The Cost-Benefit from the Perspective of the Hospital of a Proactive Psychiatric Consultation Service on Inpatient General Medicine Services

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Abstract

Objective: Co-occurring mental illness and substance abuse disorders, highly prevalent in general medical inpatients, are associated with longer Lengths of Stay (LOS) and higher costs. We examined the increased financial costs and benefits associated with a proactive multidisciplinary intervention, the Behavioral Intervention Team (BIT), relative to the fiscal benefit.

Methods: Costs and benefits associated with a Conventional Consultation Liaison (CCL) model and the BIT on three general inpatients units of a tertiary care hospital in a before-and-after design.

Results: Inpatients seen by the BIT had reduced LOS, resulting in lower per-case costs and incremental revenue from new cases. Total financial benefit when offset by additional BIT personnel costs resulted in a return of investment of 1.7:1.

Conclusion: Compared to the reactive CCL model, the proactive BIT resulted in significant financial benefit. Further study is needed to examine the impact of BIT model on quality of patient care and staff satisfaction.

Keywords: Hospital economics; Proactive consultation; Length of Stay (LOS); Multidisciplinary team; Cost benefit

Introduction

As the United States health care system transforms under the Affordable Care Act (ACA) and other initiatives, new ways of providing care must be created to provide the best care possible in a cost effective manner. The triple aims of the ACA explicitly demand a cost effective approach to the provision of services.

In prior publications we have reviewed the literature [1] and demonstrated, through our initial proof of concept study [2] and an implementation trial [3], the effectiveness of a proactively organized consultation intervention for inpatient medical care.

In the implementation publication we described an 11-month trial of the Behavioral Intervention Team (BIT) comprised of psychiatric, social work, and nurse practitioner efforts [3]. In this before-and-after study, we compared usual consultation with a team of mental health professionals who screened all admissions to three general medical units (total census of 92 patients) and proactively engaged those who had a history or presented signs and symptoms of substance abuse and/or mental illness upon admission. We consulted formally on 9.9% of all patients and for an unrecorded, substantial number, advised their team of the intervention. Lyons et al. found that earlier consultations during the hospitalization were associated with shorter LOS [5]. Probably the most carefully conducted random control study did not show a positive cost benefit [6]. In contrast to Kishi et al. [6] and Leveson et al. [7] found the CL patients had a longer LOS of 1.1 days compared to the control group.

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**Goals**

The study goal of this report is to assess the effect on the costs and benefits of the BIT intervention.

**Cost effectiveness**

**General considerations:** Cost-effectiveness studies typically take the perspective of one party in the relationships among several potential parties: patient, treater/provider, insurer/payer, and/or society [8]. The goals of these four perspectives are not always congruent; hence there is the opportunity for conflict of values and outcomes. In this study we take the perspective of the hospital as provider. If the perspective is that of the provider, then the benefit consideration (setting aside general humane considerations) is the revenue and cost savings of the intervention for the providers compared to its full cost to the provider. If the perspective is the cost to society, then the cost is more complex and must take into consideration the quality of life for the patient, the cost to the patient, insurers, providers and the benefit is not merely the efficiency and unencumbered revenue, but the entire experience (i.e., cost to the patient and quality adjusted life years compared to the control condition). We take the perspective of the hospital provider in order to explore more clearly and practically the operational advantages of the BIT and guide institutional decision makers as to whether this is an intervention that they would seek to adopt and develop in their own settings.

**Methods**

**Intervention**

The Yale Behavioral Intervention Team (BIT) is a multi-disciplinary (nursing, social work and psychiatry) consultation service located at and supported by Yale-New Haven Hospital (YNHH) and collaboratively managed by the Department of Psychiatry consultation liaison services. The aim of this program is to provide the highest quality care possible as quickly as possible. This goal is achieved by changing the paradigm of psychiatric consultation liaison services from “reactive” to “proactive.” This change recognizes and treats behavioral health problems among hospitalized medical patients as soon as possible, before their problems cascade into greater ones and provides support to medical personnel effectively and efficiently. In addition to the care of individual patients, the BIT educates staff and assists them with the care of the patient while in the hospital and with a discharge disposition that includes additional psychiatric and behavioral care if needed after medical hospitalization.

