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SATU TUOVINEN

REDUCTION OF SECLUSION AND RESTRAINT AND HOSPITAL VIOLENCE DURING INVOLUNTARY FORENSIC PSYCHIATRIC CARE

Reduction of Seclusion and Restraint and Hospital Violence During Involuntary Forensic Psychiatric Care

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ABSTRACT

The overall purpose of this study was to develop the care of forensic psychiatric patients by investigating hospital violence and use of seclusion and restraint, and identifying safe measures for reducing use of seclusion and restraint. Data for four studies were collected from January 2007 to May 2013 from a state-run forensic psychiatric hospital in Finland. Study material consisted of: three years of violent incident reports (n = 840), six years of violent incident reports (n = 2,057) in addition to six years of hospital statistics on seclusion and restraint rates, and four years of seclusion and restraint forms (n = 175) in addition to patient records. First, hospital violence was described in general, and seasonal variations in incidents of violence, seclusion, and restraint were investigated. Second, the clinical reasons for seclusion and restraint, and de-escalation techniques used prior to seclusion and restraint episodes, were investigated. Third, the effectiveness and safety of The Six Core Strategies on seclusion and restraint reduction in the forensic psychiatric setting were tested through a randomised clinical trial in 2 intervention and 2 control wards.

Female patients and patients deemed too difficult and/or dangerous to treat in psychiatric wards in municipal hospitals were at the highest risk of perpetrating physical violence. Use of seclusion and restraint demonstrated significant seasonal variation, but hospital violence did not vary significantly by season during the same period. Use of seclusion and restraint was lowest in January and highest in August. The main clinical reason for use of seclusion and restraint was threatening harmful behaviour. Other reasons were: direct harmful behaviour, indirect harmful behaviour, and the ”other” category. The three most often used de-escalation techniques were one-to-one discussion, administration of medication, and facility arrangements. The Six Core Strategies were effective and safe for reducing use of seclusion and restraint in the forensic psychiatric hospital. The monthly rates of seclusion and restraint decreased significantly more in intervention wards than in control wards. Hospital violence was reduced, but not significantly.

This dissertation provides evidence of variation in violent behaviour among different patient groups during care in a forensic psychiatric hospital. Individual care plans are necessary for solving the problem of violent behaviour in clinical practice. The de-escalation techniques used were traditional, highlighting the needs for staff education on one hand and for consideration of patient perspectives of individual patient education on violent behaviour on the other hand. Safely reduced use of seclusion and restraint without increased hospital violence is possible in forensic psychiatry. The relationship between hospital violence and use of seclusion and restraint is not linear. These two variables do not vary together during the calendar year, and coercive measures do not eliminate hospital violence. Other therapeutic means are needed to support emotional regulation by psychiatric patients.

National Library of Medicine Classification: W 740; WM 35
Medical Subject Headings: Forensic Psychiatry; Hospitals; Violence; Restraint, Physical

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TIIVISTELMÄ

Tutkimuksen tarkoituksena oli kehittää oikeuspsykiatristen potilaiden hoitoa tuottamalla tietoa sairaalaväkivallasta ja eristämis- ja sitomiskäytännöistä, sekä löytämällä menetelmä, jolla eristämisen ja sitomisen käyttöä voidaan vähentää. Neljän osatutkimuksen aineisto kerättiin tammikuun 2007 ja toukokuun 2013 välisenä aikana valtion oikeuspsykiatrisesta sairaalasta Suomessa. Aineisto koostui 3 vuoden väkivaltailmoituksista (n = 840), 6 vuoden väkivaltailmoituksista (n = 2057) ja eristys- ja sitomistilastoista, sekä neljän vuoden eristyslomakkeista (n = 175) täydennettynä potilasasiakirjatiedoilla. Sairaalaväkivaltaa kuvailtiin yleisellä tasolla, ja sen sekä eristämisen ja sitomisen vuodenaikavaihtelua tutkittiin. Eristämisen ja sitomisen syitä selvitettiin ja käytettyjä de-eskalaatiotekniikoita tukittiin. Kuuden ydinstrategian (The Six Core Strategies) tehokkuutta ja turvallisuutta eristämisen ja sitomisen vähentämisessä testattiin satunnaistetulla koeasetelmalla 2 koe- ja 2 kontrolliosastolla.

Riski fyysiselle väkivaltakäyttäytymiselle oli korkein naispotilaiden ja vaikeahoitoisten potilaiden keskuudessa. Sairaalaväkivalta ei vaihdellut tilastollisesti merkitsevästi vuodenaikojen mukaan, mutta eristämisen ja sitomisen käyttö vaihteli. Eristäminen ja sitominen olivat vähäisintä tammikuussa ja yleisintä elokuussa. Useimmin ilmennyt kliininen syy eristämiselle ja sitomiselle oli uhkaava väkivaltakäyttäytyminen. Muita syitä olivat välitön väkivaltakäyttäytyminen, epäsuora haitallinen käyttäytyminen. De-eskalaatiomenetelmät voitiin jakaa auttamismenetelmiin ja rajoitteisiin. Kolme yleisimmin käytettyä de-eskalaatiomenetelmää olivat kahdenkeskinen keskustelu, tarvittava lääkitys ja tilajärjestelyt. Kuusi ydinstrategiaa oli tehokas ja turvallinen menetelmä eristämisen ja sitomisen vähentämiseksi oikeuspsykiatrisessa sairaalassa. Kuukausittaiset eristys- ja sitomisluvut laskivat tilastollisesti merkitsevästi enemmän koeosastoilla kuin kontrolliosastoilla. Sairaalaväkivalta väheni, mutta ei tilastollisesti merkitsevästi.

Tämä väitöskirja tuottaa näyttöä sairaalahoidon aikaisen väkivaltakäyttäytymisen vaihtelusta eri potilasryhmien välillä oikeuspsykiatrisen hoidon aikana. Kliinisessä käytännössä tarvitaan yksilölliset, potilaskohtaiset hoitosuunnitelmat väkivaltaongelman ratkaisemiseksi. Käytetyt de-eskalaatiotekniikat olivat perinteisiä, joka yhtäältä tuo esiin henkilökunnan koulutustarpeen, ja toisaalta tarpeen lisätä potilasnäkökulmaa yksilölliseen potilasohjaukseen tämän ongelman ratkaisemiseksi. Eristämistä ja sitomista voidaan vähentää turvallisesti oikeuspsykiatrialla. Sairaalaväkivallan ja eristämisen ja sitomisen välinen suhde ei ole lineaarinen. Ne eivät vaihtele yhdenmukaisesti vuodenaikojen mukaan, eikä pakkotoimien käyttö lopeta sairaalaväkivaltaa. Muita, terapeuttisia keinoja tarvitaan tukemaan potilaita tunteiden itsesäätelyssä.

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I have sometimes wondered why acknowledgements often include a comment showing gratitude to somebody because they remind the author of the fact that there is also life outside research. I have learned why during last year. My daughter, Ella, husband, Petri and my brothers, Antti and Markku, together with their families, are evidence that I have life outside of research. I am honestly grateful for them, especially my husband Petri for the concrete support he has given me. He sent me photographs via WhatsApp of the main dishes he had cooked me on my busiest weeks when I was staying late at the office. That reminded me to go home. I am also grateful for him for marrying me earlier this year, even after he had seen me concentrate more in this process than in our life. I am very grateful to my parents, Anja and Mauri Tuovinen, for all the support I have received from them during my life. During the course of this study process, my mother passed away. For some years, there has been an empty wall at our house. It has been waiting for a tapestry, which my mother made me as a dissertation present during her final years. I realise I am now close to getting my precious present.

