

Correlation Between Reduction of Seclusion and Restraint and Assaults by Patients in Pennsylvania's State Hospitals

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Objective: This prospective study assessed the use of seclusion and restraint in the Pennsylvania state hospital system from 2001 through 2010. It also examined the correlation between declining use of containment procedures and assaults by patients on other patients and staff.

Methods: The 12,900 anonymized records involving the 1,801 unique, civilly committed individuals who were physically or mechanically restrained and secluded in the nine civil hospitals during this study period were entered into a database. The data set included demographic and diagnostic information about the patients and the cause and effect of the procedures. These data were compared with rates of patient-to-patient and patient-to-staff assaults to determine any correlation between changes in use of containment and assaults.

Results: From 2001 to 2010, the use of mechanical restraint significantly declined from .37 to .08 episodes per 1,000 days

($p < .018$), and the use of seclusion significantly declined from .21 to .01 episodes per 1,000 days ($p < .001$). Persons with an axis I diagnosis of psychotic disorder accounted for 44% of containment procedures used during this study. Patient-to-patient assaults declined slightly, and patient-to-staff assaults were unaffected.

Conclusions: Decreasing the use of containment procedures did not increase assaults. Better leadership, data transparency, use of clinical alerts, workforce development, policy changes, enhanced use of response teams, implementation of dialectical behavior therapy, and discontinuation of the psychiatric use of PRN orders contributed to the change in use of containment procedures. A philosophical change to a recovery model of psychiatric care and services was the driving force behind this transformation.

Psychiatric Services 2015; 66:303–309; doi: 10.1176/appi.ps.201400185

Since 2000, the reported use of containment procedures—seclusion and restraint—within state psychiatric hospitals in the United States has been declining (1). Over the past decade, efforts to limit the use of these procedures and identify best practices for their use have been documented (2). Among these efforts is the Pennsylvania State Hospital Seclusion and Restraint Reduction Program. The program cited the effectiveness of response teams, staff training, data transparency, treatment malls, leadership, and advocacy in helping the hospitals reduce the use of containment measures (3). In addition, the National Association of State Mental Health Program Directors (NASMHPD) issued *Six Core Strategies for Reducing Seclusion and Restraint Use* (4).

Recent studies and news reports suggest there is a relationship between reductions in seclusion and restraint and increases in patient-related violence (5–9). There has also been discussion in professional forums questioning the role of the clinician during restraint events (10,11). At the same time, more national attention has been given to patient-related assaults. During the past decade, several states have

passed laws criminalizing the assault of health care workers (12,13).

The objective of this prospective study was to assess the use of containment procedures in Pennsylvania state hospitals from 2001 to 2010 and its effect on patient-to-patient and patient-to-staff assaults.

METHODS

Study Setting

The Pennsylvania state hospital system, one of the oldest in the country, provides inpatient psychiatric treatment to individuals with severe and persistent mental illness admitted on civil, time-limited, involuntary commitments. Patients come from local psychiatric settings when it has been determined that they require extended psychiatric hospitalization. Throughout this study, the length of residence for half the people served was greater than two years (14).

The system's civil census declined significantly from January 1, 2001, to December 31, 2010—from 2,474 to 1,255

patients—a 49% decrease ($N=1,219$, $p<.001$). More than 8,500 people were admitted to the hospitals during this time span (14).

While the hospital system declined in size and scope, the typical hospital unit remained unchanged. On average, a hospital unit supported 30 patients and was staffed by two nurses and three to five psychiatric aides on both the first and second shifts. A psychiatrist served as the treatment team leader for each unit. The midnight shift was staffed with two to four workers. In addition, program services staff worked weekdays between 7 a.m. and 8 p.m.

A central office in Harrisburg provided oversight of the hospital system. Leadership from across the system provided input into hospital policies, particularly those affecting the use of restrictive procedures. The hospital workforce is unionized, and all hospitals were accredited by The Joint Commission throughout the study period.

