A Quality Improvement Intervention to Increase Access to Pediatric Subspecialty Practice

**OBJECTIVE:** To improve access to new pediatric endocrinology appointments in an urban academic hospital faculty-based practice.

**METHODS:** Three strategies were implemented to increase the number of appointment slots: new patient appointments were protected from conversion to follow-up appointments; all physicians, including senior faculty, were scheduled to see 3 to 4 new patients per session; and sessions devoted exclusively to follow-up appointments were added based on demand. The main outcomes for this quality improvement activity were waiting times for new and follow-up appointments, monthly visit volume, the per-provider visit volume, differences in the proportion of new visits, and clinic arrival rates pre- and postintervention.

**RESULTS:** Thirteen months after the intervention, average wait for a new patient appointment decreased from 11.4 to 1.7 weeks (P < .001) and follow-up appointment wait time decreased from 8.2 to 2.9 weeks (P < .001). Mean monthly total visit volume increased from 284 to 366 patient visits (P < .01) and mean monthly visit volume per provider increased from 36.8 to 41.0 patients (P = .08). New patients were 27% of the visit volume and 35% after the intervention.

**CONCLUSIONS:** Access to our pediatric specialty care clinic was improved without increasing the number of providers by improved scheduling. *Pediatrics* 2013;131:e585–e590
Timely access to health care is essential to optimal health outcomes and is part of the “Triple Aim” goals of improving the US health care system. A survey of US pediatricians conducted in 2007 suggested that primary care physicians were dissatisfied with the wait times for subspecialty care visits. Access to pediatric specialty care is a major challenge for many Americans and their children today. Suboptimal access may delay diagnosis and delivery of appropriate, and even lifesaving, medical therapies. The pediatric specialty workforce currently is unable to keep up with the demand for timely access to health care.

The pediatric obesity epidemic has led to an increase in referrals for type 2 diabetes, metabolic syndrome, hyperlipidemia, and precocious puberty. Consequently, the wait time to see a pediatric endocrinologist in a national survey was reported to be 9 weeks in 2005.

The open-access model is a useful scheduling strategy in the primary care setting. This allows physicians to adjust their availability based on individual-practice demands. However, there are no published studies on the use of an open access model to address poor access to pediatric subspecialty practices. At our institution, a large academic faculty subspecialty practice located in an urban Children’s Hospital in New York City, new patients seeking a nonemergent endocrine appointment waited an average of 11 weeks to see a pediatric endocrinologist from 2003 to 2009. Through the implementation of a process change in the scheduling system, we aimed to reduce the waiting time for new patients from 11 weeks to 1 to 2 weeks.

We used the elements of advanced access (reducing backlog, balancing supply and demand, and developing contingency plans for unusual demands) in designing our intervention.

**METHODS**

**Setting**

The Children’s Hospital at Montefiore is located in the North Bronx in New York City. The pediatric endocrine division is composed of the division chief, 8 faculty members, 2 nurse practitioners, and 1 physician assistant. Although a new faculty member joined the practice in November 2010, we had a decrease in workload of another faculty member during the same period, keeping the total full-time equivalents constant during the intervention. In 2011, the pediatric endocrinology service was responsible for 4489 patient care visits. At our institution, ~70% of all patient visits are Medicaid-enrolled or uninsured. Clinic visits are not prioritized by insurance status. The practices operate simultaneously with other services in a shared clinical space with shared clerical and nursing staff that are responsible for ancillary services and follow-up appointments. The central call center for appointment scheduling is off-site and is staffed by the same personnel that schedule all ambulatory subspecialty visits. Visit volume, waiting times for new appointments, and arrival rates for each of the subspecialty practices are tracked in an automated system allowing for analysis of operational and performance metrics. The average waiting time for the new patient endocrinology appointment was 12.3 weeks from calendar years 2003 to 2009. The no-show rate to pediatric endocrinology appointments for the practice from 2008 to 2010 was 29%. The need for a process improvement change was identified 3 months before the intervention implementation.

**Study Design**

This was an interrupted time series study design using statistical process control (SPC) charts in an outpatient pediatric subspecialty practice.

**Intervention**

We started our process improvement with a detailed review of operational data, examination of the scheduling system and central call center, and interviews with the clinic’s front-desk staff and patients.

The clinic schedule for each provider operates with clinic templates that offer 2 appointment types: new patients and follow-up patients. After each clinic session, we examined each provider’s schedule to determine how many patient visits were used for new and follow-up appointments. This analysis led us to the recognition that the supply of new appointments was compromised by 2 mechanisms:

1. Physicians had variable numbers of new patient appointment slots in their schedule template.
2. New appointment slots were frequently used for follow-up appointments at the request of physicians when the demand for follow-up appointments exceeded the number of available follow-up appointment slots.