Kuopio, December 11, 2017

Satu Tuovinen

List of the original publications

This dissertation is based on the following original publications:

I Putkonen A, Kuivalainen S (at present Tuovinen S), Louheranta O, Repo-Tiihonen E, Ryynänen OP, Kautiainen H and Tiihonen J. Cluster-randomized controlled trial of reducing seclusion and restraint in secured care of men with schizophrenia. *Psychiatric Services 64: 850–855, 2013*.

II Kuivalainen S (at present Tuovinen S), Vehviläinen-Julkunen K, Putkonen A, Louheranta O and Tiihonen J. Violent behaviour in a forensic psychiatric hospital in Finland: an analysis of violence incident reports. *Journal of Psychiatric and Mental Health Nursing 21: 214–218, 2014.*

III Kuivalainen S (at present Tuovinen S), Vehviläinen-Julkunen K, Louheranta O, Putkonen A, Repo-Tiihonen E and Tiihonen J. Seasonal variation of hospital violence, seclusion and restraint in a forensic psychiatric hospital. *International Journal of Law and Psychiatry 52: 1–6, 2017.*

IV Kuivalainen S (at present Tuovinen S), Vehviläinen-Julkunen K, Louheranta O, Putkonen A, Repo-Tiihonen E and Tiihonen J. De-escalation techniques used and the reasons for seclusion and restraint in forensic psychiatric hospital. *International Journal of Mental Health Nursing 26: 513–524, 2017.*

Contents

Abbreviations

AUC	Area under curve
BVC	Brøset Violence Checklist
CPT	European Committee for the Prevention of Torture and Inhumane or Degrading Treatment or Punishment
DASA	Dynamic Appraisal of Situational Aggression
EU	The European Union
HCR-20	The Historical Clinical Risk Management-20
HCR-20V3	The Historical Clinical Risk Management-20, Version 3
IRR	Incident rate ratio
NASMHPD	National Association of State Mental Health Program Directors
PRN	Pro re nata -medication, “as needed” medication
START	A Short Term Assessment of Risk and Treatability
SAPROF	A Structured Assessment of Protective Factors for violence risk
THL	National Institute for Health and Welfare
VRS	Violence Risk Scale
WHO	World Health Organization

1 Introduction

Personal liberty and the right to freedom are secured for every human being as human rights (United Nations 1948). According to the Constitution of Finland "everyone has the right to life, personal liberty, and security" (The Constitution of Finland 731/1999). Limitations to one's constitutional rights are provided only by an act. Involuntary care of psychiatric patients restricts their human and constitutional rights, and these restrictions are regulated in detail through the Mental Health Act (1116/1990) of Finland. The main reasons for using restriction include actual or threatened violent behaviour towards others (Paavola & Tiihonen, 2010; Raboch et al., 2010; Bowers et al., 2011; Noda et al., 2013). In psychiatric inpatient settings, violent behaviour of patients towards others insults the human rights of staff and other patients.

Use of restrictive measures during involuntary psychiatric care is considered an ethical dilemma for staff (Kontio et al., 2010). Use of seclusion and restraint has been questioned, from a medical perspective, due to lacking evidence of its safety and efficacy in psychiatric treatment (Sailas & Fenton, 2000; Tuominen, 2013). However, evidence of the safety and efficacy of other nonpharmaceutical methods for curbing acutely disturbed behaviours in psychiatric patients is also lacking (Muralidharan & Fenton, 2006). Seclusion and restraint use is a matter of treatment culture as well as a medical issue. Restrictions and their uses in psychiatric patient care vary, irrespective of diagnoses, among countries, even in Europe, as well as within countries (Bak & Aggernæs, 2012; Noorthoorn et al., 2016; Allan et al., 2017). A movement to reduce the use of seclusion and restraint in Western psychiatry and in Finland has been growing over the last decade.

Coercive measures in psychiatric care have been used in Finland since treatment of mental illness became organized. The first effort to eliminate the use of coercive measures in Finnish mental hospitals was reported at the end of the 1850s. Fahlander, medical director of Lapinlahti Mental Hospital in Helsinki, conceptualized coercion-free hospitals after visiting several mental hospitals in Europe; however coercive measures were reimplemented later (Hyvönen, 2008). At the turn of the century, the movement for eliminating coercive measures in psychiatric care regained momentum in Finland. Björkman, medical director of Niuvanniemi Hospital, helped initiate psychiatric treatment without restraint use in Finland in 1899, and coercive measures were abandoned again at Lapinlahti in 1904 (Malmivuori, 1985; Hyvönen, 2008). During Björkman's tenure in Niuvanniemi, coercion could not be eliminated, but he demanded humane treatment of patients (Vuorio, 2010). During the early decades of the 19th century and wartimes in Finland, the development of humane treatment stalled with the shortage of goods, and use of coercion increased. Psychiatric treatment made big developmental leaps in the 1950s, after chlorpromazine was invented and mental health services were re-organized in Finland. New hospitals were built, and treatment and status of the patient evolved. The theme of reducing coercive measures in psychiatric treatment recurs at approximate 50-year intervals in psychiatry history in Finland (Malmivuori, 1985; Hyvönen, 2008; Vuorio, 2010).

The current drive to reduce use of seclusion and restraint has its roots in patient safety and human rights. The need for reducing use of such restrictive measures has been addressed at the international level, through policy creation, as well as at the national level. The European Union (EU) and World Health Organization (WHO) have expressed concern about the human rights of people with mental health problems in their policies (Official Journal of the European Union C 76; WHOa). In Finland, the National Institute for Health and Welfare (THL) published a national plan for mental health and substance abuse work, MIELI, in 2009. MIELI presented principles and priorities for mental health work until 2015,

including a goal to reduce use of restrictive measures in mental health work. The target was to reduce the use of seclusion and restraint during involuntary psychiatric treatment, and to encourage voluntary psychiatric treatment instead of involuntary treatment (MIELI Plan, 2009).

The need for further action on reduction of the use of restrictive measures in psychiatric care is still being discussed. The European Committee for the Prevention of Torture and Inhumane or Degrading Treatment or Punishment (CPT) makes periodic visits to hospitals and pays attention to human rights themes. The CPT has visited state-run forensic psychiatric hospitals in Finland three times starting in 2003. Despite encouraging feedback from its latest visit, the CPT gave suggestions for improving on current restrictive clinical practices such as reducing use of restraint and of clothes that prohibit movement (CPT, 2015). In addition, Finnish guidelines on treating schizophrenia suggests minimizing the use of restrictive measures with pharmaceutical and non-pharmaceutical measures during inpatient psychiatric care, despite the lack of evidence of effectiveness of these alternative measures (Tuominen, 2013).

On the other hand, it is impossible to separate use of restriction from hospital violence and its impact on targeted patients. The present dissertation with four original publications was implemented in one of the two forensic psychiatric hospitals in Finland, with 284 beds for adult patients. The hospital admit three groups of patients; patients who have committed a crime but have been found not quilty for reason of insanity, patients who are difficult to care for in local hospitals, and patients who are undergoing forensic mental examination. These studies altogether aim to identify the factors associated with hospital violence in a forensic psychiatric setting, and to investigate whether reducing use of seclusion and restraint with the Six Core Strategies is possible and safe in forensic psychiatry. In clinical reality, nurses try to predict violent events by observing patients' clues and warning signs, and they use de-escalation tehchniques to prevent challenging situations with patients from escalating into violence (Lantta et al., 2016a). By identifying the factors associated with violent behaviour, efforts to improve care may focus on the relevant patient groups. Moreover, consideration for human rights is crucial when caring for the special group comprising patients who are treated involuntarily at forensic psychiatric hospitals. Therefore, improvement of care must be evidence-based. The results of this study provide information for improving inpatient care and add to current knowledge on re-organizing the social and healthcare systems in Finland. The study highlights the need for inpatient beds and specialised care for patients exhibiting violent behaviour; to date it has been inappropriate to organise this kind of specialised care in local hospitals.

