Objective: To describe the operating characteristics, financial performance, and perceived value of computerized children’s hospital–based telephone triage and advice (TTA) programs.

Design: A written survey of all 32 children’s hospital–based TTA programs in the United States that used the same proprietary pediatric TTA software product for at least 6 months.

Main Outcome Measures: The expense, revenues, and perceived value of children’s hospital–based TTA programs.

Results: Of 30 programs (94%) responding, 27 (90%) were eligible for the study and reported on their experience with nearly 1.3 million TTA calls over a 12-month period. Programs provided pediatric TTA services for 1560 physicians, serving an average of 82 physicians (range, 10-340 physicians) and answering 38,880 calls (range, 8500-140,000 calls) annually. The mean call duration was 11.3 minutes and the estimated mean total expense per call was $12.45. Of programs charging fees for TTA services, 16 (59%) used a per-call fee and 7 (26%) used a monthly service fee. All respondents indicated that fees did not cover all associated costs. Telephone triage and advice programs, when examined on a stand-alone basis, were all operating with annual deficits (mean, $447,000; median, $325,000; range, $74,000–$1.3 million), supported by the sponsoring children’s hospitals and their companion programs. Using a 3-point Likert scale, the TTA program managers rated the value of the TTA program very highly as a mechanism for marketing to physicians (2.85) and increasing physician (2.92) and patient (2.80) satisfaction.

Conclusions: Children’s hospital–based TTA programs operate at substantial financial deficits. Ongoing support of these programs may derive from the perception that they are a valuable mechanism for marketing and increase patient and physician satisfaction. Children’s hospitals should develop strategies to ensure the long-term financial viability of TTA programs or they may have to discontinue these services.


Editor’s Note: This well-conceived and well-executed study provides valuable information. A dollar a minute seems pretty reasonable for a successful marketing initiative, not to mention the resulting care and education benefit.

Catherine D. DeAngelis, MD

As the pediatric health care environment becomes more competitive, many children’s hospitals, facing the threat of loss of referrals, are seeking ways to strengthen their relationships with and increase the loyalty of referring physicians, patients, and parents. As part of this effort, many children’s hospitals have recently developed pediatric telephone triage and advice (TTA) programs. These programs have been well described in the literature and generally use pediatric nurses and standardized TTA protocols to provide after-hours TTA to the patients and parents of referring physicians or to provide telephone advice to the general public as part of a health information line.

Telephone triage and advice services are often chosen by children’s hospitals as a relationship- or loyalty-building strategy directed toward physicians, in part because telephone calls are a major source of dissatisfaction in pediatric practice. High levels of satisfaction and some improvements in physician allegiance have been described among physician users of TTA programs. Telephone triage and advice programs may also increase patient satisfaction through the provision of credible, consistent, useful, and rapid responses to parental questions and concerns.
MATERIALS AND METHODS

STUDY INSTITUTIONS

A written survey was mailed to the identified managers of children’s hospital–based TTA programs in the United States that use the Pediatric Telephone Triage and Advice System (PTAS) software (National Health Enhancement Systems, Phoenix, Ariz). The names of the children’s hospitals were obtained from the software vendor. Programs were eligible for inclusion in the study if they had been in operation and using the software for at least 6 months. The survey was mailed to the program managers in September 1997, with follow-up calls made to those who failed to complete surveys.

SURVEY INSTRUMENT

Survey respondents were asked to provide, when possible, 12 months of data. A 41-question survey was used to examine the following aspects of call center operation: operating characteristics of TTA programs (scope of services; organizations that use TTA services; their experience with TTA software; call volume, flow, and duration; and hours of operation), financial performance of TTA programs (expense-per-call fees, overall financial performance of programs, and improving financial performance of TTA programs), perceived value of TTA programs, and future direction of TTA programs.

DESCRIPTION OF THE TTA SOFTWARE

The PTAS software features the pediatric TTA algorithms developed by Schmitt and colleagues. Each algorithm uses a rank-ordered series of questions designed for nurses to use in responding to telephone calls from parents regarding their child’s health problems and guides the nurse in selecting disposition and care advice depending on the answers to the questions. The software also enables electronic documentation of the telephone encounter.

ANALYSIS

Call center operating and financial characteristics were tabulated and analyzed using Microsoft Access (Microsoft Corp, Redmond, Wash) and SPSS (SPSS Inc, Chicago, Ill). For programs with less than 1 year of data, annual volume estimates were calculated by annualizing their data.

