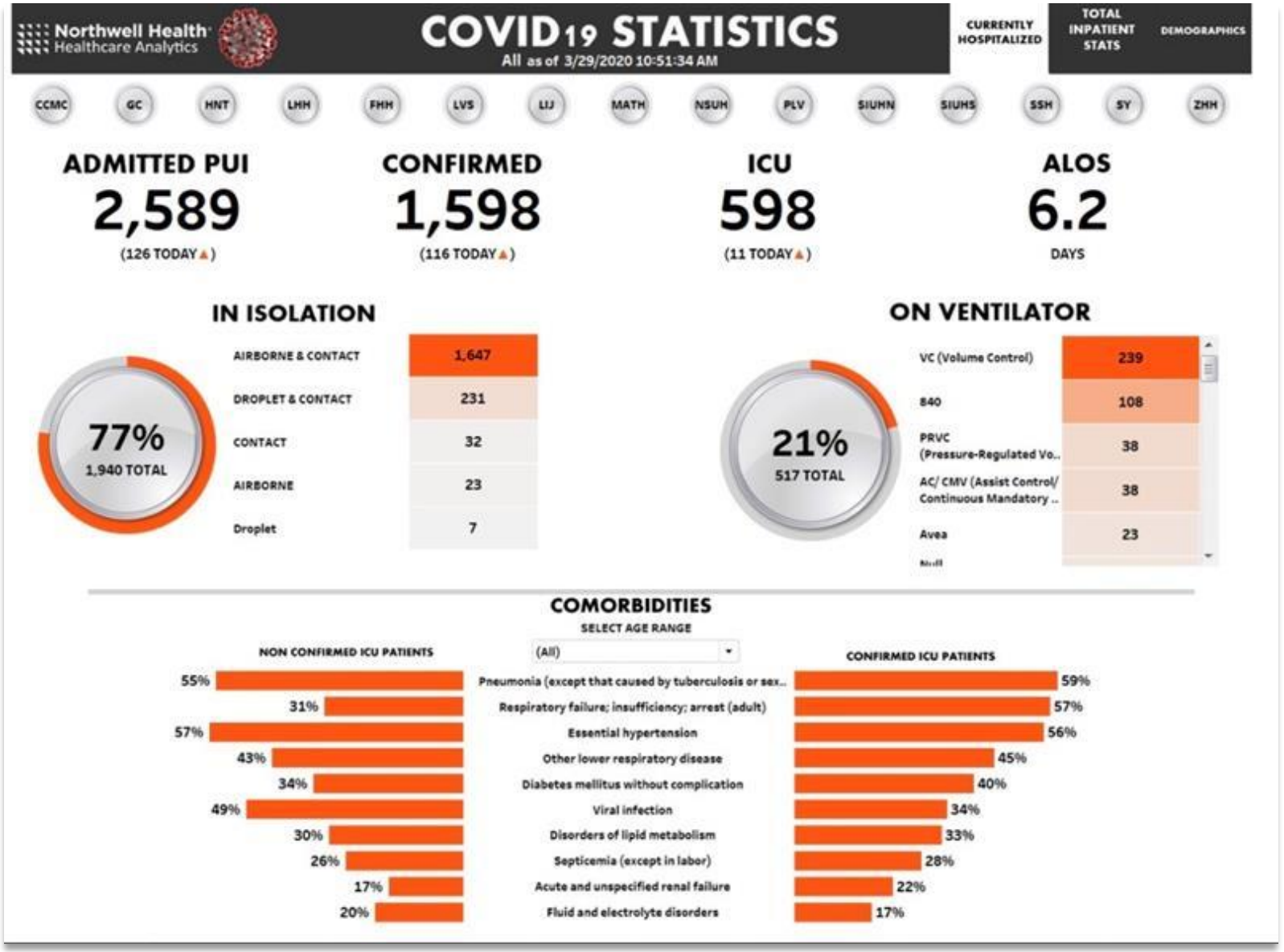
- Created and deployed a fully self-contained kit delivering a “Northwell network anywhere” capability. Kit provides secure way of connecting to the network via wired/wirelessly methods.
- Operational dashboard for load balancing amongst various sites.