2 Review of the Literature

2.1 DEFINITIONS AND LEGISLATION CONCERNING SECLUSION AND RESTRAINT USE

2.1.1 Definitions of violence

The World Health Organisation defines violence as "the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, which either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment, or deprivation" (WHOb). Guidelines for short-term management of violence and aggression by the National Institute for Health and Care Excellence (2015) state that "violence and aggression refer to a range of behaviours or actions that can result in harm, hurt, or injury to another person, regardless of whether the violence or aggression is physically or verbally expressed, physical harm is sustained, or the intention is clear" (National Institute for Health and Care Excellence, 2015).

The target of violence in hospitals determines the perspective from which it is viewed; clinically the target may be patient or staff. Some estimated 8–38% of healthcare workers are assaulted at least once during their career (WHOc). Assaults against healthcare staff are generally reported from mental health and learning disability settings, as well as from ambulance staff, primary care staff, and acute hospital staff. In mental health services, violence most frequently occurs in inpatient psychiatric units (National Institute for Health and Care Excellence, 2015). This dissertation takes a clinical perspective of hospital violence.

One common drawback of models that explain violent behaviour is that they incorporate a combination of several perspectives (Duxbury, 2002; Lantta et al., 2016a). An example of a framework from one of these models for hospital violence includes a combination of internal, external, and situational factors. This framework accounts for internal and external characteristics of the patients and staff as well as interaction between staff and patients and the organisation of care (Duxbury, 2002). A general aggression model integrates social and cognitive aspects of aggression and violence. This model is a framework that describes aggression and violence by combining personality, individual traits, situation, and individual decision-making processes. This model may be used as a structure to explain or study different aspects of aggression and violence (DeWall et al., 2011; Sutton et al., 2013). The social climate of the ward is also an important factor for aggression and its prevention (McCann et al., 2015; Lantta et al., 2016a).

2.1.2 Definitions of restrictive measures

The Mental Health Act of Finland (1116/1990) uses the term "special limitations" when describing restrictions used during psychiatric treatment. Such restrictions include isolation from other patients and tying a patient down with belts. The scientific literature uses the terms "seclusion" and "mechanical restraint" (Crenshaw & Francis, 1995; Sailas & Fentom 2000; Huckshorn 2006; Steinert & Lepping, 2008). Seclusion involves locking a patient inside a room alone so that he/she cannot leave the room independently. Mechanical restraint involves tying a patient into a bed with softened leather belts (Crenshaw & Francis, 1995; Steinert & Lepping, 2008). Another form of restraint, physical restraint, involves physically holding a patient. The term "restraint" used in this dissertation, refers to mechanical restraint unless otherwise defined.

Other restrictive measures that are implemented during involuntary psychiatric care in Europe include forced medication for long and short periods, time outs (during which the patient must stay in his/her room), constant observation, and ambulatory mechanical restraint (defined as the use of restraint devices that allow the patient to be out of bed and walking around) (Bak & Aggernæs, 2012). Various forms of restriction are used differently by 11 European countries (Denmark, Sweden, Norway, Finland, Iceland, Belgium, the Netherlands, the United Kingdom, Ireland, France, and Italy). All countries allowed the use of forced medication for short or long periods or both. The United Kingdom was the only country where mechanical restraint was not allowed, and Denmark did not allow the use of seclusion (Bak & Aggernæs, 2012).

2.1.3 Legislation concerning the use of seclusion and restraint during involuntary psychiatric treatment and forensic mental examination

One's fundamental rights, which are affirmed in the Constitution of Finland, may be limited only if allowed at the legislative level. The Mental Health Act stipulates the use of seclusion and restraint during involuntary psychiatric treatment. The same paragraphs of law stipulate the use of restrictions in both general and forensic psychiatry. In Finland: "a patient may be isolated from other patients against his/her will if: 1) the patient would, on account of his/her behaviour or threats, probably harm himself/herself or others; 2) the patient by his/her behaviour seriously hampers the treatment of other patients or seriously jeopardises his/her own safety, or would probably cause significant damage to property, or 3) it is necessary to isolate the patient for other, especially weighty therapeutic reasons" (Mental Health Act 1116/1990). A patient may be restrained only in the case of fulfilment of probable harm to himself/herself or other people. (Mental Health Act 1116/1990) A patient's right to self-determination, and other fundamental rights, may be limited during involuntary psychiatric treatment only to the extent necessary for treatment of the illness, for the person's safety, or for the safety of others. The restrictive "measures shall be undertaken as safely as possible and with respect for the patient's dignity. When choosing and determining the extent of a limitation on the right of self-determination, special attention shall be paid to the criteria for the patient's hospitalisation" (Mental Health Act 1116/1990). The principle of minimum restriction must be followed.

In addition to seclusion and restraint, other restrictive measures implemented against the patient's will and regulated by the Mental Health Act (1116/1990) are used in Finland. Such restrictions include: physical restraint, limitation of freedom of movement, taking possession of personal property, checking a patient's possessions, consignments to the patient, frisk and bodily search, and limitation of contacts. In addition to these restrictions, the Mental Health Act (1116/1990) regulates treatment of mental illness and physical illness against a patient's will during involuntary psychiatric treatment.

2.1.4 Delivery of forensic psychiatric services

Forensic psychiatric services in Finland are organised into two state-run hospitals and single wards at regional psychiatric hospitals. Three main laws are concerned with forensic psychiatry services: the Criminal Code of Finland, the Health Care Act, and the Mental Health Act. The Criminal Code stipulates the provisions on criminal responsibility. The Health Care Act determines the principles for delivering healthcare, while specific principles of psychiatric care are provided in the Mental Health Act (Mental Health Act 1116/1990). State mental hospitals perform tasks such as forensic mental examinations, forensic psychiatric treatment for patients found not guilty by reason of insanity and, finally, hospitalisation of patients deemed too dangerous and difficult to treat in municipal hospitals.

Three fourths of forensic mental examinations were performed in state mental hospitals in Finland in 2016. From 2012 to 2016, approximately 104 forensic mental examinations were performed annually (The National Institute for Health and Welfare, 2017). Forensic

mental examinations are performed under the supervision of a forensic psychiatrist, a specialised physician who is always a civil servant of the state (i.e. an employee whose salary comes from the state to ensure objectivity). The examination includes thorough and extensive data gathering from the healthcare system, schools, relatives, etc. The person undergoes a comprehensive psychiatric examination, standardised psychological tests, interviews by a social worker, observation by nurses, and a complete physical health examination, including several laboratory tests. The maximum duration for the forensic evaluation is two months; in rare, exceptional cases, two additional months are granted. However, in most cases, the process takes approximately five weeks. After a forensic mental examination, the court decides independently on the responsibility of the accused, having received the doctor's statement and a statement from the forensic psychiatry board at the National Institute for Health and Welfare (THL). The THL is left to determine treatment for persons found irresponsible by the court. In 2016, 37% of the persons examined were found not guilty by reason of insanity (THL, 2017). The THL decides on the treatment for the individual and the hospital where treatment will begin. Moreover, THL decides on the treatment of those found criminally irresponsible on the basis of intellectual deficiency.

