ORIGINAL RESEARCH

The Family Medicine Learning and Experience (FLEX) Lab: A Collaborative Approach to Advancing Clinical Care and Operations

Margaret M. Paul, PhD, MS, Marc R. Matthews, MD, Gerry B. Greaney, MFA, Deanne W. Wallenstein, MSN, RN, Jason D. Greenwood, MD, MS, Tony Spaulding, MS, Jon S. Eckdahl, MBA, and David R. Rushlow, MD

Introduction: The population in need of primary care is rapidly growing and increasingly complex with respect to chronic disease burden. We must develop alternative and more efficient approaches to managing patients if we are to increase access to care without sacrificing continuity; however, there is little guidance for innovation strategies at the practice level.

Methods: The Mayo Clinic Department of Family Medicine engaged in a 2-year multistage planning process to develop plans for the Family Medicine Learning and Experience (FLEX) Lab to identify opportunities for innovation to improve daily practice. The purpose of the FLEX Lab is to drive continuous advancements within the context of our health system with the goal of delivering high-quality care to a greater number of patients while working within the constraints of limited staffing.

Results: Key lessons from the planning stage led to the development of a contextualized, incremental, and continuous approach to design and innovation. In its first phase, the FLEX Lab implemented a set of interventions that were novel to the unit itself, including nurse-led hypertension management, task-shifting rooming responsibilities, incorporating telehealth visits into routine clinician schedules, and ambient documentation to replace clinician-generated visit notes. We present a description of the overall FLEX Lab approach including early-stage findings and future work.

Conclusions: The FLEX Lab is an adaptable and generalizable example of how health systems can strategically implement practice improvements informed by real-time input from clinicians and staff to support continuous and phased evolution. (J Am Board Fam Med 2025;38:877–885.)

Keywords: Chronic Disease, Family Medicine, Health Services Accessibility, Organizational Innovation, Preventive Care, Primary Health Care, Telemedicine

Introduction

The Problem

The population in need of preventive care and chronic disease management is rapidly growing. The number of people aged 50 years and older will increase from 137 million in 2020 to 221 million by 2050, with chronic disease burden increasing at twice the rate, from 72 million to 142 million over the same period of time.[1] Concurrently, there is a deficit of primary care physicians that is estimated to grow to a national shortage of 139,160 physicians by 2030.[2] The primary care workforce is already feeling the effects of this burden; physicians and staff are stressed, with increasing rates of dissatisfaction and burnout widely reported throughout the country.[3,4] These problems are not new, but they continue to worsen and fuel the problem of a dwindling supply of primary care physicians.

Corresponding author: Margaret M. Paul, PhD, MS, 5711 E. Mayo Blvd., Phoenix, AZ 85054 (E-mail: paul.margaret@mayo.edu).

Panel size is often at the center of discussions on how to improve physician satisfaction, and smaller panel sizes have indeed been associated with higher quality of care.[5] Recent research suggests that average primary care panel sizes may actually be shrinking nationally, but at the expense of access to care at the population level.[6,7] We must develop alternative and more efficient approaches to managing patients if we are to increase access to care without sacrificing continuity. Advances in health care related to artificial intelligence (AI), other digital tools, and expanded access and use of telehealth have unlocked potential to change the way we practice medicine; however, more research is needed to assess strategies to implement these structures and processes in real-world practice settings, and their impacts on access, continuity, quality, and outcomes.

Our Approach

The Mayo Clinic Department of Family Medicine has developed the Family Medicine Learning and Experience (FLEX) Lab to evaluate new approaches to care in the context of its large integrated practice in the upper Midwest. The purpose of the FLEX Lab is to drive continuous advancements within the context of our health system with the goal of delivering high-quality care to a greater number of patients while working within the constraints of limited staffing. The fundamental assumption of the FLEX Lab and the interventions tested therein is the hard truth that providing access and care continuity to our community means that panel sizes will inevitably grow due to the immense challenge of recruiting enough care team members to meet the rising demand for care, both now and in the future.

