Reducing Seclusion and Restraints in Adolescent Patients

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Abstract

Seclusion and restraint (SR) continue to be used in psychiatric settings when a patient is a harm to self or others despite growing concern and calls to eliminate the practice due to its harmful, potentially life-threatening effects on patients. The purpose of this evidence-based project was to assist a hospital in the southwestern United States decrease their seclusion and restraint rates among their adolescent patients. Trauma-informed care approaches have been shown to significantly reduce the incidence of SR in inpatient settings. The nurses and behavioral health technicians (BHTs) received a two-hour trauma-informed care training in November of 2019. SR rates three months pre-training and post-training were compared. In the three months prior to the training, SR rates averaged 23.4 events per 1000 patient days. Comparatively, the three months after the training SR rates averaged 19.5 events per 1000 patient days. This shows a clinically significant decrease in SR rates after the TIC training. This evidence-based project (EBP) highlights the need to address this problem and gives an intervention option that can reduce harm for patients and address the needs of healthcare organizations seeking to improve patient care.

Keywords: behavioral health, adolescents, seclusion, restraints, trauma informed care

Reducing Seclusion and Restraints in Adolescent Patients

The practice of secluding and restraining (SR) patients has been used for over three centuries. Despite the known risks, behavioral health facilities continue to employ this strategy as a means to ensure patient and staff safety. Government and credentialing agencies, as well as health care provider organizations have called for the reduction of SR. Hospitals are responding to these calls by finding interventions to reduce or eliminate its use in their facilities. An understanding of the scope of the problem and contributing factors must first be completed to find evidence-based solutions.

Problem Statement

Seclusion and restraints are used when a patient demonstrates they are an immediate danger to themselves or others. Seclusion is when a person is confined to a space they cannot leave (Center for Medicare and Medicaid Services [CMS], 2014). Restraints are either physical, mechanical or chemical means that restrict the voluntary movement of an individual (Masters, 2017). Although it may be argued that SR is necessary in some cases to prevent harm to patients and staff, the risks associated with this practice cannot be ignored. Seclusion and restraints have shown to traumatize patients causing symptoms similar to post-traumatic stress disorder (Timbo et al., 2016). Individuals who have already experienced trauma in their past are at risk for re-traumatization causing fear and the feeling of not being safe in their environment (Rakhmatullina, Taub, & Jacob, 2013; Timbo et al., 2016). There are also multiple physical risk factors associated with SR. Chun, Mace, and Katz (2016) noted that between 1993 and 2003, there were 45 deaths attributed to the use of restraints in child and adolescent psychiatry units. Risks of restraints include skin breakdown, rhabdomyolysis, accidental strangulation, brachial plexus injuries, electrolyte abnormalities, hyperthermia, deep vein thrombosis, pulmonary injury

and asphyxia (Chun et al., 2016). The serious risks associated with SR highlight the seriousness of the problem and the need for continued investigation.

Purpose and Rationale

Psychiatric institutions continue to use seclusion and restraints when treating patients despite its known dangers and national calls for elimination. Given its continued use, it is imperative to find effective interventions to decrease the practice of secluding and restraining patients. The purpose of this Doctoral of Nursing Practice (DNP) project was to implement a trauma-informed care intervention in an adolescent inpatient psychiatric setting to assess its effect on seclusion and restraint rates.

Background and Significance

Reducing the incidence of SR in the mental health population has been an objective of various organizations who have released position statements advocating for the reduction and elimination of the practice. The American Nurses Association (ANA) (2018) notes SR contradicts nurse's ethical commitment to patients, violates a patient's rights and dignity, and puts patients at risk for harm. The American Psychiatric Nurses Association (APNA) (2014) endorses the reduction of SR and supports research to find evidence-based practices to prevent and better manage behavioral emergencies. National organizations are calling for the complete elimination of SR (National Association of State Mental Health Program Directors [NASMHPD], 2019; National Center for Trauma-Informed Care and Alternatives to Seclusion and Restraint [NCTIC], 2018). Credentialing and governmental agencies have assigned quality measures to track the use of restraints in adolescent patients and have been using that information as a measure to qualify for accreditation (CMS, 2014; Joint Commission, 2013).

To understand why SR is used in psychiatric settings, studies have been done to learn the risk factors and common characteristics of patients who experience a SR event. A Massachusetts hospital did chart reviews and found that over a 17-year period there was an increase in trauma related admissions among youth (Meagher, Rajan, Wyshak, & Goldstein, 2013). Younger age, extended hospitalization, a history of physical or sexual abuse and multiple psychiatric co-morbidities place patients at higher risk for SR (Pogge, Papparlardo, Buccolo, & Harvey, 2013; Timbo et al., 2016). Certain staff characteristics have shown to contribute to SR use, including skill and experience level of staff, whether injury occurred, and the perception of a lack of safety measures in place by the employing organization (Jacob et al., 2016). Nursing staff who felt personally verbally attacked were more likely to endorse SR though they did not necessarily follow through with implementation (Jalil, Huber, Sixsmith, & Dickens, 2017).

Patients have reported that the staff and facility environment both have a significant impact on the perception of the SR experience. The experience is less traumatizing if the individual feels they were respected and treated humanely (Aguilera-Serrano, Guzman-Parra, Garcia-Sanchez, Moreno-Küstner, & Mayoral-Cleries, 2018). In a survey of mental health staff, respondents agreed that the SR process can cause harm, violates human rights and activates trauma. The majority agreed that SR had the benefit of ensuring patient and staff safety, and setting boundaries (Kinner et al., 2017).