Involuntary forensic psychiatric treatment will, in most cases, continue for several years in state mental hospitals. After the first court decision, THL gets involved only in cases where treatment is no longer required and termination of treatment is considered. Meanwhile during treatment, doctors reconsider the patient's situation once every six months in accordance with the Mental Health Act. Every decision is supervised by the Administration Court. The patient can also appeal to the Administration Court.

2.2 HOSPITAL VIOLENCE

2.2.1 Literature Search

The literature search for earlier studies and systematic reviews of hospital violence involved a combination of systematic and manual searches. Systematic searches of the PsychINFO, PubMed and Scopus databases were conducted in February 2017. The following terms were used to search the PsychINFO database: (violence and (psychiatric or mental) and inpatient*). The search was limited to peer-reviewed publications in the English language published between the year 2012 and February 2017. A total of 201 references resulted from the PsychINFO search. The same search terms and limits were used in the PubMed database which produced 186 references. The Scopus database produced 222 references. The systematic searches were performed by an information specialist at the University of Eastern Finland. This literature search was limited to hospital violence by perspective and purpose. A search for workplace violence would have produced broader reference lists. The titles of the articles were reviewed and the abstracts were read if the titles were considered relevant for the study subject. If the abstract included relevant information, the whole article was read (Appendix 1).

The manual search was conducted by reading the reference lists of the articles sourced from the systematic search, and the websites of various organisations such as the European Union, the World Health Organisation, and the producers of relevant guidelines. Moreover, publications after February 2017 were identified using the original search terms and included if relevant for the subject. Descriptive studies and reviews of hospital violence and of single measures to reduce hospital violence are presented in Appendix 2. Studies examining risk assessment methods for hospital violence are presented in Appendix 3, and programs aimed at reducing hospital violence are listed in Appendix 4. Studies and reviews published before 2012 were searched in association with each original publication process. For that reason this search was limited between the year 2012 and 2017. The selected studies and reviews on hospital violence and reduction are presented in Table 1.

2.2.2 Hospital violence in psychiatry

Hospital violence is investigated extensively, but differences in the systems for reporting violent incidents and in the definitions of reported violent behaviour complicate any comparison of the findings. Furthermore, the regulations and healthcare systems vary considerably between countries, adding to the challenge of objectively generalising and comparing study results (Cornaggia et al., 2011; Flannery et al., 2014). The most frequent form of hospital violence found in publications was verbal aggression, followed by violence towards objects and physical violence (Renwick et al., 2016a). Verbal aggression was also the most frequent form of violence observed in forensic psychiatry (Verstegen et al., 2017). Expressions of verbal aggression were described as abusive language, shouting, different forms of threats, racist comments, and expressions of anger with no precise definition (Stewart & Bowers, 2013). Nursing staff members were most frequently the targets of violence (Cornaggio et al., 2011).

The reported prevalence of violently behaving patients expressing verbal aggression was 51% (n = 264) of admitted patients. The prevalence of violently behaving patients varied from 56% (n = 291) (Renwick et al., 2016a) to 63% (n = 40) (Danivas et al., 2016). The prevalence of patients with at least one act of physical violence in acute psychiatric care was 17% in a meta-analysis of data from 23,972 patients (Iozzino et al., 2015). The literature reported 0.62 assaults per 1,000 patient-days from 2007–2013 based on data from 317 United States (US) hospitals (Staggs, 2015a). A cross-sectional study on staffing-assault rates that compared differences between hospital units found an association between staffing levels and the prevalence of hospital violence (Staggs, 2015b). In another study, each unit was its own control, the number of violent incidents targeting registered and non-registered nurses was compared over a 3-year study period, and monthly deviations in staffing-assault rates were analysed. This study found no association between the number of violent incidents and registered nurses' work hours compared to non-registered nurses' work hours (Staggs, 2016).

Hospital violence can involve aggressors other than the patient. An observational study from India reported patients' relatives, security staff, and ward assistants as aggressors (Danivas et al., 2016). Violence most often targeted a patient in those incidents, but relatives and other staff members were also targets. Cultural characteristics might explain the differences in the targets of violence, as well as disparities in economic reality. In India, relatives spend more time in direct contact with patients than staff (Danivas et al., 2016).

Table 1. Selected studies and reviews on hospital violence and reduction.

Authors, country	Purpose	Study design and sample	Results relevant to study subject
Abderhalden, C., Needham, I., Dassen, T., Halfens, R., Haug, H-J. & Fisher, J. (2008) Switzerland	To assess whether a structured risk assessment reduces violent incidents and use of coercion in psychiatric in-patient care.	• A randomised controlled trial. • 14 acute psychiatric admission wards were the units of randomisation.	Adjusted risk ratios suggested 41% reduction in severely aggressive incidents and 27% decline in the use of coercive measures (forced injection, seclusion, and mechanical restraint).
Bader, S. M., Evans, S. E. & Welsh, E. (2014) United States of America	To identify rates of inpatient aggression and describe the severity of aggression in a forensic psychiatric inpatient facility.	• No study design mentioned. • 52,109 documented acts of aggression between 2009 and 2013 in a 1,500-bed forensic psychiatric hospital.	Increased violence during meals, medication, and shift change. Violence targeted patients in 62% of incidents, and staff members in 38% of incidents. More violent acts occurred during fall and winter than in spring and summer, but no difference in severity of violence. More severe violence occurred during the swing shift than during the morning and overnight shifts ($p = 0.001$) and when staff members worked overtime ($p = 0.050$).
Chalmers, A., Harrison, S., Mollison, K., Molloy, N. & Gray, K. (2012) Australia	To reflect the implementation of sensory-based approaches within psychiatric unit.	• A prospective intervention study. • 109 patients with 126 visits to a sensory room, 29-bed psychiatric unit, 10-month study period from July 2009 to April 2010.	Preliminary results showed significant reduction in distress level during the visit to the sensory room. Patients reported that the sensory room experience reduced the following problems: anxiety (39%), restless (22%), agitation (17%) and distress (15%).
Dack, C., Ross, J., Papadopoulos, C., Steward, D. & Bowers, L. (2013) Worldwide	To combine earlier study results of inpatient aggression and assess the strength of the association between patient factors and aggressive behaviour and patient factors and repetitive aggressive behaviour.	• A systematic review and meta-analysis. • Empirical articles and reports of comparison studies of aggression and non-aggression in adult psychiatry.	Factors associated to in-patient violence: young age, male gender, involuntary admission, not being married, a diagnosis of schizophrenia, previous admissions, a history of violence, a history of self-destructive behaviour, and history of substance abuse. Factors associated with repetitive aggression: not being male, history of violence and history of substance abuse.
Flannery, R. B. Jr., Wyshak, G., Tecce, J. J. & Flannery, G. J. (2014) Worldwide (except the United States)	To assess the characteristics of assaultive psychiatric patients in community and inpatient settings.	• A review. • Literature searches on PubMed and PsychINFO from 2000 to 2012, adult patients, English language, raw data for the total number of violent incidents and basic characteristics of patients available. A total of 45 studies, and 30,500 patients included.	Male and female patients with schizophrenia, affective disorders, personality disorders and other diagnoses presented the greatest worldwide risk for community and inpatient violence.
Hermanstyne, K. A. & Mangurian, C. (2015) Worldwide	To explore the evidence supporting the efficacy of behavioural interventions for reducing inpatient violence.	• A systematic literature review. • Search on PubMed/Medline databases, English language, adult patients, behavioural strategies targeted to violent behaviour.	13 articles were found. There is a lack of evidence of efficacy of behavioural strategies on violence reduction, and the prevalence of violence in inpatient units. Two RCTs might help guide development of programs to reduce violent behaviour.

