

Cost Analysis of a Multidisciplinary Aerodigestive Clinic: Are Such Clinics Financially Feasible?

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Abstract

Objective: Multidisciplinary clinics offer important value to pediatric patients with complex conditions that overlap specialties; however, such labor-intensive clinics are difficult to facilitate. We performed a cost analysis of our pediatric multidisciplinary aerodigestive clinic (MADC) to assess its financial feasibility at our tertiary care institution.

Method: Revenue was based on net collections for clinic, professional, and hospital setting charges generated during 12 consecutive monthly MADCs beginning August 2013. Clinic charges included facility and speech pathologist fees. Professional charges included clinic and operative fees generated by providers and anesthesiologist. Hospital setting fees included facility and material charges for technical procedures. Direct expense calculations included all providers and staff salaries, benefits, and supply costs.

Results: Charge capture for 54 consecutive patients seen during the study time included new visits 99203-99205 (n = 63), consults 99243-99245 (n = 60), and follow-up visits 99212-99215 (n = 196). Sixty percent of patients underwent a clinic nasopharyngeal or laryngeal endoscopy (92511 or 31575), and 60% underwent subsequent intraoperative procedures with 1 (n = 8) or 2 to 3 services (n = 24). Program net revenue totaled \$828 136 and direct costs \$518 867, accounting for a net positive margin of \$309 269.

Conclusions: When including direct downstream revenue, our MADC operates on a net positive margin, making it financially feasible.

Keywords

aerodigestive clinic, multidisciplinary clinic, value based care, clinic revenue

Introduction

Multidisciplinary clinics offer important advantages to patients and their families by providing evaluations from multiple specialists during a single clinic visit. Convenient “one-stop shopping” is not the only advantage as these clinics also facilitate the development of a unified, coordinated management plan that takes into account the recommendations of all providers. Such a care plan prevents a patient from receiving multiple varied medical recommendations for the same condition from different providers.

Multidisciplinary clinics are gaining increasing popularity and are known to improve the quality of patient care for a variety of conditions, including malignancies,¹ chronic ailments such as congestive heart failure,² and even developmental disorders.³

Despite the recognized value from a patient and family perspective, the institutional cost of operating multidisciplinary clinics has not been well assessed. Operational efforts exceed that of single specialty clinics as multidisciplinary

clinics typically require patient eligibility prescreening, employment of qualified care providers dedicated to the multidisciplinary approach, coordination of care provider schedules, and establishment of facilities acceptable to all providers.

We established a multidisciplinary aerodigestive clinic (MADC) at Children’s National Health System to coordinate the care of patients with complex aerodigestive conditions who were seeing more than 1 specialist. The patient benefits of establishing a MADC were readily apparent to the families and the providers; however, it was unclear

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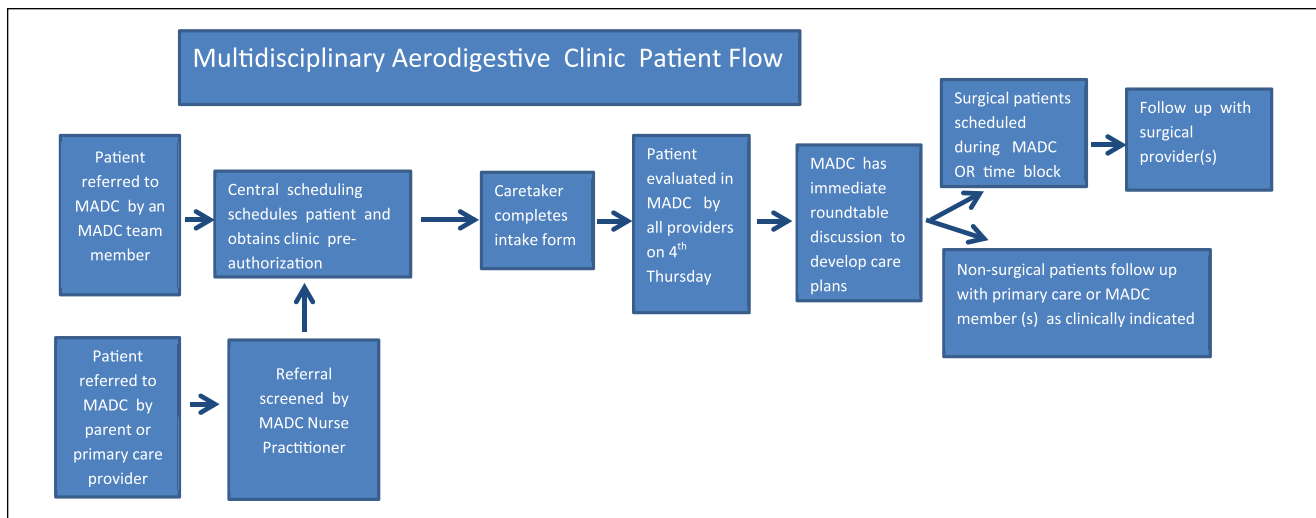