The BIT functions by screening all patients upon admission to the general medical services of the Yale New Haven Hospital (York Street Campus) and providing prompt (by hospital day 2) formal consultation for patients whose screening reveals a need for on-going treatment or management of psychiatric illness. In performing this task, BIT members actively look for patients who are distressed and/ or manifesting behaviors, however subtle, that may come to interfere with their physical care. The team seeks to identify active mental illness and substance abuse disorders at their earliest possible time during the hospitalization. In focusing on early recognition, the BIT seeks to: 1) Provide interventions that will mitigate the effects of their patients’ mental or substance abuse disorders on their physical healthcare; 2) Educate and support the various professional disciplines caring for patients; and 3) Assist non-psychiatric staff in the management of flow and disposition for patients who require downstream behavioral health care. The program screens all admissions to the medical services to determine who might benefit from a formal consultation and, with the permission of the medical team, carries out this consultation. Concurrent with the evaluation, the team members educate their corresponding professional medical team colleagues (MD to MD, nurse to nurse, and social worker to social worker), focusing first on immediate patient needs and later on the roles of the family and the referral process for on-going care. In addition, for patients who are not formally consulted but for whom a psychiatric or substance abuse issue may exist, there is extensive advice given about approaches to the care of the patient and possible post hospitalization referral options, the so-called “curb-siding” noted above.

This change in paradigm was instituted in order to address the perception that our hospital’s standard “reactive” psychiatric consultation liaison model was not as effective as all the stakeholders wanted and needed. Consultations done under the standard Conventional Consultation Liaison (CCL) model were not timely, as they were often requested late in the patient’s hospitalization, nor were they maximally effective, because the behavioral health problems had already had their negative effects on the care experience. Late consultations had virtually no chance of being of any substantive use. Furthermore, there were frequent inappropriate requests for consultations to address trivial problems, while major problems were ignored or delayed in being addressed. Consequently, the opportunity for therapeutic effectiveness of psychiatric intervention was needlessly delayed or completely absent.

Additionally, there were a growing number of patients admitted to medical services with active mental illness or substance abuse disorders that were perplexing to the medical staff and who complicated the staff’s ability to treat and refer these patients effectively. On some services, over 50% of patients suffered co-morbid substance abuse and/or mental health problems. We noted that some patients created a degree of havoc and discomfort among medical and nursing staff that interfered with staff effectiveness and compromised staff ability to engage their patients with the full resources of the services.

In addition to clinical care and education, the BIT provided rapid assistance in risk assessment for patients threatening self-harm (suicidal) and helped facilitate timely and appropriate discharge dispositions. These educational and managerial processes had a direct effect on the use of constant companions (i.e., sitters), and on denied days (i.e., unpaid stays on medical inpatient services once medical care is completed and the patient is awaiting suitable disposition for psychiatric care). Managing these functions of flow and discharge disposition improved patient care and increased economic benefit by reducing avoidable stays on internal medical services.