Data Description and Analysis

The study included all 14,430 containment procedures used during 12,900 events with 1,801 unique, civilly committed patients, ages 18 and older, served at Allentown, Clark Summit, Danville, Harrisburg, Mayview, Norristown, Torrance, Warren, and Wernersville state hospitals between January 1, 2001, and December 31, 2010. Of the 12,900 events reported, 1,530 were complex, requiring the use of two or more procedure types. During this span, three hospitals closed: Harrisburg in January 2006, Mayview in December 2008, and Allentown in December 2010.

Containment procedures were classified as mechanical restraint, physical restraint, and seclusion. Other devices designed to temporarily incapacitate or restrain a person during a crisis through use of electrical current or chemical spray are not permitted for use in the hospital system. All data were anonymized and reviewed to assure uniform classification and coding. Data were structured by using the NASMHPD Research Institutes data dictionary (15). Physical restraint data were not available until 2002. Rates of use for each procedure type were established for comparative analysis and to control for differences in hospital census. The total monthly events for each procedure served as the numerator. The denominator was the number of days of care provided by each hospital for each month. This result was then multiplied by 1,000 to establish rates of use per 1,000 days.

Data were examined for cause of the procedure; effect of the procedure; and age, gender, racial and ethnic characteristics, hospital length of residence, and diagnosis of the patient. Length of residence was determined by comparing the date of the event and the patient's date of admission.

SPSS, version 22, statistical software was used to perform a linear regression analysis of each containment procedure over time. Statistical significance was indicated by a level of $p<.05$. A Pearson correlation coefficient analysis was used to assess the relationship between the decreasing use of restrictive procedures and assaults (16).

RESULTS

Containment Procedures

During the last 108 months of this study the total use of physical restraint, mechanical restraint, and seclusion declined significantly from 2.65 events per 1,000 days in 2002 to 1.62 events per 1,000 days in 2010 ($p<.01$) (Table 1).

Mechanical restraint. In 2001, there were .37 (mean \pm SD = $.35 \pm .23$) episodes of mechanical restraint per 1,000 days ($N=324$) throughout the hospital system. In 2010, use of mechanical restraint significantly declined to .08 (mean = $.07 \pm .10$) events per 1,000 days ($N=39$, $p<.018$). The duration of mechanical restraint events significantly decreased from .52 hours per 1,000 days ($N=448$) in 2001 to .07 hours per 1,000 days ($N=34$) in 2010 ($p<.015$).

Seclusion. In 2001, there were .21 (mean = $.25 \pm .37$) episodes of seclusion per 1,000 days ($N=185$). By 2010, the rate of seclusion events had declined significantly to .01 (mean = $.01 \pm .01$) events per 1,000 days ($N=3$, $p<.001$). Seclusion hours significantly decreased from .23 hours per 1,000 days in 2001 ($N=202$) to .01 hours per 1,000 days ($N=2.55$) in 2010 ($p<.006$).

Physical restraint. Physical restraint data were not available until 2002. There was a nonsignificant reduction in the use of physical restraint from January 2002 through December 2010. In 2003, there were 2.28 (mean = 2.44 ± 1.42) events per 1,000 days ($N=1,662$). In 2010, the system rate declined to 1.54 (mean = $1.43 \pm .61$) events per 1,000 days ($N=740$). During the last two years of the study, consistent with state policy changes limiting physical restraint to a maximum of ten minutes, the average length of physical restraint was .17 hours (ten minutes).

Primary Causes

To understand why containment procedures were used, each incident was assigned a primary cause at the time of the event.

During the study, 34% ($N=4,383$) of the events were attributed to aggression, defined as verbal threats of bodily harm. Physically assaulting staff, the second most common cause of restraint or seclusion, accounted for 28% ($N=3,640$) of events, and patient-to-patient assaults accounted for 10% ($N=1,279$) of events. Physical assaults of staff were more than twice as likely as patient-to-patient assaults to result in the use of a containment procedure.