Figure 1. Patient admission and flow through multidisciplinary aerodigestive clinic (MADC).
OR = operating room.

whether the clinic operated at a positive or negative financial margin. We hypothesized that the MADC operates in a cost positive fashion when taking into account downstream revenue from operative procedures and teamed with our business office to investigate this hypothesis. We did not seek to determine whether a single multispecialty clinic, such as our MADC, is more cost effective than multiple single specialty clinics for this cohort of patients. Rather, we wished to determine if our MADC operates in a cost positive fashion.

Methods

The study was conducted in a retrospective fashion to include all consecutive charges generated during 12 monthly clinics. Our MADC team consists of a nurse practitioner (0.2 FTE), a pediatric otolaryngologist, a pediatric gastroenterologist, a pediatric pulmonologist, and 2 speech and language pathologists, 1 of whom attended each monthly clinic. Team members tried to schedule vacations and elective departures on days other than the MADC to maintain consistency in evaluations.

Patients during this period were most often referred by a MADC team member who had seen the patient singly prior to referral and who called or emailed our central scheduling department to request an appointment for the patient. Clinic flow is depicted in Figure 1. Patients were also referred by their primary care physician or by self. Each of these latter referrals were prescreened by the team nurse practitioner for appropriateness, which was defined as having a condition that had already been evaluated by their primary care physician and for which an evaluation by more than 1 specialist was felt indicated. The nurse practitioner forwarded the

scheduling request to our central scheduling department. The patient's caretaker was asked to complete an intake data form sent electronically or via postal service that summarized the patient's current complaints, aggravating and alleviating factors, past medical history, and prior studies obtained to evaluate the condition. The scheduler preauthorized clinic visits for each of the 4 specialists. Patients over 5 years of age with pulmonary complaints and without pulmonary function test results from 3 months prior to the clinic appointment were scheduled for testing in the pulmonary function lab immediately before the MADC appointment. All providers reviewed the intake data form prior to the clinic, a task consuming approximately 1.5 hours per provider.

The clinic was conducted in the Children's National Otolaryngology clinic space from 1 to 6 pm on the fourth Thursday of each month monthly, during which time a maximum of 6 new and 2 follow-up patients were evaluated. Follow-up patients were subsequently also seen in the individual clinics of team members if an entire team reevaluation was felt unnecessary.

Patients were evaluated during the first 3.5 hours of clinic, with time allotted for individual evaluation and exam by each team provider. Some services had residents accompanying them during the clinic due to its educational benefit. After seeing all care providers, patients were discharged from clinic with a preliminary visit summary. Once all patients had been discharged, a roundtable discussion was held in the same setting with each service rendering an opinion of the patient's condition and management options, including whether operative endoscopy or other surgical intervention was felt indicated. After all opinions had been rendered and the relevance of each discussed, a primary

treatment plan was agreed on. An alternative treatment plan was also outlined in case the patient did not improve with the primary plan. The primary care provider received a letter from each MADC provider as well as a group letter summarizing the treatment plan.