Although the effectiveness of TTA programs in maintaining physician referrals and patient loyalty is unknown, these programs remain very popular with children’s hospitals, despite substantial costs. Many children’s hospitals have opted to develop their own TTA programs and purchase the necessary computer hardware and software to support their own pediatric call center. As these computerized systems require extensive investment to develop and maintain, it is not surprising that, as some of these programs have begun operations, there have been anecdotal reports of operating losses by many of the sponsoring children’s hospitals. Because children’s hospital–based computerized TTA programs are relatively new, most institutions embarking on development of such programs have done so with few operational benchmarks and limited data regarding the anticipated costs, expected financial performance, and perceived value of TTA programs. Therefore, a national study of children’s hospital–based TTA programs would be of value to children’s hospitals that are either currently operating TTA programs or considering their development.

In this study, we describe the operating characteristics and financial performance of 27 computerized children’s hospital–based TTA programs. We also report on the value of the TTA programs from the perspective of the sponsoring institution. This survey was undertaken to test our hypotheses that children’s hospital–based TTA programs generally operate at a substantial financial deficit and that ongoing support by institutions is derived from a perception that the programs are valuable as a mechanism for marketing and to increase referring physician and patient satisfaction.

RESULTS

RESPONSE TO SURVEY

Of 32 children’s hospital TTA programs that had purchased the PTAS software, 30 (94%) responded. Three programs (10%) were excluded, 2 that had less than 6 months of data available and 1 program that had discontinued TTA services. Complete data were collected on the remaining 27 programs from 27 different cities in 24 states. Twenty-one programs reported 12 months of data and 6 reported less than 12 months of data, which were annualized for the purposes of the analysis. Of the 21 programs reporting 12 months of data, 19 (90%) provided information from fiscal year 1996-1997 and 2 (10%) reported data from either calendar year 1996 or other 12-month intervals spanning 1996 and 1997. The respondents identified themselves as administrative managers (42% [n = 12]), nursing administrators (34% [n = 10]), and program medical directors (20% [n = 5]).

OPERATING CHARACTERISTICS OF TTA PROGRAMS

Scope of Services and Users of TTA at Children’s Hospital–Based Call Centers

All programs offered pediatric TTA services but none offered TTA oriented to adults. All of the TTA programs reported providing TTA to physician groups, serving 1560 physicians nationally (Table 1). Seven programs (26%) also provided TTA as a public service to parents calling the hospital for information (“ask-a-nurse” lines). No children’s hospital provided services to a patient information line for another hospital. Six children’s hospitals provided physician referral and 5 offered automated interactive voice-response systems that provided prerecorded health education messages available to callers using a touch-tone telephone. One children’s hospital pro-
gram offered a physician answering service and 1 offered emergency department authorization for Medicaid patients. None provided enrollment verification services, member services information, or other managed care customer services.

Experience With PTAS Software

The mean time that the TTA programs had been in operation was 2.4 years (range, 1-9 years), and the mean time using the PTAS software was 1.8 years, reflecting the finding that some programs had begun as manual “pen and paper” operations before transitioning to computerized operations.

Annual Call Volumes

Twenty-one programs reported call volumes for a full year, 4 for 8 to 10 months, and 2 for 6 months. The annualized total call volume during the 1-year study period among the 27 children’s hospital TTA programs was 1 293 481 calls. The mean (SD) annual total call volume per children’s hospital was 47 907 (52 384) (range, 6878-256 241). Most calls (81%) were managed on behalf of physician groups, and centers answered an average of 38 000 calls annually for physicians. The 7 children’s hospitals that provided TTA for the general public handled an average of 45 000 calls per year, and the 5 hospitals that offered prerecorded, automated telephone health information lines handled an average of 11 400 of these calls each year.

Call Flow and Duration

Most programs (85% [n = 23]) reported that patients generally called the physician’s office and appropriate calls were then routed to the call center. Call duration was distributed in a bimodal pattern (Figure). Although the mean (11.3 minutes) and median (11.5 minutes) durations were very similar, 6 programs (22%) reported a 9-minute average call and 7 programs (26%) a 12-minute average call.

