Models to promote medical health care delivery for indigent families:
   Computerized tracking to case management.


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Models to Promote Medical Health Care Delivery for Indigent Families: Computerized Tracking to Case Management

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ABSTRACT. Poor patient/parental medical compliance is one of the most important health care issues of today. Multiple interrelated factors contribute to this problem. Of prime importance is patient/parental maturity and knowledge. Reversal of this process is undoubtedly harder than prevention. The cost effectiveness of various methods of intervention is discussed in relation to a large mid-south indigent population. Computerized patient tracking is cost efficient and effectively promotes compliance in a percentage of patients. Its additional utility is the identification and triage of patients, most in need of intervention, to existing social service personnel for family centered case management. Family-centered case management holds the best hope of reversing the many factors adversely affecting patient compliance. However, this method is costly and requires a low ratio of clients to caseworkers in order to be effective. Community
centered patient management is less costly to implement and is very useful in tightly woven communities resistant to outside intervention. However, this method often has a high client to caseworker ratio and has less utility in dealing with complex medical problems.

**INTRODUCTION**

This communication will discuss the utilization and cost effectiveness of various methods used to promote family acceptance and access to medical care. Major problems in health care delivery still exist in the United States. These problems include:

1. Child abuse and neglect increased 55% from 1981 to 1985.1
2. Of 3.8 million births, 40,000 children die before age 1 yr.1,10
3. Twenty-five percent of all children1,10 and 38%,10 of black children are born to pregnant women who receive late or no prenatal care.
4. Less than 60% of non-white and 80% of white children have complete basic immunizations by age 2 yrs.10
5. From 1960 to 1984 the suicide rate for age groups 15 to 19 has doubled.1
6. 1.1 million teenagers become pregnant per year4 with 472,000 births10 (12.7% of all births and 17.3% of the low birth weight babies10).

Most of the above problems involve the delivery of relatively simple medical care confounded by complex socio-economic factors. For example, the low rate of childhood immunizations and lack of prenatal maternal care are problems which are adversely reflected by the high patient/parental failure rate for medical appointments. Most healthcare facilities in the mid-south region surrounding Memphis, Tenn. have a 35% to 45% patient appointment failure rate.12 Sackett and Snow19 have found that patients fail to attend 50% of appointments that are scheduled by healthcare professionals. Parental appointment compliance for preventive pediatric medical care may be higher.19 However, there is a significantly poorer appointment attendance rate in families having a lower socio-economic status.11 A multivariate analysis (stepwise regression technique) of patients attending an otologic clinic in Memphis, Tenn.
found that parental age, parental education level, patient's age and family ownership of a car (for rural families) were the primary independent factors predictive of appointment attendance. Patient's sex, family size, income, form of payment, ownership of a phone, ownership of a home and parental marital status were not independently related to attendance. Patient's race was a borderline factor. It is apparent that parental knowledge and maturity are very important factors, underscoring the importance of family-centered management. Trying to reverse these factors in a young single parent who has dropped out of high school and lives close to or below the federal poverty level is extremely difficult. It is almost as though these families are suffering from a "Terminal Social-Economic Disease." The chances of bringing a family out of the bounds of poverty is less than that of curing a child of leukemia. Prevention is certainly worth a pound of cure.

Only providing the availability of the medical care is insufficient in pediatric healthcare delivery systems. The child has no choice in the obtainment of healthcare and society as a whole has an obligation to make sure the child obtains needed care. This responsibility often falls on the primary care physician or healthcare worker. Unfortunately, many of the major pediatric healthcare problems involve indigent populations and public healthcare systems are understaffed and underfinanced to fully meet this challenge. For example: the Shelby County Health Department services the metropolitan Memphis, Tenn. area. This health department had approximately 70,000 pediatric healthcare appointments over a one-year period. The appointment failure rate was 40% and there was only one half-time social service personnel directly assigned to the clinics. The Department of Human Services will often lend assistance in refractory cases, but it is also overwhelmed by the increase in child abuse and neglect cases, another major child healthcare problem.

There is a plethora of interventions designed to promote patient compliance-see Table 1. These interventions include patient education, case management, behavioral techniques and appointment reminders. None of these mechanisms are mutually exclusive and their use in various clinical settings will depend upon their cost effectiveness. The following is an in-depth discussion of a comput-
TABLE 1. Mechanisms to Promote Patient Appointment Compliance

Subject Factors: Age, Income, Psychiatric Diagnosis, Acuteness of Appointment.