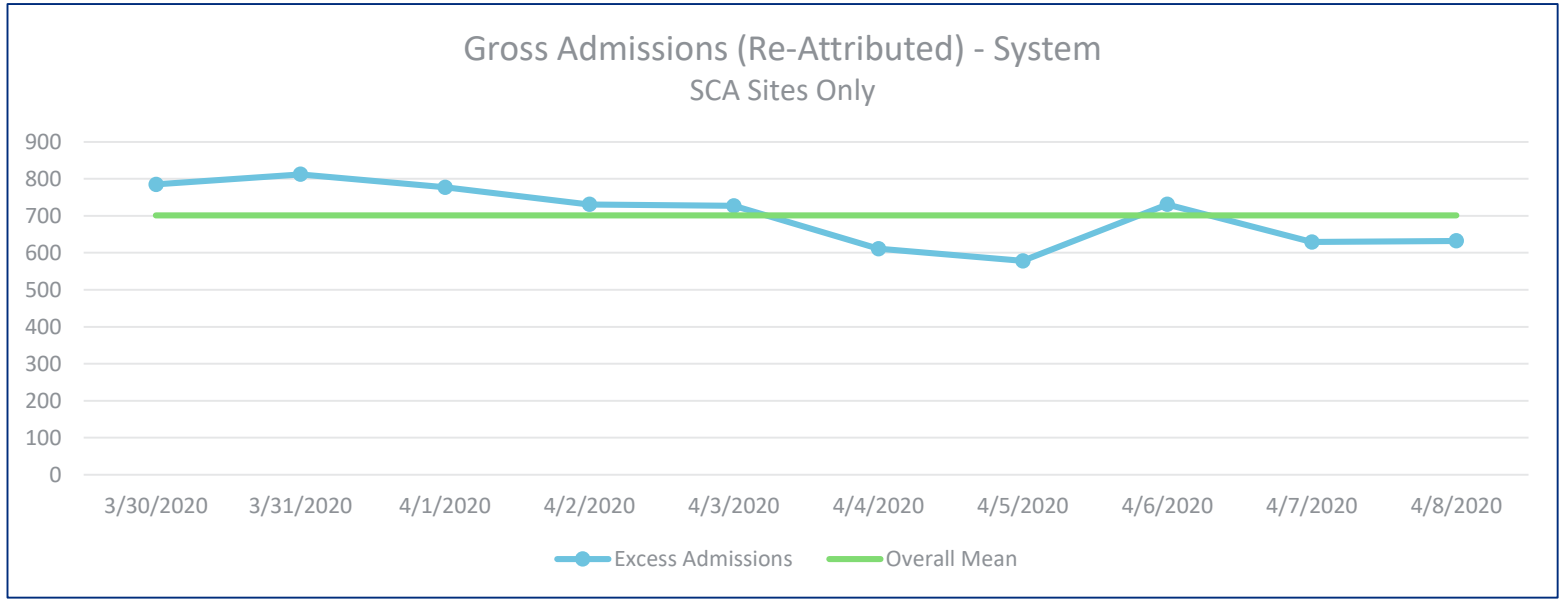


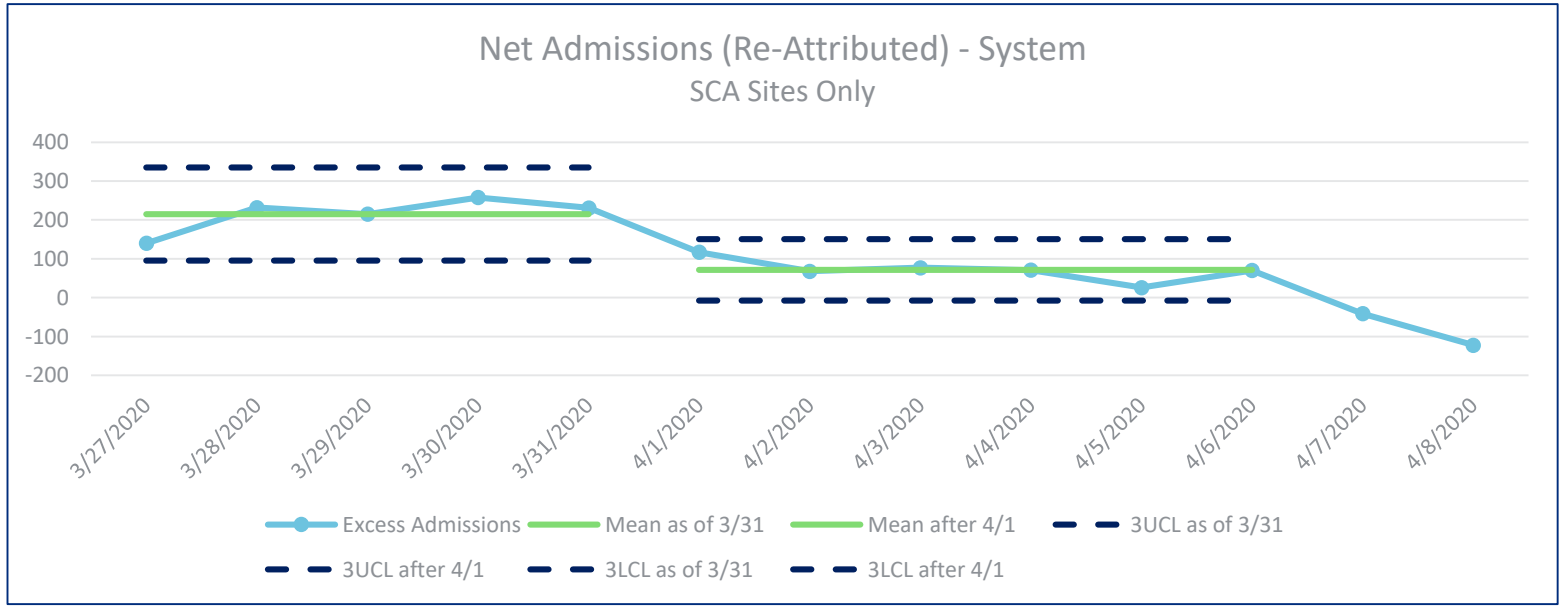
Inside the Northwell BluMed Tents

Situational Awareness: COVID Inpatient Dashboard