Self-injurious behavior accounted for 17% ($N=2,211$) of all events, and suicide threat or attempt was the primary cause for 1% ($N=109$) of the events. The remaining events (10%, $N=1,278$) were attributed to elopement attempts, property destruction, and contraband possession.

Effects of Procedures

A physical examination of the patient following any use of a containment procedure was required. During the study period,

83% (N=10,692) of the events resulted in no injury. Abrasions, scratches, or hematomas occurred in 8% (N=1,031), and lacerations requiring sutures occurred in .2% (N=30). Fractures, the most serious of the injuries reported, occurred during ten physical-restraint events.

Differences in Patient Characteristics

Racial and ethnic differences. Differences in use of containment procedures by race-ethnicity were determined by comparing the race-ethnicity of patients who experienced containment procedures with the diversity of the community in which the hospital was located. No significant racial or ethnic differences were observed in the use of these procedures. Overall, whites accounted for 84% (N=10,857) and blacks accounted for 12% (N=1,587) of all procedures used. All other groups accounted for the remaining 4% (N=456).

Gender differences. Differences in the duration of restraint and seclusion of men and women were observed. On average, men were held in mechanical restraint nine minutes longer compared with women, and women were held in physical restraint five minutes longer compared with men. Men were secluded eight minutes longer compared with women.

When the gender of individual patients was assessed, gender differences reverted to the expected distribution for each hospital. Overall, of the 1,801 unique individuals involved in containment procedures, 58% (N=1,051) were men and 42% (N=750) were women.

Diagnostic differences. Throughout this study, persons with axis I diagnoses of schizophrenia and psychotic disorders accounted for 70% of those served in the hospital system (14). However, this group accounted for 44% (N=5,692) of the containment procedures used.

Persons diagnosed as having a mood disorder accounted for 13% of the people served by the system (14). However, 29% (N=3,795) of the containment procedures were used with this group. Persons with impulse control disorders accounted for 10% (N=1,323) of the events reported.

Persons with axis II diagnoses were also part of this cohort. Throughout the study, individuals with early onset disorders, all subgroups, accounted for 7% (N=120) of the hospital population (14). However, people with these diagnoses accounted for 12% (N=1,571) of the containment procedures used.

Age and length-of-residence differences. Persons between the ages of 18 and 21 accounted for 11% (N=1,413) of the events reported, and those under the age of 30 accounted for 41% (N=5,298).