**Design**

As reported elsewhere the assessment design is a before (reactive conventional consultation liaison consultations (CCL)) and after (implementation of the BIT) design, over the same calendar eleven-month period in two contiguous years on the same three general internal medicine units. Metrics are designated as annualized for ease of reporting and comparison when appropriate. There were three separate and distinct nursing units serving 92 beds involved in this study. The results on LOS are reported in Sledge et al. [3] and for convenience the LOS results from that study are given here in Table 1 [3]. Of note, as described, we did not include patients in our main comparison whose LOS was greater than 30 days, as our intervention was designed for patients with acute and evolving problems and who would be discharged within a month. In this analysis BIT patients are compared to CCL patients on the same three units, for the same days of the consecutive years in question, namely August through June.
The estimated cost-per-case reduction for BIT cases as compared to CCL cases was calculated in the following manner: initially, since the BIT was implemented in period 3, the year following the CCL period 2, BIT actual direct cost per case was reduced by 3% to account for inflation (This is based on the 3.3% healthcare CPI in BIT period 3). The estimated cost-per-case reduction for BIT cases as compared to CCL cases was calculated in the following manner: initially, since the BIT was implemented in period 3, the year following the CCL period 2, BIT actual direct cost per case was reduced by 3% to account for inflation (This is based on the 3.3% healthcare CPI in BIT period 3). The estimated cost-per-case reduction for BIT cases as compared to CCL cases was calculated in the following manner: initially, since the BIT was implemented in period 3, the year following the CCL period 2, BIT actual direct cost per case was reduced by 3% to account for inflation (This is based on the 3.3% healthcare CPI in BIT period 3). The estimated cost-per-case reduction for BIT cases as compared to CCL cases was calculated in the following manner: initially, since the BIT was implemented in period 3, the year following the CCL period 2, BIT actual direct cost per case was reduced by 3% to account for inflation (This is based on the 3.3% healthcare CPI in BIT period 3). The estimated cost-per-case reduction for BIT cases as compared to CCL cases was calculated in the following manner: initially, since the BIT was implemented in period 3, the year following the CCL period 2, BIT actual direct cost per case was reduced by 3% to account for inflation (This is based on the 3.3% healthcare CPI in BIT period 3). The estimated cost-per-case reduction for BIT cases as compared to CCL cases was calculated in the following manner: initially, since the BIT was implemented in period 3, the year following the CCL period 2, BIT actual direct cost per case was reduced by 3% to account for inflation (This is based on the 3.3% healthcare CPI in BIT period 3). The estimated cost-per-case reduction for BIT cases as compared to CCL cases was calculated in the following manner: initially, since the BIT was implemented in period 3, the year following the CCL period 2, BIT actual direct cost per case was reduced by 3% to account for inflation (This is based on the 3.3% healthcare CPI in BIT period 3).
following two adjustments could be made to model outcomes associated with alternative assumptions. First, if the institution did not anticipate 100% backfill, the incremental revenue calculation could be adjusted down by reducing the estimated new cases proportionally to the level of backfill expected (Table 4). Additionally, the average net revenue per case could be adjusted to reflect differences in payor mix experienced by different institutions. Our institution serves a population with a high proportion of uninsured/underinsured, including 27% Medicaid on the units served by BIT. An institution with a different payor mix may anticipate a higher (or lower) average net revenue per case, which would raise or lower the estimated total incremental revenue derived from the calculation (Table 5).

For our institution, the benefits associated with the BIT, totaling $306,916, were off-set by the incremental BIT salary costs: one full-time nurse; one full-time social worker; and one half-time psychiatrist, totaling $306,230 (these costs include fringe and indirect expenses associated with the salaries). When expenses were subtracted from benefit, the BIT program still showed an estimated annual benefit (contribution to the margin) of $52,686 for the 11-month study period, annualized to $572,385, estimated yearly benefit (Table 6) for a return on investment of 1.7:1. There was a projected contribution to the margin at all percent occupancy rates above 50%.

Discussion

This financial analysis is an approximation of the costs and benefits but we believe that it is an accurate enough assessment to use to determine if this intervention is economically feasible in other settings. Several features must be considered in terms of its generalizability. This analysis does not include income from revenue of professional fees and the total indirect expense is not fully allocated. We did not include professional fees for two reasons, the most important of which was that an accurate assessment of them was not available due to the failure to bill properly.

The costs reported did not include the direct and indirect expenses of the non-clinical hospital staff needed to support the program (supervisors, administrators, etc.). We reasoned that there would be no significant difference between the two types of programs in these expenses. Our accounting did not include start-up costs of planning or other indirect cost such as office space and computers. These costs vary widely from institution to institution and are minimal for our settings.

### Table 4: Incremental revenue based on bed demand: alternate estimates of incremental net revenue.

<table>
<thead>
<tr>
<th>Revenue</th>
<th>Backfill %</th>
<th>New cases</th>
<th>Annualized</th>
</tr>
</thead>
<tbody>
<tr>
<td>$723,889</td>
<td>100%</td>
<td>57.08</td>
<td>$789,697</td>
</tr>
<tr>
<td>$651,500</td>
<td>90%</td>
<td>51.37</td>
<td>$710,727</td>
</tr>
<tr>
<td>$579,111</td>
<td>80%</td>
<td>45.66</td>
<td>$631,757</td>
</tr>
<tr>
<td>$506,722</td>
<td>70%</td>
<td>39.96</td>
<td>$552,787</td>
</tr>
<tr>
<td>$434,333</td>
<td>60%</td>
<td>34.25</td>
<td>$473,818</td>
</tr>
<tr>
<td>$361,944</td>
<td>50%</td>
<td>28.54</td>
<td>$394,848</td>
</tr>
</tbody>
</table>

