SPROUT COVID-19 MEASURE FRAMEWORK
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Purpose
With the massive response to COVID-19 resulting in rapid expansion and revisioning of telehealth services, many teams are wondering: "What is the impact of telehealth on COVID-19 response?" To help SPROUT members and others interested in answering this question, we provide a list of potential data elements, and measures to consider for inclusion in analysis of the institutional, local, regional, and national telehealth responses to COVID-19.

Description
The list presented in Appendix A is a work in progress lead by the SPROUT Metrics Topic Working Group - drafted on 3/21/2020 – and may be updated in the future. The suggested data points can serve as stand-alone measures and/or combined (i.e. measures of rates, percentages, and ratios). With robust data collection for these proposed measures, comparisons can be made for locations with and without telehealth services and for pre-post telehealth service deployment.

As you embark on this journey to evaluate the impact of telehealth, do not overlook the importance of documenting the resources being deployed and the timing of the deployment. Clearly document what you did, how you did it, and at what time, while you are in the moment (Appendix B). This will strengthen your ability to conduct analyses after you are able to return to "business as usual". Be mindful of and document important co-variates or confounders, such as the timing of institutional changes in response to COVID-19 that were not telehealth-specific (e.g. changes in PPE and isolation practices, changes in method of delivery for inhaled beta-agonists). These practice changes will be critical to our understanding of how telehealth impacted COVID-19.

Measure concepts are listed regardless of how easy or hard they may be to obtain. We expect data found in administrative databases and electronic medical/health records (EMRs and EHRs) will be most readily available. Population denominators in geographic areas can be determined from data collected by the U.S. Census. Primary data collection from patients and providers, needed for some of these measures, may be difficult without a pre-existing infrastructure or new funding to support data collection. New "work from home" mandates may allow shifting of resources toward primary data collection in this crisis. *Please consult your Institutional Review Board for guidance on regulations related to primary data collection and secondary analysis of EMR/EHR and hospital administrative data.*

In addition, it will be key to understand the nature of the presence of telehealth in a given area before, and in response to, COVID-19. We encourage investigators to record programmatic

elements in the moment. We provide 10 key questions about your telehealth program to get you started.

1) Who is coordinating the telehealth service? (e.g., health system, health plan, private company, a mix of these, no coordination)
2) Who is providing telehealth services? (e.g., nurse, physician, advanced practice nurse or physician's assistant, pharmacist, public health professional)
3) What modalities are used? (i.e., live video, asynchronous, remote monitoring)
4) What types of telehealth services are offered? (Screening, Medical Advice, Patient Telemedicine visits)
5) What telehealth services required outsourcing or new contracts with vendors?
6) Where are the healthcare workers providing this service and where are the patients and families? (e.g. home, clinic, hospital, call center, public health office)
7) When did the service start and when is the service offered to providers, patients, and families?
8) Why is the telehealth service being offered? What is the intended goal? (such as a mitigation of spread strategy to healthcare workers providing services to patients in isolation in-hospital, conserving PPE, home monitoring for home quarantined individuals' continuity of care for patients with chronic disease)
9) How is the service paid for? (e.g., covered by insurance fully, with co-pay or co-insurance, out of pocket, absorbed by the health system/hospital)
10) How was science translated into practice? What implementation science model was used? (e.g., RE-AIM, Precede-Proceed, Dynamic Sustainability, PRISM, CFIR)

A NOTE on NEW deployment of telehealth services: The collection of cost data in real time will prime you to conduct economic analyses. Example costs associated with your COVID-19 response could include: costs of onboarding new telehealth service providers (time for trainees, time and number of trainers, time for planning, time for advocacy for policy change), costs of new equipment, and costs of disseminating information about telehealth to end users.

We acknowledge that COVID is having impacts on the larger health system, outside of those with symptoms of concern for COVID and documented COVID disease. This may lead you to collect or secondarily analyze _data on three subpopulations (or more)_: 1) well individuals in your community who may have scheduled or acute care needs that are not related to concern for COVID; 2) patients with symptoms concerning for COVID (lower respiratory tract infection and fever); 3) patients who are positive for COVID.

Please reach out to the SPROUT Research Coordinator, Christina Coleman, at colemach@musc.edu with additional ideas, suggestions, and feedback on this list of potential measures. Organizations or societies external to the SPROUT-AAP or SPROUT-CTSA Network that contribute substantively to the enhancement of the SPROUT COVID-19 Measure Framework will be included in the acknowledgement section of future versions of this guidance. Visit https://services.aap.org/en/community/aap-sections/telehealth-care/sprout/ for more information on SPROUT.