To achieve the reduction of SR, NASMHPD (2019) emphasizes the importance of well-trained staff and quality patient programs at behavioral health facilities, while NCTIC (2018) endorses the implementation of trauma-informed care initiatives. Training staff in trauma-informed care strategies and conflict de-escalation can improve the staff/patient relationship which decreases the SR occurrence (Jacob et al., 2016; Timbo et al., 2016). The six core

strategies (6CS) for reduction of seclusion and restraints is a curriculum that has shown to reduce the practice at 43 different facilities in the United States and in various hospitals in the United Kingdom, Australia and Finland (Lebel et al., 2014; Wieman, Camacho-Gonsalves, Huckshorn, & Leff, 2014). Specific trauma-informed care approaches have also shown promise. A sensory based training was given to staff of a psychiatric facility in Norway, which led to a decrease in SR use at their facility. An organization serving children and adults in residential settings decreased the use of SR by 93%, staff injury by 81% and patient injury by 51% after instituting the Context, Input, Process and Product model. (Anderson, Kolmos, Anderson, Sippel, & Stenager, 2017; Craig, 2016). These successful interventions present a variety of educational and systematic approaches a facility seeking to reduce the incidence of SR can use to achieve institutional target goals.

Internal Evidence

An inpatient mental health hospital in the southwestern United States that serves adult and adolescent patients has identified the problem of a high number of seclusion and restraint episodes on the adolescent units. A process improvement committee consisting of the director of nursing (DON), assistant director of nursing, director of clinical services, director of human resources, director of risk and patient advocate, has been assembled to address this problem. They have established a goal of a 25% reduction in SR events. The committee has identified multiple possible contributors to the number of SR events. The DON believes a major contributing reason SR events occur at the current rate is the lack of behavioral health experience and knowledge by new nurses and behavioral health technicians which does not allow them to effectively manage the adolescent patients. In the months between November 2018 and June 2019, the facility averaged 33.6 SR events per 1000 patient days.

This inquiry has led to the PICOT question, on inpatient adolescent units at a hospital (P), what is the effect of a trauma-informed care training for nurses and behavioral health technicians (I), compared to baseline care (C), on the incidence of seclusion and restraints (O) over a three-month period (T)?

Search Strategy

An exhaustive search was conducted to answer this clinically important PICOT question. On three separate occasions during the month of February 2019, four databases were searched, including the Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, PsycINFO and Cochrane Database. The keywords *pediatric inpatient*, *pediatric*, *adolescent*, *restraint*, *physical restraint*, *psychiatry*, *behavioral health*, *trauma-informed care*, and *reduction* were searched using various combinations of terms with a Boolean connector. The search results were scanned for relevant articles by examining research titles. If deemed relevant to the clinical question, the abstract was read to determine inclusion. Inclusion criteria was limited to English language articles from peer-reviewed journals published between 2013 and 2019. The decision to include the publication year of 2013 was made based on the fact that the search was done in early 2019, allowing for an entire five-year span of publication results. Research must have been limited to behavioral health settings with the objective of seclusion and restraint reduction. Exclusion criteria included healthcare settings outside of behavioral health, chemical restraint as the only item addressed, and gray literature. The reference section of chosen articles was examined for additional sources.

Using keywords excluding *trauma-informed care*, the CINAHL database yielded a total of 40 results, PsycINFO delivered 100 results, and PubMed yielded 2325 results. Once trauma-informed care was chosen as the intervention, its inclusion in the search yielded 25 results in

CINAHL, 20 results in PsycINFO, 60 results in PubMed and 9 results in the Cochrane database.

After reviewing the results for inclusion criteria, 21 articles were further scrutinized for strength

and reliability. Ten studies met criteria and relevancy to the PICOT question, including two

systematic reviews, seven retrospective analysis studies and one quasi-experimental study. One

of the chosen retrospective studies is two years outside of the publication year criteria, having

been published in 2011. Inclusion of this study was chosen due to meeting all elements of the

PICOT question.

<div align="center">**Critical Appraisal and Synthesis of Evidence**</div>

The ten studies retained are of higher evidence, with two being level one studies and the

rest being level II studies (Appendix A). Eight studies involve the chosen adolescent population,

although only one is limited to only adolescents. The remaining two focused on adult patients

exclusively. The majority are performed in inpatient facilities, with the exception of two that

conducted their study in outpatient settings. The measurement tools used were heterogenous and

specific to the treatment setting, mostly using non-validated tools, a noted weakness (Appendix

A). The studies were homogenous in their use of trauma-informed interventions, though varied

in type (Appendix B). The mostly widely used was the NASMHPD 6CS curriculum, although

only Azeem, Aujla, Rammerth, Binsfeld and Jones (2011) used the entire curriculum, while five

studies chose which strategies of 6CS to implement (Appendix A). Risk assessment was the next

most used intervention among the studies and two of the ten studies used two different and

specific trauma-informed care interventions. All studies, with the exception of one, focused on

the reduction of SR events and two studies used risk assessment as the dependent variable. The

systemic reviews concluded that 6CS is the most useful intervention in reducing SR (Appendix

B). The majority of studies found 6CS to decrease SR rates however, a noted weakness is the

heterogeneity of 6CS fidelity and implementation. The six core strategies provide a framework that allows organizations to choose how they will implement a strategy. This flexibility, along with varied facility adherence to the 6CS, makes it difficult to determine which approach is most efficacious (Appendix A).

Evidence Conclusion

The literature review highlights multiple promising interventions that reduce SR. Evidence suggests that a trauma-informed approach is effective in decreasing duration and incidence of SR. A multi-modal approach, like 6CS is well supported. The six core strategies training includes strong leadership involvement in organizational change to set the tone for the new emerging culture. Collecting data and sharing results with staff is the next component of this strategy. Education on trauma-informed care, using assessment tools to inform patient treatment, debriefing after SR events and involving the patient and family in treatment goals are all aspects of the six core strategies. Individual portions of 6CS also show promise of having a significant impact on the reduction of SR. The majority of studies used the parts of 6CS that best suited their facility and still reported a statistically significant decrease in SR events. This suggests there is flexibility in choosing one of the six core strategies that best meets the needs of an acute adolescent psychiatric setting. A trauma-informed care intervention rooted in the NASMHPD six core strategies can help the chosen organization reach its goal of reducing seclusion and restraints. Ideally, application of the entire 6CS curriculum would be the best practice, however, this is a labor and time intensive approach that would require an entire organizational change that could be costly and beyond the reach of this evidence-based project.