### Alternate estimates of incremental net revenue

<table>
<thead>
<tr>
<th>Change to net revenue per case</th>
<th>Net revenue per case</th>
<th>Estimated Financial Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>110%</td>
<td>$13,950</td>
<td>$723,889</td>
</tr>
<tr>
<td>105%</td>
<td>$13,316</td>
<td>$789,697</td>
</tr>
<tr>
<td>100%</td>
<td>$12,882</td>
<td>$750,212</td>
</tr>
<tr>
<td>95%</td>
<td>$12,048</td>
<td>$675,191</td>
</tr>
<tr>
<td>90%</td>
<td>$11,414</td>
<td>$573,912</td>
</tr>
</tbody>
</table>

### Table 5: Incremental revenue based on alternate estimates of average net revenue per case.

<table>
<thead>
<tr>
<th>Estimated Financial Benefit</th>
<th>11 months</th>
<th>12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incremental Net Revenue from Backfill (filled at 100%)</td>
<td>$723,889</td>
<td>$789,697</td>
</tr>
<tr>
<td>Overall Reduction in cost/case for BIT cases including Reduction in use of sitters</td>
<td>$107,027</td>
<td>$116,757</td>
</tr>
<tr>
<td>Subtotal, Estimated Financial Benefit</td>
<td>$830,916</td>
<td>$906,454</td>
</tr>
<tr>
<td>Estimated Additional Expenses</td>
<td>$306,230</td>
<td>$334,069</td>
</tr>
<tr>
<td>Estimated Benefit minus Expenses</td>
<td>$524,686</td>
<td>$572,384</td>
</tr>
</tbody>
</table>

### Sources/Notes

Authors’ analysis of data from Yale New Haven Hospital’s cost accounting software Allscripts™. Clinical data were collected from a hospital-based and maintained, clinical management system that was carefully monitored and tested against other data sources. Data from this clinical management system (including LOS, diagnoses, and possible confounding variables) were extracted from the electronic medical record and uploaded into a relational database and spreadsheet.

Table 6: Summary of net financial return on BIT.

We caution that the estimated benefit probably should be considered as a contribution to the margin.

Also not monetized, (in part because they have not been thoroughly measured) are staff and patient satisfaction and health outcome improvements that we believe are represented in the LOS reduction. We also note that a variety of other benefits may be present, such as improvement in patient care and satisfaction, improvement in the quality of all the staffs’ experience and subsequent willingness to care for mentally ill patients, and the reduction of staff distress in dealing with patients for whom they are not fully trained and prepared.

Other benefits were measured but not reported which included the value of rapid transfer and admission of patients from non-exempt (from prospective pay reimbursement of Medicare payers) to exempt (our inpatient psychiatric services) settings; thereby filling a bed on the exempt unit faster than we would have done without the transfer. Furthermore, results will vary according to the dimensions of opportunity, i.e., the proportion of people with mental illness and the bed occupancy in the face of increased capacity (without capital expenses except those of the enhanced program). Typically, the more mentally ill patients cared for on medical services concurrently with their medical problems, the more efficient and economically viable the total program will be. Also the size and flexibility of the associated psychiatric service should be considered. Some hospitals have opted not to sponsor or staff inpatient psychiatric services, relying on downstream referrals to partners or other institutions non-aligned. The presence of a proactive psychiatric service embedded in a medical hospitalist service would be an ideal solution for managing the inevitable presence of mental illness in these scenarios.
But the most important advantage is improved patient care and increased staff satisfaction and comfort, improvements we have noticed anecdotally in abundance but have not measured systematically.

Conclusion

Proactive, multi-disciplinary psychiatric consultation has been demonstrated in our system to be effective, well received by patients and staff and, in all instances, not only cost effective but revenue enhancing, particularly in prospective, case rate systems of reimbursement. However, more work on the effect of this intervention on patient outcomes as well as staff and patient acceptance and satisfaction needs to be completed to understand the full impact of a proactive approach.

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References