

The Economic Cost of Using Restraint and the Value Added by Restraint Reduction or Elimination

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Objective: The purpose of this study was to calculate the economic cost of using restraint on one adolescent inpatient service and to examine the effect of an initiative to reduce or eliminate the use of restraint after it was implemented. **Methods:** A detailed process-task analysis of mechanical, physical, and medication-based restraint was conducted in accordance with state and federal restraint requirements. Facility restraint data were collected, verified, and analyzed. A model was developed to determine the cost and duration of an average episode for each type of restraint. Staff time allocated to restraint activities and medication costs were computed. Calculation of the cost of restraint was restricted to staff and medication costs. Aggregate costs of restraint use and staff-related costs for one full year before the restraint reduction initiative (FY 2000) and one full year after the initiative (FY 2003) were calculated. Outcome, discharge, and recidivism data were analyzed. **Results:** A comparison of the FY 2000 data with the FY 2003 data showed that the adolescent inpatient service's aggregate use of restraint decreased from 3,991 episodes to 373 episodes (91 percent), which was associated with a reduction in the cost of restraint from \$1,446,740 to \$117,036 (a 92 percent reduction). In addition, sick time, staff turnover and replacement costs, workers' compensation, injuries to adolescents and staff, and recidivism decreased. Adolescent Global Assessment of Functioning scores at discharge significantly improved. **Conclusions:** Implementation of a restraint reduction initiative was associated with a reduction in the use of restraint, staff time devoted to restraint, and staff-related costs. This shift appears to have contributed to better outcomes for adolescents, fewer injuries to adolescents and staff, and lower staff turnover. The initiative may have enhanced adolescent treatment and work conditions for staff. (*Psychiatric Services* 56:1109–1114, 2005)

National interest in reducing or eliminating the use of seclusion and restraint was ignited by the *Hartford Courant's* 1998 Pulitzer Prize-winning series on deaths associated with restraint (1) and was fueled by several important efforts, including the Children's Health Act of 2000, the Substance Abuse and Mental Health Services Administration's (SAMHSA's) *National Call to Action: Eliminating The Use of Seclusion and Restraint*, the National Association of State Mental Health Program Directors' (NASMHPD's) National Executive Training Institutes and curriculum to reduce seclusion and restraint, and successful state seclusion and restraint reduction initiatives (2–6).

Massachusetts has an established history of stringent statutory and regulatory requirements that govern the use of seclusion and restraint in psychiatric facilities. In 1985, the state's Department of Mental Health (DMH) issued regulations limiting the use of seclusion and restraint among children. An impact analysis at one facility concluded that the new requirements had been successful in reducing rates of restraint (7).

In 2001, DMH used its statutory role again to change seclusion and restraint practices in psychiatric facilities that serve children and adolescents by developing a statewide initiative to reduce or eliminate the use of seclusion and restraint among children and adolescents (6). This effort was undertaken because rates of seclusion and restraint in child and adolescent psychiatric facilities were

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five to six times higher than in adult facilities.

The initiative began in fiscal year (FY) 2001 and was fully implemented in FY 2002. It included strategic planning, training, and technical assistance from DMH; quarterly grand rounds; annual provider forums; monthly facility-specific consultation; data monitoring and comparative reports; and continuous review and planning. No new fiscal resources were provided.

When statewide child and adolescent seclusion and restraint data for FY 2000 and FY 2003 were compared, a decrease in the number of episodes of seclusion and restraint (68 percent, from 8,599 to 2,712) and in the number of hours of seclusion and restraint (79 percent, from 14,085 to 2,924) was demonstrated. Reduction was evident, but questions resulted: Were treatment outcomes or inpatient services affected? What did seclusion and restraint cost? What did reducing seclusion and restraint save? What else changed?

No research on the explicit costs associated with the use of seclusion and restraint in psychiatric inpatient settings was found in the literature. Phillips and colleagues (8) considered cost implications of reducing the use of physical restraint in 276 nursing homes in seven states. After examining the major component of nursing home cost—staff time—and how time was allocated with residents who were restrained and those who were not, these authors concluded that “residents free of restraints are less costly to care for than restrained residents.” Fraser and associates (9) considered the cost of patient-initiated elimination of restraint in intensive care settings and noted that the use of restraint represented a “significant consumption of health care resources.”