We instituted the following process intervention for appointment scheduling:

1. All physicians were scheduled to see 3 to 4 new patients per session.
2. Slots for new patient appointments could not be used for follow-up appointment slots, regardless of increased demand for follow-up appointments.

In preparation for anticipated increase in demand for follow-up appointments, we devised a strategy in which additional sessions were opened and staffed with a nurse practitioner and a physician’s assistant for follow-up of less-complex patients. Before the interventions, these providers assisted physicians in clinic with new and follow-up patient encounters and did not have an independent clinic session. Additional clinic sessions were also...
added on an ad hoc basis by individual physicians based on a monthly report that detailed the waiting time for a follow-up appointment for their own patients. Physicians were instructed to keep the wait for follow-up appointments to ≤3 weeks. Figure 1 presents the process for the intervention.

The planning phase for our process change occurred between May 2010 and July 2010. The intervention was implemented in October 2010 and we report data through November 2011. The initial planning of this quality improvement project involved the use of tally sheets as well as process flow mapping to determine the potential causes for the prolonged access delay. Once the primary sources for access delay were determined, multiple Plan-Do-Study-Act cycles were instituted to incorporate the change interventions aimed at improving waiting times for new patient appointments while maintaining adequate access for follow-up patients. The quality improvement project was led and monitored by the division chief of the pediatric endocrine faculty practice (R.A.H.). Weekly meetings were held with the faculty and staff to outline our goals, report on our progress, and to troubleshoot any issues and concerns that arose as a result of our new scheduling system. Monthly meetings were also held with the medical director of the Pediatric Ambulatory Subspecialty Services (P.F.B.) and our hospital’s medical director of quality (S.J.C.) to discuss our performance measures and modeling of this process change.

**Outcome Measures**

Our primary outcome was weeks to third available appointment (waiting time) for new patients seen by the Pediatric Endocrinology Practice. The analysis of wait time for new and follow-up appointments used the standard third available methodology. This is the same methodology that is used throughout our entire medical center to track patient access for all ambulatory visits. Secondary outcome measures included weeks to third available appointment for follow-up patients, total monthly visit volume, total monthly visit volume per provider, and no-show rate for the pediatric endocrinology practice.

**Statistical Analysis**

Time-trend data for waiting times for third available appointments and visit volumes were analyzed and monitored through SPC charts (x-bar) with 95% control limits. SPC charts are quality improvement tools that determine if a particular measured outcome is under “control” (ie, stable with expected variation associated with the involved process) or “out-of-control” (ie, an indication that the process has undergone a variation that is unexpected and may require change). This methodology, originally designed for the manufacturing industry, is a powerful tool to study and monitor the performance of various health care delivery systems and processes. By incorporating SPC charts throughout our project, we were able to track and monitor our performance outcomes after the process changes. We used unpaired t-tests for samples of different sizes to assess differences in outcome measures before and after our process change, and we used correlation analysis of the monthly values of arrival rate with waiting time for a new patient appointment. For these comparisons, we

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**Figure 1**

Time line of the intervention.
considered $P < .05$ to be statistically significant. We obtained Albert Einstein College of Medicine’s Institutional Review Board approval for this quality improvement study.

RESULTS

We studied data for 34 months before the intervention and for 13 months postintervention. Data from January 2008 to November 2011 were used. After the intervention, the wait time for a new appointment improved markedly. The mean wait time for a new appointment decreased from 11.0 (7.7–15.0) to 1.7 (0–5.3) weeks ($P < .001$). This is represented in Fig 2 and Table 1. This improvement in the wait times occurred despite an increase in new patient volume from 27% of the total visit volume before to 35% after the intervention. The total patient visit volume for the clinic also significantly increased during the time period ($P < .01$). The mean monthly total visit volume increased from 284 to 374 patient visits postintervention ($P < .01$). Thus, improvements in access did not result from a decrease in the total demand for patient appointments after the intervention, but from improved efficiency and remodeling of the scheduling process. Interestingly, the wait for follow-up appointments also decreased significantly from 8.2 weeks (5.7–11.0) to 2.9 weeks (0–4.6) postintervention, as shown in Fig 3 ($P < .001$).

To determine if the improvement in waiting times was a result of increasing the work demand on individual provider, we compared the total monthly visit volume per provider during the year preceding and the year after the process change. The mean monthly visit volume increased from only 38.5 (30.1–44.6) to 41.60 (33.7–52.3) patients per provider ($P < .05$). The clinic no-show rate decreased from 29% to 26% after the intervention but was not significant ($P = .29$). Table 1 summarizes the results of our findings.