To be continued

Table 1 continues

Authors, country	Purpose	Study design and sample	Results relevant to study subject
Lavelle, M., Steward, D., James, K., Richardson, M., Renwick, L., Brennan, G. & Bowers, L. (2016) United Kingdom	To explore the factors that influence the use of de-escalation and its successive conflict management.	• A retrospective case note analysis. • 522 patients on 84 acute psychiatric units in randomly selected 31 hospitals in London and surrounding area, patients' involvement in conflict or containment was recorded during the two weeks after admission between July 2009 and March 2010.	53% of patients experienced de-escalation during the two first weeks in psychiatric care. De-escalation was successful in 60% of the cases. Successful de-escalation preceded fewer and less aggressive conflict events compared with unsuccessful de-escalation. Patients with history of violence experienced de-escalation more often and it was more often unsuccessful.
Olsson, H., Audulv, A., Strand, S. & Kristiansen, L. (2015) Sweden	To attempt to understand inpatients' experiences of decreased and increased risk for violent behaviour.	• Interpretive description. • Semi-structured interviews with 13 forensic psychiatric inpatients, who were less aggressive and had been successfully placed to lower levels of security services.	The patient's own strategies to avoid violence were working to increase personal insight, manage aggression, cope with illness and attend to warning signs. The staff's attitudes were central to reducing or increasing violent incidents. Patients valued the availability of staff to them and staff making them feel respected. In challenging situations, patients wanted to be treated respectfully, for example talking privately with staff, not in front of other patients and not challenging back when the patient was behaving in challenging way.
Papadopoulos, C., Ross, J., Stewart, D., Dack, C., James, K. & Bowers, L. (2012) Worldwide	To investigate the types of prospectively reported antecedents of aggressive and violent incidents and to estimate the proportion of violence they each account for.	• A systematic literature review. • Peer-review journal article papers, book chapters or reports with primary empirical data, English language, between 1960 and 2009.	59 studies reported the antecedents which were categorized into 9 themes. Staff-patient interaction was the most common theme, occurring prior to 39% of the incidents. Other themes: Patient-patient interaction, patient conflict behaviours, external/ personal, structural issues, patient behavioural cues, patient emotional/mood cues, patient symptoms, and no clear cause.
Stewart, D. & Bowers, L. (2013) United Kingdom	To examine, how frequently patients were involved in incidents of verbal abuse, shouting, making threats, showing anger or making racist comments.	• Cross-sectional, retrospective case note study. • 522 patients form 84 acute psychiatric wards in 31 randomly-selected hospitals in London and the surrounding area, data for conflicts and containment measures during the 2 weeks immediately after admission; patients between July 2009 and March 2010, standardized data collection with Patient Staff Conflict Checklist.	1,398 incidents of verbal aggression, reported half of the sample. Types of verbal aggression: abusive language, shouting, threats, expressions of anger and racist comments. Staff was most frequently targeted for aggression. A history of violence and previous substance abuse were associated with verbal aggression.
van de Sande, R., Nijman, H., Noorthoorn, E., Wierdsma, A., Hellendoorn, E., van der Staak, C. & Mulder, C. (2011) The Netherlands	To evaluate the effect of risk assessment on the number of aggression incidents and time in seclusion in acute psychiatric wards.	• A cluster-randomised controlled trial. • Four wards, two intervention and two control wards, 40-week period (n = 597 patients).	The number of aggressive incidents (RRR = -68%) decreased significantly. Duration of seclusion decreased significantly more in intervention wards than in control wards (RRR = -45%). The number of seclusion episodes or patients did not decrease.

A worldwide analysis of psychiatric patient violence found that male and female patients with schizophrenia, affective disorders, personality disorders, and other primary psychiatric diagnoses presented the greatest risk of perpetrating violence (Flannery et al., 2014). The patient-related factors associated particularly with hospital violence include: younger age, (Cornaggia et al., 2011; Newton et al., 2012; Dack et al., 2013), involuntary admission (Cornaggia et al., 2011; Dack et al., 2013), not being married (Dack et al., 2013), a greater number of previous admissions (Newton et al., 2012; Dack et al., 2013), a history of violence (Cornaggia et al., 2011; Dack et al., 2013), a history of self-destructive behaviour (Dack et al., 2013), a history of substance abuse (Cornaggia et al., 2011; Dack et al., 2013), impulsiveness/hostility (Cornaggia et al., 2011), and the same gender of aggressor and victim (Cornaggia et al., 2011). Weaker evidence of the following as patient-related factors associated with hospital violence was identified: estimated intelligence below average, no history of employment, homelessness (Newton et al., 2012), a diagnosis of psychosis, and risk for suicide (Cornaggia et al., 2011).

In clinical reality, patients' current use of alcohol or drugs during the shift on the wards seemed unrelated to incidents of physical violence, but incidents of substance use might be related to verbal aggression (Stewart & Bowers, 2015). Acute intoxication by substance at admission increased the risk of the patient being subjected to restrictive measures (Andersen & Nielsen, 2016). In a meta-analysis by Iozzino et al. (2015), wards with more male patients, more patients with alcohol use disorders, and more involuntary admissions had more patients who committed acts of violence.

The most frequently reported situational factor predicting hospital violence was staff-patient interactions (Papadopoulos et al., 2012), including rule-breaking, administration of mediction or restrictive measures (Renwick et al., 2016a), and situations in which the staff noticed patient behavioural, emotional, or mood cues (Papadopoulos et al., 2012; Lantta et al., 2016a). Patient-patient interactions were also a situational factor predicting hospital violence (Papadopoulos et al., 2012). Furthermore, staff commonly did not realize the clear cause for violence (Papadopoulos et al., 2012; Renwick et al., 2016b). Patient symptoms were reported as antecedents to violent incidents, in addition to patient conflict behaviours (e.g. attempts to abscond, substance misuse), structural issues within the ward, and, finally, patients' personal issues, such as money issues or unresolved family problems (Papadopoulos et al., 2012).

2.2.3 Special characteristics of hospital violence studies from forensic psychiatry

Research on hospital violence in forensic psychiatric settings focuses primarily on risk assessment, and secondarily on a special group of chronically violent patients. No unequivocal information on a comparison of the amount of hospital violence between general and forensic psychiatry exists. Previous violence is a well-known risk factor for future violence (Webster et al., 1997). This fact leads to the assumption that hospital violence is expected in forensic psychiatric facilities. In a study on high security forensic services in California, USA, 5,219 violent incidents occurred over three years and during an 8-month study period (Bader et al., 2014). The hospital had 1,500 beds, and the number of violent incidents seemed higher than reported levels of assaults in general psychiatric hospitals in the US (which was 0.62 assaults per 1,000 patient-days from 2007–2013 in data from 317 hospitals; Bader et al., 2014; Staggs 2015a). Yet the chronically violent patients, a minority, generated most of the violent incidents in forensic psychiatric settings (Weizmann-Henelius & Suutala, 2000; Lussier et al., 2010; Vojt et al., 2010; Verstegen et al., 2017). Furthermore, evidence from a register study of the mental health trusts with high security hospitals in England showed higher rates of violent incidents leading to sick leave, compared to trusts without high security hospitals (Renwick et al., 2016b).