The FLEX Lab is the Department of Family Medicine's adaptation of a clinical microsystem model[8,9] in which we have elevated the role of experience-centered health care design in generating contextual knowledge to drive improvements in our day-to-day operations. It is distinct from but complementary to the work done through other health care improvement initiatives at Mayo Clinic, including our Quality Academy, which is focused on enhancing care through discrete quality improvement projects, and Mayo Clinic's broader transformation effort, Bold, Forward, Unbound, which aims to elevate care across the enterprise and enhance the experiences of all patients and care teams. Importantly, the FLEX Lab is not meant to have a final goal, to implement a specific care model, or to

only experiment with novel technologies. Rather, it embodies our approach to designing and running practice improvement activities in a practical way that integrates real-time feedback from our clinicians and staff with the anticipation of nimble, continuous, and gradual change.

Core Principles

Our routine work in the FLEX Lab is grounded in 4 core principles which support the focal point of our model: practice-driven design to facilitate transformative, patient-centered innovation (Figure 1). In the context of the FLEX Lab, health care design is: 1) contextualized and originates from within the practice area of focus; 2) collaborative in that its function is dependent on insights and action from a multidisciplinary and dynamic team; 3) a continuous cycle of evaluating our interventions, responding to feedback loops with clinicians and staff, and allowing innovations to adapt and evolve to meet the needs of the practice; and 4) dependent on iterative, strategic prototyping to examine new ideas in the context of a real-world clinic.

These principles ensure that the interventions implemented through the FLEX Lab are highly dependent on the context of our specific practice; however, the structures and processes required to plan, implement, and evaluate the activities of the Lab are generalizable to other large health systems. In this article, we introduce the overall structure of the FLEX Lab, share our plans for the first 3 phases and related research and evaluation, and our vision for sustainability. In addition to assessing individual interventions, we describe our structures to facilitate

Figure 1. Core innovation principles of the Family Medicine Learning and Experience (FLEX) Lab.

ongoing assessment of the Lab overall to monitor its impact on the practice and adapt as necessary to support acceptability to a diverse group of stakeholders and sustainability.

Methods
Planning
Planning for the FLEX Lab began in 2021 with the formation of a multidisciplinary stakeholder committee based at the Mayo Clinic in Rochester. The group included clinical leadership representation from the Department of Family Medicine as well as clinical, informatics, nursing and administrative leadership from the clinical site itself. The purpose of this committee was to explore opportunities for innovation in the Mayo Midwest practice, a network of 56 primary care practices located throughout parts of southeastern Minnesota, western Wisconsin, and northwest Iowa. An initial phase of this work focused on broad scale, system-wide implementation of bundled interventions to improve family medicine practice throughout Mayo Midwest locations using our pre-established department governance structure. Rather than test interventions on a system level, which has proven difficult to implement and research, the stakeholders decided to focus on piloting new interventions within a single team in a Rochester-based family medicine clinic. The selected care team is diverse and has a long history of innovation and dedicated support and vision from physician leaders within the practice, therefore the stakeholder committee felt that they were a superb choice for the FLEX Lab, capable of readily transforming daily practice to test innovative approaches to care.

In spring 2023, after identifying the care team that would become the FLEX Lab, the stakeholder group was transitioned by 2 new committees focused on operationalizing their vision: the Design Committee and the Research Committee. These committees were refined during the first phase of our work and have become permanent structures of the FLEX Lab, designed to support all future phases of work. FLEX Lab team members work collaboratively across committees to maintain momentum of the Lab's initiatives while minimizing burden on clinicians and staff working in the clinic.

Structures
The Design Committee is the governing body of the FLEX Lab and is responsible for engaging the care team in defining the overall structures of the Lab, selecting interventions, monitoring implementation progress, and identifying primary and secondary outcomes for each intervention. This team meets every other week, usually over the lunch hour, and much like the prior stakeholder committee, is multidisciplinary and includes representation from a variety of individuals who we have found to be critical to decision making around intervention selection and the design of core elements. Membership has shifted over time to reflect the current needs of the FLEX Lab. The core team includes clinicians and staff practicing in the FLEX Lab care team, family medicine department leadership, leadership representing scheduling for the department, a health care service designer, a mixed-methods health services researcher, an implementation coordinator, and a program manager. Individuals with expertise in other areas such as clinical informatics and organizational strategy, and leaders from the larger umbrella of primary care at Mayo Clinic have rotated on and off of the Design Committee and join on an ad hoc basis as needed. In late 2024, one of our family medicine physician leaders became the Director of Innovation in Family Medicine, a role which dovetails nicely with the work of the FLEX Lab and provides additional stability and visibility for our work. Notably, the Mayo Clinic culture is highly collaborative around initiatives to improve patient experience and patient care, and such partnerships have been relatively easy to form on an ad hoc basis without formal agreements, incentives, or FTE coverage.