All patients for whom a surgical intervention was felt indicated were scheduled for the procedure during the dedicated operating room MADC block time conducted on the fourth Wednesday afternoon of each month. Nonsurgical patients were seen in follow-up by their primary care physician or by 1 or more MADC providers as clinically indicated. If follow-up was indicated by only 1 specialist, the patient did not return to the MADC but followed up with that specific provider. Surgical patients followed up with their proceduralist.

Revenues in the clinic setting were calculated from the actual net collections of professional fees for visits and procedures performed in clinic by each of the 3 physician providers (otolaryngology, pulmonary, and gastroenterology) as well as our standard clinic facility fee, which also included speech and language pathologist charges. Revenue in the hospital setting included professional charges for the 3 physicians and an anesthesiologist in addition to direct costs for time and materials used in the operating room (OR), recovery room, and laboratories. Downstream revenues for inpatient costs outside of the OR procedure were not included since such admissions were not felt immediately related to the outpatient MADC visit or the OR procedures, which were largely diagnostic/outpatient and did not require an admission.

Expenses were calculated based on the providers' actual salaries for the annual time estimates of 75 hours of clinic and 16 hours of OR time for direct and indirect care of patients and 60 hours for the nurse practitioner's preparatory and follow-up work in addition to her time in the clinic. Additional clinic personnel costs included a medical scheduler, a clinic nurse, and a speech and language pathologist. As our facility operates as a typical employed academic model, we included base salary plus 21.5% benefits. We used the ratio of cost to charge percent from our decision support department for expenses associated with the time and materials related to the OR, post-anesthesia care unit, and laboratory. Capital costs such as the building lease or capital equipment purchases were excluded from this operating cost analysis.

Results

Twelve monthly clinics were conducted from August 2013 to October 2014. A 14-month period was required to assess 12 clinics as November and December clinics fell on public holidays during the study year. Core team members remained the same at every clinic except on 2 occasions

Table 1. Profit and Loss Data for 12 Consecutive Aerodigestive Clinics.

Financial Impact (Operating)		
Downstream revenue	Facility revenue ^a	\$1 642 466
	Less allowances, bad debt, and charity	\$936 206
	Net patient revenue	\$706 260
Clinic revenue	Physician revenue ^b	\$338 543
	Less allowances, bad debt, and charity	\$216 668
	Net patient revenue	\$121 875
Total net revenue		\$828 136
Costs (salary cost includes 21.5% benefits)	Physician salaries ^c	\$166 686
	Clinic personnel salaries ^d	\$11 550
	Facility direct costs	\$340 631
Total salary + direct costs		\$518 867
Net margin		\$309 269

^aDownstream revenue calculated from charges directly attributed to anesthesia, operating room (OR), post-anesthesia care unit, laboratory medicine, radiology, and clinic.

^bClinic revenue calculated from actual charges of specialists, including otolaryngologist, pulmonologist, and gastroenterologist in addition to facility fee, which includes speech and language pathologist and ancillary staff.

^cPhysician salary includes: 75 hours of clinic time for otolaryngologist, pulmonologist, and gastroenterologist plus 4 hours for each provider and anesthesiologist in monthly OR.

^dClinic personnel includes: nurse practitioner, clinic scheduler, clinic registered nurse, speech language pathologist.

when a substitute physician was provided when a core team member was out of town.

Fifty-four patients were seen during the study period for 1 or more appointments. CPT codes were new visits (99202-205, n = 63), consults (99243-45, n = 60), and follow-up visits (99212-15, n = 196). Flexible laryngoscopy (31575) or fiberoptic nasopharyngoscopy (92511) was completed in 60% and pulmonary function testing in 75%. Sixty percent underwent subsequent intraoperative procedures with 1 (n = 8) or 2 to 3 services (n = 24).

Medicaid accounted for 45% of the payor mix of the patients presented and was similar to our total hospital's payor mix of 48% Medicaid during the same time period.