Several studies have tested the efficacy of risk assessment tools on predicting hospital violence in forensic psychiatry. The value of predicting hospital violence is the provision of an opportunity to intervene and prevent violence. Special risk assessment instruments for

hospital violence, such as the Brøset Violence Checklist (BVC: Almvik et al., 2000; Woods et al., 2015) and the Dynamic Appraisal of Situational Aggression (DASA: Ogloff & Daffern, 2006; Vojt et al., 2010), as well as the more general risk assessment measure, the Historical Clinical Risk Management-20 Clinical scale Version 3 (HCR-20 V3; Douglas, 2014; Hogan & Olver, 2016), have proven effective for predicting hospital violence in a forensic psychiatric setting (Chu et al., 2013). These instruments each evaluate 5 to 7 different current clinical factors; some factors are shared among the instruments (Table 2).

Other risk assessment measures that have proven accurate for predicting inpatient violence in forensic psychiatry are the Short-Term Assessment of Risk and Treatability (START: Hogan & Olver, 2016; O'Shea et al., 2016), the Violence Risk Scale (VRS: Hogan & Olver, 2016), an earlier version of the HCR-20, and a Structured Assessment of Protective Factors for Violence Risk (SAPROF: de Vries Robbé et al., 2016; de Vogel et al., 2009). The START evaluates protective factors and vulnerabilities of the patient as well as certain risk factors (START: Webster et al., 2009). The START is a framework for evaluating a patient's current situation. The VRS assesses both violence risk and treatment-related change using static and dynamic items (Wong & Gordon, 1999–2003).

Predictive accuracy for hospital violence over a short time period is stronger using dynamic risk factors than static risk factors (Chu et al., 2011; Table 3). Accuracy is probably based on a risk factor's sensitivity to variation in patients' clinical state during inpatient care (Chu et al., 2011). Despite the value of several risk assessment instruments for predicting hospital violence, their use for reducing hospital violence has scarcely been reported. In addition to risk assessment, the BVC (first mentioned two paragraphs above) includes built-in de-escalation practices if the scores accomplish the specified level. For this reason, BVC has proven successful at reducing hospital violence at the unit level in acute psychiatry in randomised clinical trials (Abderhalden et al., 2008; van de Sande et al., 2011).

Table 2. The items of the violence risk assessment methods BVC, DASA, and HCR-20 Clinical scale (Chu et al., 2013)

Items	BVC	DASA	HCR-20 Clinical scale
Confusion	x		
Irritability	x	x	
Boisterousness	x		
Physical threats	x		
Verbal Threats	x	x	
Attacks on objects	x		
Negative attitudes		x	
Impulsivity		x	x
Sensitivity to perceived provocation		x	
Easily angered when requests are denied		x	
Unwillingness to follow directions		x	
Lack of insight			x
Negative attitudes			x
Active symptoms of mental illness			x
Unresponsiveness to treatment			x

Table 3. Predictive value of different risk assessment measures in different studies (AUC: >0.90 = outstanding discrimination, 0.80-0.89 = excellent, 0.70–0.79 = acceptable, 0.60-0.69 = modest, 0.50 = equal to chance, Chu et al., 2013).

Study	BVC	Dasa	HCR-20 Clinical scale	HCR-20V3	START	VRS	SAPROF
Chu et al., 2013	acceptable	acceptable	modest				
Hogan & Olver, 2016				acceptable	acceptable[1]	modest	
de Vries Robbé et al., 2016			acceptable				acceptable
Woods et al., 2015	excellent[2]						
Vojt et al., 2010		acceptable					

[1]Vulnerability items
[2]Diagnostic category: psychosis

In forensic psychiatry settings, hospital violence is naturally directed towards those who are available: staff members, other patients, or the patient's self. The present literature searches did not include any reports of hospital violence towards relatives in forensic psychiatry settings. According to the literature, 62% (n = 3,436) of hospital violence targets were other patients, and 38% (n = 2,103) of targets were staff (Bader et al., 2014). Reports on the severity of hospital violence were from the perspectives of the consequences of the violence and the injuries to the victim. In a study from England, in mental health trusts with high security hospitals, the most commonly reported injuries were contusions and bruising as opposed to strains, sprains, and fractures in trusts without high security hospitals (Renwick et al., 2016a). The consequences of hospital violence toward the victim mostly involved the need for minor first aid or no injuries (Bader et al., 2014). On the other hand, a study from Australia reported very serious injuries, even deaths, of other patients (Lee at al., 2015). The psychological effects of those very serious acts of hospital violence to staff have been studied. Few differences were observed in posttraumatic stress and distress, evaluated before and after the homicides in the Australian study (Lee et al., 2015).

Researchers have identified the following patient-related factors associated with special groups of chronically violent patients in forensic psychiatry settings: antisocial personality disorder (Lussier et al., 2010; Bader & Evans, 2015), brain damage (Lussier et al., 2010), cognitive impairments (Lussier et al., 2010), a history of suicide attempts (Bader & Evans, 2015), and psychiatric hospitalisation as child or adolescent (Bader & Evans, 2015). Compared to general psychiatric settings, hospital violence incidents in forensic psychiatry settings may more frequently be preceded by recognisable triggers (Renwick et al., 2016b). For example, some studies report that female patients behave aggressively more frequently than male patients in forensic psychiatry settings (de Vogel et al., 2016; Selenius et al., 2016; Verstegen et al., 2017). In a study by Verstegen et al. (2017), the prevalence of patients that engaged in physical hospital violence between 2008 and 2012 was 27.2% (n = 137). Another study by Selenius et al. (2016) showed that over half of the female patients under forensic psychiatric care were verbally and/or physically aggressive towards staff or other patients during care. When considering the prevalence of hospital violence from the staff's perspective, reports show that up to 70% of the staff (N = 348) were targets of an assault within the most recent 12 months (Kelly et al., 2014). Only one study analysed seasonal variation of hospital violence and found no significant variation between the months of the year (Verstegen et al., 2017).

2.2.4 Measures to prevent hospital violence

The strategies which prevent or reduce violent behaviour in inpatient psychiatric settings, include verbal and/or nonverbal de-escalation techniques, and psycho-social strategies. Some studies also suggest that patients' self-directed strategies may prevent hospital

violence, but to date there are no reports on the beneficial effects of these strategies (Dickens et al., 2013a; Olsson et al., 2015). De-escalation is a largely accepted and recommended measure used to help patients to gain control of their behaviour in challenging situations. De-escalation might involve verbal and/or non-verbal communication (Lavelle et al., 2016). Although de-escalation is recommended, reports of successful and unsuccessful use of this measure are scarce. The general circumstances prior to de-escalation use appear related to successful use of de-escalation. Lavelle et al. (2016) reported that 53% (N = 522) of patients studied in a large sample of acute inpatient psychiatry settings experienced de-escalation, and 61% (n = 476) of the conflict situations for which de-escalation was used was successful. Conflicts may be fewer and less aggressive after successful uses of de-escalation compared to unsuccessful uses (Lavelle et al., 2016).