Theoretical Framework

The theoretical framework chosen to inform this practice project is Lewin's Change Theory. Lewin's theory is comprised of three parts: *unfreezing, moving and refreezing*. *Unfreezing* disrupts old behaviors to allow for the acceptance of new behaviors. The act of *moving* refers to the process of learning and adopting the new behaviors. Once movement has occurred, *refreezing* is necessary to restore equilibrium and solidify the adoption of the new behaviors (Burnes, 2004). This model was chosen for its simplicity and focus on destabilizing existing behaviors to implement change. The long-standing accepted use of SR in behavioral health and at the practice facility requires a change in culture prior to attempting to implement a change that seeks to reduce the use of SR. Without unfreezing, the culture will be immovable. The process of refreezing will set the practice change, creating a new culture with a corresponding set of behaviors.

Evidence-Based Model

Rosswurm and Larrabee's (1999) Model provides the structural guide to implement a change in clinical practice. This model was chosen because of its emphasis on changing the established organizational culture. The Rosswurm and Larrabee Model is a six-step process that sequentially moves through the act of assessment, linking the problem to a desired intervention and outcome, synthesizing the best evidence available, designing the practice change, implementing and evaluating the change, and finally, integrating and maintaining the change (Rosswurm & Larrabee, 1999). This model's systematic process emphasizes collaboration with key stakeholders and synthesis of best available evidence to inform the most efficacious intervention to achieve desired results, making it an appropriate choice to guide this evidence-based project (Appendix C).

Methods

This evidence-based project reviewed SR rates at a psychiatric hospital serving adolescent patients using a pre/post-test design. The hospital has three adolescent units treating patients ages 11 to 17. The project was approved by Arizona State University's Institutional Review Board. The seclusion and restraint rates were reviewed for the three months before the training intervention and the three months after between the months of August 2019 and February 2020 (Table 3). SR events were tracked by the hospital and the rates were calculated using the formula (number of SR events in a month/number of total patient days)*1000. This calculation normalizes SR rates to account for the varying census. The pre and post data was then compared.

In November 2019, the nurses and BHTs of the hospital were trained in trauma-informed care during their monthly staff meeting. Attendance was made mandatory by the hospital administration. The hospital compensated the staff for their attendance by paying them their hourly wage. The trauma-informed care training was developed by the principal investigator. The two-hour training included education on what trauma is, how it impacts a person physically and psychologically and what Adverse Childhood Experiences are. Additionally, staff were educated on the principles of trauma-informed care, ways to exercise those principles in their work with patients, how to de-escalate patients and how to self-regulate emotions. The training consisted of didactic teaching, discussion and practice activities. Other than the wages paid to the employees, no funding for the project was received.

Results

The hospital made the training mandatory, however only 72 out of their 130 nursing and BHT employees attended. The months of August, September and October of 2019 had a SR rate of 23.4 SR events per 1000 patient days. The three months post the intervention, December

2019, January and February 2020 had a SR rate of 19.5 SR events per 1000 patient days (Figure

2). A *z-test* for two proportions was performed comparing the SR rate mean pre and post-

intervention. There was not a significant difference in SR rates between the pre and post-test

time frames ($z=1.157$, $p=.24604$, $p<.05$). Though there was not statistical significance between

SR rates, there was clinical significance. When comparing the pre-intervention time frame to the

post-intervention time frame, there was a decrease in SR rates. The organization had set a goal of

a 25% decrease in rates. A decrease of 16.7% occurred. A decrease in SR events makes the

hospital environment safer for patients and staff both physically and psychologically. The

hospital is closer to meeting its goal of SR reduction and will have improved results to

demonstrate to state and quality regulators. If the hospital sees that reducing SR is possible, they

may choose to move toward total elimination of the practice. The nurse educator at the facility

has incorporated the trauma-informed care training into the new employee orientation to ensure

all new employees receive the education.

Discussion

This project was implemented with the objective of reducing SR rates using the evidence-

based practice of TIC. Trauma-informed care has shown to decrease SR rates in behavioral

health settings. The expected reduction of SR rates did occur though not statistically significant.

A total adoption of the 6CS for TIC reduces SR events, however, implementing parts of the 6CS

also has an impact on SR reduction. The clinically significant reduction in SR seen in this DNP

project using a TIC staff training is consistent with the findings that applying specific portions of

6CS still yields a reduction in SR (Appendix B).

There were limitations to this project. The pre/post-test design does not control for other

factors that could have influenced the SR rates. During the time frame reviewed, the hospital

started a reward based behavioral modification approach to encourage patients to follow unit

rules and expectations which could have impacted the results of this project. Another limitation

was the timeframe. A longer timeframe for the comparison of data could show if the organization

experiences a continued decrease in SR events. This project focused on adolescent patients

limiting its generalizability and application. Further research is needed to find if TIC reduces SR

rates in children and adults.

   A barrier to the project was the partial participation of staff. Total participation may have

yielded different results. In addition, training was limited to nursing and BHT staff per the

hospital's request. Inclusion of all staff at the hospital is critical in becoming a trauma-informed

organization, as it demonstrates a commitment to the well-being of all patients and staff

(Substance Abuse and Mental Health Services Administration, 2014). The hospital leadership

was supportive of the project but did not participate in the training. Leadership participation

would have demonstrated buy-in to the nursing staff and lent importance to attending the

training.

   The need to reduce or eliminate SR is well documented resulting in a need for further

research on effective strategies to prevent, reduce and eliminate SR events in all settings.