Primary Intervention Aimed At Patients Keeping Appointments:

Make Appointments More Available (Case Management/Social Service).\textsuperscript{15}

Cost, Transportation Problems, Sitting Services.

Education

Orientation Statement (at healthcare visit) Using: Pamphlets, video tape and conferences.

Home Visits.

Appointment Prompters Using: Postcards, letters and phone calls.

Shortened time to appointment.\textsuperscript{2}

Financial Incentives or Penalties Linked to Clinic Attendance Rates.\textsuperscript{7,17,22}

Secondary Intervention Aimed At Recovering Patients That Have Missed Appointments:

Rescheduling Appointments By: Phone calls, postcards and letters.

Home Visits.

Notification of Referring Doctors.

erized patient tracking system and how it can complement family centered case management and community-centered family management.

**METHODS**

The clinical setting for program implementation was the region of Western Tennessee, Northern Mississippi and Eastern Arkansas. This region has 1.5 million inhabitants, with 25% of individuals living below the federal poverty level.\textsuperscript{6} Seventy-four percent of the patients in our Memphis, Tennessee clinic were black, with 30% of parents not graduating from high school, 63% single, and 18% less than 21 yrs of age. Seventy-six percent of families lived below the federal poverty level.
Computerized patient tracking was performed with an integrated medical appointment and billing program to maximize clinic operations. The program is not designed to replace case management, family planning, or social service intervention but to supplement it. The current system, the Delta Patient Management/Billing System, will perform medical data storage, appointment scheduling, epidemiology, patient tracking, and medical billing functions. [The program is shareware (free of charge to federal government projects and institutions; and to nonprofit indigent care clinics) which can be downloaded from the Delta Medical Shareware, Inc. forum on MacNet (Connect, Inc., Cupertino, Calif.).] The software operates with a user-friendly interface (see Figure 1), has a maximum file size of 2.5 gigabytes and has multi-tasking and multi-user capabilities with up to 64 terminals. It requires an Apple Macintosh computer, Omnis 3+ database and a hard-disk drive.

Clinic operation using the system involves the following:

1. Every Friday, reminder postcards are sent to patients for the following week's clinics.
2. Every Friday, patients that have failed their appointments are scheduled for another appointment two weeks later.
3. The first of every month, referrers and health department coordinators are sent medical and attendance information on their patients.
4. Before every clinic, patient attendance ratios are calculated and the records of patients with poor compliance are reviewed for possible intervention.

During the early testing of the system, all patients that failed their appointments were rescheduled using a letter, because of the high cost and poor results, the protocol was switched and post-cards were used. Attendance of all rescheduled patients was recorded for a four-week period after the failed appointment. Patients that attended any time during this period, not necessarily during their rescheduled appointment, were counted as "Attended," other patients were counted as "Failed." The results of both postcard and letter contacts will be compared using chi-square analysis.
As you know patient demographic data has to be entered before a billing record can be recorded. The primary and secondary insurers will be recorded in the patient's billing records. Both the family size & income must be present for evaluation by the sliding fee scale.

Enter/Edit Patient Demographic Records (New Numbers must be Unique):

- Enter New Record
- Edit Old Record

To Look up the Patient Number click on these screen buttons:
- Last Name-Exact Match
- Last Name-Beginning with
- Birth Date-Exact Match

* Figure 1. User Interface of the Patient Management System
RESULTS

The use of letters to recall patients that have failed their appointments was found to be less effective than postcards, along with being more expensive (requiring both greater postage and personnel time). Only 23% of patients (19% of new and 25% of return) attended an appointment within four weeks after their missed visit. This can be compared to the overall return rate of 41% using postcard prompters—See Table 2. Letter reminders were significantly less effective than postcards at the $p < 0.01$ level. A complete analysis of the postcard rescheduling results is described in Kavanagh et al.\textsuperscript{12}

DISCUSSION

In order to effectively promote patient medical compliance, family and parental factors must be addressed. The underlying reasons for non-compliance are often related to patient/parental age, education and poverty. Social service interventions hold the promise of lifting a family out of poverty through coordinated assistance and guidance. However, no technique will consistently be effective on the most recalcitrant patients, i.e., teenage parents who have undergone years of educational deprivation and social isolation while stagnating in inner city housing projects. These extreme cases are very refractory and prevention is the key. There are, however, many families that can be helped with proper intervention. There

<table>
<thead>
<tr>
<th></th>
<th>Postcards</th>
<th>Letters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attended</td>
<td>70</td>
<td>14</td>
</tr>
<tr>
<td>Failed</td>
<td>100</td>
<td>48</td>
</tr>
<tr>
<td>Attended 41.2%</td>
<td>41.2%</td>
<td>22.6%</td>
</tr>
</tbody>
</table>

$p < 0.01$
are three basic mechanisms which can be used to promote medical compliance. They are patient tracking, family-centered case management and community-centered family management.