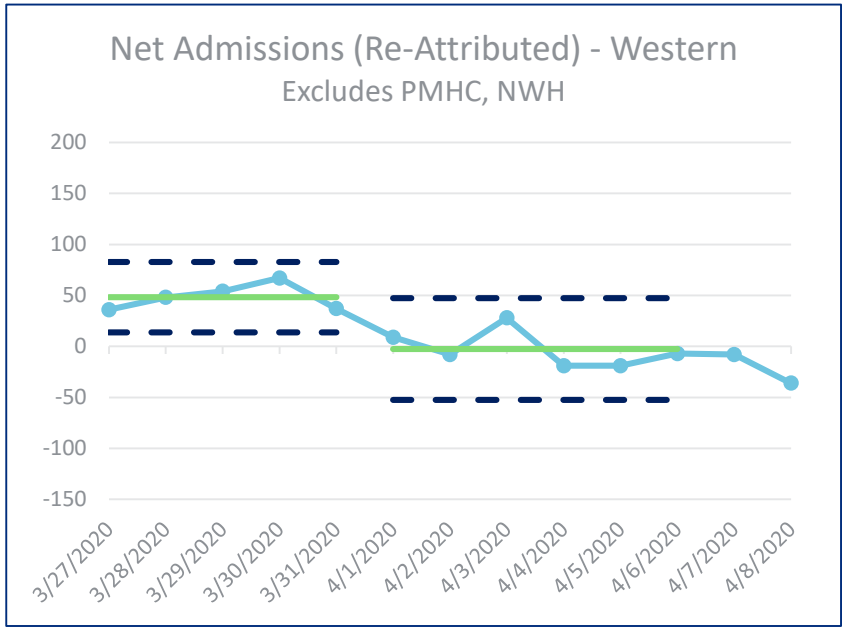


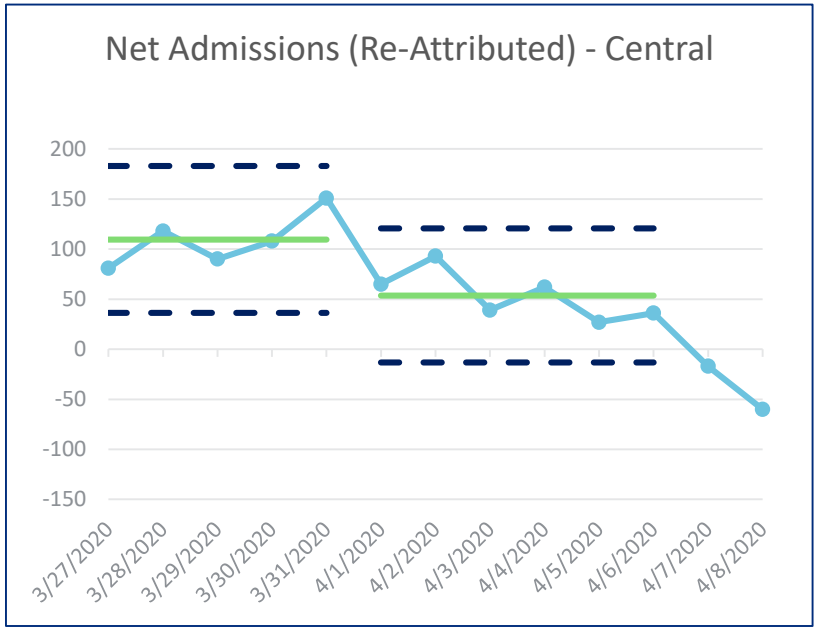
Situational Awareness: Trend Analytics / Projections