Behavioral health settings that serve children are particularly important since children are

considered a vulnerable population. Trauma remains highly prevalent in the mental health

population necessitating continued research on the adoption of TIC in behavioral health settings

to help achieve better patient outcomes (Felitti et al., 1998).

Conclusions

   This project shows that it is possible to reduce SR in a behavioral health hospital setting

that treats adolescent patients. The best practice for a sustained and significant reduction in SR

events in an organization is the entire adoption of the 6CS for the reduction of SR. The 6CS

promotes an organizational shift in culture that has shown to address SR reduction. It is further

recommended that all behavioral health organizations, particularly those that treat children,

continue to work toward SR reduction and elimination for better patient outcomes.

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Appendix A

Table 1

Evaluation Table

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for Use
Azeem et al. (2011). Effectiveness of six core strategies based on trauma informed care in reducing seclusions and restraints at a child and adolescent psychiatric hospital. **Country**: United States **Funding:** Not disclosed. **Bias:** None noted.	Organizational Cultural Competence Theory (Inferred)	**Design:** Retrospective study **Method:** Data collection between July 2004 and March 2007. Intervention implemented March 2005.	**Sample:** N – 458 **Demographics:** f – 276 m – 182 **Setting:** A 26-bed child adolescent hospital with a 9-bed female adolescent unit, 9- bed male adolescent unit and 8 bed child (ages 6-12) mixed gender unit.	**IV:** National Association of State Mental health Program directors (NASMHPD) 6CS training. **DV:** SR events	Hospital specific standard form tracking SR incidents	Logistic regression analysis	6-month pre-intervention SR incidents: 93 (S – 73, R – 20), 6-month post-intervention SR incidents: 31 (S – 6, R – 25). SR decreased 62% Direct correlation between LOS and number of SR incidents.	**Level of Evidence:** II **Strengths:** Strong methodology **Weakness:** A DBT intervention was implemented concurrently on f unit. **Conclusions:** 6CS training reduced SR incidence. **Feasibility:** Can be implemented in short time period.

Key: **6CS** – Six Core Strategies; **c** – continued program; **d** – decreased program; **di** – discontinued program; **DBT** – Dialectical Behavioral Therapy; **DV** – Dependent variable; **f** – Female; **IV** – Independent variable; **LOS** – Length of stay; **m** – Male; **M** – mean; **N** – Sample; **ni** – never implemented program; **o** – Other self-identified gender; **Po** – post-intervention; **Pr** – pre-intervention; **Pt** – patient; **R** – Restraint; **RCT** – randomized controlled trial; **s** – stabilized program; **S** – Seclusion; **TIC** – Trauma Informed Care

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for Use
Blair et al. (2017). Reduction of seclusion and restraint in an inpatient psychiatric setting: A pilot study. **Country:** United States **Funding:** Not disclosed. **Bias:** None noted.	Organizational Cultural Competence Theory (Inferred)	**Design:** Retrospective study **Method:** Data collection of SR events from pre (October 2008-September 2009) and post (October 2010-September 2012) intervention admissions.	**Sample:** Pr: N - 3884 Po: N – 8029 **Demographics:** Pr: f – 49.7% m – 50.3% Po: f – 48.5% m – 51.5% **Setting:** A 120-bed psychiatric hospital serving children, adolescents and adults in large urban area.	**IV1:** Staff education on TIC **IV2:** Brøset Violence Checklist (BVC) **DV:** SR	BVC checklist, hospital specific tracking of SR	Descriptive statistics, Chi square, *t* test	Significant 52% reduction of S events (p < 0.01) Non-significant 6% reduction of R events (p < 0.44) BVC most common behaviors associated with SR: Irritability – 96% Boisterousness – 78% Verbal threats – 63% Confusion – 50%	**Level of Evidence:** II **Strengths:** Sample size **Weaknesses:** Multiple interventions make conclusion of reason for SR difficult. **Conclusions:** Knowledge of behaviors associated with SR may help staff intervene early. **Feasibility:** Education and checklists are easily implemented in short period of time. Cost may Impede education.

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Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for Use
Gaynes et al. (2017). Preventing and de-escalating aggressive behavior among adult psychiatric patients: A systematic review of the evidence. **Country:** United States **Funding:** Agency for Healthcare Research and Quality, United States Department of Health and Human Services **Bias:** None noted.	Organizational Cultural Competence Theory (Inferred)	**Design:** Systematic review **Method:** Six database and manual reference list search for studies published between January 1, 1999 and February 3, 2016.	**Sample:** 17 articles describing de-escalation strategies for aggressive behaviors in acute care. **Inclusion criteria:** Adult pts in inpatient psychiatric settings. RCTs, cluster RCTs, non-RCTs, cohort studies. **Exclusion criteria:** Pts with dementia, pre-post designs.	**IV1:** 6CS based de-escalation strategies **IV2:** Risk assessment **DV:** SR	Cochrane Risk of Bias tool, Research Triangle Institute Risk of Bias Tool for Observational Studies.	Strength of evidence measured study limitations, consistency, directness, precision and reporting bias.	Highest strength of evidence (lowest bias) determined for two preventative interventions, risk assessment and 6CS. Risk assessment decreased S hours 45%. 6CS significant decrease SR rate (p= .001).	**Level of Evidence:** I **Strengths:** Number of studies. **Weaknesses:** Limited evidence, exact description of interventions not included. **Conclusions:** Weak evidence, risk assessment and 6CS showed most promise. **Feasibility:** Risk assessment easily implemented.