The FLEX Lab Research Committee is a subgroup of the Design Committee responsible for planning the details of the evaluation and dissemination efforts related to FLEX Lab planning, implementation, and evaluation. The Research Committee is composed of 3 physicians and a health services researcher from the Design Committee, with a quantitative data analyst available on an ad hoc basis to support dissemination efforts. This group meets once a month and works asynchronously as needed to prepare conference presentations and publications related to the FLEX Lab. All Design, Planning, and Research Committee meetings are held on the Microsoft Teams platform and are set to automatically record and transcribe for notetaking purposes.

Two additional, regularly held meetings emerged after the launch of the FLEX Lab to support routine operations. The Planning Committee was formed

during the first phase of our work as the implementation arm of the FLEX Lab. Whereas the Design Committee plays a critical role in identifying opportunities to test in practice, the Planning Committee is essential for operationalizing this work, tracking early implementation, and facilitating the feedback loop between the practice and the Design Committee. Similarly, the planning committee develops and executes primary and secondary data collection and analysis plans to support the needs of both the Research and Design Committees. The Planning Committee meets more frequently than any other group in the FLEX Lab, at a cadence of 1 to 2 times each week depending on workload. Agendas usually include topics related developing implementation strategies, data needs, and timelines for initiatives endorsed by the Design Committee. Members of this committee are a subset of the Design Committee and include a project manager, an implementation coordinator, a health care service designer, and a mixed-methods health services researcher, all based in the Mayo Clinic Robert D. and Patricia E. Kern Center for the Science of Health Care Research, a research center fully embedded in our clinical practice, which provides support for the FLEX Lab.

In addition to our FLEX Lab Committees, representatives from the Design Committee host open meetings with the care team – referred to as Care Team Huddles – every 3 weeks to provide an update on our work and to get their input on current challenges in practice, discuss how to overcome barriers to implementing FLEX Lab interventions, and future directions for our work. Whereas our smaller team meetings for the Design, Planning, and Research Committees are recorded and transcribed for note taking purposes, Care Team Huddles are not recorded to facilitate open, direct communication. Highlights of Huddle conversations are summarized and shared with the full Design Committee, and we alter our work in response to this feedback loop with the practice. This feedback loop is especially helpful for identifying stressors of day-to-day practice including any added burden associated with the interventions we are currently testing. This group has been a critical source of information on how we can create slack in schedules to accommodate the added work of the FLEX Lab.

Processes

In fall of 2023, the Design Committee determined the initial process for identifying, implementing, and testing structures and processes in the FLEX Lab. We decided to use a phased approach which includes discrete cycles to implement and evaluate short-term outcomes, bundling 2 to 3 interventions per cycle. Over the course of about 6 months, the Design Committee continued to refine the structure and overall goals of the FLEX Lab and operationalized our innovation principles into a framework that also represents our core structures (Figure 2). We quickly identified toward the end of phase one that phases would not be independent from one another, but rather a way to segment our activities for essential organizational tracking and reporting to sustain support for our work. For example, FTE support from the Kern Center requires semiannual reporting in which we share findings from the current phase of work and submit a new request for subsequent work which includes new milestones and goals for practice impact. While we have retained the phase structure,

Figure 2. The Family Medicine Learning and Experience (FLEX) Lab framework.
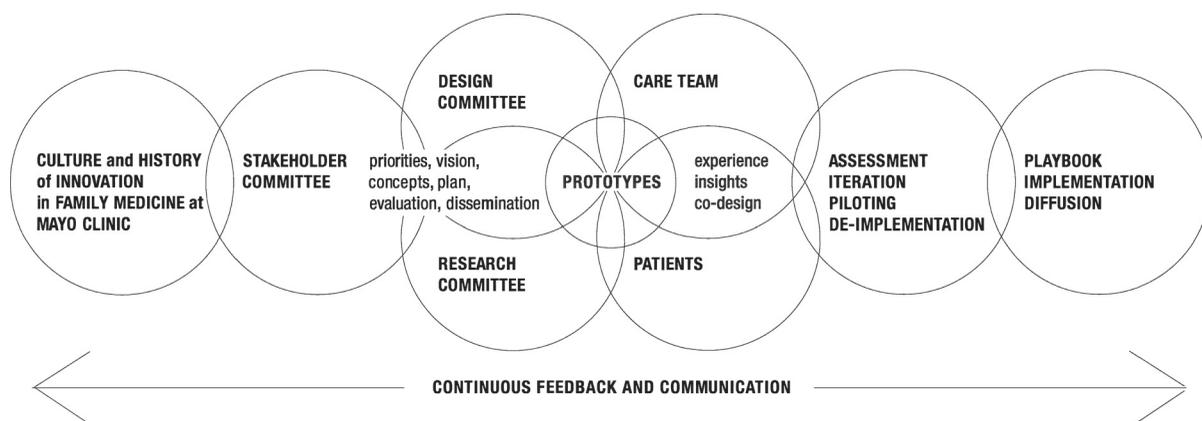
the interventions tested in the Lab did not remain discrete blocks of work as we originally envisioned.