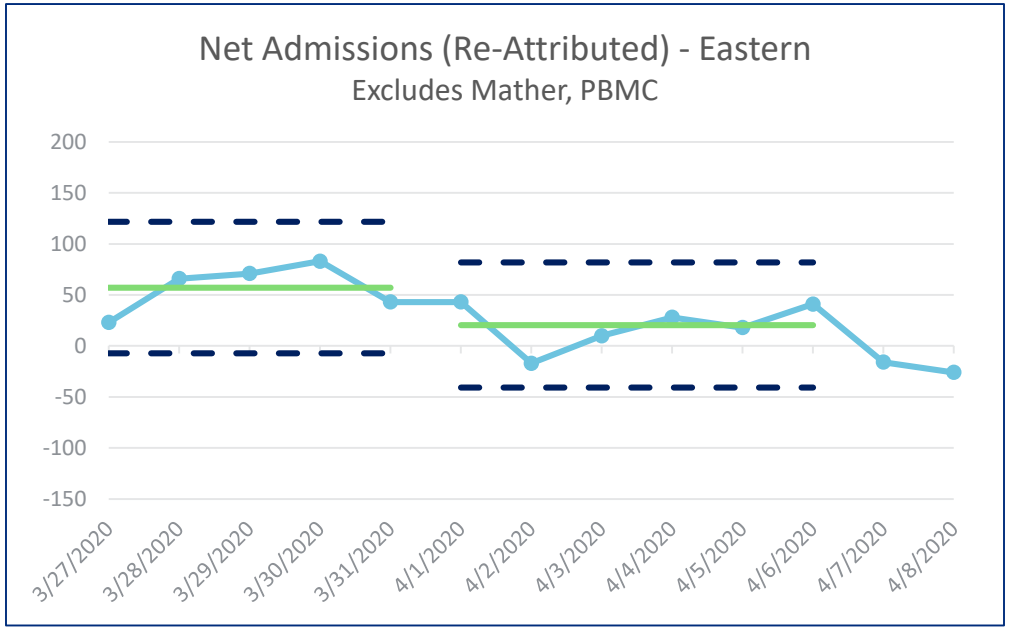




Northwell Health







Northwell Health

Care Efficiency & Throughput

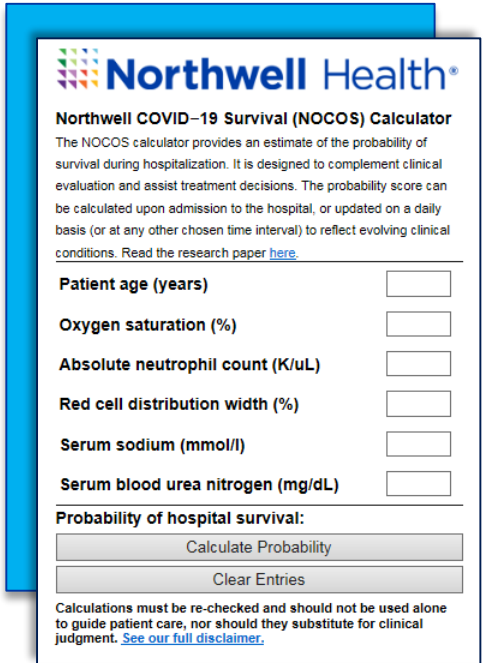
- Rapid buildout/modifications to **inpatient** Electronic Health Records to enable clinicians to focus on high volumes of complex patients.
- Developed special documentation and tools for severity-based longitudinal monitoring and tracking of COVID+ **outpatients**.
- Deployed “readiness for discharge” machine-learning-based predictive model to identify both non-COVID and COVID-19 patients appropriate for discharge to support bed use optimization.
- Developed machine-learning based predictive model to identify patients with highest risk of mortality for goal-of-care discussions and resource allocation.
    - Northwell COVID-19 Survival (NOCOS) Calculator made publicly available on the web for all institutions:

https://cbmi.northwell.edu/nocos/ or http://feinstein.northwell.edu/nocos

Development and Validation of a Survival Calculator for Hospitalized Patients with COVID-19

Todd J. Levy, Safiya Richardson, Kevin Coppa, Douglas P. Barnaby, Thomas McGinn, Lance B. Becker, Karina W. Davidson, Stuart L. Cohen, Jamie S. Hirsch, Theodoros Zanos, Northwell & Maimonides COVID-19 Research Consortium

doi: https://doi.org/10.1101/2020.04.22.20075416



Staff and Patient Safety

- Deployed consumer-grade two-way audio-video communication systems in patient rooms to minimize entry by staff, thus reducing PPE utilization and lowering exposure risk.
- Instances where enhanced safety monitoring was required, continuous video-surveillance with night-vision capabilities were deployed in lieu of an in-room Patient Sitter to assure patient safety.
- Continuous monitoring of patient vital signs status through wireless sensors with automated alerting to nursing, providing closer monitoring of patients without requiring frequent staff entry into rooms and decreasing PPE use (limited pilots completed).

Patient Engagement

- Implemented text-based Chatbot for follow-up program for ED treat & release patients via their smart phones.
- Created chat bots for COVID test results to maintain call center efficiency and minimize wait times.
- Provided in-room devices with software to give patients the option for video chats with family, as no visitors were allowed.
- Rapid deployment of telehealth to maintain contact and provide ongoing medical care to outpatients (for both COVID and non-COVID).