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Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for Use
Guzman-Parra et al. (2016). Effectiveness of a multimodal intervention program for restraint prevention in an acute Spanish psychiatric ward. **Country**: Spain **Funding:** Not disclosed. **Bias:** None noted.	Organizational Cultural Competence Theory (Inferred)	**Design:** Retrospective study **Method:** Data of SR frequency collected one year prior and the year during intervention.	**Sample:** Pr: N – 735 Po: N – 840 **Demographics:** M age on admission 42.8 f – 42.1% m – 57.9% **Setting:** A 42-bed acute adult psychiatric unit in a university general hospital in an urban area in Spain.	**IV:** Four 6CS: Leadership and organizational change, monitoring risk, staff education and pt involvement in treatment plan. **DV1:** SR frequency **DV2:** SR risk	Hospital specific records tracking SR incidents	SR frequency: Chi-square test, Fisher's exact test, t test, nonparametric Mann-Whitney U test, Bonferroni correction. SR risk: Multivariate binary logistic regression analysis.	Number of patients in R decreased 35.7% Risk factors for SR: age, gender, single, length of stay, substance abuse history, involuntary admission.	**Level of Evidence:** II **Strengths:** Multivariate analysis adjusts for confounding variables. **Weakness:** Non-standardized measurement tool. **Conclusions:** 6CS principles reduced number of patients restrained. **Feasibility:** Multi-modal 6CS is time/resource intensive. Individual components could be feasible.

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Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for Use
Rahman et al. (2018). On becoming trauma-informed: Role of the Adverse Childhood Experiences Survey in tertiary child and adolescent mental health services and the association with standard measures of impairment and severity. **Country**: Canada **Funding:** Not disclosed. **Bias:** None noted.	Organizational Cultural Competence Theory (Inferred)	**Design:** Retrospective study **Method:** Cross-sectional ACE surveys and registration-linked data collected on patients from November 2016 to March 2017.	**Sample:** N – 9329 **Demographics:** f – 3268 m – 2464 o – 77 M f age – 14.7 years M m age – 12.3 years M o age – 18.8 years **Setting:** Child and Adolescent Addiction Mental health and Psychiatry Program (CAAMHPP)	**IV:** Adverse Childhood Experiences (ACE). **DV:** existing clinical measures of clinical severity, global function and problem severity	Strength/concern scale, Western Canada Waiting List Children's Mental Health-Priority Criteria Score (WCWL-CMH-PCS), Adverse Childhood Experience Survey (ACE)	Descriptive statistics, bivariate, multivariable analyses, regression analysis, polychoric factor analysis	ACE scores significantly ($p < 0.001$) correlated to existing measures of clinical severity on 29 variables for m and 27 for f.	**Level of Evidence:** II **Strengths:** Large sample size, reliable instruments. **Weaknesses:** Insufficient data for self-assigned gender. **Conclusions:** ACE survey allows for individualized TIC intervention. **Feasibility:** ACE survey easily implemented using previously collected information.

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Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for Use
Seckman et al. (2016). Evaluation of the use of a sensory room on an adolescent unit and its impact on restraint and seclusion prevention. **Country:** United States **Funding:** Not disclosed. **Bias:** None noted.	Quality Improvement. Plan, Do, Check, Act model. (Stated)	**Design:** Quasi-experimental (pre-posttest) **Method:** SR and aggressive behavior frequency collected 6 months Pr and Po.	**Sample:** N – 202 **Demographics:** f – 59% m – 41% **Setting:** 20-bed inpatient adolescent psychiatric unit.	**IV:** Sensory room (a TIC intervention) **DV1:** SR **DV2:** Unit safety	Hospital developed project evaluation form, Pre/Post staff training survey, Sensory Session form. Combined Assessment of Psychiatric Environments	Two-tailed paired sample t-test, ANOVA.	R rates decreased 26.5%, S rates decreased 32.8%. R durations increased by 31%, S durations increased by 17% Decreased rates of physical assault (31.1%), attempted assault (25.5%), threat (21.3%). Increased rate of destruction of property (23.6%)	**Level of Evidence:** II **Strengths:** Experimental study **Weaknesses:** Evaluation tools not validated, study was part of larger SR reduction intervention potentially influencing results. **Conclusions:** Need further study of sensory room use. **Feasibility:** Cost of sensory room could impede implementation.

Key: **6CS** – Six Core Strategies; **c** – continued program; **d** – decreased program; **di** – discontinued program; **DBT** – Dialectical Behavioral Therapy; **DV** – Dependent variable; **f** – Female; **IV** – Independent variable; **LOS** – Length of stay; **m** – Male; **M** – mean; **N** – Sample; **ni** – never implemented program; **o** – Other self-identified gender; **Po** – post-intervention; **Pr** – pre-intervention; **Pt** – patient; **R** – Restraint; **RCT** – randomized controlled trial; **s** – stabilized program; **S** – Seclusion; **TIC** – Trauma Informed Care

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for Use
Timbo et al. (2016). Risk factors for seclusion and restraint in a pediatric psychiatry day hospital. **Country:** United States **Funding:** Not disclosed. **Bias:** None noted.	Social Determinants of Health (Inferred)	**Design:** Case-control retrospective analysis **Method:** Review of psychiatric records from July 2009-June 2011 finding patients who experienced at least one SR event.	**Sample:** N - 309 **Demographics:** 12% (36 patients) experienced SR, 81 total SR events. **Setting:** Psychiatric day hospital for 5-17 y.o. patients.	**IV1:** Demographics (age, sex, race/ethnicity, mean income, history of abuse) **IV2:** Clinical variables (GAF, number of diagnosis, primary diagnosis) **DV:** SR	Instrument not stated.	Chi-squared, Fisher, independent-sample t tests and multivariate logistic regression.	Young age ($p < 0.001$), increased psychiatric co-morbidity ($p < 0.001$), anxiety diagnosis ($p = 0.003$), PTSD diagnosis ($p= 0.02$), history of physical abuse ($p= 0.01$) are significant predictors of SR events.	**Level of Evidence:** II **Strengths:** Higher level of evidence. **Weaknesses:** Small sample, mostly representing inner city, urban youth. **Conclusions:** Risk factors for SR demonstrate need for TIC interventions and risk assessment. **Feasibility:** Risk assessment easily implemented.