**Computerized Patient Tracking**

Automation of patient tracking by a microcomputer can serve to lift some of the burden placed on case managers/social service workers, and at the same time automatically perform rudimentary interventions designed to augment patient compliance. For example: the Delta Patient Management/Billing System has the following capabilities:

1. Generation of postcards to remind patients of their appointments.
2. Notification to referrers of patients that fail their appointments.
3. Automatic rescheduling of patients that fail their appointments.
4. Calculation of an appointment attendance ratio to identify patients that have a chronic history of nonattendance. Referral for further intervention can then take place.

Postcard reminders have been shown in multiple studies (see Table 3) to augment total clinic appointment attendance by 10 to 25%. Postcards are just as effective as telephone reminders (see Table 3) and cost much less to implement.

The rescheduling of failed appointments by postcards can increase the total clinic attendance percentage by 20% to 30% (compared to controls). The use of letters was found to be more expensive and not as effective.

All of these tasks are accomplished in a cost efficient manner using an integrated patient management/billing system. The Delta System costs approximately $3000.00 for hardware and software (Omnis 3 + ), not including the salary of one employee. The cost of recapturing one patient (above controls) who had failed his/her medical appointment by rescheduling with postcards was approximately $2.50. The cost of using letters for this purpose was nearly twice as much, and had a lower impact on patient attendance.
TABLE 3. Effectiveness of Postcard and Phone Call Appointment Reminders in Augmenting Clinic Attendance

**Postcard Prompters:**

<table>
<thead>
<tr>
<th>Increase in Total Clinic Attendance Compared to Controls</th>
<th>Patient Population</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>16% p &lt; 0.001</td>
<td>Low Income Pediatric</td>
<td>Nazarian, et al. 16, 1974</td>
</tr>
<tr>
<td>13%* p &lt; 0.002</td>
<td>Pediatric Eye and Ear Clinic</td>
<td>Shepard, et al. 20, 1976</td>
</tr>
<tr>
<td>11% p &lt; 0.01</td>
<td>Low Income Pediatric</td>
<td>Meller, et al. 14, 1976</td>
</tr>
<tr>
<td>25%* p &lt; 0.003</td>
<td>Median Income Adult</td>
<td>Thompson, et al. 21, 1986</td>
</tr>
</tbody>
</table>

* Recalculated data from Tables in the Paper.

**Telephone Prompters:**

<table>
<thead>
<tr>
<th>Increase in Total Clinic Attendance Compared to Controls</th>
<th>Patient Population</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS</td>
<td>Inner city, Black, Pediatric</td>
<td>Cromer, et al. 5, 1987</td>
</tr>
<tr>
<td>NS</td>
<td>Inner city, Hispanic, Psychiatric</td>
<td>Burgoyne, et al. 3, 1983</td>
</tr>
<tr>
<td>19% p &lt; 0.001</td>
<td>Pediatric, Eye &amp; ENT Clinic</td>
<td>Shepard, et al. 20, 1976</td>
</tr>
<tr>
<td>10% p &lt; 0.05</td>
<td>Private Practice</td>
<td>Grover, et al. 9, 1983</td>
</tr>
<tr>
<td>12%* p &lt; 0.0001</td>
<td>Young Adult, Psychiatric Clinic</td>
<td>Turner, et al. 22, 1976</td>
</tr>
</tbody>
</table>

* Recalculated data from Tables in the Paper.

Even though this system significantly improves attendance in a cost-efficient manner, the majority of patients are unaffected and still do not attend their medical appointments. Family factors must be addressed in order to have any lasting impact on medical delivery. Other interventions are needed to support the family, bringing them out of the bounds of poverty and allowing them to compete successfully in the free marketplace. 

*Family-centered case management (FCCM)* utilizing social workers has shown great promise, however, it is costly to implement on a large scale. Case management is the provision of family
support and coordination of medical and social services.\textsuperscript{15} (Note: Many states define case management as the determination of family eligibility for services. This latter service is provided by office based staff with little community or family contact. This definition of case management is not the one used in this report.)

