



Using mobile clinics to deliver care to difficult-to-reach populations: A COVID-19 practice we should keep

Abigail Leibowitz^{a,b,*}, Laura Livaditis^{c,d}, Genevieve Daftary^{d,e}, Leslie Pelton-Cairns^f, Craig Regis^g, Elsie Taveras^{g,h}

^a Harvard T.H. Chan School of Public Health, 677 Huntington Ave, Boston, MA, United States

^b University of Colorado School of Medicine, 13001 E 17th Pl, Aurora, CO, United States

^c Mattapan Community Health Center, 1575 Blue Hill Ave, Mattapan, MA, United States

^d Boston University School of Medicine, 72 E Concord St, Boston, MA, United States

^e Codman Square Health Center, 637 Washington St, Boston, MA, United States

^f Massachusetts League of Community Health Centers, 40 Court Street, 10th Floor, Boston, MA, United States

^g Kraft Center for Community Health, Community Health Improvement, Massachusetts General Hospital, Boston, MA, United States

^h Division of General Academic Pediatrics, Massachusetts General Hospital for Children, Boston, MA, United States

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ABSTRACT

In the United States, mobile health clinics are an important method for delivering care to medically underserved populations. Mobile clinics have long been used in pediatric primary care, but there is little published to help pediatricians disseminate this practice more widely. During the COVID-19 pandemic, reduced in-person medical visits and subsequent declines in routine pediatric vaccination rates highlighted the importance of using a variety of care delivery models to reach patients. To improve vaccination coverage among young children in Boston during summer 2020, Mattapan Community Health Center and Codman Square Health Center deployed mobile clinics as an adjunct to their in-person preventive pediatric clinical services. In total, the health centers completed 17 mobile clinic sessions and served 50 unique patients, 77% of whom were African-American/Black and 75% of whom were under the age of two. A total of 146 vaccine injections were administered. A quality improvement survey of participating families demonstrated high levels of patient satisfaction and a high likelihood of using mobile services again in the future. The mobile clinic model was most valuable in reaching families who avoided in-person care due to COVID-19 transmission concerns or faced barriers to in-person care. The health centers fostered trust and demonstrated cultural competency during this novel initiative by leveraging established patient-provider relationships, using interpreters, and involving staff who reflected the diversity of the communities. Although there are challenges to implementing mobile health clinics, this initiative demonstrates the value of mobile clinics in delivering high quality pediatric preventive care to difficult-to-reach populations.

1. Introduction

In the United States, mobile health clinics are an important method for delivering high quality care to medically underserved populations. Mobile health clinics have been employed to reach people who are homeless (Knight and Christopher, 1990; Nuttbrock et al., 2003), seasonal farmworkers (Luque and Castañeda, 2013), in disaster zones (Brito, 2011), and more (Hill et al., 2014; Regis et al., 2020). Studies have shown that these clinics can produce both cost savings and improved outcomes (Chen et al., 2020; Hill et al., 2014; Song et al.,

2013; Yu et al., 2017). In pediatrics, mobile health clinics providing primary care are common (Children's Health Fund, n.d.; Ronald McDonald House Charities, n.d.), but published studies have focused on children requiring specialty care (Abdel-Aleem et al., 2016; Diao et al., 2016; Jones et al. 2005; Mulligan et al., 2010). There is little published to help general pediatricians disseminate this practice more widely.

During the COVID-19 pandemic, routine office visits dwindled due to parental concerns about viral transmission as well as the pandemic's economic and social impacts. Although telehealth provided a viable, temporary alternative for adult care (U.S. Department of Health &

* Corresponding author at: 13001 East 17th Place, Mail Stop C292, Aurora, CO 80045, United States.

E-mail address: Abigail.Leibowitz@CUAnschutz.edu (A. Leibowitz).

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Human Services, 2020; U.S. Department of Health & Human Services 2021; Koonin et al., 2020; Mehrotra et al., 2020), pediatric preventive care declined and routine vaccination rates decreased nationally (San-toli et al., 2020; Bramer et al., 2020).