Key: **6CS** – Six Core Strategies; **c** – continued program; **d** – decreased program; **di** – discontinued program; **DBT** – Dialectical Behavioral Therapy; **DV** – Dependent variable; **f** – Female; **IV** – Independent variable; **LOS** – Length of stay; **m** – Male; **M** – mean; **N** – Sample; **ni** – never implemented program; **o** – Other self-identified gender; **Po** – post-intervention; **Pr** – pre-intervention; **Pt** – patient; **R** – Restraint; **RCT** – randomized controlled trial; **s** – stabilized program; **S** – Seclusion; **TIC** – Trauma Informed Care

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for Use
Valenkamp et al. (2014). Reducing seclusion and restraint during child and adolescent inpatient treatment: Still an underdeveloped area of research. **Country:** Netherlands **Funding:** Not disclosed. **Bias:** None noted.	Quality Improvement (Inferred)	**Design:** Systemic Review **Method:** PubMed and PsychINFO searched for published studies between 2006-2013 evaluating intervention models for reduction of SR.	**Sample:** 3 studies **Inclusion criteria:** Pre-posttest design, youth, seclusion or restraint, aggression. **Exclusion criteria:** Studies done in school settings, medical restraint.	**IV:** 6CS based intervention models **DV:** SR	Not stated.	Linear regression analysis	Collaborative Problem Solving (CPS) decreased R by 99% in one study and R by 97% and S by 69% in another. Comprehensive Behavioral Management (CBM) reduction of R was statistically significant, 83%.	**Level of Evidence:** I **Strengths:** Focus on desired population and SR reduction. **Weaknesses:** Small sample, no RCTs **Conclusions:** 6CS effective in decreasing SR **Feasibility:** CPS and CBM training can be done in a day.

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Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for Use
Wieman et al. (2014). Multisite study of an evidence-based practice to reduce seclusion and restraint in psychiatric inpatient facilities. **Country**: United States **Funding:** Substance Abuse and Mental Health Services Administration **Bias:** None noted	Organizational Cultural Competence Theory (Inferred)	**Design:** Retrospective study **Method:** Program fidelity and SR events tracked between 2004 and 2007 in facilities utilizing six core strategies for TIC.	**Sample:** N – 42 Facility characteristics: c – 7 d – 5 di – 1 ni - 2 s – 28 **Setting:** 43 hospitals in 8 states serving children, adolescents and adults.	**IV:** Facility characteristics 6CS components used. **DV:** SR events	Inventory of Seclusion and Restraint Reduction Interventions (ISSRI), Behavioral Health Performance Measurement System (BHPMS)	Linear modeling, random-effects meta-analysis, dose-effect analysis	s – reduced seclusion by 17% (p=.002), seclusion hours by 19% (p=.001), restraint reduced by 30% (p=.03), restraint hours reduced by 55% (p=.08)	**Level of Evidence:** II **Strengths:** Various facilities in different states. **Weaknesses:** ISSRI tool minimally tested prototype. Different components of six core strategies used at facilities. **Conclusions:** Fidelity to program varies. Faithful programs decrease S rates and hours. **Feasibility:** Suggests TIC can be implemented in diverse facilities.

Key: **6CS** – Six Core Strategies; **c** – continued program; **d** – decreased program; **di** – discontinued program; **DBT** – Dialectical Behavioral Therapy; **DV** – Dependent variable; **f** – Female; **IV** – Independent variable; **LOS** – Length of stay; **m** – Male; **M** – mean; **N** – Sample; **ni** – never implemented program; **o** – Other self-identified gender; **Po** – post-intervention; **Pr** – pre-intervention; **Pt** – patient; **R** – Restraint; **RCT** – randomized controlled trial; **s** – stabilized program; **S** – Seclusion; **TIC** – Trauma Informed Care

Citation	Conceptual Framework	Design/Method	Sample/Setting	Major Variables & Definitions	Measurement	Data Analysis	Findings	Decision for Use
Wisdom et al. (2015). The New York State Office of Mental Health Positive Alternatives to Restraint and Seclusion (PARS) project. **Country**: United States **Funding:** Substance Abuse and Mental Health Services Administration **Bias:** None noted	Organizational Cultural Competence Theory (Inferred) Recovery, resiliency and wellness (Stated)	**Design:** Retrospective analysis **Method:** SR events tracked between January 2007 and December 2011.	**Sample:** N – 3 **Setting:** Mental health facilities for children and adolescents in New York State	**IV:** 6CS **DV:** SR events	New York State Incident Management and Reporting System (NIMRS)	Linear regression analysis	Facility 1: SR decreased 62% Facility 2: SR decreased 86% Facility 3: SR Decreased 69%	**Level of Evidence:** II **Strengths:** Large sample of child/adolescent pts. **Weaknesses:** 6CS elements to implement chosen by each facility differed. **Conclusions:** Desire to reduce SR requires staff/leadership commitment. **Feasibility:** Choice of 6CS elements to implement offers flexibility.

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Appendix B

Table 2

Synthesis Table

	Azeem (2011)	Blair (2017)	Gaynes (2017)	Guzman-Parra (2016)	Rahman (2018)	Seckman (2016)	Timbo (2016)	Valenkamp (2014)	Wieman (2014)	Wisdom (2015)
Design/Level of Evidence	Retro/II	Retro/II	Sys R/I	Retro/II	Retro/II	Quasi-experimental/II	Retro/II	Sys R/I	Retro/II	Retro/II
Demographics	C, A	C, A, AD	AD	AD	C, A	A	C, A	C, A	C, A, AD	C, A
Setting	26-bed pu	120-bed ph	pi	42-bed pu	Op	20-bed pu	Op	pi	ph in 8 states	3 ph in New York
Sample Size	458	11,913	17 RCTs, c	1,575	9329	202	309	3 studies	43 ph	3 ph
Measurement	HF	BVC, HF	CRB, RT	HF	SCS, WCWL-CMH-PCS, ACE	HF	Not stated	Not stated	ISSRI, BHPMS	NIMRS
IV										
6CS	X		X	X				X	X	X
Risk Assessment		X	X		X (ACE)					
TIC education		X								
Sensory room						X				
Demographics							X			