The issue of cost in psychiatric inpatient settings has been researched by others. However, the focus has been on the impact of violence, such as the cost of patient assault (10), the cost of staff injuries from inpatient violence (11,12), and the cost of implementing total quality management to reduce violence (13). Although violence and resulting patient and staff injuries often involved the use of

seclusion and restraint (11,12,14), none of the analyses included the cost of using seclusion and restraint or the economic impact if seclusion and restraint were reduced or eliminated.

However, the literature articulated the more recent determination that the use of seclusion and restraint was not therapeutic and reflected a failure in the treatment process (15,16). This pronouncement was particularly meaningful when measured against the federal statute that defined the purpose of psychiatric inpatient service as providing physician-directed diagnostic services and active individualized treatment that must be reasonably expected to improve the per-



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son's condition (17). The use of seclusion and restraint conflicted with the statute, the goals of psychiatric inpatient service, and the advancement of standards of care. Moreover, children and adolescents with trauma histories who experienced seclusion and restraint perceived the hospital as a source of new trauma, not treatment (18–21). Hippocrates' dictum to physicians—“to help, or at least to do no harm” (22)—underscored the contradictory nature of the use of seclusion and restraint in contemporary psychiatric practice.

We developed a model to analyze the cost of restraint, to answer the question, What else did the initiative achieve besides reducing restraint episodes and hours? Our purpose was to retrospectively calculate the cost of restraint and the impact of the initiative on one inpatient facility by comparing the use of restraint and restraint-related costs for one full year before the initiative was implemented (FY 2000) with those one full year after (FY 2003).

A 30-bed, co-ed, adolescent continuing care inpatient service for youths aged 13 to 18 years was selected for the study. The service is located at Westborough State Hospital in Westborough, Massachusetts. The service is the only privatized long-term inpatient resource for adolescents who require extended postacute inpatient care to stabilize treatment-refractory behavior. All adolescents have experienced previous hospitalizations, and their diagnostic profiles are complex. The most frequently occurring admitting diagnoses are posttraumatic stress disorder, bipolar disorder, conduct disorder, major depression, and psychotic disorders.

Before admission, adolescents are assessed by trained child and adolescent psychiatrists. Admission is recommended only if clinical criteria established for this service are satisfied. The admission criteria have not changed since the service was created in 1985.

Of 81 patients served in FY 2000, 49 (60 percent) were Caucasian, 11 (14 percent) were African American, and six (7 percent) were Hispanic. In FY 2003, of 75 patients, 50 (67 percent) were Caucasian, ten (13 percent) were Hispanic, and nine (12 percent) were African American. A portion of the population was not racially identified in FY 2000 and FY 2003. No patient-identifying information was reviewed or used. The data were collected from July 2003 to February 2005, and prior consent was obtained from DMH's institutional review board.

Methods

To analyze the cost of restraint, the principles of time-motion analysis were applied (23,24). Time-motion

analysis pioneers Frederick Taylor and Frank Gilbreth endorsed studying an activity process and analyzing each task in the process to improve outcomes. Thus we conducted a process-task analysis for physical, mechanical, medication-based, and medication-combination restraint. Seclusion was not used at the service and therefore was not included in the analysis.

Process-task analysis

A process-task analysis was conducted by examining statutory and regulatory restraint requirements of DMH, accreditation standards of the Joint Commission on Accreditation of Healthcare Organizations, and certification requirements of the Centers for Medicare and Medicaid Services (25–27,17). This analysis produced a template in which each task of the restraint process was identified.

Next, several meetings were held with service staff. Using the template, staff further delineated restraint tasks, the staff disciplines involved, and the number of staff and time required to perform each task (Table 1). A detailed sequence of restraint activities resulted.

The refined restraint process-task analysis indicated three discrete phases: prerestraint (initial crisis management); restraint application, monitoring, and release; and postrestraint activities, as shown in Table 2. The number of tasks, staff, and time remained consistent across restraint types in the first and third phases but not in the second phase. This variation affected the cost of each type of restraint.

Cost estimation

To fully evaluate the cost of restraint and the impact of reducing restraint, a range of costs were considered. Determining which costs to include in the cost calculation for a restraint episode proved difficult. Costs explicitly incurred during restraint were clear (staff time and medication). Costs resulting from restraint activity—that is, injuries, lost staff time, and turnover—were calculated but were not factored into the cost calculation for each type of episode.