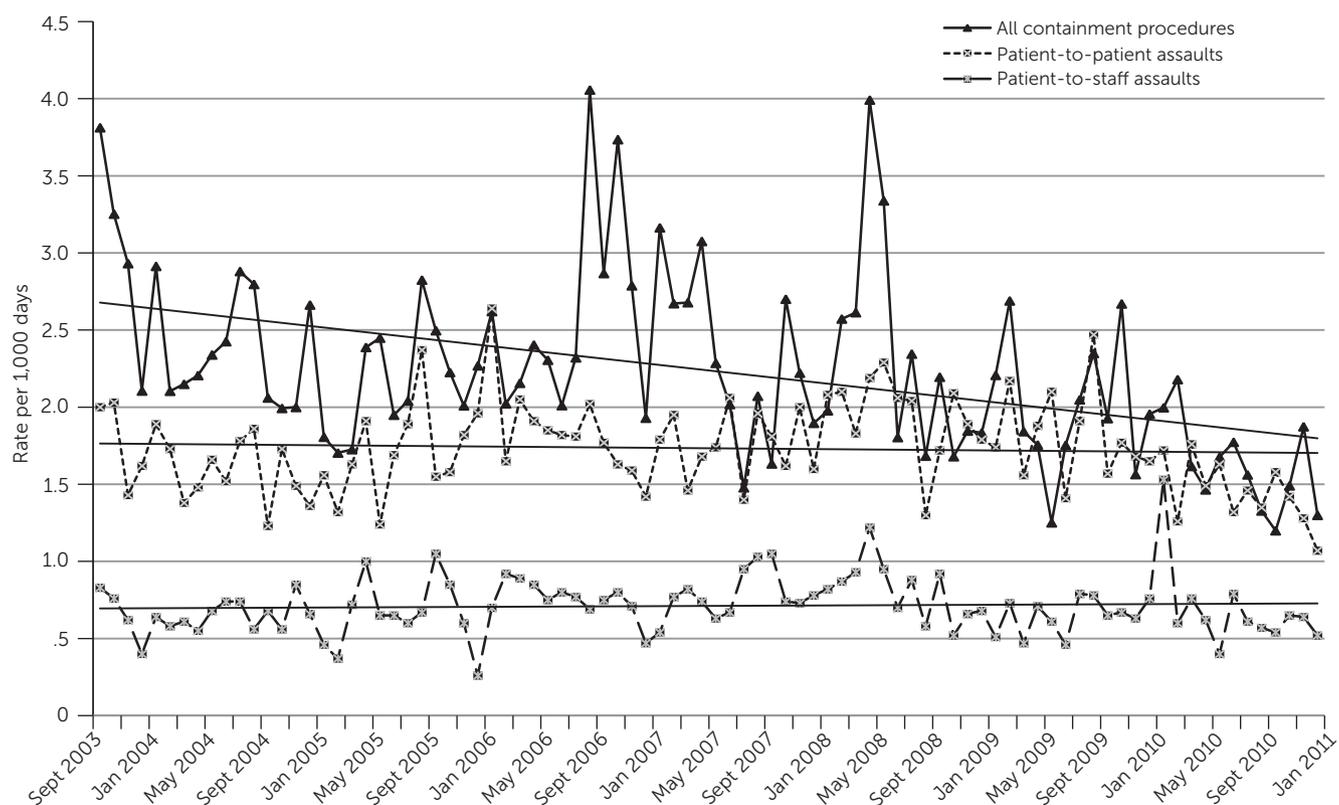
The results showed that 23% (N=3,023) of the events occurred within the first 90 days of admission and 50% (N=6,483) of events occurred within the first year of hospitalization.

TABLE 1. Use of seclusion, mechanical restraint, and physical restraint at state hospitals in Pennsylvania, 2001 to 2010^a

Year	Seclusion			Mechanical restraint			Physical restraint ^b			All containment procedures				
	Events	Hours		Events	Hours		Events	Hours		Events	Hours			
		Per 1,000 days	N		Per 1,000 days	N		Per 1,000 days	N		Per 1,000 days	N	Per 1,000 days	N
2001	185	.21	202.36	.23	324	.37	448.46	.52	N/A	N/A	509	.59	650.82	.75
2002	148	.19	196.76	.26	596	.78	747.48	.97	1,288	1.68	2,032	2.65	1,065.13	1.39
2003	54	.07	44.93	.06	783	1.08	1,036.61	1.43	1,662	2.28	2,499	3.44	1,239.62	1.70
2004	55	.08	60.58	.08	413	.57	526.58	.73	1,261	1.74	1,729	2.38	704.54	.97
2005	23	.03	28.03	.04	240	.34	252.87	.36	1,256	1.79	1,519	2.16	425.32	.60
2006	33	.05	24.12	.04	119	.19	119.29	.19	1,516	2.36	2,095	2.60	352.96	.55
2007	20	.03	13.59	.02	96	.16	97.27	.16	1,305	2.14	1,421	2.33	272.88	.45
2008	2	.00	2.00	.00	99	.18	105.30	.19	1,160	2.07	1,261	2.25	249.46	.45
2009	9	.02	9.18	.02	86	.17	83.98	.17	915	1.82	1,010	2.01	177.18	.35
2010	3	.01	2.55	.01	39	.08	34.14	.07	740	1.54	82.39	1.62	119.08	.25

^a All of the patients were adults who were civilly committed. Significant differences were found for use of seclusion (events per 1,000 days, $p < .001$; hours per 1,000 days, $p < .018$) and mechanical restraint (events per 1,000 days, $p < .006$; hours per 1,000 days, $p < .002$) between 2001 and 2010. Significant differences were found for use of all containment procedures (events per 1,000 days, $p < .01$; hours per 1,000 days, $p < .001$) between 2002 and 2010.