The Brøset Violence Checklist (BVC) successfully reduced hospital violence in acute psychiatry units in two randomised clinical trials (Abderhalden et al., 2008; van de Sande et al., 2011). A probable explanation for this measure's success is that, in addition to risk assessment, the BVC includes a built-in de-escalation practice if the risk scores reach the specified level. One form of nonverbal de-escalation, sensory modulation, entails one's ability to regulate and organise responses to sensory input appropriately to adapt to the challenges presented by daily life. Evidence of the effectiveness of the goal-oriented characteristics of sensory modulation in reducing violence is lacking, but this form of de-escalation is a promising addition to the range of effective options for distress management and disturbed behaviour (Novak et al., 2012; Sutton et al., 2013; Björkdahl et al., 2016). Single healthcare units have provided some evidence of the effects of self-rated sensory modulation experiences on distress reduction (Chalmers et al., 2012, Novak et al., 2012; Lloyd et al., 2014; Winglesworth & Farnworth, 2016). Also, patients have reported using sensory rooms because of feelings of anxiety, restlessness, agitation and distress. Furthermore, preliminary results of an Australian study showed that self-reported and staff-reported rates of distress decreased significantly during sensory room stays (Chalmers et al., 2012).

Except for studies of the BVC, randomised controlled studies on the effectiveness of non-pharmaceutical alternatives to seclusion and restraint use in challenging situations are lacking (Muralidharan & Fenton, 2006). However, recently published reviews of certain psycho-social treatment programs highlight promising results on the ability of these programs to reduce violence among people with severe mental illness (Hermanstyne & Mangurian, 2015; Darmedru et al., 2017; Tolisano et al., 2017). Published studies of promising treatment programs to date were based on principles of cognitive behavioural therapy (Hermanstyne & Mangurian, 2015; Tolisano et al., 2017), cognitive remediation therapy, and social cognitive training (Darmedru et al., 2017). Furthermore, equine-assisted psychotherapy was associated with reduced violence for long-term inpatients at the three-month follow-up (Nurenberg et al., 2015). In addition, both equine-assisted and canine-assisted psychotheraphy reduced the need for one-to-one special observation with long-term psychiatric inpatients (Nurenberg et al., 2015).

Patient involvement may be an important characteristic factor of these programs and equine-assisted methods. Some suggest that staff training on de-escalation and the use of physical interventions do not reduce hospital violence (Laker et al., 2010). Furthermore, Lantta et al. (2016b) found that only a minor group of patients agreed to participate in a violence risk assessment study that tested the Dynamic Appraisal of Situational Aggression (DASA) method. Although the DASA accurately predicted hospital violence by study participants, scoring was inconsiderate of the participants themselves. Inconsiderate scoring may hinder participant involvement in aggression management, which should occur within confidential relationships with staff (Lantta et al., 2016b). Patient involvement is critical for aggression management. One example of an aggression management tool used with patient involvement is Fluttert et al.'s (2011) tool for nurses working with

patients on early warning signs. A study protocol for a nationwide cluster-randomised controlled trial of user-driven intervention of aggression prevention will be implemented in Finland (Välimäki et al., 2017).

Patients' perspectives on hospital violence and its prevention in forensic psychiatry settings differ from professionals' perspectives (Dickens et al., 2013a). Patients are generally more optimistic than nursing staff of their ability to change violent behaviour (Dickens et al., 2013a). Patients also recognise the need for the use of several techniques to prevent and manage violent behaviour (Dickens et al., 2013a). Patients' own means of avoiding violence included an ongoing inner dialog to encourage oneself by increasing self-esteem and trying to accept the situation. Patients, for example, seek help from staff when feeling ill and participate in their treatment. They also expect respect and a proactive staff. In threatening situations, patients wanted the staff to get involved at an early stage. They wished staff members were present on the ward to reduce frustration and maintain a calm environment (Olsson et al., 2015).

Although hospital violence is a problem in forensic psychiatry, patient participation in studies on effective risk management in forensic psychiatry settings is still scarce (Eidhammer et al., 2014). The same is also evident in general psychiatry settings as well (Välimäki et al., 2017). Along with increasing patient involvement in aggression management during research, there are recently published studies comprising interviews with patients' relatives on inpatient violence management (Kontio et al., 2017). Parents' experiences with their child's offenses have also been studied (Askola et al., 2017).

2.3 SECLUSION AND RESTRAINT USE DURING INVOLUNTARY PSYCHIATRIC TREATMENT

2.3.1 Literature Search

The literature search for earlier studies and reviews of reduced use of seclusion and restraint involved a combination of systematic and manual searches. Systematic searches of the PsychINFO, PubMed and Scopus databases were conducted in February 2017. The following terms were used to search the PsychINFO database: ([restrain* or seclu* or isolate* or coersi*] and [psychiatric or mental] and [inpatient* or hospital*] and [reduc* or prevent*]). The search was limited to peer-reviewed publications in the English language published between the year 2012 and February 2017. A total of 135 references resulted from the PsychINFO search. The same search terms and limits were used in the PubMed database which produced 150 references. The Scopus database produced 256 references. The systematic searches were performed by an information specialist at the University of Eastern Finland. The titles of the articles were reviewed and the abstracts were read if titles were considered relevant for the study subject. If the abstract included relevant information, the whole article was read (Appendix 5).

The manual search was conducted by reading the reference lists of the articles sourced from the systematic search, and the websites of various organisations such as the European Union, the World Health Organisation, and the producers of relevant guidelines. Moreover, studies and reviews published after February 2017 were identified using the original search terms and included if relevant for the subject. Studies and reviews published before 2012 were searched in association with each original publication process. The selected publications on programs aimed at reducing seclusion and restraint are presented in Appendix 6; some of these studies reviews are presented in Table 4.

2.3.2 Controversial background aspects regarding seclusion and restraint reduction

The current drive to reduce use of seclusion and restraint was incited by patient safety issues. At the turn of the 21st century, tens of restraint-related patient deaths were made public in the USA (Weiss et al., 1998; Huckshorn, 2006). Since then, procedures for reducing and eliminating use of seclusion and restraint have been developed. The reasons for

physical-restraint-related deaths were analysed (Hem et al., 2001; Nunno et al., 2006; Berlanovich et al., 2012), and measures of physical and mechanical restraint were developed to enhance their safety (Hem et al., 2001; Parkes et al., 2011; Barnett et al., 2012; Barnett et al., 2013; Barnett et al., 2016). In addition to the deaths in the US, other non-lethal disadvantages of the use of restrictive measures were reported, as were some advantages experienced by some patients. A review from the Cochrane Library by Sailas and Fenton (2000) on seclusion and restraint, published 17 years ago, concluded that no trials exist that assess the effects of these measures on psychotic patients. Despite this conclusion, seclusion and mechanical restraint are still largely used in involuntary care of psychiatric patients. Publications on objective characteristics like efficacy and safety of seclusion and mechanical restraint are still scarce, but studies that focus on patients' subjective experiences and the prevalence of seclusion and mechanical restraint use have recently been published (Bergk et al., 2010).

Restrictive measures deeply insult the patient's human rights; they appear countertherapeutic, and they consume resources from care (Lebel & Goldstein 2005; Ezeobele et al., 2014; Cusack et al., 2016). Some patients experience seclusion and restraint negatively and as a form of punishment (Keski-Valkama et al., 2010; Ezeobele et al., 2014). One study described seclusion as an opportunity for staff to exert their power, and a form of rejection and deprivation (Ezeobele et al., 2014). Cusac et al. (2016) concluded that the use of restraint (physical or mechanical) is detrimental to patients and staff, but for different reasons. Restraint causes distress, fear, and increased risk of physical injury, leading to situations in which restrictions hamper the relationship between the patient and the healthcare professional (Cusack et al., 2016). Some patients did not remember being placed in seclusion, while others reported that seclusion had a positive effect on them as it calmed them down or provided a time and place to meditate and spend time alone without a roommate (Steinert et al., 2013; Ezeobele et al., 2014).