Hours of Operation

All of the children’s hospitals operated after-hours TTA on weekdays and weekends, and 7 programs (26%) offered TTA services during weekday office hours. Programs offering only after-hours TTA reported that approximately half their calls were answered during weekdays after hours and half their calls were answered during week-ends and holidays. Programs that also offered weekday daytime office hours TTA reported that approximately 15% of their calls were during this period.

FINANCIAL PERFORMANCE OF TTA PROGRAMS

Expense per Call

The most commonly used indicator of expenses and efficiency of operation for TTA call centers is the calculation of the expense per call.\(^3\) The managers of 24 children’s hospital–based TTA programs (89%) provided estimates of expense per call based on total annualized expenses (Table 2). The mean and median expenses per call were reported as $12.45 and $11.32, respectively. All managers included salary costs in per-call estimates; 65% [n = 18] of the managers also included capital expenses, such as hardware and software, in per-call cost estimates.

Fees

Sixteen children’s hospitals (59%) charge a fee to the physician practices for use of TTA services, with most charging the physicians on a per-call basis. Per-call fees were highly variable, ranging from $1.50 to $15 per call. Many programs charged at least 2 different per-call fees, which were often based on total call volumes. The average of these programs’ most commonly used per-call fee was $3.45; the average of the second most commonly used per-call fee was $5.90. Monthly service fees were also used by 8 programs (30%), and 3 (11%) reported using a

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<th>Table 1. Operating Characteristics of Children’s Hospital–Based Telephone Triage and Advice (TTA) Programs</th>
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<tr>
<td><strong>Mean (Range)</strong></td>
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<tr>
<td>Time in operation, y</td>
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<tr>
<td>Annual call volume*</td>
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<tr>
<td>Physicians served, No.</td>
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<td>TTA call duration, min</td>
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* Including hospital information lines.

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<th>Table 2. Costs and Fees for Pediatric Telephone Triage and Advice Among Children’s Hospital–Based Call Centers</th>
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<tr>
<td><strong>Mean (Range)</strong></td>
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<tr>
<td>Annual call volume for physician groups</td>
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<tr>
<td>Estimated expense per call, $</td>
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<td>Most common per-call charge, $</td>
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<td>Second most common per-call charge, $</td>
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<td>Annual financial deficit for call center, $</td>
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monthly service fee and per-call fee. Monthly fees ranged from $50 to $250. One program had a capitated fee in effect, charged as a per-member-per-month rate to the physician group. No program providing TTA as a public service charged for this service.

Financial Performance

Survey respondents indicated that revenues did not cover all the expenses of the program. Of 24 programs responding to specific questions about financial performance of the TTA program, all reported that their program, when examined on a stand-alone basis, was operating at a deficit. The mean annual deficit for TTA programs was $47,000 (median, $325,000; range, $74,000–$1.3 million). In all but 2 cases, program deficits were written by the sponsoring children's hospitals and their companion programs. In the 2 exceptions, the program was written by a physician hospital organization and a hospital physician group practice. Multiple regression analysis indicated that 8 variables—including most common per-call rate, 3 variables representing the percentage of free calls for specific purposes, how long the call center had been in operation, average call duration, percentage of calls during weekday after-hours periods, and total calls during period—accounted for 94.2% of the variation in total annual deficit per call center. Pairwise correlations indicate that total annual call volume alone accounted for 57.4% of the variance ($r = 0.76, P < .001$) in total annual deficit of the TTA programs responding to the survey. Three other call center characteristics also exhibited significant correlations with total annual deficit: percentage of public calls on behalf of the hospital at no charge ($r = 0.67, P = .002$), percentage of calls for specific physicians at no charge ($r = 0.66, P = .002$), and how long the call center had been in operation ($r = 0.51, P = .02$). Twenty-four program managers (89%) reported that overall they were not satisfied with the total revenues.

Improving Financial Performances

When asked about ways to improve finances, most program managers gave multiple responses. Eighteen (67%) reported plans to expand the service (serving more physicians and new customers, such as employers and payers), 14 (52%) were planning to increase fees, and 11 (41%) were hoping to lower their costs and improve efficiency. One area contributing to costs that received particular attention was call duration. Seventeen managers (63%) reported that they were dissatisfied with call duration and identified improvement in call duration as an important way to decrease costs. Based on their experience and other TTA program standards, the managers felt that the optimal mean call time was 8.5 minutes (compared with the actual mean of 11.5 minutes). When asked about specific interventions to decrease call duration, 15 (55%) indicated that faster software and better training in the use of software would improve call efficiency. Nearly one fourth recommended improved computer skills among nurses to reduce call duration and 5 (18%) felt that shorter triage algorithms would result in decreased call duration.