^b Physical restraint data were not reliably reported until January 2002.

FIGURE 1. Use of containment procedures and assaults resulting in injury per 1,000 days at state hospitals in Pennsylvania, 2003 to 2010

Assaults

Throughout the time span of this study, assaults were defined as any aggressive act by a patient toward another person involving physical contact that may or may not result in injury (17). Beginning in September 2003, data on assaults in the hospital system were reported on a monthly basis in the State Hospital Risk Management Summary Report (18). This information was used to determine the relationship, if any, between declining use of containment procedures and assaults.

Within this report were monthly rates of patient-to-patient assaults and patient-to-staff assaults resulting in injuries per 1,000 days. Over the 88 months for which data were available, there was no significant change in either assault category (Figure 1). Patient-to-patient assaults showed a slight decline, and patient-to-staff assaults were unchanged.

Correlation analyses showed a positive, weak association between the declining use of all containment procedures and patient-to-patient assaults ($r=.377$, $N=88$, $p<.001$) and patient-to-staff assaults ($r=.275$, $N=88$, $p<.01$) between September 2003 and December 2010 (Figures 2 and 3).

System Changes

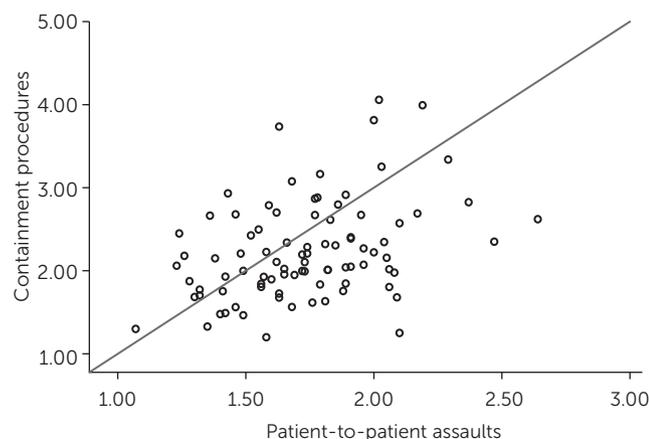
The *Six Core Strategies for Reducing Seclusion and Restraint Use* by the NASMHPD provided structure for many of the changes instituted by Pennsylvania state hospitals during the study period (4).

Leadership. During this ten-year period, hospital leadership intensified efforts to standardize risk management approaches and to develop strategies for improved patient care and treatment, including goals to reduce and eliminate the utilization of containment procedures. The leaders used hospital data and clinical alerts to monitor use of containment procedures and, if needed, reacted by updating treatment plans, adding staff training, and leading performance improvement projects. They also responded to any crisis by providing support and oversight.

Policy changes. Policies limiting the types of procedures that could be used and their duration contributed to the decline in use of restrictive procedures in the system. Between 2001 and 2010 state policy changed three times. Starting in 2001, state policy limited the use of seclusion or mechanical restraint to up to one hour and permitted extended use only for increments of one hour. At the time, this policy was one of the most restrictive in the country, falling below the two-hour limit adopted by the Centers for Medicare and Medicaid Services. This policy also required a face-to-face examination by a physician within 30 minutes of ordering the use of a procedure. At the same time, a policy was put in place to structure the debriefing process (19).

In 2005, state policy was revised to limit physical restraint to a maximum of ten minutes and prohibit the use of floor control restraint techniques, prone or supine. At the

FIGURE 2. Correlation between rates of patient-to-patient assaults resulting in injury and use of containment procedures per month at state hospitals in Pennsylvania, 2003 to 2010^a



^aRates are reported as events per 1,000 days for the 88 months between September 2003 and December 2010.

end of ten minutes staff were required to release the person and reengage only if the individual had not regained control. This release of the policy also limited a physician's order for the use of seclusion or mechanical restraint to 30 minutes and could only be reordered in 30-minute increments (20).