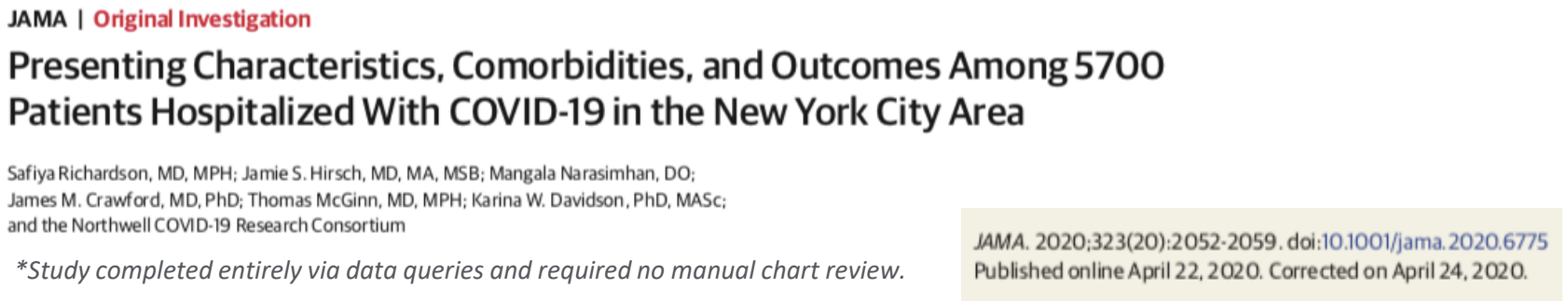
Clinical Knowledge Dissemination

- Deployment of prebuilt order sets with **automated dosing recommendations** in the EHR to standardize COVID treatment and support research protocols.
- Automated tools for insertion of COVID results, treatment plans, vitals, and other clinical data into documentation/provider progress notes.
- Sometimes <1 day turnaround on changes to EMR based on rapidly changing knowledge
  - ***Effective and agile clinical governance critical to streamlining content development and deployment!***

Research / New Knowledge Discovery

Use of Data Mart for Research, Clinical Trial Notifications in EMR; Clinical Trial Order Sets

- Deployed tools to support identification and enrollment of appropriate patients for COVID clinical trials.
- Rapid-cycle database-based research to identify best-practices for treating COVID-19 patients.



JAMA | Original Investigation

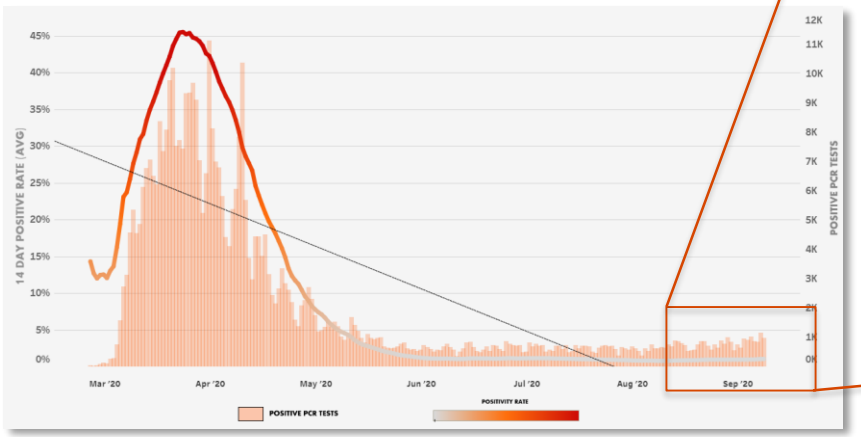
Presenting Characteristics, Comorbidities, and Outcomes Among 5700 Patients Hospitalized With COVID-19 in the New York City Area