To address declining vaccination coverage among young children in Boston during the pandemic, Mattapan Community Health Center (Mattapan) and Codman Square Health Center (Codman Square) deployed pediatric mobile health clinics as an adjunct to their in-person clinical services. This initiative was made possible in July 2020 by partnering with The Kraft Center for Community Health at Massachusetts General Hospital and the Massachusetts League of Community Health Centers.

The goal of these mobile health services was threefold: (1) maximize routine childhood vaccinations and preventive care visits during the COVID-19 pandemic, (2) decrease barriers to care by expanding the service delivery models offered, and (3) strengthen the community health centers' relationships with their communities. The implementation of mobile health clinics by two established health centers demonstrates that mobile clinics are a feasible, versatile way for pediatricians to reach patients who face barriers to in-person care.

2. Materials and methods

2.1. Outreach and scheduling

Health center staff identified families for outreach based on age and immunization status. Both clinics targeted established patients up to five years old who required a well child visit and/or routine vaccinations. Several options for care delivery were offered, including examinations and vaccinations through the mobile health clinic. Mobile health clinic visits were scheduled primarily based on parental preference for time and secondarily based on geography. Insurance verification and subsequent steps were maintained according to traditional clinic registration workflows. During the pandemic, both health centers also expanded care delivery into formerly non-clinical spaces, such as clinic parking lots, in order to maximize the options available to families.

2.2. Clinical structure

2.2.1. Codman Square health Center

Prior to the mobile clinic, Codman Square patients completed a telehealth visit during which the primary care provider reviewed the child's history, addressed parental concerns, and discussed the upcoming mobile clinic. During the mobile visit, an advanced practice provider then performed a full physical exam and, if appropriate, administered vaccinations alongside a nurse or MA. Most mobile visits were conducted inside the van's clinical space.

Mattapan Community Health Center

Mattapan performed well child checks and administered vaccines during the mobile clinic without prior telehealth communication. Mattapan's mobile clinical team consisted of the clinic's lead pediatrician and one nurse. Most patient visits were outdoors per patient and provider preference, with all participants over the age of two wearing masks.

2.2.2. Licensing and Insurance

Both health centers were licensed to provide mobile health services by the Massachusetts Department of Public Health (MDPH) and the Health Resources and Services Administration (HRSA). Prior to starting mobile clinic services, the health centers each submitted a Special Projects Proposal to and obtained clearance from the appropriate divisions of MDPH. Medications available for emergency use during mobile clinic visits (eg. Epi-Pen) were discussed with representatives from the MDPH Drug Control Program. Scope of practice was confirmed with all accrediting bodies, including HRSA. The mobile health clinic was insured through Boston Health Care for the Homeless Program, which

operates its own mobile clinic in partnership with The Kraft Center and provided a professional driver for the van. Each clinic completed a Memorandum of Agreement with The Kraft Center regarding its use of the clinical van. Each participating family signed a waiver and release of liability form at the time of mobile health services.

2.2.3. Billing

2.2.3.1. Codman Square Health Center. Codman Square billed antecedent telehealth visits using preventive services CPT codes. If appropriate, E&M codes were then used during the mobile health visit, commensurate with the level of clinical decision-making performed by the advanced practice provider. This dual billing structure was made possible by MassHealth telehealth regulations instituted during the pandemic (Commonwealth of Massachusetts, 2020).

2.2.3.2. Mattapan Community Health Center. Mattapan billed mobile clinic visits in accordance with typical office practices. Although mobile health services were delivered off-site, this initiative was encompassed within Mattapan's scope of practice and thus did not require the addition of a new location for billing purposes. For clinicians, a four-hour mobile session counted as a traditional session in terms of scheduling and FTE.

2.2.4. Vaccine storage and transport

Vaccines administered during mobile health visits were provided by the health centers and acquired through normal supply routes. Vaccines were stored and transported in portable coolers. Insulating materials and conditioned water bottles were utilized in accordance with Centers for Disease Control and Prevention vaccine storage protocols (U.S. Department of Health & Human Services, 2019). Digital Data Logger (DDL) probes were obtained from MDPH Bureau of Infectious Disease; DDL probe data were subsequently shared with MDPH.