Prerestraint episode costs, such as

Table 1

Total staff hours by discipline per episode of restraint in an adolescent inpatient service, by type of restraint

Type of staff	Medication	Physical	Mechanical	Mechanical or physical with medication
Mental health counselor	4.57	4.73	4.98	5.98
Nursing	3.33	3.25	3.33	3.83
Psychiatrist	.33	.75	.75	.75
Social worker	1.17	1.17	1.17	1.17
Psychologist	.5	.5	.5	.5
Program director	.5	.5	.5	.5
Secretary	.42	.42	.42	.42
Human rights officer	.25	.25	.25	.25
Total	11.07	11.57	11.9	13.4

escalation monitoring and deescalation interventions, were considered, but we were unable to quantify them because of variations in staff techniques and the inability to define standardized procedures. Staff stated that an important part of their work is good milieu management—anticipating and intervening early to prevent circumstances from escalating to crisis proportions. This approach was used by staff “all the time” as part of their job rather than being a discrete task. Similarly, postrestraint episode costs, such as milieu instability, contagion, damage to the treatment

process, and the traumatic effect of being restrained, could not be adequately measured and were not included (28).

To generate conservative cost estimates for the use of restraint, the following criteria were used: the minimum number of staff needed per task, the minimum amount of staff time needed per task, and the low end of the staff salary range per discipline. The medication-based and medication-combination restraint calculations were based on these criteria and included a fixed medication cost estimate according to FY 2003

Table 2

Costs of an average-duration episode of restraint for various phases of restraint in an adolescent inpatient service, by type of restraint intervention

Type of staff	Medication	Physical	Mechanical	Mechanical or physical with medication
Phase 1 (prerestraint)				
Number of tasks	8	8	8	8
Number of staff disciplines	4	4	4	4
Staff time (hours)	1.65	1.65	1.65	1.65
Cost	\$39.35	\$39.35	\$39.35	\$39.35
Phase 2 (restraint application, monitoring, and release)				
Number of tasks	8	7	7	11
Number of staff disciplines	3	3	3	3
Staff time (hours)	3.58	4.08	4.42	5.92
Medication cost	12.33	—	—	12.33
Cost	\$96.20	\$110.94	\$118.12	\$163.41
Phase 3 (postrestraint activities)				
Number of tasks	10	10	10	10
Number of staff disciplines	8	8	8	8
Staff time (hours)	5.83	5.83	5.83	5.83
Cost	\$151.74	\$151.74	\$151.74	\$151.74
Total staff time	11.07	11.57	11.90	13.40
Total cost per episode	\$287.30	\$302.03	\$309.21	\$354.51

Table 3

Mean duration of restraint episodes in an adolescent continuing care inpatient service, by type of restraint

Type of restraint	Fiscal year 2000		Fiscal year 2003	
	Mean	SD	Mean	SD
Medication only	—	—	—	—
Physical	0	—	.25	.08
Mechanical	2.01	.375	.87	.277
Mechanical or physical with medication	2.01	.375	.85	.272

costs of the service's most frequently prescribed medication-based restraints: haloperidol (5 mg/mL, \$4.69 per vial), lorazepam (2 mg/mL, \$1.14 per vial), and benztropine (2 mg/mL, \$6.50 per vial).

Data collection

Restraint data were reported to DMH each month by the inpatient service and by Westborough State Hospital. These reports were submitted on standard DMH forms with instructions on the restraint data, initiation and termination times, staff signatures, and other staff documentation to be reported and then cross-referenced to verify the service's data.

The inpatient service and the hospital provided restraint data (episodes and hours) for each type of restraint for one full year preinitiative (FY 2000) and one full year postinitiative (FY 2003). There were 3,991 episodes, or 8,040 hours, in FY 2000 and 373 episodes, or 327 hours, in FY 2003. Restraint episodes varied by type and duration, which determined the number of tasks, staff, and staff time. The service's average episode duration for each restraint type for FY 2000 and FY 2003 was calculated

and applied in phase 2 (Table 3). The exception was medication-based restraint, for which no duration factor was applied.

The inpatient service also provided staff, salary, and staff-related data. The service was state-contracted and level-funded from FY 2000 to FY 2003. Consequently, salary costs and ranges remained constant. There was no change in staffing pattern, environment of care, benefits, or other staff-related factors that could have contributed to a change in the work or environmental conditions.

Cost calculations were performed for restraint, medication, staff, and staff-related costs in FY 2000 and FY 2003. Restraint and nonrestraint time also was calculated. Using this approach, we examined the staff time allocated to restraint as a subset of the total staff time available in FY 2000 and FY 2003 (Table 4).