In 2009, the policy was updated to unify staff training for safe physical management techniques to a single vendor for all facilities (21).

Data transparency and clinical alerts. Data transparency and the use of clinical alerts by the hospital system contributed to the decline in the use of containment procedures by providing frequent, measurable performance data on patient and staff safety.

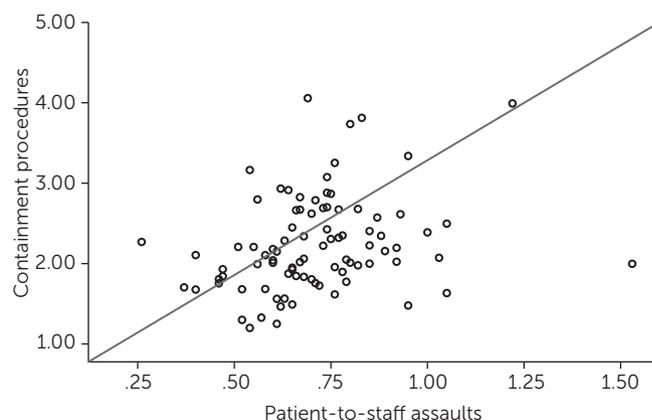
Throughout this study, data on the use of seclusion and restraint, along with 40 other measures, were shared monthly with the hospital system and worldwide with interested parties. These summary reports were issued via e-mail and the state Web site (18).

This transparency enabled monitoring of the system by interested groups. Also, according to Charles Curie, Pennsylvania's Deputy Secretary for Mental Health and Substance Abuse Services from 1995–2001, this effort provided direction to the hospitals regarding their use of these procedures (22).

E-mail messages containing clinical alerts were first introduced in 2005 to identify patients who received high amounts of unscheduled medication (23). By 2006, this process was expanded to include patients who were repeatedly restrained or who engaged in frequent assaults. The alerts were sent to the hospital leadership and to the teams associated with these events. The alerts cautioned the teams about the health and safety issues associated with use of containment procedures and requested that they meet to update treatment plans.

Response teams. Response teams contributed to the reduction in use of containment procedures by ensuring compliance

FIGURE 3. Correlation between rates of patient-to-staff assaults resulting in injury and use of containment procedures per month at state hospitals in Pennsylvania, 2003 to 2010^a



^aRates are reported as events per 1,000 days for the 88 months between September 2003 and December 2010.

with hospital policies, identifying conflicts that could lead to the use of seclusion or restraint, and providing a safe and therapeutic response to a crisis.

By 2001, all hospitals had strategies in place that provided a structured response to psychiatric crises and training in use of the procedures. This training—both the initial offering and an annual refresher—prepared all staff to be first responders to any patient crisis they may encounter. Response teams provided added support and direction at the scene of an emergency. However, standing down and waiting for the response team to arrive at the scene of a crisis was considered an unacceptable reaction.

Statewide, response team members were direct care staff, doctors, nurses, psychologists, program services staff, and social workers. They had regular duties to perform and were not compensated for their additional duties as members of the response team.

The Psychiatric Emergency Response Team (PERT) process at Allentown State Hospital (24,25) served as a model for the other hospitals. Its approach was highly structured, was data driven, and involved a cross-section of volunteer staff dedicated to a safe and therapeutic response to a crisis. Teams met frequently to address the needs of new patients and to practice their skills. This approach included a “PERT assist process” used by hospital staff in anticipation of a psychiatric or behavioral crisis, for example, a patient with a history of violence who may become upset after receiving unsettling news about his or her discharge.

Structured response teams, such as PERT, ensured fidelity to state policies and safe responses to psychiatric crises by placing the most experienced staff available at the scene of a crisis (3,24,25).

Workforce development. From 2001 through 2008, the hospital system used three separate training groups to train staff about positive therapeutic interactions. This training also focused on crisis response skills and team building.