The FLEX Lab is built on the rich history and culture of innovation of Family Medicine at Mayo Clinic and the underlying assumptions that our success depends on our ability to collect continuous feedback and communicate with stakeholders about our work. Prototypes are at the heart of our design process and are developed with input from our core committees, the FLEX Lab care team broadly speaking, from physicians to front desk and scheduling staff, and patients as appropriate. Together, our 3 committees and Care Team Huddles are responsible for the overall vision and execution of the Unit, setting priorities that are aligned with those of the Mayo Clinic enterprise, securing additional input and support as needed from other areas of our health system, and managing the implementation, evaluation, and dissemination of our findings.

We have established plans for 3 phases of the Lab, which will continue to extend this work indefinitely through our phased approach. The first phase was focused on internal operations to enhance our operational efficiency within the practice, and we have incorporated these themes into subsequent phases. The interventions for phase 1 were selected to address 3 critical areas of focus defined by the Design Committee, including improving chronic disease management, increasing flexibility in scheduling for patients, clinicians, and staff, and reducing clerical and cognitive burden among clinicians and staff. In February 2025, the FLEX Lab was designated as a quality improvement initiative by our IRB which allows us to engage with patients on a strategic ad hoc basis for feedback on the prototypes we design.

We recognize that the rapid, phased nature of the FLEX Lab structure has the potential to contribute to burnout among our staff and clinicians. Therefore, in terms of evaluation, we rely to the extent possible on existing data which can be extracted from the electronic health record (Epic) and other administrative datasets that are automatically generated through routine clinical care to assess our implementations. We plan to occasionally conduct more in-depth evaluations of specific interventions that are of particular interest to the Design Committee and other stakeholders. In these instances, the Planning Committee would request additional resources from the Kern Center to meet the needs of our study. To date, our research has been limited to the mixed-methods expertise on our team which allows us to design and administer surveys, perform basic statistical analyses, and conduct interviews and focus groups as needed. In May 2025, we interviewed our first group of patients to understand their perspectives on our goal of increasing video visits, and our results were used to inform future directions for that component of our work.

Results

The Practice

The FLEX Lab is located at the Mayo Clinic in Rochester and is colocated on the same campus as multiple specialty clinics with other services, such as lab, imaging, and pharmacy. Although these areas of practice are not represented as members of care teams, the care we provided is routinely supported by these services as well as staff supporting scheduling and operations. The FLEX Lab team is composed of 6 physicians, 5 advanced practice providers (APPs), 8 nurses, and 1 scheduler who collectively care for 10,506 patients annually. In the context of our care team members, we use the term nurse to refer to both RNs and LPNs, advanced practice providers (APPs) include nurse practitioners (NPs) and physician assistants (PAs). We use the word clinicians in situations where we are referring to both physicians and APPs. Though they are not a part of specific care teams, our Department of Family Medicine also has access to clinical pharmacists. The current average risk adjusted panel size is 1,979 (range 1,124 to 2,940) patients per physician and 825 patients (range 644 to 1,044) per APP. The APPs in our practice have smaller panel sizes than physicians to manage physician overflow and acute care appointments as appropriate.

Phase 1 Interventions

In its first phase, we implemented 3 interventions designed to address the areas of focus defined by the Design Committee to cut across all phases of our work: to improve chronic disease management, reduce clerical burden, and increase flexible scheduling (Table 1). Each intervention has at least one primary outcome associated with it which we felt could reasonably show effects within 9 months of implementation.