Future Direction of Pediatric TTA Programs

Managers were asked about their plans for the financial management and future direction of their TTA programs in the next 2 to 5 years. Twelve (44%) identified the need to ensure that all users paid some fee for the services, but 10 (37%) indicated that they would likely continue to provide some services at no direct charge to the users. Regarding expansion of their program to include adult TTA or joining with other triage organizations to provide adult triage, 15 (56%) indicated that they would stay as a pediatric triage service only and 7 (26%) indicated that they would likely be offering adult triage services as well.

Perceived Value of TTA Programs

Despite the presence of operating deficits and dissatisfaction with revenue and call duration, TTA managers rated the programs highly in their marketing value to physicians and patients, assigning ratings of 2.85 and 2.56, respectively, using a 3-point Likert scale (not valuable, somewhat valuable, and very valuable) (Table 3). The managers also rated the TTA program highly as a means of increasing physician (2.92) and patient (2.80) satisfaction. The TTA managers also reported increased referrals to the hospital and associated programs, enhanced physician loyalty, and enhanced ability to attract and retain both physicians and patients to programs sponsored by the hospital as other perceived benefits of the program.

Table 3. Perceived Value of Pediatric Telephone Triage and Advice Among Children’s Hospital-Based Call Centers

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<th>Service Type</th>
<th>Mean Score</th>
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<tr>
<td>Increasing physician satisfaction</td>
<td>2.92</td>
</tr>
<tr>
<td>Marketing value to physicians</td>
<td>2.85</td>
</tr>
<tr>
<td>Increasing patient satisfaction</td>
<td>2.80</td>
</tr>
<tr>
<td>Marketing value to patients</td>
<td>2.56</td>
</tr>
<tr>
<td>Managing risk contracts</td>
<td>2.15</td>
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* Using a 3-point Likert scale: 1, no value; 2, somewhat valuable; and 3, very valuable.

COMMENT

More than 1 million pediatric telephone calls were managed by the 27 children's hospital–based TTA programs surveyed during the 1-year period for which data were reported. The expense and revenue data from these calls, along with information provided by program managers regarding their perception of the program, confirmed our hypotheses. Children's hospital–based TTA programs operate at substantial deficits. Despite these deficits, however, TTA programs continue to receive ongoing support, as they are perceived as highly valuable for marketing the children's hospital and increasing the level of physician and patient satisfaction.

Why do the programs perform so poorly financially? The significant deficits in the TTA programs we described reflect an imbalance between the expenses of
TTA and the revenues generated from these programs. There are few national benchmarks for the expenses associated with pediatric TTA at children’s hospital-based call centers. However, our data suggest that the expenses of TTA at the programs are too high. From the managers’ perspective, it seems that one important reason that expenses are high is because of long call duration. Call duration is an important measure of efficiency and influences costs through its effect on the most costly ongoing expense, nursing salaries. In contrast to calls handled by physicians (which are not algorithm-based, are inconsistently documented, and generally last 3 to 5 minutes9,14-16), call center encounters are usually algorithm-based and better documented, but generally last much longer. In this study, 18 managers (67%) felt that their call duration was too long. Although the clinical impact of shortening calls is unknown, the financial impact can be approximated. Decreasing call time by 10% (for example, an increase from 5 to 6 calls per hour per nurse) in a call center that manages 100 000 calls per year may result in annual savings of nearly $80 000 in nursing salaries alone. Other factors may affect the expenses of the TTA programs in this study. The relative lack of experience among programs may result in higher costs in other areas besides personnel efficiency. Our experience has shown that start-up programs have increased capital expenditures and training expenses.

In addition to high costs, the deficits encountered in these programs are exacerbated by inadequate program revenues, with a striking disparity reported between the expenses of TTA and the per-call fees. The fees charged by the TTA programs may be low for many reasons. Hospitals may view TTA programs as linkage strategies and may therefore justify providing TTA services at no charge or for a very low fee with sensitivity to the perceptions of their physician customers, who traditionally handled their own TTA and are unaccustomed or unwilling to pay for such a service. It is unclear whether such sensitivities are warranted. A recent survey of physicians in Albany, NY, showed that most favor compensation for telephone calls and suggested charging a mean of $9.18 per call.9 This suggested per-call fee is consistent with the actual expense per call among centers in this study and may indicate that the hospitals, with average fees of $3.45 per call, are undercharging for a service that is valued by physicians.