Key: **6CS** – Six Core Strategies; **A** – Adolescent; **a** – age; **aa** – attempted assault; **ACE** – Adverse Childhood Experience Survey; **AD** – Adult; **Ax** – Assessment; **B** – Boisterousness; **BHPMS** – Behavioral Health Performance Measurement System; **BVC** – Brøset Violence Checklist; **C** – Child; **c** – cohort studies; **Co** – Confusion; **CRB** – Cochrane Risk of Bias tool; **dp** – destruction of property; **DV** – Dependent variable; **dx** – psychiatric diagnosis; **g** – gender; **hx** – history of; **HF** – Hospital specific forms; **I** – Irritability; **ia** – involuntary admission; **ISSRI** – Inventory of Seclusion and Restraint Reduction Interventions; **IV** – Independent variable; **LOS** – Length of stay; **m** – Male; **NIMRS** – New York State Incident Management and Reporting System; **Op** – outpatient program; **pa** – physical assault; **ph** – psychiatric hospital; **pi** – psychiatric inpatient settings; **pu** – psychiatric unit; **R** – Restraint; **RCT** – randomized-controlled trials; **Retro** – retrospective study; **RT** – Research Triangle Institute Risk of Bias Tool for Observational Studies; **S** – Seclusion; **s** – marital status as single; **sa** – substance abuse history; **SCS** – Strength/concern scale; **Sys R** – Systematic review; **t** – verbal threat; **TIC** – Trauma informed care; **V** – Verbal threats; **WCWL-CMH-PCS** – Western Canada Waiting List Children's Mental Health-Priority Criteria Score; ***** - statistically non-significant

Clinical variables						X				
DV										
SR events	X	X	X	X		X	X	X	X	X
SR Risk				X						
Unit Safety						X				
Existing clinical tools					X					
Findings										
Seclusion	↓	↓	↓			↓		↓	↓	↓
Restraints	↓	↓ *	↓	↓		↓		↓	↓	↓
Event duration			↓S only			↑			↓	
Risk for SR	LOS	I, B, V, Co		a, g, s, sa, ia, LOS			a, dx, hx pa			
Safety						↓pa, aa, t ↑ dp				
Validated intervention			6CS, risk Ax		ACE			6CS		

Key: **6CS** – Six Core Strategies; **A** – Adolescent; **a** – age; **aa** – attempted assault; **ACE** – Adverse Childhood Experience Survey; **AD** – Adult; **Ax** – Assessment; **B** – Boisterousness; **BHPMS** – Behavioral Health Performance Measurement System; **BVC** – Brøset Violence Checklist; **C** – Child; **c** – cohort studies; **Co** – Confusion; **CRB** – Cochrane Risk of Bias tool; **dp** – destruction of property; **DV** – Dependent variable; **dx** – psychiatric diagnosis; **g** – gender; **hx** – history of; **HF** – Hospital specific forms; **I** – Irritability; **ia** – involuntary admission; **ISSRI** – Inventory of Seclusion and Restraint Reduction Interventions; **IV** – Independent variable; **LOS** – Length of stay; **m** – Male; **NIMRS** – New York State Incident Management and Reporting System; **Op** – outpatient program; **pa** – physical assault; **ph** – psychiatric hospital; **pi** – psychiatric inpatient settings; **pu** – psychiatric unit; **R** – Restraint; **RCT** – randomized-controlled trials; **Retro** – retrospective study; **RT** – Research Triangle Institute Risk of Bias Tool for Observational Studies; **S** – Seclusion; **s** – marital status as single; **sa** – substance abuse history; **SCS** – Strength/concern scale; **Sys R** – Systematic review; **t** – verbal threat; **TIC** – Trauma informed care; **V** – Verbal threats; **WCWL-CMH-PCS** – Western Canada Waiting List Children's Mental Health-Priority Criteria Score; ***** - statistically non-significant

Appendix C

Rosswurm and Larrabee Model

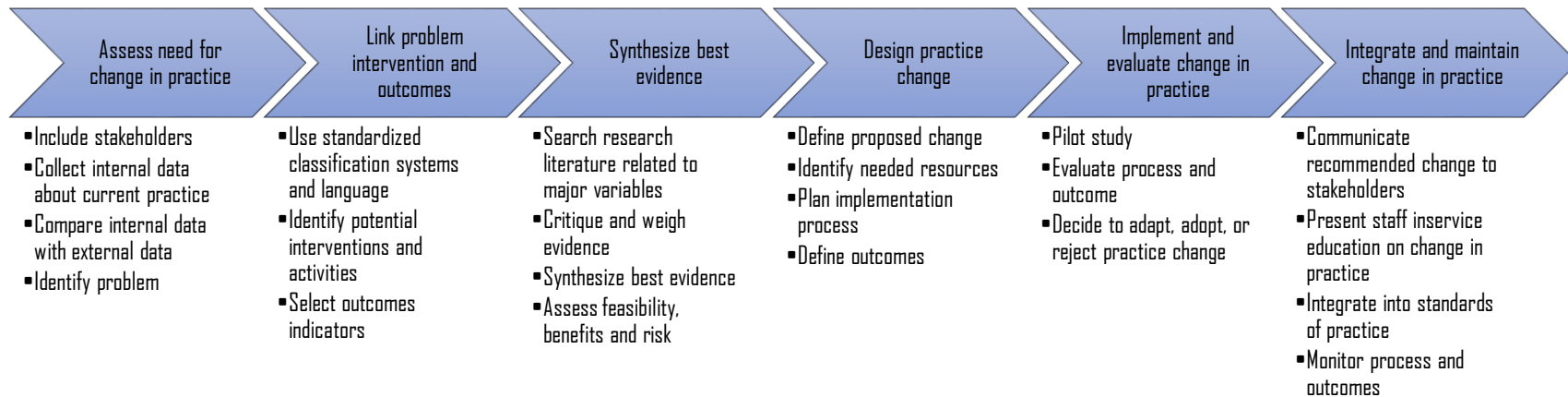| Assess need for change in practice	Link problem intervention and outcomes	Synthesize best evidence	Design practice change	Implement and evaluate change in practice	Integrate and maintain change in practice
▪Include stakeholders ▪Collect internal data about current practice ▪Compare internal data with external data ▪Identify problem	▪Use standardized classification systems and language ▪Identify potential interventions and activities ▪Select outcomes indicators	▪Search research literature related to major variables ▪Critique and weigh evidence ▪Synthesize best evidence ▪Assess feasibility, benefits and risk	▪Define proposed change ▪Identify needed resources ▪Plan implementation process ▪Define outcomes	▪Pilot study ▪Evaluate process and outcome ▪Decide to adapt, adopt, or reject practice change	▪Communicate recommended change to stakeholders ▪Present staff inservice education on change in practice ▪Integrate into standards of practice ▪Monitor process and outcomes