We are creating new care pathways to facilitate nurse-led chronic disease management, and this work has proceeded more slowly than expected due

Table 1. Family Medicine Learning and Experience (FLEX) Lab Phase 1 Interventions and Measures of Success

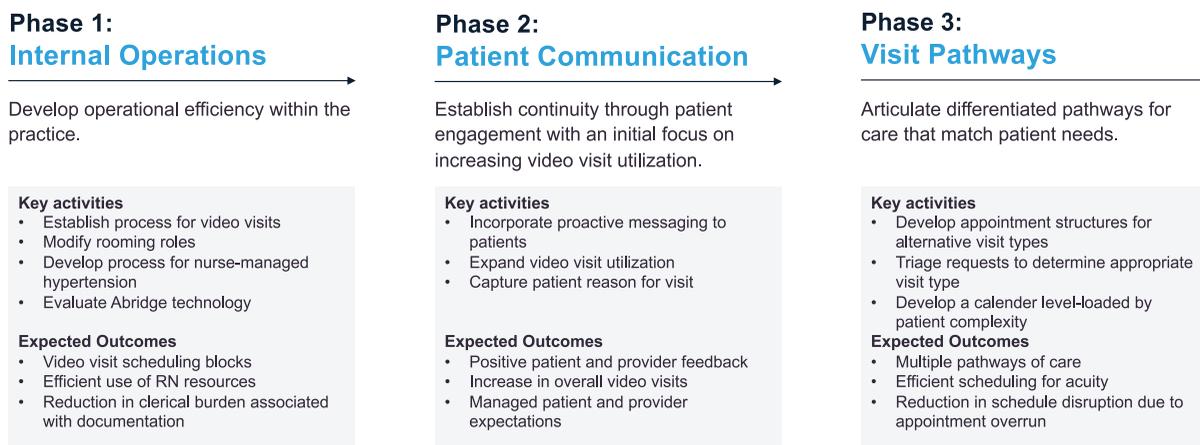| Interventions	Key Outcomes	Goals	Status
RN-led hypertension management combined with new PSA role to create slack for panel management	Proportion of patients with RN-led hypertension management	20% of eligible patients under RN management	Not yet achieved
	Patient blood pressure	Improvement in blood pressure over time for newly empaneled patients and no difference in trajectory of BPs for patients under clinician vs RN-led management	N/A, dependent on meeting management target
Increased complexity of physician patient panels	Increased complexity of physician panels relative to nurse and APP panels	N/A, Dependent on meeting management target	
Decrease in average # of patients roomed by nursing staff in each week	50% decrease in nurse rooming	Exceeded; nurses no longer rooming	
Ambient documentation	Adoption (proportion of eligible clinicians using it)	100% of clinicians with access are using the tool	Achieved
	Time dedicated to documentation (minutes/day) and cognitive burden from generating visit notes	Reductions in documentation time and cognitive burden associated with note taking	Achieved
Regular use of telehealth visits	Appointments available	50 slots available (5/wk/clinician)	Achieved
	Appointments filled/available	80% completed appointments of those appointments made available	Achieved
	Ratio of telehealth to in-person visits	Gradual increase to every provider having 1/2 day of telehealth appointments each week	In progress

Abbreviation: APP, advanced practice providers.

to the challenges inherent to shifting care models. After reducing nurse-led rooming and creating capacity for nurses to take on new cases, we planned to implement LPN-led weight-management visits and RN-led hypertension management visits simultaneously in the first quarter of 2025; however, we experienced delays due to an enterprise-wide initiative on workflows related to follow up visits for weight management and a lack of clinician engagement in the workflows with respect to engaging in the hypertension protocol. Despite these barriers, we remain committed to our original goal which has carried through to subsequent phases of work, and we believe will ultimately improve chronic disease management and facilitate staff and clinicians to work at the top of their skillsets.

Since the beginning of our work, our clinical partners on the Design Committee highlighted the challenge in task shifting from clinicians to nurses, namely that the nurses could not reasonably pick up hypertension management without being able to shift some of their clerical tasks to other staff members. The FLEX Lab has made several attempts to address this issue, the most successful of which has been empowering scheduling staff located at the front desk of the clinic to room patients and support clinic operations activities to off-load this task from nursing staff. Feedback on this task shifting has been positive from both nurses and scheduling staff. After we have implemented nurse-led hypertension with a significant portion of our patient population, we will begin to monitor trends over time in blood pressure control among RN vs physician led patient panels to ensure that our physicians are taking on the most complex cases, that standards of care are maintained, as well as the amount of rooming done by RNs vs scheduling staff to ensure that the planned task shifting is occurring in daily practice. At that point, we will also be able to assess opportunities for interventions targeted at specific subgroups, for example, patients who need assistance to quit smoking or improve their diet. In the future, we would also like to assess the impact of remote patient monitoring (RPM) for hypertension on care team satisfaction and clinical outcomes.