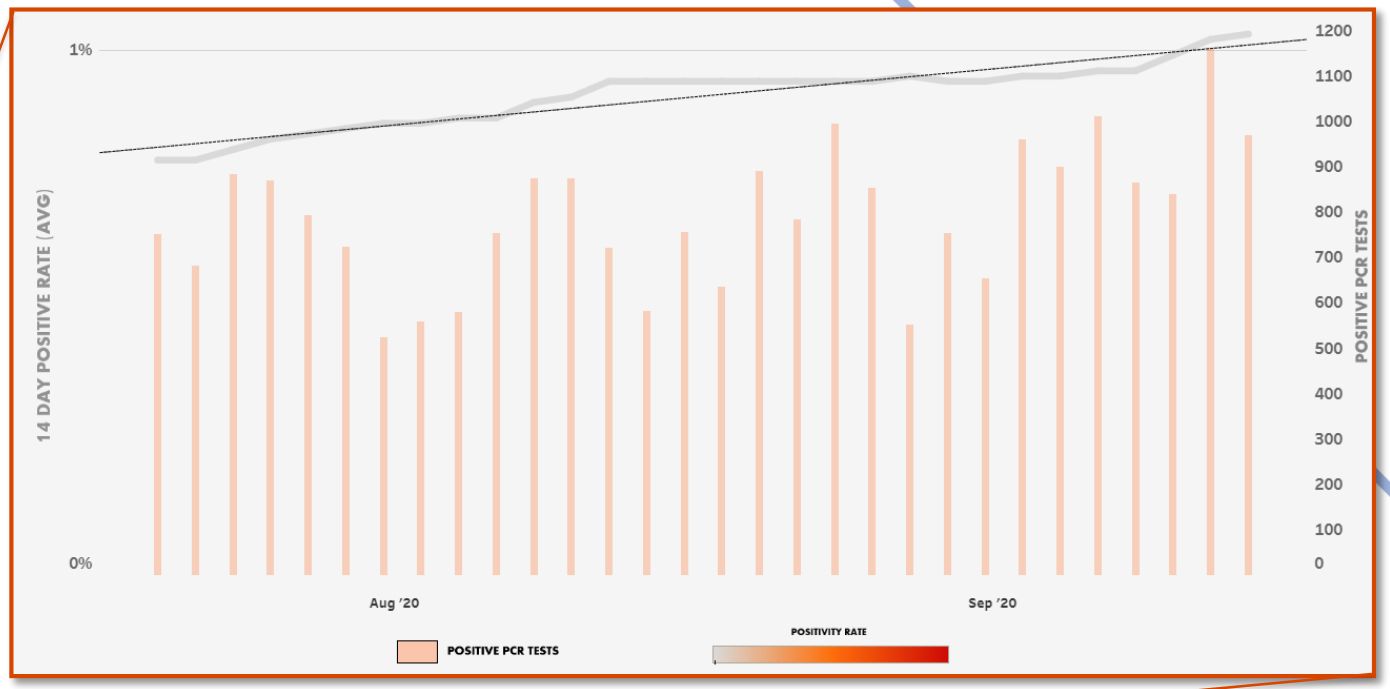
Safiya Richardson, MD, MPH; Jamie S. Hirsch, MD, MA, MSB; Mangala Narasimhan, DO; James M. Crawford, MD, PhD; Thomas McGinn, MD, MPH; Karina W. Davidson, PhD, MASc; and the Northwell COVID-19 Research Consortium

**Study completed entirely via data queries and required no manual chart review.*

JAMA. 2020;323(20):2052-2059. doi:10.1001/jama.2020.6775
Published online April 22, 2020. Corrected on April 24, 2020.

Recovery & Resurgence Readiness





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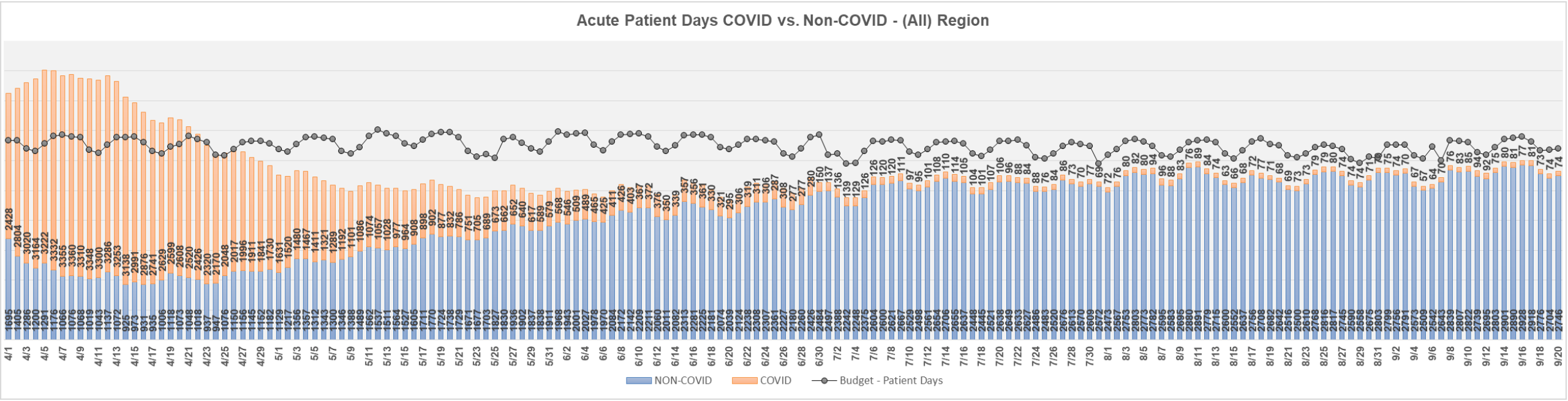