2.2.5. Program evaluation

After the final mobile health session was completed, Mattapan invited participating families to complete a modified quality improvement survey. Outreach and interviews were conducted via telephone by an affiliated staff member who was not involved in patient care. Staff members from both Mattapan and Codman Square also participated in a debrief to discuss their experiences with the mobile health initiative.

3. Results

During July - September 2020, Mattapan held 9 mobile health clinics and Codman Square held 8 mobile health clinics, together serving 50 unique patients. Approximately half (48%) of the patients were male, and 75% were two years old or younger. 77% of patients were Black/African-American, 21% of patients were Hispanic, and 2% of patients were White, according to medical records. 28% of visits were conducted in a language other than English. A total of 146 vaccine injections were delivered (Table 1), and three total visits did not require vaccine administration. Mattapan clinicians saw, on average, 4 children per four-hour mobile clinic session (range 1–7 children), and mobile clinics served 4.5% of their patients 0–5 years in age. Codman Square clinicians saw, on average, 3.6 children per three- or four-hour mobile clinic session (range 2–6 children) and mobile clinics served 2.5% of their patients 0–2 years in age.

Twelve of Mattapan's 34 participating families (35%) completed the survey. All respondents rated the mobile clinic as "good" or "excellent" in the following categories: ease of scheduling, convenience, quality of care, clarity of communication, and cultural & language competency (Fig. 1). Although only seven families (58%) stated that they were "very likely" or "likely" to have utilized the mobile health clinic prior to the pandemic, 100% of respondents stated that they are "likely" or "very

Table 1
Summary of patient demographics and services provided during 17 total mobile health clinics.

		Mattapan Community Health Center	Codman Square Health Center	Total
		N	N	N (%)
Total	Unique Patients	34	16	50
	Visits	35	18	53
Gender	Male	17	7	24 (48%)
	Female	17	9	26 (52%)
Race/ Ethnicity	Black/African- American	26	14	40 (77%)
	Hispanic	8	3	11 (21%)
	White	0	1	1 (2%)
	Haitian Creole	4	4	8 (16%)
Preferred Language	Spanish	3	2	5 (10%)
	Portuguese	0	1	1 (2%)
	English	27	9	36 (72%)
	0–6 months	1	5	6 (12%)
Age of Patient	7–12 months	8	3	11 (21%)
	13–24 months	14	8	22 (42%)
	25–36 months	2	2	4 (8%)
	3–5 years	9	0	9 (17%)
	Well Child Checks/ Physical Exam	19	17	36 (72%)
Clinical Services Provided	Hepatitis A Vaccine	16	3	19 (38%)
	Rotavirus Vaccine	0	5	5 (10%)
	Pneumococcal (PCV- 13) Vaccine	5	9	14 (28%)
	<i>Haemophilus influenzae</i> type b Vaccine	17	9	26 (52%)
	DTaP Vaccine	20	7	27 (54%)
	Hepatitis B Vaccine	6	6	12 (24%)
	Inactivated Polio Vaccine	11	6	17 (34%)
	Measles, Mumps, Rubella Vaccine	9	3	12 (24%)
	Varicella Vaccine	10	3	13 (26%)
	Influenza Vaccine	0	1	1 (2%)
	Fluoride Varnish Application	0	12	12 (24%)
Non- Clinical Services Provided	Reach Out and Read Books	18	14	32 (64%)
	Internal Referrals for Care Coordination (case management, financial counseling, housing & food support)	3	5	8 (16%)
	External Referrals (Early Intervention, specialty medical care)	4	3	7 (14%)

likely” to use this service if offered again in the future. Moving forwards, 92% of respondents would recommend this same service to others. However, this willingness was contingent on services being delivered directly outside the home; only 50% of respondents stated that they would utilize a mobile health clinic located in a public space (i.e., nearby parking lot).