To decrease the substantial clerical burden of documenting visit notes, the Lab and Mayo Clinic more broadly has implemented ambient documentation,

Figure 3. Family Medicine Learning and Experience (FLEX) Lab phases.

Phase 1:
Internal Operations

Develop operational efficiency within the practice.

Key activities
- Establish process for video visits
- Modify rooming roles
- Develop process for nurse-managed hypertension
- Evaluate Abridge technology

Expected Outcomes
- Video visit scheduling blocks
- Efficient use of RN resources
- Reduction in clerical burden associated with documentation

Phase 2:
Patient Communication

Establish continuity through patient engagement with an initial focus on increasing video visit utilization.

Key activities
- Incorporate proactive messaging to patients
- Expand video visit utilization
- Capture patient reason for visit

Expected Outcomes
- Positive patient and provider feedback
- Increase in overall video visits
- Managed patient and provider expectations

Phase 3:
Visit Pathways

Articulate differentiated pathways for care that match patient needs.

Key activities
- Develop appointment structures for alternative visit types
- Triage requests to determine appropriate visit type
- Develop a calender level-loaded by patient complexity

Expected Outcomes
- Multiple pathways of care
- Efficient scheduling for acuity
- Reduction in schedule disruption due to appointment overrun

which utilizes a generative AI vended platform to auto-create the clinician note during the visit. While the workflow designed to integrate ambient documentation into clinical practice requires physician review, the task of editing an automatically generated note is not nearly as burdensome as creating the note independently. Reports from FLEX Lab clinicians have been extremely positive with a few seeing 80% reduction on documentation time and 90% improvement in same day encounter closure rate. We will continue to monitor use of this tool and qualitatively explore barriers to use. The primary outcome for this intervention is clinician satisfaction with the tool and reductions of clinician clerical and cognitive burden with the possibility of improving access. Currently, we are expanding access to this tool to nursing staff based on positive initial findings from clinicians.

Finally, to increase flexibility in physician workplace, reduce stress on both clinical and nonclinical staff, and improve facility utilization, the FLEX Lab has been exploring ways to incorporate telehealth visits into routine scheduling. Our goal is for each clinician to have at least 1 half-day a week of video visits on their calendars each week. Clinicians can choose to perform these visits from home on a secured/encrypted laptop device. Early findings suggested that this may increase efficiency in the clinic (ie, less prep time for staff per patient), reduced utilization of examination rooms and on current facilities, and increase clinician satisfaction. Through our Care Team huddles, we learned that clinicians enjoy the option to work from home; however, some

prefer to conduct half day video visit blocks from the office in the event that they can squeeze in same day appointments from their panel. At the end of the first phase of testing, we observed an increase in the availability and fill rates of telehealth appointment slots which translated to an increase in video visits from 4% to 11%; however, our new goal is to achieve a 20% video visit rate.

Future Work

Figure 3 represents our planned path forward in terms of key activities and expected outcomes. Our second phase carries phase 1 themes forward with a focus on previsit communication between the care team and our patients with the goal of improving continuity through patient engagement. In phase 2, we will conduct a pilot on proactive messaging to offer a video visit to eligible patients to support our overarching goal of expanding video visit utilization. We will also expand half day video visit blocks to facilitate increased video visit availability among our clinicians. In addition, we will implement a separate messaging pilot to contact patients within 3 days of their visit to ascertain a more accurate reason for visit. This will allow our care teams to better prepare for visits. Looking ahead to phase 3, we hope to test a series of interventions designed to facilitate our work around intentional care pathways. These pathways will include a range of end points other than one-on-one, in-person visits with our clinicians, including video visits, nurse-led care management visits, and Primary Care on Demand among other options, to ensure that our patients

are seeing the right provider in the right place at the right time.

The immediate next steps for the FLEX Lab are to fully implement phase 2 interventions, evaluate their impact, and determine which will be retained in routine care. Within the next year, we hope to expand video visits and panel sizes as informed by the quantitative and qualitative data from the initial interventions to better satisfy demand and achieve our goal of providing better care to more patients. Therefore, as with phase 1, the interventions for phases 2 and 3 will be selected in part based on their ability to create slack in clinician and staff schedules.