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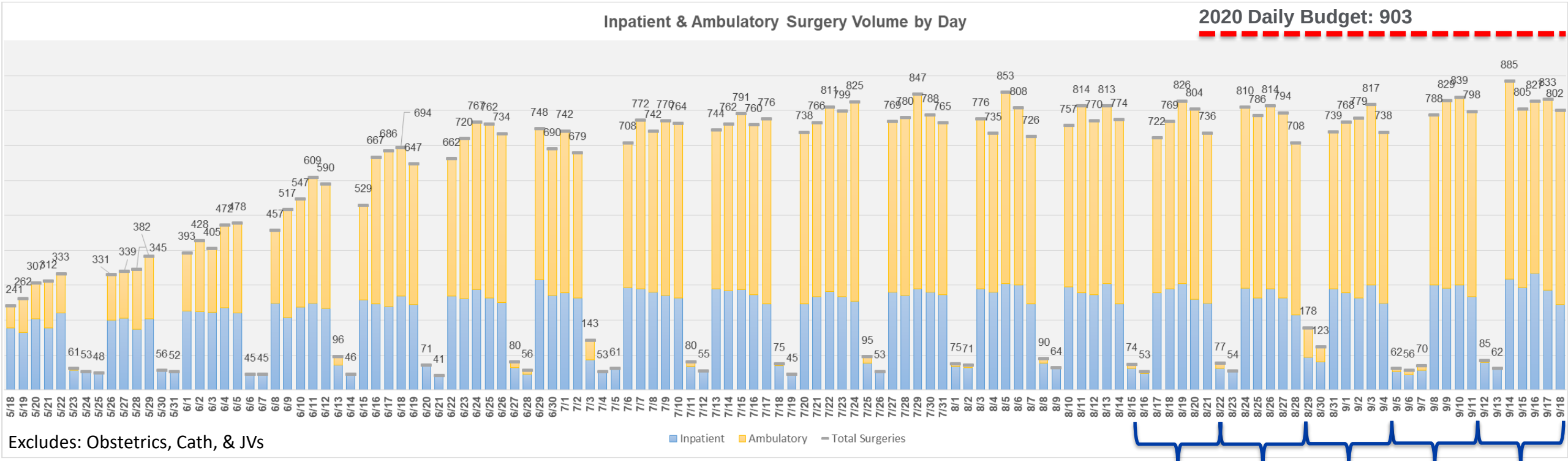
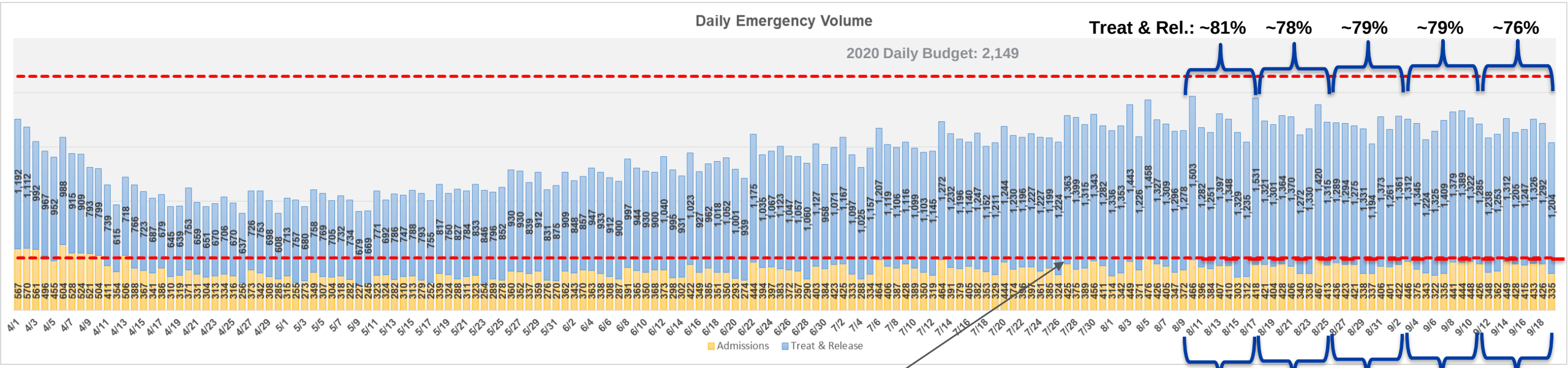