Notably, five Mattapan families (42%) reported having avoided or delayed necessary care for their child since the start of the pandemic. A Codman Square clinician estimated that roughly 25% of the families who participated in their mobile services would not have attended clinic otherwise.

From the provider perspective, clinicians remarked that they enjoyed the opportunity to leave the clinic, vary their work, and bring care directly to their patients. Clinicians felt that clear communication and cultural competency were crucial to the mobile initiative’s success. Ultimately, providers believed that the mobile clinics enabled them to provide comprehensive preventive care to hesitant families in an innovative way.

4. Discussion and conclusion

During the COVID-19 pandemic, mobile clinics proved to be a valuable tool for providing comprehensive, preventive pediatric care to families who were unlikely to seek in-person care. Prior to this initiative, Mattapan had never achieved more than 70% routine vaccination coverage among children up to two years old (excluding the influenza vaccine). After the mobile initiative, however, vaccine coverage reached 73%. The patient experience was also positive, as demonstrated by high ratings in Mattapan’s quality improvement survey and the willingness of all respondents to use this service again in the future.

Moreover, more than 40% of the Mattapan families in the survey reported that they had delayed or avoided care during the pandemic, suggesting that the mobile clinic provided a critical point of healthcare access. Mobile services likely improved accessibility by alleviating concerns about contracting COVID-19 and obviating the need for transportation and childcare.

Providing services directly outside patients’ homes was also an important factor in participation, as significantly fewer families reported that they would utilize a mobile clinic if offered in a nearby public location. This finding may be unique to the COVID-19 pandemic, as many families avoided public spaces more generally due to concerns about infection. Nevertheless, providing care directly outside patients’ homes was beneficial in allowing providers to gain a deeper understanding of their patients’ living conditions and social context.

Furthermore, providers felt that trust and cultural competency were key to the initiative’s success, which is consistent with research on patient priorities in mobile health care (de Peralta et al., 2019). The health centers intentionally involved staff who reflected the diversity of their patient population. Interpretation services were provided to maximize effective communication. Moreover, the mobile clinic was offered as an adjunct service to established patients only, and this pre-existing relationship likely eased the deployment of an unfamiliar care delivery model. Likewise, Codman Square’s use of telehealth prior to the mobile visit provided this novel service with a “stamp of approval” from the patient’s trusted primary care provider.

However, there are several challenges for clinics seeking to implement their own mobile health services. During the pandemic, HRSA and MDPH were able to expedite approval processes and reduce regulatory burden such that both clinics completed licensure in only four weeks. This accelerated timeline may be unique to the state of emergency. In addition, the regulatory environment in other states may present greater administrative obstacles.

Moreover, financial considerations may impede expansion of mobile clinics. Codman Square utilized a unique billing model that may not be available after the pandemic. Mattapan strived to mimic a traditional clinic schedule and billing structure. However, with time required for