Last Updated: March 24, 2020

Appendix A – Measures List

SPROUT Measurement Framework Domains	Subdomains	Measure Name	Description and Specifications
Health Outcomes	COVID population	COVID Cases	Number of COVID positive cases in your catchment area. Consider stratifying by age groups (Children, Adults, age groups within those two larger categories)
		Population Adjusted COVID Cases	Number of COVID positive cases in your catchment area divided by the total population in your catchment area. (Children, Adults, age groups within those two larger categories)
		COVID among healthcare workers	1) Number of COVID positive healthcare workers
			2) Number of healthcare workers required to self-quarantine
		Mortality rate	Number of COVID cases resulting in death divided by the number of COVID positive cases in the relevant time period
		Morbidity rate	Number of COVID survivors with associated short- or long-term consequences of the disease (e.g., neurologic disability, respiratory support) divided by the number of COVID positive cases in the relevant time period
		Level of Care Required for COVID Patients	Number of patients with COVID concerns managed in one or more of following settings: 1) outpatient clinics; 2) emergency departments; 3) inpatient general care; 4) inpatient intensive care; 5) novel care settings - drive through triage; 6) via telehealth
			Number of encounters for patients with COVID concerns managed in each of the following settings: 1) outpatient clinics; 2) emergency departments; 3) inpatient general care; 4) inpatient intensive care; 5) novel care settings - drive through triage; 6) via telehealth
	General Population or subpopulations with chronic disease	Population health outcomes tracked prior to COVID-19 (i.e. HEDIS Measures, NQF, benchmarking data registries)	Mental health visits for anxiety, stress, depression, fatigue (some of these could be assessed by professional or Patient reported outcomes). PEDS-QL 4.0, DALY (disability adjusted life years) related measures

Value of Healthcare Delivery	Utilization	Proportion of completed telehealth visits	Number of telehealth visits completed divided by the number of telehealth visits scheduled
		ED visit rate	Number of ED visits overall and for specific conditions, e.g., LRTI, URI, fever, mental health concerns over time
		COVID testing rates	COVID testing divided by number of cases presenting for consideration of testing
	Value of Care	COVID testing yield	COVID positive tests divided by total tests
	Access	COVID testing availability	Number of tests ordered but not obtained (or number of tests declined) due to lack of testing supplies
		Cancelation of Care	Number of Cancelled 1) Primary care appointments for well child care; 2) primary care appointments for chronic disease management; 3) subspecialty care; 4) surgical cases; 5) imaging studies
		No show rate	Number of missed appointments divided by the number of scheduled appointments
		Wait times	Wait time for "on demand" care (include in-person and telehealth visits)
			Wait time for scheduled visits (include in-person and telehealth visits)
		Hospital and intensive care unit capacity	Number of available hospital beds; ED boarding time; number of patients boarding in ED
	Safety	Proportion of telehealth visits that were directed to in-person care	number of telehealth visits directed to in-person evaluation divided by the number of telehealth visits
		PPE Use Rate	Amount of PPE utilized for patient evaluation divided by the number of patients seen in the COVID-19 response time period
		Availability of PPE	Number of face-to-face patient encounters where less than maximal PPE precautions are taken due to either lack of availability or conservation measures. (Specify your local practice regarding N-95 and surgical masks, gloves, gowns, head covering, shoe covers)
		COVID transmission to healthcare workers	Number of providers who contract COVID divided by the number of patients evaluated for COVID (include in person and telehealth visits in the denominator to estimate "COVID transmission avoided" in settings with and without/pre-post telehealth)
	Costs of Care	See notes above on costs	

	Effectiveness	Existing measures of healthcare delivery quality that are already being tracked (i.e. NQF, benchmarking data registries)	Developmental screening in the 1st 3 years of life (NQF - 1448), by 2 years old (NQF - 1339).
	Equity	Demographic Characteristics	Consider analyses stratified by race/ethnicity, preferred language, insurance status/payer, gender, family income
Patient/Provider Experience	Satisfaction	Patient/Family/Provider Satisfaction	Apply existing patient/family satisfaction/provider survey that is already part of quality of care assessment for clinic/health system in person visits to telehealth population (Examples - TUQ, Net Promotor score, TSUQ, TAM, etc. In doing so, consider cognitive bias principles)
	Individual workload burden	Miles Saved for Patient/Family	Patient address to location of care if in person visit was required
		Travel Time Saved for Patient Family	Calculated from travel distance and typical travel times: consider categorical estimates - <15 minutes, 16-30 minutes. 31-60 minutes, 1-2 hours, > 2 hours
		Miles Saved for Providers	Provider address to location where care would have been provided if visit was conducted in person
		Travel Time Saved for Providers	Calculated from travel distance and typical travel times: consider categorical estimates - <15 minutes, 16-30 minutes. 31-60 minutes, 1-2 hours, > 2 hours
		Staff wellness and Burnout	Examples tools - Maslach inventory, Oldenburg inventory, MBI:EE, Physician Work-Life Study Single Item measure (Rohland et al), Professional Fulfillment Index, Well-being Index)
		Technical Events	# of Technical issues experienced during telehealth encounters (Consider tracking if there were: No technical issues, Video not working, Video suboptimal, Audio not Working, Audio suboptimal, resorted to telephone call)
	Telehealth Encounter Logistics	Absent telehealth participants	Were all participants present? If not, who was missing and why?

