

1. Formulating a Research Question

There are many available guides to formulation of research questions in general. The PICO (population, comparison, intervention, and outcomes) format provides a useful starting point, although PICO is most relevant to clinical trials.¹ The economic impact of health services interventions is inherently complex, involving more stakeholders than a single population, many elements beyond a single intervention, and comparison groups that are difficult to either define or control. This toolkit aims to simplify the development of research questions specifically addressing the economic and financial impact of telehealth and virtual care programs.

Formulating the right question is essential to your study's success. Proactively determine the outcome you wish to measure, how that outcome should be measured, what kind of factors may create bias, and how those factors can be measured. Missing variables in the analysis will shape the number of subjects included and could lead to bias. Once you have determined the population you will be studying, make sure that what you can measure actually reflects the patients you were originally interested in.

The SPROUT Telehealth Evaluation and Measurement (STEM) Framework and the logic model guidance that follows should be utilized to guide selection of specific and relevant metrics and outcomes for your program. The SPROUT Policy STEM Framework can also serve as a resource to help frame a research question by considering different metrics relevant to different healthcare stakeholder groups. Each stakeholder group may experience a financial impact from the program being investigated. Sometimes these financial impacts may be aligned across stakeholders, while at other times they are at odds. It is important to consider how the specific economic or financial impact you are studying will impact each stakeholder group, so that you can more specifically formulate and target your question. For example, a reduction in missed work days by patients due to improved chronic disease management and reduction in travel time associated with medical encounters may provide a significant economic impact for the patient but may not be meaningful for healthcare systems or payers. Improved chronic disease management, however, may directly reduce claims billed to the payer, and copays for the patient. Your target stakeholder group will have a dramatic influence over your targeted outcome metric.

The first step is to understand the specific characteristics of the telehealth program being evaluated (Table 1). This is not an exhaustive list, as telehealth services vary widely. Having these characteristics in mind allows an investigator to better understand the potential economic and financial impacts of the program on various stakeholders (Table 2). Finally, consider whether economic and financial impacts are immediate or downstream. Can they be directly tied to the provision of the telehealth service, or is the impact the secondary or tertiary effect of an impact on other factors? Take into consideration the realistic timeline over which you would expect to see these impacts. Will the impact be immediate upon implementation of the service, or take time to develop? For longer-term impacts, selection of a surrogate short-term measure that has previously been proven to be associated long-term outcome may be necessary.

The research question can take multiple forms, but the following examples may be useful to construct your question based on the above considerations:

Question structure: How does *{feature of telehealth service}* for *{population served}* impact *{financial/economic metric}* for *{impacted population/stakeholder}* over *{period of time}*?

¹ VCU Libraries Research Guides. How to Conduct a Literature Review (Health Sciences): Developing a Research Question. Website: <https://guides.library.vcu.edu/health-sciences-lit-review/question>. Accessed April 21, 2021

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- **Example:** Does remote home monitoring of pulse oximetry for ventilator-dependent children with chronic lung disease reduce Medicaid claims for ED visits and hospitalizations in the 6 months post-implementation?
- **Example:** Does provision of real-time monthly audio/video multidisciplinary care coordination visits for autistic children reduce the rate of missed clinic appointments for the practice?
- **Example:** Did Medicaid patients in South Carolina have a higher-rate of billed audio-only telehealth encounters compared to billed video-enabled encounters between June and December of 2020?

Table 1: Characteristics of the Telehealth Program/Service		
Category	Characteristic	Examples
Population Served	Volume of the Service	Size of population served
		Number of encounters per patient
	Clinical condition or scenario	Specific disease or condition (<i>i.e.</i> asthma, ADHD, chronic lung disease)
Remote-site and patient-side Characteristics	Providers	Scenario triggering telehealth encounter (<i>e.g.</i> critical care consultation to rural emergency department)
		Specialties, number of providers
Practice/Institution	Physical Locations	Ambulatory clinic, emergency department, FQHC, home, other
		Academic institution, non-academic institution, community practice, telehealth-only service, etc.
Technical Build	Synchronous or asynchronous	Real-time, store and forward, etc.
	Mode of communication	Audio-only, audio/video, text-based, web interface
Billing	Payers	Public payer (Medicaid, Medicare), private insurance, out-of-pocket cost, grant-funded, unfunded/uninsured, other third-party payer
	Billing approach	Value-based model, shared savings model, fee-for-service, not billed, etc.

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Table 2: Potential Economic and Financial Impacts		
Category	Characteristic	Examples
Impact on Patients	Costs to patients	Out-of-pocket payments
		Copay, deductible, premium payments
	Travel	Reduced travel expenses (gas, meals, lodging, etc.)
	Work/school	Missed days of work
		Costs to parents/caregivers of missed school days (missed work, paid caregiver, etc.)
Impact on Providers	Efficiency of practice	Volume of patients seen
		Productivity measures
		Reduction in overtime
	Salary/payment	Bonus/stipend payments
		Revenue generation
Impact on Practice/Institution	Volume of billable services (telehealth or other impacted services)	Volume of billable telehealth services
		Volume of substituted billable service (i.e. reduction of ED visits)
		Volume of downstream billable service (i.e. increased referrals to revenue-generating service)
	Operational impacts	No-show rates, schedule density, number of encounters per provider, appointment availability
	Overhead expenses	Cost of space, supplies, equipment, etc.
	Personnel expenses	Staffing, overtime
Impact on state or national healthcare system/populations	Costs	Total healthcare expenditures, costs associated with a disease, condition, or population, unreimbursed costs
	Equity and Access (may function as surrogate measures for financial outcomes)	Access to specialists in underserved areas, access to interpreter services
	Workforce	Distribution, availability, and reach of providers and other care team members
Impact on payers	Utilization	Avoidable utilization (i.e. ED visits), primary and preventative care services, wellness services
	Cost of covered services	Costs per member per month