Excludes: Obstetrics, Cath, & JVs

~88% ~90% ~92% ~95% ~95%

Emergency Visits by Day



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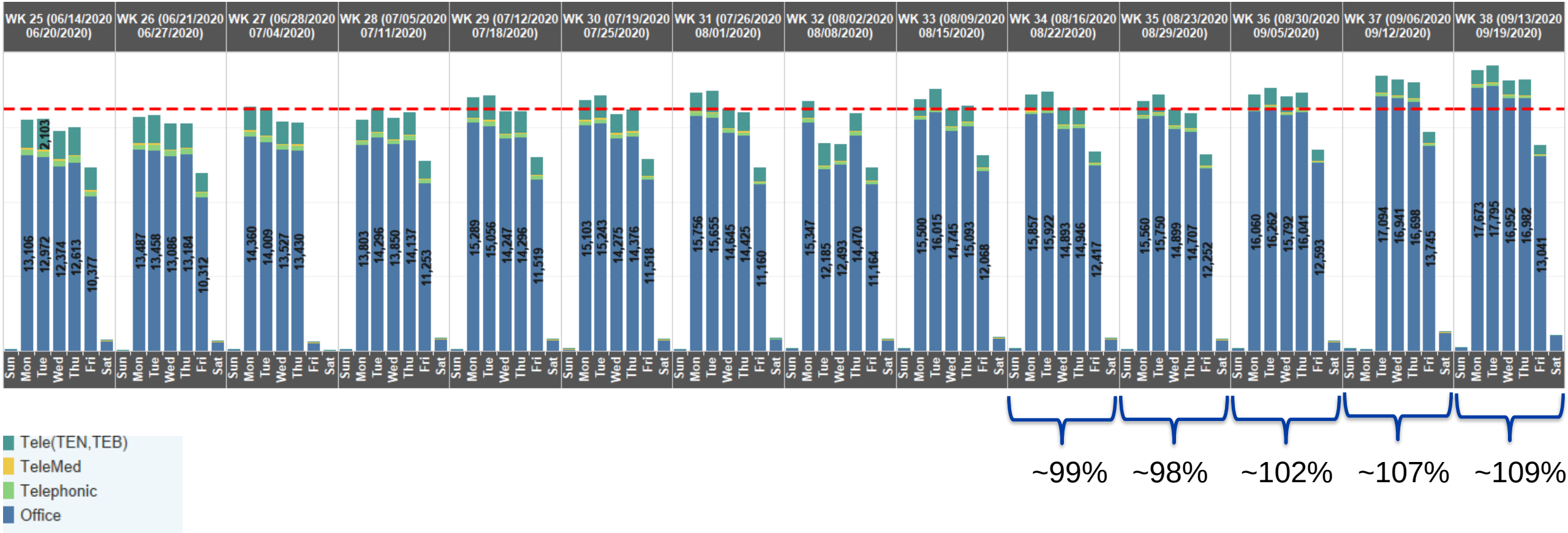

~99% ~98% ~102% ~107% ~109%

Northwell Recovery / Resurgence Priorities:
Information Technology

Centralized Logistics / Data Analytics

- Bed Tracking
- Referral Management
- Surveillance (internal, community)

Pharmacy and Supply Chain

- Pharmacy Inventory Management
- Real Time Location Services (RTLS)
- Warehouse management system

Clinical Communication and Support

- Nursing mobility
- Continuous patient video monitoring
- Continuous vital sign monitoring

Northwell Recovery / Resurgence Priorities:
Information Technology

Patient Experience
- Comprehensive in-room infotainment / engagement platform
- Patient/Family/Caregiver updates

Telehealth
- Expansion of services
- Improved integration into practice workflows
- Virtual inpatient consultation

Medical Staff Services & Employee Health Services
- Next-generation credentialing software
- Employee Health Service EMR upgrade

How Policy Makers Helped and Could Do More

Regulatory Changes Critical for Success:

Telehealth-Related Waivers

- Allowed initial visits via telehealth.
- Removed limitations on provider location at time of telehealth visit.
- Allowed use of non-HIPAA compliant technologies if needed.

Payer Parity for Tele-visits for Medicare Beneficiaries (Commercial Payers followed) including Telephonic

Relaxation of Hospital Care Documentation Requirements

- Enabled clinicians to spend more time on clinical care with less administrative/documentation burden.

Quality Program Delays

- Numerous Federal reporting programs delayed because focus on COVID-19 prevented implementation of systems to address programs and reporting requirements.

COVID19: Unaddressed Opportunities for Regulators

Redundancy in Public-Health Reporting

- Limited sharing of data across public health organizations added significant work burden on Northwell personnel.
  - Similar data requested by Center for Disease Control / National Healthcare Safety Network (NHSN), city, county and state Departments of Health.
- No sharing of public health data back to provider organizations to support our planning efforts.

Quality Program Delays

- Clinical Decision Support / Appropriate Use Criteria (Protecting Access to Medicare Act - PAMA) requirement NOT delayed (*as of the time of the pandemic peak in NY*); significant burdens on hospitals to meet requirements given halting of implementation of systems needed to meet requirements.

FDA Limitations Around Monitoring Devices

- Use of cutting-edge biosensors for patient monitoring limited because of pending FDA approvals for some components of those devices.
- No regulatory relief from FDA for use of devices if deemed safe and validated by organization (as was done by FDA for laboratory assays).

Limitations on Data Sharing Across Organizations

- Public Health Informational Exchange in NY requires actively asserted patient consent (“opt-in”), which limits clinical data sharing across organizations in same region cooperating on load balancing and resource optimization.
- Universal access to immunization data across regions/states will be needed once COVID immunization is being performed.

Thank You