In 2004, a statewide committee was formed to assess this staff training curriculum. The goal was to redesign this instruction to teach skills and techniques that ensure a safe and therapeutic response to a crisis. It was felt that training needed to be proactive and provide greater emphasis on positive approaches. In 2009, a single vendor was selected to provide this unified training to all hospitals. This change involved two days of initial training for all new employees, annual refresher training for experienced staff, and quarterly updates for all direct care staff on issues related to safe and therapeutic responses to a crisis.

Discontinuing use of PRN orders. The use of medication as a form of restraint is an issue in all psychiatric settings. In 2004, the state hospital system began a 15-month study of the use of 46,913 medication doses administered by PRN or STAT physician order (23). During March 2004, the first month of the study, 87.7 unscheduled medication doses were administered per 1,000 days in the civil hospitals. In May 2005, the last month of the study, the rate of unscheduled medication doses had decreased to 17 per 1,000 days ($p < .001$).

All use of containment procedures was monitored throughout this study. Hours of mechanical restraint during this time span declined from 79 to 15 per 1,000 days ($p < .003$). Incidents of patient-to-patient assault and aggression also decreased. On the basis of the results of this study, a decision was made to eliminate the use of PRN orders for psychiatric indications effective March 1, 2005 (26).

Dialectical behavior therapy (DBT). In 2003, DBT was introduced in the statewide hospital system as a treatment approach for persons diagnosed as having borderline personality disorders. At the time, data showed this group was at high risk of violence resulting in the use of a containment procedure or unscheduled medication. Select hospital staff was certified to provide individual and group therapy to persons with this diagnosis. The desired outcomes included reduction in self-injurious and suicidal behaviors, shorter lengths of stay, better anger control, and improved social functioning (27).

Other strategies. During this study, an array of other strategies to reduce the use of containment procedures was implemented statewide. They included but were not limited to “do-not-restrain lists” of persons with preexisting conditions, such as brittle bone disorder, or significant trauma histories; development of comfort rooms; and use of peer-to-peer specialists, psychiatric advance directives, and Wellness Recovery Action Plans.

DISCUSSION AND CONCLUSIONS

This study demonstrated that over the last decade the use of containment procedures in the Pennsylvania state hospitals significantly declined. It also showed that during the last 88 months of this study, this reduction had a positive effect on patient-to-patient assaults and, to a lesser degree, on patient-to-staff assaults.

The study also showed that during the first 90 days of their hospital stay, patients were at greater risk of committing assaultive behaviors requiring the use of restraint. Intensifying treatment for newer patients along with proactively treating the causes of aggression could further decrease the need for a containment procedure.

When the state hospitals first reported success in reducing use of containment procedures, there was concern that the reductions were accomplished, in part, by substituting medication (3). But when PRN orders for psychiatric indications were discontinued in 2005, the use of containment procedures decreased further and other patient safety measures improved (23,26). These improvements continued throughout the end of this study.

Changes in the types of patients treated in Pennsylvania's state hospitals have been suggested as a possible reason for the reduction in use of containment procedures. However, there is no evidence to support this claim. In fact, efforts to reduce use of restraint and seclusion at the state's forensic centers for patients with criminal commitments have been equally compelling. A separate study of this change is the subject of ongoing research.

Pennsylvania's commitment to a recovery approach has transformed its service delivery system to emphasize community services and supports. This commitment is the overall reason for the significant reduction in use of seclusion and restraint.

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The authors thank the direct care staff, nurses, doctors, and program services staff who work in the Pennsylvania state hospital system. Their leadership and support of the nonrestraint approach to psychiatric care and services are sincerely appreciated. The authors also acknowledge the work of the state hospital performance improvement staff for their many contributions to the data reported here and the assistance of Edward Bixler, Ph.D. They gratefully acknowledge the leadership and vision of Richard M. O'Dea, M.S., R.N., and George A. Kopchick, M.S.

The authors report no financial relationships with commercial interests.

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