We were reimbursed at 36% on average for professional fees within the clinic visits and procedure charges. The facility side charges were reimbursed at 43% for the OR, radiology, and laboratory services. Profit and loss data are provided in Table 1. Clinic revenue was cost negative with clinic charges of \$338 543, net collections of \$121 875, and expenses of \$331 856. However, subsequent direct

downstream revenue that included reimbursement for OR procedures was \$1 642 466, with net collections of \$706 260 providing a facility margin of \$374 404. OR-related professional fee charges, including surgeons and anesthesiologists, totaled \$383 953, with net collection of \$122 865.

Overall, collected program revenue totaled \$828 136, including all clinic, professional, and hospital fees for the 54 patients and the 32 OR cases. Total expenses were \$518 867, including all provider and support staff salaries and OR expenses and material costs. This resulted in a positive program margin of \$309 269.

Discussion

The multidisciplinary clinic approach fits well within the Center for Medicare and Medicaid Services (CMS) model of a value-based approach to health care.^{4,5} In consideration of value-based care, institutions must take into account the value as well the costs to determine which efforts are best supported. Caretakers of our MADC patients frequently comment on the advantage of the clinic's coordinated care efforts and lend support to its clinical value. This clinical advantage can be costly for an institution compared to operating a single specialty clinic. At our institution, the senior author evaluates 25 to 30 patients in a half-day otolaryngology clinic and books an average of 5 to 6 operative procedures. However, during the half day MADC, she only sees an average of 6 patients and books 2 to 3 operative procedures. Fortunately, this study was not a cost comparison study but rather an endeavor to determine whether the MADC operates in a cost positive or cost negative fashion.

Discussions at the recent Fourth Annual Contemporary Management of Aerodigestive Disease in Children confirmed a lack of understanding of the financial impact of MADCs among experts in this area of medicine. Sharing financial knowledge of our model with pediatric specialists seeking to establish a MADC may lend support to their endeavors. Our analysis is simplistic but addresses the hypothesis of whether our MADC operates in a cost positive fashion. Future financial studies would be useful to explore ways to optimize MADC revenue. One such mechanism would be to employ time-driven activity-based costing (TDABC) accounting to compare various approaches to maximize personnel utilization in a clinic setting. The advantages of this strategy were well described in a study reducing personnel costs for adenotonsillectomy.⁶ This approach would be time consuming and require the development of process maps but might prove particularly helpful to optimize personnel utilization. One downside of our MADC is that all providers are not actively engaged in patient evaluations during the entire clinic time and sometimes experience delays in seeing patients while waiting for other providers to complete their evaluation. This is an

inherent problem of our MADC since the time required for patient evaluation varies considerably between our different specialties. Waiting time is used in a meaningful way by providers who frequently answer emails and phone calls during the time period, but a TDABC analysis might optimize these personnel costs for the benefit of the MADC. In addition, this style of analysis could be useful in determining the best operative room flow when multiple providers are managing MADC children in a single setting.

Pediatric multidisciplinary clinics have shown benefits in a variety of complex medical conditions, including asthma,⁷ diabetes,⁸ and cystic fibrosis.⁹ Multidisciplinary clinics offer direct benefit to patients, including a single clinic visit during which patients are assessed by multiple specialists, a multidisciplinary approach to evaluation and management of often complex conditions, and an opportunity to combine surgical procedures under 1 anesthetic. This latter advantage is particularly important given the theoretic concerns of repeated anesthetic exposure on neurocognitive development.¹⁰ Even though anesthetic concerns have not been proven in humans to cause neurocognitive problems, anesthetic exposure remains concerning to family members. Multidisciplinary clinics align well with family-centered care, resulting in fewer missed days of school and work for patients and their families. A recent study showed a significant cost savings per visit for families in terms of gas, parking, and facility fees, although the study results were based on theoretic and not actual measures of cost.¹¹