In addition, Global Assessment of Functioning (GAF) scores assigned at admission and discharge for each adolescent by the treating psychiatrists for the pre- and poststudy periods were obtained from the service and the hospital. The data were compared by using unpaired two-tailed *t*

tests of statistical significance.

Data from the DMH performance-based contracting (PBC) system were also used. Since FY 2002, the inpatient service has analyzed and reported semiannually on performance indicators, including adolescent participation, family and collateral involvement, outcomes, postdischarge follow-up, and recidivism.

Results

Restraint cost

Restraint costs varied by type and phase (Table 2). The amount of time required for one average episode of any type of restraint was considerable, particularly in the third phase. Costs were driven by the number of tasks and staff, staff time, and the average episode duration. A compilation of these restraint costs yielded an aggregate restraint cost. A comparison of aggregate restraint costs in FY 2000 and FY 2003 indicated a reduction in cost from \$1,446,740 to \$117,036 (a 92 percent reduction) because of the decrease in episodes from 3,991 to 373 (a 91 percent reduction).

Impact on adolescents

The admission and discharge GAF scores for FY 2000 and FY 2003 were analyzed and compared. A significantly more impaired population was admitted in FY 2003 than in FY 2000 (29.64 ± 11.54 and 34.25 ± 10.66 , respectively; $t=2.05$, $df=96$, $p<.05$). Despite the increased functional impairment of FY 2003 admissions, discharge GAF scores from pre- to postinitiative nevertheless increased significantly (57.79 ± 13.39 compared with 52.70 ± 11.59 ; $t=2.08$, $df=102$, $p<.05$).

Aggregate data from the PBC system supported this finding. More adolescents were discharged with higher GAF scores in FY 2003 (90 percent, or 46 of 51 discharges) than in FY 2002 (77 percent, or 27 of 35 discharges).

The PBC data also revealed decreased recidivism. At six months postdischarge, 32 percent fewer adolescents were rehospitalized in FY 2003 (two of 25 adolescents) than in FY 2002 (three of 12 adolescents). Similarly, at 12 months postdischarge,

Table 4

Staff time spent in restraint and nonrestraint activities in an adolescent continuing care inpatient service

Variable	Fiscal year 2000		Fiscal year 2003	
	N	%	N	%
Total staff hours available	105,984		105,984	
Staff hours spent in restraint activities	24,690	23	4,285	4
Staff hours spent in nonrestraint activities	81,294	77	101,699	96

14 percent fewer adolescents were rehospitalized in FY 2003 (five of 35 adolescents) than in FY 2002 (three of 18 adolescents).

Other positive adolescent outcomes were suggested when FY 2000 and FY 2003 data were compared. Aggregate injury data indicated a 60 percent reduction in restraint-related injuries (from 15 to six injuries). No major injuries were reported. In addition, the average number of restraints for the cohort of adolescents who were restrained the most decreased 91 percent (from 83 to seven episodes). The average length of stay for this group also decreased by 58 percent (from 556 to 229 days).

Impact on staff

The initiative was associated with a shift in staff focus. The reduction in the use of restraint decreased the amount of time that staff devoted to restraint activities. In FY 2000, staff spent 23 percent of their work time (24,690 hours) engaged in restraint-related tasks. In FY 2003, staff spent four percent of their time in such activities (4,285 hours). The initiative was associated with a 19 percent redirection of staff time (20,405 hours) into nonrestraint activities (Table 4). Increased staff availability may have contributed to greater adolescent participation in programming (a 15 percent increase, from 58 to 67 adolescents), family and collateral participation in treatment planning (10 percent, from 61 to 67 adolescents), and postdischarge follow-up (45 percent, from 29 to 42 adolescents).

The change in focus may have also contributed to positive staffing outcomes. A comparison of FY 2000 and FY 2003 data indicated that staff turnover decreased by 80 percent (from 45 to nine staff changes). The use of sick time decreased by 53 percent (from 4,825 to 2,289 days). Injuries to staff decreased modestly by seven percent (from 29 to 27 injuries). However, the severity of staff injuries lessened, resulting in a 98 percent reduction in the number of workdays missed because of restraint-related injury (from 226 to five days). The use of replacement staff decreased by 78 percent (from 83 to 18 shifts). The cost to fill shifts vacated

because restraint-related injury decreased by 77 percent (from \$13,007 to \$2,916). Less demand for replacement staff reduced the need to advertise vacant positions, resulting in lower advertising costs (65 percent, from \$9,800 to \$3,400).