In certain communities, there may exist significant competitive forces leading hospitals to deliberately underprice TTA services. This practice may be in violation of the federal antitrust and health care fraud and abuse regulations that prohibit hospitals from offering certain types of financial incentives to physicians in exchange for patient referrals.17,18 Alternatively, underpricing services may be inadvertent. As noted above, most hospitals developing TTA services have done so with inadequate experience or cost benchmarks, which are necessary for accurate pricing.

We found that the sponsoring children’s hospitals perceived that the TTA programs represent a valuable mechanism for marketing and improving patient and physician satisfaction. Although we acknowledge that the program managers may not be unbiased with respect to this question, and although we did not objectively define value, this finding offers some valuable insight into the reasons why the children’s hospitals continue to support these programs. Some of the sponsoring hospitals are in very difficult and competitive health care markets, with limited strategic options or programs to link physicians to their hospitals and associated facilities. They may be under competitive pressures by adult specialists, other delivery systems, and other children’s hospitals all seeking to establish and maintain pediatric patient volumes in the face of decreased pediatric utilization. Many of these hospitals have not developed successful strategies to link physicians to them through contractual relationships or organizations, such as a physician hospital organization or management service organization. Others have developed such programs and are seeking services to add value and differentiation to their physician hospital organization or management service organization. In this context, programs such as TTA that may bring added benefits or value to physician practice are likely to be supported by hospital administrators despite high costs.

While the institutions responding to this survey represent a broad spectrum of children’s hospitals across the United States, our findings may not necessarily represent the experience of the more than 50 pediatric institutions providing TTA services. Telephone triage and advice programs using other software or those that are part of a larger health care system may have different operating and financial characteristics. Also, different methods of calculating expenses per call make interinstitutional comparisons difficult. Nonetheless, we believe that it is possible to speculate on the general long-term outlook for children’s hospital–based TTA programs. We believe it is likely that the financial performance of these programs will improve in the near future. Expenses of TTA should fall moderately as programs gain experience and develop strategies to shorten call duration. Revenue for TTA programs may also increase as physician acceptance and interest in TTA increases and more programs ensure that all users pay some fees for TTA.

As more information about office and after-hours TTA becomes available to practicing pediatricians, continued growth in the popularity and acceptance of TTA services can be anticipated.20 However, this may present challenges to children’s hospitals sponsoring these programs, as our data suggest that the greater the demand and call volumes, the higher the program deficit. What then can a children’s hospital, faced with greater demand for TTA and the risk of high deficits, do to improve the performance of these programs? One important step may be to expand their customer base beyond physician groups to include other users, such as employers, health plans, management service organizations, and other types of managed care organizations. Reimbursement strategies other than per-call rates should be expanded to include population-based pricing, such as capitation. Partnerships with TTA pro-
grams that serve adult patients may facilitate these goals. Development of strategies to differentiate children’s hospital–based programs from their national competitors should be sought. These may include pediatric disease–specific TTA and other pediatric disease management services that use computerized call center technology; for example, asthma management by telephone protocol or telephone management of recently discharged newborns.

Our data suggest that, in the increasingly competitive health care environment, the future of children’s hospital–based TTA programs remains uncertain, in part because of the financial risk these programs entail. Much remains unknown about the true value of pediatric TTA, and as children’s hospital–based TTA programs evolve, they should be prepared to leverage their specific expertise in pediatric services and research. Clinical outcomes of TTA should be better defined; documentation of improved outcomes through use of TTA will encourage the children’s hospitals to stay in this business. Research is also needed to understand the impact of TTA programs on patient and physician loyalty and health care utilization patterns. The results of these and other studies will be invaluable in defining the future role of pediatric TTA programs at children’s hospitals across the United States.

Accepted for publication December 18, 1998.

Funding for this study was provided in part by a grant from National Health Enhancement Systems Inc, Phoenix, Ariz (Dr Melzer).


We thank Virginia Sharp, Sharp Research, Seattle, Wash, who provided valuable assistance in data analysis, and Alex Dunne for assistance in the preparation of this article.

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REFERENCES