Recalcitrant conditions of the aerodigestive tract are ideally suited for evaluation in a multidisciplinary clinic as the etiology is often multifactorial. Involvement of gastroenterology, pulmonary, speech language pathology, and otolaryngology can optimize management. A recent study showed marked improvement or resolution of symptoms in 75% of patients seen in a multidisciplinary clinic who had recalcitrant conditions despite being seen by a single team specialist prior to referral.¹² A review of the websites of the pediatric hospitals in our Children's Hospital Association cohort shows 60% conduct a MDAC.¹³ The nature of MDACs varies widely. While some clinics operate similarly to ours, with providers seeing patients in the same setting on the same day, in other clinics, providers see patients independently and discuss clinical findings and recommendations at a later time. The value of the emerging field of aerodigestive disorders in children is apparent as the American Academy of Pediatrics is attempting to include it as a pediatric specialty.

In this cost analysis, a rather straightforward analysis of clinic revenues and costs shows the clinic overall operates on a net negative margin. However, direct downstream revenue generated by OR utilization for MADC patients improves the financial outlook to one with a positive

margin. The findings of our study suggest that the financial feasibility of such a clinic is dependent on a favorable ratio of surgically versus medically managed patients. We do not perform preclinical screening to select for surgical patients; however, we do have a screening process to select for patients with recalcitrant conditions. Most patients in our clinic are referred from a specialist, a pulmonologist, a gastroenterologist, an otolaryngologist, or a speech and language pathologist who has already seen the patients and who perceives an advantage to a multidisciplinary evaluation. Direct referrals from patients or from primary care specialists are screened by our nurse practitioner. This screening process is not intended to select surgical candidates but to verify that the patients presenting complaints warrant evaluation by at least 2 specialists of the clinic. In a recent review of the presenting symptoms of this cohort of patients, we found chronic cough to be the most common complaint.¹²

One could argue that noncohesive care may generate a more favorable margin; for example, if each provider performed cases independently in the OR, this would increase OR utilization and downstream revenue. However, exposing children to additional anesthetics for the benefit of revenue alone would be unconscionable. In addition, it is understood anecdotally that the customer service provided to families and patients suffers when there is segmented care. Subjective factors contributing to value and cost are more difficult to capture.

Cost effectiveness studies seek to evaluate the economic and outcome impacts of different care practices. A recently published systematic review of cost effectiveness of secondary multidisciplinary teams versus single specialty clinics found only 11 randomized clinical studies in non-cancer care that reported full economic evaluations out of over 1700 studies screened.¹⁴ Results were mixed, with some studies showing an economic advantage with or without a decrease in patient morbidity, some studies showing a decrease in morbidity without an economic advantage, and some studies showing no advantage in either outcome measure. The heterogeneity of the published studies precluded a meta-analysis and prompted a plea from the authors to include important information in cost analysis for subsequent reviews.¹⁴

Although this is a purely a cost analysis evaluation and no outcome-based measures are used, the authors find this information helpful as it allows the passion of the providers, who believe that coordinated patient care is value positive, to resonate with administrators who are focused on the financial picture. The new paradigm of medical care has shifted from volume to value, and a hospital-wide appreciation for this shift demands crossing the chasm into the business of medicine for health care providers. The value-based care model puts the value of health care as seen by the

patient of greater import than the volume of patients seen in an institution. In this case, we were able to demonstrate a favorable financial margin to support what we view as a high value care model. Future outcome analyses and patient satisfaction surveys would provide objective data on the patient value of this care model. As noted in our method section, capital costs were not included in this analysis since operating and capital costs are separate entities on a balance sheet. No new capital costs were expended at our institution to establish the MADC. The findings of this study might therefore not apply to a new MADC in a new institution where capital costs would have more of a financial impact than in our established institution. Additionally, our analysis was designed to assess the overall financial operational costs of the MADC at our institution and not examine the financial impact on each department. Such a study would be interesting to pursue.

Conclusions

Multidisciplinary clinics like this MADC are seen as a value for patients and families with complex conditions. The benefits to patients are clearly evident to the providers although not studied in detail in this paper. Although such clinics are costly to operate, this study shows that they can operate in a cost positive fashion when accounting for direct downstream revenue. These findings give support to physicians to start or continue such clinics.

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