A comparison of FY 2000 and FY 2003 data indicated a reduction in workers' compensation costs. The number of workers' compensation claims decreased by 29 percent (from 31 to 22 claims). However, the amount of compensation paid decreased by 98 percent (from \$29,355 to \$597), and the amount of medical costs paid decreased by 98 percent (from \$6,798 to \$157).

Decreased staff-related costs were not attributable to staff reduction or change in staffing pattern. Preventing the use of restraint required staff to be in the milieu, anticipate crises, and be available to adolescents before a problem erupted. To operate a more proactive program, staff resources became more effective but were not reduced.

Impact on the facility

The preinitiative cost of restraint was considerable (\$1,446,740) because of the high use of restraint. The cost was staggering when measured against the service's annual budget (\$3,998,741), representing a substantial amount of staff time engaged in nontherapeutic activities, which is contrary to the purpose of care.

No new fiscal resources were provided to Massachusetts child and adolescent facilities through the initiative. However, the inpatient service modified existing resources to support the effort. For example, staff training was refocused to emphasize building relationships, understanding each adolescent's needs, precrisis intervention planning, and deescalation skill development. Alternative interventions were created by using existing program resources. The role of occupational therapy was expanded. Sensory modulation and integration as well as pet therapy interventions were integrated into crisis prevention plans and activities for adolescents to practice and use as needed. The service also changed its debriefing practice and added administrative debriefing after each restraint. Although

additional staff supervision was not used, the focus shifted to a prevention orientation and how to intervene at the earliest signs of distress.

One area of possible increased cost was physical plant repair. The explicit repair cost was not quantifiable and was managed within the operating budget. However, the number of incidents of property destruction increased by 13 percent (from 86 incidents in FY 2000 to 97 incidents in FY 2003), and the number of episodes of purposeful property destruction by adolescents increased by 17 percent (from 30 to 35 episodes) during this period. As staff developed greater skill in using alternatives to restraint, they also developed tolerance for minor environmental damage. Rather than restraining adolescents, staff later enlisted their help with repairing and making restitution to the inpatient community.

Discussion and conclusions

Several limitations to this study restrict interpretation and application of the findings. The nonrandomized, nonexperimental, pre-post study design raises the possibility that the results were affected by confounding or extraneous variables or secular trends. Generalizability of the study's findings to other settings is limited by the small sample, the estimated time per restraint activity, and the limited staffing and outcome data.

The lack of comparative data was another limitation. Early efforts to select an adolescent-serving acute care hospital to compare with the inpatient service in this study suggested that little comparable information of this type was routinely or uniformly collected or available at other facilities.

Questions remain that further challenge the interpretation of this effort—for example, are statistically significant findings clinically significant? Adolescents' postinitiative discharge functional assessment (GAF) scores were significantly higher and suggested true clinical improvement. However, the most important arbiter of clinical significance is the perspective of the adolescents. Unfortunately, their voice was not a part of the study, which is a limitation of this effort and

of all service-related research that attempts to interpret or evaluate meaning absent the essential perspective of those we serve.

The intent of the initiative was to reduce or eliminate the use of restraint. In addition to reduction in restraint, other positive changes resulted that could not be attributed to alteration of environmental, fiscal, or administrative practices. The number of injuries to adolescents and staff was reduced, and sick time, workers' compensation, and replacement costs decreased substantially. Recidivism also decreased, and adolescent functioning measured at discharge significantly improved.

We expected that the decrease in the number of restraints would drive the reduction in restraint costs. However, the improved adolescent outcomes, positive impact on staff, and decreased staff-related costs were not anticipated. Calculating the economics of the restraint process and sequelae of restraint reduction also illuminated the negative consequences of restraint: adverse treatment and staffing effects and redirected staff time. The value-added component of restraint reduction or elimination was the improvement in these dimensions and a return to the mission of inpatient care: treatment.

Seclusion and restraint are high-risk, violent interventions whose impact extends beyond the immediate task of attempting to manage a volatile situation. Additional study can occur only if leaders from federal agencies, state mental health authorities, and psychiatric facilities continue to work toward elimination of seclusion and restraint. National efforts implemented by SAMHSA Administrator Charles Curie and by NASMHPD's leadership, Robert Glover and Kevin Huckshorn, are critical to advancing this direction. Additional study is needed to assess the impact of reduction and elimination initiatives, particularly the long-term staffing and therapeutic effects,

the fiscal implications, and the relationship between redirected staff time and restraint reduction. ♦

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