FCCM is a personnel-intense service. Each staff member will have a case-load averaging 30 to 50 families per year. Managers in charge of medically complex families, such as ventilator-dependent children, may have a case-load of only 10 families per year. The cost can be formidable, and prevent implementation on a wide scale. For example: In a years time, the Shelby County Health Dept. (Memphis, Tennessee) had 28,000 failed pediatric appointments. If we assume these appointments are from 3000 families and that the average caseworker can manage 50 families per year (this allows for 25\% administration time, 25\% travel time and 50\% case management time for a total of 1000 hours per year or 20 hours per family) sixty caseworkers and at least three administrators will be needed. The cost using paraprofessionals at $15,000 salary-plus-fringes will be $900,000. Adding another $100,000 for administration and secretarial salaries rounds off the budget to $1,000,000. This does not include travel expenses, or the physical plant to house these people. The costs are formidable and the effect on patient attendance has not been well documented. Because of the high cost of implementation, FCCM has found its greatest implementation in the handling of complex medical and social-economic problems which involve relatively few families.

Community-centered patient management (CCPM) trains members of the community to provide case management and encourage families to obtain needed medical evaluations. This method is not only more cost effective but may also lead to a greater acceptance of the medical care by families living in the community. CCPM is most useful in dealing with simple medical problems (i.e., to promote immunizations or prenatal care) in healthcare delivery systems that have scant personnel resources, or those systems servicing tightly woven communities having resistance to outside intervention (i.e., Indian reservations or inner city ghettos). In general, this method has a very high client-to-caseworker ratio and is not as proficient as FCCM at handling complex individual problems, such as those found with multiple-handicapped children. However, it can
produce widespread lasting change involving basic health habits of the community. CCPM is similar to parent-to-parent models employed by many service organizations. The major difference is that CCPM targets a large community and tries to promote basic healthcare needs, as parent-to-parent organizations usually target a specific subpopulation, usually having a similar complex healthcare need. There are also many other possible models combining the various features of FCCM and CCPM; utilizing social workers, paraprofessionals, community members, or parents as the caseworker.

"Social Service Triage" is a process which is widely practiced but seldom talked about. Because of high-operating costs, direct intervention by trained social workers will probably never be available for all families that could benefit from it. Patients must be referred based upon need. Computerized patient tracking can calculate patient attendance ratios that are very helpful in identifying families in need of intervention.

Educational techniques are also important but will not in themselves solve the compliance problem. Glogow7 (1970) found that the amount of patient education did not affect the attendance rate on return appointments. She concluded that it is not the content of the information that is important, but the perception that the health delivery staff cares about the patient. Interestingly, additional assistance with transportation, babysitting and ways to obtain permission to leave work did not increase appointment attendance. Researchers have even reported that telephone or postcard prompting were more effective than educational sessions in augmenting patient appointment compliance.18

Ethical and Legal Issues

A basic tenet in our culture is that society as a whole and not the parent is ultimately responsible for the welfare of a child. Failure of a parent to obtain needed medical treatment can be a form of neglect and treatment can be given to a child even if it violates the parent's religious beliefs. Thus, in pediatric healthcare delivery, society has an obligation to promote medical compliance and to intervene if the care is not obtained. Even in adult populations, the physician may be held legally accountable for patients who suffer
adverse effects from their failure to attend appointments. Courts have held physicians at a higher-level of accountability than patients and reason that patients may not have understood the significance of his/her condition.17

Many ethical issues exist in the promotion of medical compliance. The first is patient confidentiality. Efforts to contact the patient or his/her family may violate this trust. Postcards are often used to remind patients/parents of medical appointments. However, their use in sickle-cell or AIDS clinics may be inappropriate unless the information on the card can be expressed in such a way that the parent/patient and no one else knows the purpose of the visit. The storage and analysis of patient information (and the use of computers in such storage and analyses) has always created concerns. This is presently done on a national basis in European countries and on a state and regional level by many third-party, private and governmental insurance agencies in the United States. The use of computerized patient tracking is the increase in accountability that the system provides. Accountability of both the patient regarding his medical compliance and the ability of the healthcare provider to detect and provide assistance to patients suffering from medical neglect.

The most sobering ethical question is whether we are willing to spend the money to research and implement the technologies that will promote patient medical compliance. Another problem is that promoting medical compliance in indigent healthcare facilities may actually lower the income profile of the patient population and decrease the facilities’ economic viability.12 Finally, if the vast amount of failed appointments are attended and increased case identification is effectively promoted, are we willing to provide the resources to supplement the already overcrowded public healthcare system to accommodate these patients?

REFERENCES

3. Burgoyne RW, Acosta FX, Yamamoto J. Telephone prompting to in