Discussion

The primary objective of the FLEX Lab is to identify effective interventions that allow us to redefine the way we manage patient panels to allow us to provide better health care to a greater number of patients and improve continuity within the very real constraints of day-to-day clinical practice. Our goal of increasing panel size is somewhat controversial given that ours are already substantial at nearly 2,000 patients per physician; however, we have structures in place to support this goal. At the clinic level, our APPs panels are small to accommodate overflow from their partner physicians so that we can shift the clinician assigned to a patient for a particular visit while maintaining continuity at the care team level. At a health system level, Mayo Clinic recently adopted Primary Care on Demand, a contracted service for virtual primary care appointments, and our team is currently working on care pathways to intentionally integrate use of this service into routine practice. While we share the broad consensus that primary care would benefit from increased funding and reduced resource limitations,[10] this article is intended to describe our approach to addressing the realities of the current environment.

Our work is focused on a single clinic in a somewhat unique health system and therefore our findings from any particular intervention may not be transferrable to other clinical settings. The core underlying assumption of the FLEX Lab, and one that translates across practice settings, is that there are ample promising and feasible opportunities for practice improvement available to optimize practice efficiency and improve patient care quality and continuity without waiting on additional external resources to support operations. The purpose of the structures and processes developed to support the Lab is to identify such opportunities and select them for implementation and to evaluate the implementation and outcomes of the selected interventions; these features may also be adapted to the resources available in any clinical setting.

Lessons from the planning stage led to the development of a pragmatic, phased and continuous approach to innovation. The inclusion of FLEX Lab team members in our committees has enhanced our effectiveness by increasing the feasibility of our plans. In particular, these committee members have highlighted the need for creating the bandwidth required in each phase to make room in existing workflows for new interventions. Indeed, this has been one of the most challenging tasks for the FLEX Lab to date, as it gets at the crux of the challenge we are trying to address through innovation: how to provide better care with the same amount of staff resources. Our diverse stakeholder group has also highlighted the need for development of innovative measures of success on the business side of the practice as we implement innovations that shift away from traditional goals such as outpatient visits. Leadership from our Design Committee have begun regular meetings with leaders in finance and administration to determine how best to define success over the next year of productivity in the FLEX Lab and beyond.

Conclusion

The FLEX Lab is the Mayo Clinic approach to practice-level, pragmatic, and rapid innovation in family medicine. The Lab does not represent a specific model of care, nor is it evolving to align with a predetermined vision of ideal practice. Instead, it is our design-centered approach to structuring practice improvement activities and facilitating bottom-up innovation with the expectation of continuous, phased, and contextualized evolution.

References

1. Elamin A, Ansah JP. Projecting the burden of dental caries and periodontal diseases among the adult population in the United Kingdom using a multi-

state population model. Front Public Health 2023; 11:1190197.

2. Zhang X, Lin D, Pforsich H, Lin VW. Physician workforce in the United States of America: forecasting nationwide shortages. Hum Resour Health 2020;18:8.

3. Buck K, Williamson M, Ogbeide S, Norberg B. Family physician burnout and resilience: a cross-sectional analysis. Fam Med 2019;51:657–63.

4. Hoff T, Trovato K, Kitsakos A. Burnout among family physicians in the United States: a review of the literature. Qual Manag Health Care 2024;33:1–11.

5. Angstman KB, Horn JL, Bernard ME, et al. Family medicine panel size with care teams: impact on quality. J Am Board Fam Med 2016; 29:444–51.

6. Bazemore A, Morgan ZJ, Grumbach K. Self-reported panel size among family physicians declined by over 25% over a decade (2013-2022). J Am Board Fam Med 2024;37:504–5.

7. Bodenheimer T. Why are family physicians' panels shrinking? J Am Board Fam Med 2024;37: 502–3.

8. Nelson EC, Batalden PB, Godfrey MM. *Quality By Design: A Clinical Microsystems Approach*. Wiley; 2011.

9. Likosky DS. Clinical microsystems: a critical framework for crossing the quality chasm. J Extra Corpor Technol 2014;46:33–7.

10. National Academies of Sciences E, Medicine. *Implementing High-Quality Primary Care: Rebuilding the Foundation of Health Care*. The National Academies Press; 2021:448.