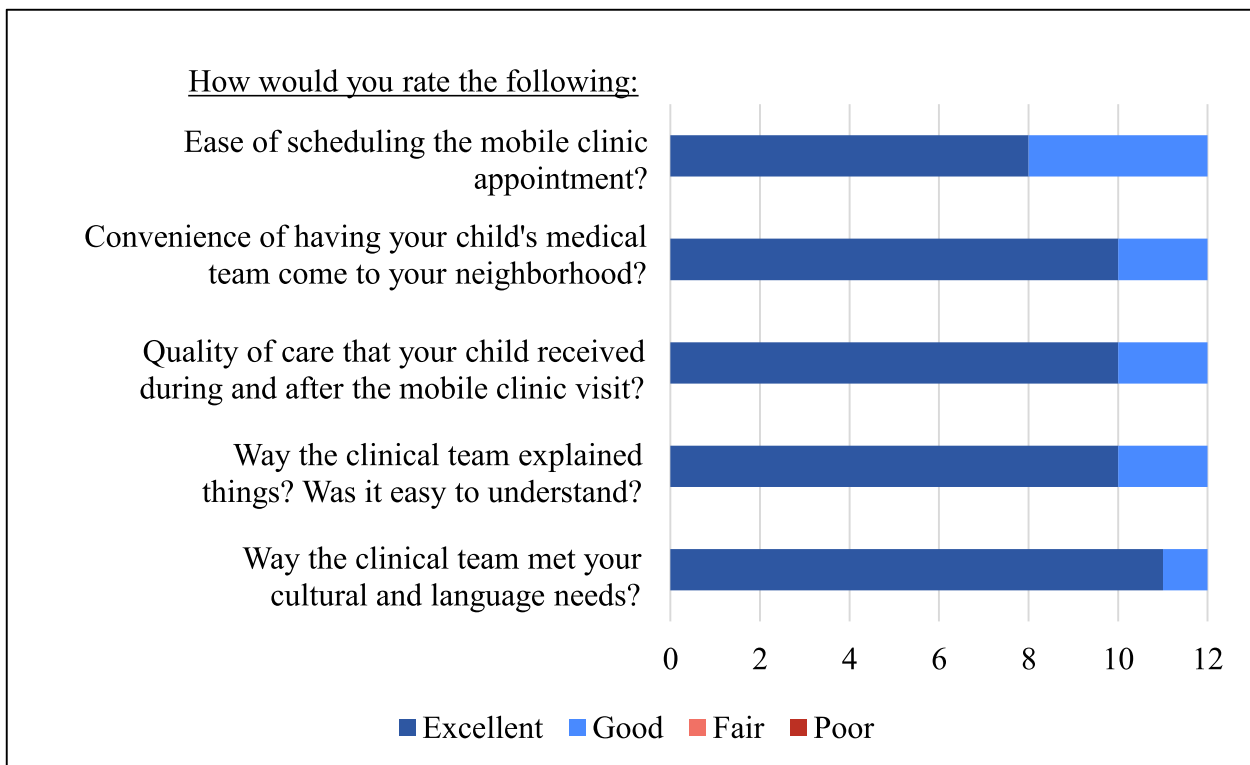


Fig. 1. Results of Quality Improvement survey completed by twelve families who participated in Mattapan Community Health Center’s mobile health clinics.

transportation and set-up, the mobile clinic simply could not approximate the typical volume of an office session. The cost to insure the van driver may have also been prohibitive for the health centers if regional partnerships were not available.

Similarly, the clinical vehicle itself may only be a reasonable investment if multiple entities can pool resources. Although a highly specialized vehicle may not be necessary, the clinical area must provide adequate patient privacy and must be appropriately outfitted for the local climate. To facilitate documentation, both health centers utilized a laptop with Wi-Fi hotspot and employed their existing down-time procedures when Wi-Fi was unavailable.

Staff and equipment availability may also determine feasibility of implementation. In addition to staffing the mobile clinic itself, mobile initiatives require greater time commitment for outreach and scheduling than traditional clinic visits. Codman Square, for instance, trained specific staff members to accurately explain this new initiative and schedule both the telehealth and mobile clinic visits. Other unique scheduling challenges include designing an efficient transportation route for the vehicle to follow during the session.

Despite the challenges, implementation of mobile health clinics enabled two Boston-area community health centers to maximize routine pediatric vaccination rates and enhance preventive care services during the COVID-19 pandemic. The use of mobile clinics expanded access for underserved populations and allowed these health centers to reach patients who likely would not have attended clinic otherwise. In addition to other forms of patient outreach and patient-centered care, mobile health clinics are an underutilized, valuable method for delivering comprehensive, high quality care to the most difficult-to-reach patient populations.

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CRedit authorship contribution statement

Abigail Leibowitz: Writing – original draft, Writing – review & editing, Visualization. **Laura Livaditis:** Conceptualization, Methodology, Supervision, Project administration, Funding acquisition, Writing – review & editing. **Genevieve Daftary:** Conceptualization, Methodology, Project administration, Writing – review & editing. **Leslie Pelton-Cairns:** Writing – review & editing, Resources. **Craig Regis:** Writing – review & editing, Resources. **Elsie Taveras:** Writing – review & editing, Resources.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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