DISCUSSION

We describe a successful intervention that reduced the wait for a new pediatric endocrine appointment at a large urban children’s hospital from a mean of 11.0 to 1.7 weeks. This intervention used the principles of advanced access scheduling. We studied both the supply and demand for appointment types and increased the supply of new appointments that were offered by the subspecialty clinic while carefully ensuring that follow-up appointments were in adequate supply. Remarkably, this subtle increase of the new patient appointment supply matched with a demand-driven supply for follow-up appointments did not require a significant time commitment from the academic faculty practice whose time is also committed to research and other

![Pediatric Endocrine Clinic Access Times-Weeks to Third Available Appointment for New Patients (Statistical Process Control Chart, 95% Limits)](image-url)

FIGURE 2

SPC chart: new patient appointments.
scholarly activities. In fact, the average provider increased their average visit volume by only $\sim 3$ patients per month. Of particular note, this improvement process took place during a system-wide implementation of a new ambulatory electronic medical record. During the 3-month period, the ambulatory clinics were required to decrease the number of scheduled appointments by 40% to train the staff and faculty in the use of the electronic medical record. Despite this interruption, the project achieved its goals and sustained a short waiting time for both new and follow-up appointments. Likewise, our process improvement results were sustained for an entire year, resulting in a reduction of waiting times for new patients to $\leq 1$ week for the last 6 months of the study period.

We believe the success of the intervention was the result of the following key factors: (1) A committed leader. The project leader (R.A.H.) spent many hours actively studying the scheduling process, observing wait times for various appointments, and directly studying the day-to-day operation of the clinic and the call center. She was also responsible for ensuring that the process change was implemented. Compliance with this directive required an active and on-going reinforcement to all faculty members, particularly with regard to “protecting” new patient appointment slots. (2) Having 9 faculty endocrinologists supported by an ancillary clinical staff, all in the same location, allowed for a greater ability to react to changes in demand. Furthermore, the gradual increase in the number of new patients resulted in an equal distribution of new patients seen by each provider without posing any undue burden on a small number of physicians. Such capacity and flexibility may be unavailable to a smaller group of subspecialists, particularly in an academic setting. (3) The demand for additional appointments was moderate. Similar efforts have been reported to fail and these failures can occur for multiple system-based reasons. Workforce availability and

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<th>TABLE 1 Summary of Results</th>
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<td><strong>Outcome</strong></td>
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<td>Wait for third available new patient appointment, wk</td>
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<tr>
<td>Wait for third available follow-up patient appointment, wk</td>
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<td>Monthly visit volume, patients</td>
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<td>Monthly visit volume per provider, patients</td>
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<td>Monthly no-show rate, %</td>
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Data are expressed as mean and SD.

FIGURE 3

SPC chart: follow-up appointments.
demand for any particular subspecialty practice may outweigh any system-based interventions.

The limitations of the intervention are that it is a single-site study in a defined geographical area and thus may not lend itself to be generalizable to other practice settings. We did not measure physician satisfaction or stress with the increased workload, albeit small. Future studies should incorporate this component in the evaluation; however, the workload of our subspecialists even with the intervention is commensurate with national benchmarks for physician relative value units.

In 2004, the federal Maternal and Child Health Bureau established a work group to address the problem of inadequate pediatric subspecialty access. This group arrived at the following 4 recommendations: an expanded role for the primary care providers to collaboratively manage subspecialty conditions, enhanced training opportunities for primary care providers, extending the reach of subspecialists, and training more pediatric subspecialists. Interestingly, the recommendations do not include a mention of what can be done locally with scheduling systems to improve access. Our results suggest that in some cases, subspecialty access may simply be a problem with the local appointment scheduling process. Hence, long waits can arise from relatively small increments of demand over the supply of available appointments. Access can be improved by implementation of specific interventions that address obstacles in the existing health care delivery system. Evaluation of data before and after an intervention can lead to a better understanding of the processes. This will ultimately identify opportunities to help alleviate barriers to access.

We conclude that in our academic hospital-based practice we markedly improved a long-standing access problem for a pediatric subspecialty practice by using the principles of advanced access scheduling. This involved an increment in the appointment supply and rebalancing of the proportion of new to follow-up appointments in the provider’s scheduling templates. This was achieved by adding new patient appointments and adopting policies that restricted conversions of new patient appointments to follow-up patient appointments. The addition of ad hoc sessions ensured that follow-up patients were seen in a timely fashion.

We are the first group to report this initiative in a pediatric subspecialty service. Our results suggest that performance improvement efforts by using advanced access scheduling principles and quality improvement tools may have a significant role in addressing the national problem of pediatric subspecialty access.

Moving forward, our goal is to maintain our access rates at current levels and plan for anticipated problems that can affect our health care delivery system. An example of such an issue is holidays that fall on Mondays. Depending on the institution or practice, such “long weekends” can occur up to 14 times per year. This becomes a challenge when the busiest day of the week for a particular practice is Monday. Planning ahead with additional clinic sessions on other days can help mitigate these anticipated appointment shortages.

REFERENCES

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