	Telehealth Encounter Logistics	Telehealth Encounters Completed, Cancelled, or Rescheduled	Was the telehealth encounter completed as planned, cancelled, or rescheduled? If cancelled or rescheduled, what was the reason?
		Reason for Telehealth Encounter	What was the reason for the telehealth encounter? Examples to consider: 1) scheduled because of a COVID-19 positive patient being monitored at home, 2) COVID-19 positive patient isolated in hospital, 3) quarantined patient with symptoms of COVID-19 (with or without travel/exposure history prior to community spread), 4) patient without symptoms and no COVID-10 exposure (prior to community spread), 5) Institutional policy change regarding contact with patients/families for certain encounters (specify type of encounter)
		Length of visit via telehealth	Encounter End Time minus Start Time
Program characteristics, performance and implementation	Program characteristics	Existing Telehealth Services	Telehealth service lines were in place prior to March 1st, 2020
			Number of clinicians/providers using telehealth
			Equipment in place for existing telehealth services
			Capacity of telehealth program to take on new patients
		New Telehealth Services	What new service lines were launched and when
			Number of staff to support telehealth services
			Number of staff to support telehealth services for managing COVID
			Number and types of clinicians/providers deployed for managing COVID
			Equipment required for new or expanded services
			Demand for new services and demand for existing services
		Telehealth Encounter completion rate	Number of telehealth encounters COMPLETED divided by the total number of telehealth encounters scheduled (including those completed, cancelled, and rescheduled)

	Target Performance Indicators / benchmarking	Program Benchmarks	How did the program perform relative to other similar programs in terms of any of the measures listed in this publication?
	Implementation	Implementation Science Framework or Model	How are you translating science into practice? Examples of implementation science frameworks include RE-AIM, PRISM, CFIR. What implementation science variables are you specifically measuring within your model?
		Staffing Adjustments	How did your staffing strategy/model change in order to meet the patient care demands in response to COVID-19? Did you need to: mobilize reserve staff, increase moonlighting incentives, hire more staff, change staff roles and responsibilities?
		Facilitating Factors	What changes were made in the system that facilitated the successful implementation of your telehealth response to COVID-19?
		Barriers	What barriers were encountered when attempting implementation of telehealth in response to COVID?
		Problems imposed on the system (change burden)	What problems did your system experience as a result of implemented changes in response to the COVID-19 crisis? Examples include: decrease in staff wellness, supply chain gaps, staffing gaps from staff call-offs due to being sick/having to care for family members, or staffing gaps due to increase in patient load

Appendix B: Telehealth Change Management Recording Tool

INSTRUCTIONS: Fill in the project aim (hint: start with a verb) and the responsible department, division, or group. Then on each row, describe the intervention by answering four questions – date of implementation, what/who/how/where done, Results, Action plan. You can delete the entries in the below example for use in your own Telehealth project.

EXAMPLE USE:

Project aim: Implement secure video tele-visit between provider and patients for post operative follow up check.			
Department, Division, Group name: Hospital A, Digital Health team			
Date of implementation start	**What was done? To/With Whom? Why? How? Where?**	**Were the results as expected? If not, why?**	**Action plan - Did you choose to adopt the change as is, abandon it, or make improvements?**
3-1-2020	One:one education of provider on the video platform	Too slow	Adapt – group classes on remote webinar
3-5-2020	Engage IS to push telemedicine platform to provider devices	Too slow, not enough devices, and personal devices do not have the required enterprise management software	Adapt – a specific task force formed to enroll devices, revised enterprise management software policies to be more accommodating
3-10-2020	Enable patients to use telemedicine from the video visit option of our mobile EMR platform	Too slow, not all patients are enrolled	Adapt – revised workflow to be more efficient and capture more patients for enrollment