Figure 1. The Rosswurm and Larrabee Model for Change to Evidence-Based Practice (1999).

Appendix D

Table 3

Data table highlighting patient days, SR events and SR events per 1000 patient days

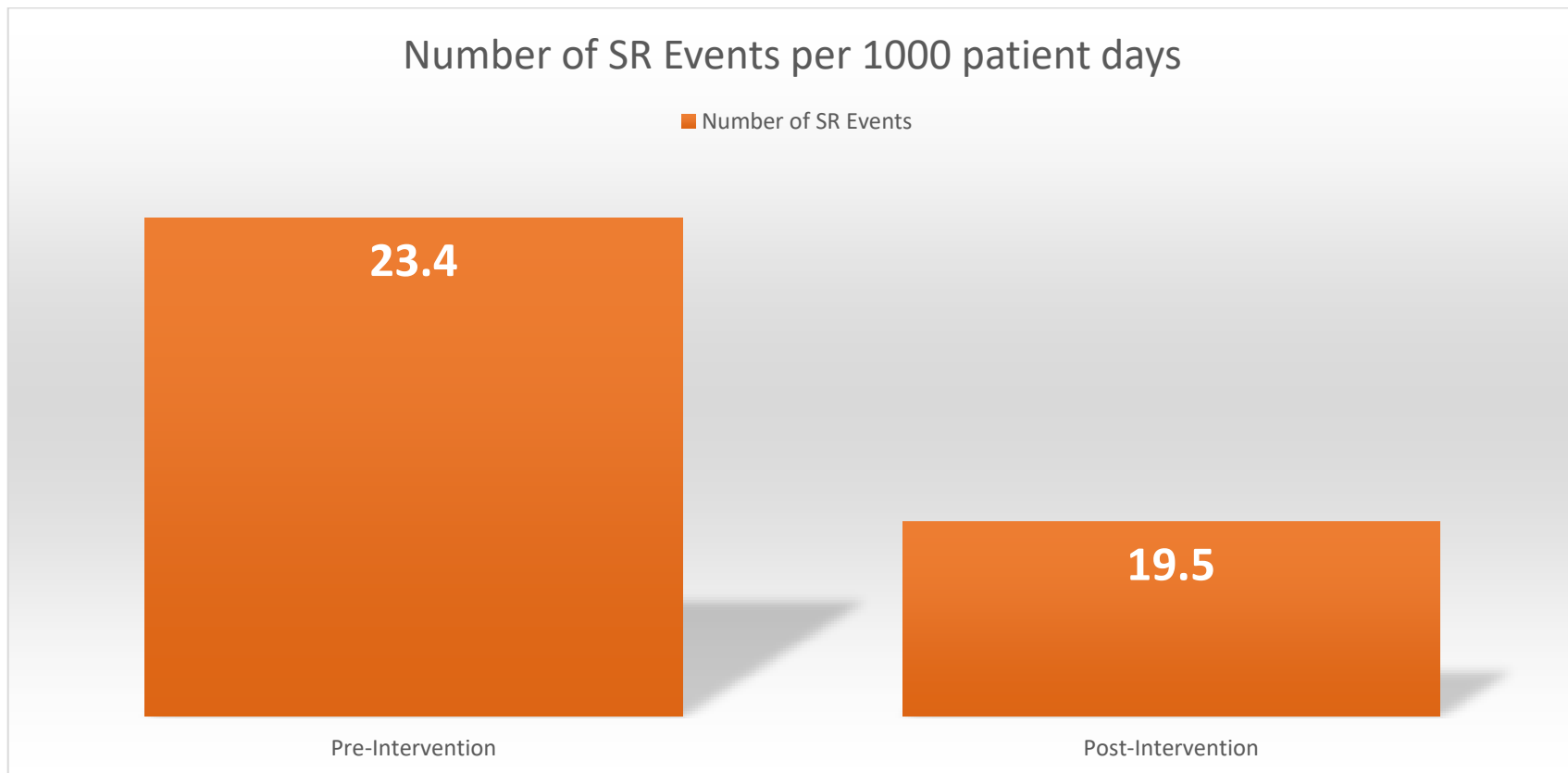| Month	Number of SR events in month (x)	Number of patient days in month (y)	SR rate per 1000 patient days= (y/x)1000
August 2019	1059	21	19.8
September 2019	1275	24	18.8
October 2019	1337	41	30.7
December 2019	1212	38	31.4
January 2020	1251	17	13.6
February 2020	1226	17	13.9

Appendix E

Number of SR Events

Figure 2. Bar graph of SR events three months pre and post-intervention.