In addition to causing distress, fear, and increased risk of physical injury (Cusac et al., 2016), the use of seclusion and restraint is an ethical dilemma for nurses and physicians (Cleary et al., 2010; Kontio et al., 2010). Nurses must balance the best interests of individual patients and other persons and should consider the resources used on seclusion and restraint procedures. In clinical practice in Finland, physicians face ethical conflict as they make decisions after seclusion or restraint has already occurred (Kontio et al., 2010).

The principle of implementing the minimum restriction has raised the question of determining the least restrictive coercive measures and the order of severity by which to sort them. There is little evidence of a solution to this question (Bergk et al., 2010, 2011; Steinert et al., 2013). Concurrently implemented restrictive interventions are more detrimental than individually implemented interventions (Georgieva et al., 2012). Some patients believe that involuntary medication may cause less distress than seclusion and mechanical restraint (Georgieva et al., 2012). Moreover, some patients consider seclusion less restrictive than mechanical restraint (Steinert et al., 2013), but other studies produce neutral results regarding any difference between these two measures depending on the circumstances surrounding their implementation (Bergk et al., 2011, Steinert et al., 2013).

Despite little evidence of objective effects of seclusion and restraint for patients from randomised controlled trials, there is some evidence of improvement in mental health and behaviour during or after seclusion, mechanical restraint, and involuntary medication (Georgieva et al., 2012). Whether improvement would have been better with or without the use of restrictive measures is impossible to conclude, but it is noteworthy that the patients' conditions did not worsen with use (Georgieva et al., 2012). Furthermore patients subjected to seclusion and restraint had better subjective quality of life at discharge than those who did not undergo either measure during psychiatric treatment (Soininen et al., 2013). On the other hand, some patients demonstrated even probable symptoms of posttraumatic stress disorder one year after undergoing seclusion and mechanical restraint (Steinert et al., 2013).

The physiological risks of physical and mechanical restraint have been studied over the past 20 years. The main concern with mechanical restraint has been prevention of deep venous thrombosis which was first associated with mechanical restraint in 2001 (Hem et al., 2001). Administration of anticoagulants to patients subjected to seclusion and restraint may prevent deep venous thrombosis (De Hert et al., 2010), but evidence of the effectiveness of administering unfractioned heparin is inconsistent. Ishida et al. (2014) found no difference in the incidence of deep vein thrombosis between psychiatric patients who did or did not receve heparin before being subjected to restraint.

Studies on the risks of physical restraint have focused on the question of patient expiratory function and position. Barnett et al. (2012, 2013), Parkes et al. (2011), and Savaser et al. (2013) all studied the physiological impact of physical restraint on healthy adults. The prone restraint position can produce pressure on the anterior chest wall and restrict respiratory function (Barnett et al., 2013), as can the seated restraint position when a patient leans forward (Parkes et al., 2011). Respiratory function during restraint is further reduced when a patient is overweight. The clinical signifigance of restricted respiratory function is unclear since it had no impact on oxygen saturation of the participants (Parkes et al., 2011). However, participants in the experiment by Parkes et al. (2011) reported inability to breathe in the seated position when leaning forward. Savaser et al. (2013) found no significant differences in heart rate, oxygen saturation, nor systolic and diastolic blood pressure, even when they tested the prone position with weight applied to participants' backs (Savaser et al., 2013). Whether the physiological risks exist or not, the patient's experience during restraint may still be traumatic (Steinert et al., 2013). Barnett et al. (2016) found that a particular supported form of the prone position produced less anxiety, less limitation on ability to breathe, and more comfort for participants than the prone position implemented in other ways. Other physical risks associated with physical restraint have been given far less attention. Examples of such risks include metabolic acidosis and heart rate variations, especially since in clinical reality they are connected to physical struggle, medications, substances, and obesity (Barnett et al., 2012). These risks are naturally more complicated for study.

The prevalence of deaths related to seclusion and restraint is difficult to evaluate because of how irregularly such deaths are registered. Clearly these extremely serious cases are rare (Berzlanovich et al., 2012; Hall et al., 2015). Over an 11-year period in the USA, 45 child and adolescent fatalities related to physical or mechanical restraints were identified. The informational source of the fatalities was an authority in 8 cases, and public news for the remaining fatalities (Nunno et al., 2006). The delicate nature of the subject and inconsistent reporting systems provide little chance for drawing any conclusions regarding the prevalence of deaths related to seclusion and restraint.

In contrast, more than 2,000 sudden unexplained deaths of persons aged 1–22 years occur annually in the USA (Wang et al., 2014). In England, the incidence of sudden unexplained deaths was 2.33 per 10,000 mental health admissions. The contribution of restraint and seclusion to those deaths was unclear, but the use of certain psychotropic medications was a risk factor for sudden unexplained death (Windfur et al., 2011). For deaths related to physical restraint that are reported in academic literature, the prone position and the basket hold seated position are risk factors (Paterson et al., 2003; Nunno et al., 2006). However little objective evidence exists that supports prevalence of the use of these restraint positions compared to other restraint positions.

2.3.3 Descriptive factors associated with use of seclusion and restraint in psychiatry

The extents to which seclusion and restraint are used vary by country (Bak & Aggernæs, 2012; Kalisova et al., 2014), by geographical area within a country, and by ward within an institution (Husum et al., 2010; Janssen et al., 2013; Jacob et al., 2016). Percentages of patients who are secluded, restrained, or involuntarily medicated (with long-acting injections) range from 0 to 88% across wards (N = 1214 patients) (Husum et al., 2010). In a

study involving 10 European countries, 38% (n = 770) of participating patients experienced restriction at least once during hospitalization (Kalisova et al., 2014). In a Norweigian study, 424 patients (35%) had been secluded, 117 (10%) restrained, and 113 (9%) given involuntary long-acting injection. There were also compositional differences in the use of restrictive measures, especially in the use of restraint. Apparently, ward characteristics substantially influence the use of seclusion, restraint, and involuntary medication, even after adjusting for patients' individual psychopathlogy. (Husum et al., 2010)

In addition to the reduced use of seclusion and restraint, it appears few patients require their use. According to the literature, these patients are typically under the age of 36 years and have a risk of violence toward others and a history of seclusion (Bullock et al., 2014). In addition to a young age, a longer hospital stay was a risk factor for multiple mechanical restraint episodes in a Spanish study (Guzman-Parra et al., 2016a) and in a Norweigian study (Knutzen et al., 2014). Males tend to be restrained for longer durations than females (Jacob et al., 2016). Re-admission within 30 days of discharge prevented multiple mechanical restraint episodes in the Spanish study (Guzman-Parra et al., 2016a). However, in the Norweigian study multiple admissions were associated with increased risk of restraint (Knutzen et al., 2014). Severe psychotic symptoms or psychological impairment, increased numbers of perceived restrictions at admission, and uncooperativeness were associated with the use of restrictions (Georgieva et al., 2010; Kalisova et al., 2014). In a Danish study the duration of mechanical restraint seemed to cumulate for 23 out of 45 patients in forensic psychiatry. These patients were subjected to restraint for about 90% of the total annual duration (N = 20,475.9 hours) of restraint (Gildberg et al., 2015).

Environmental factors like the presence of outdoor space, the presence of special safety measures, and a larger number of patients in a facility all increased the risk of seclusion use (van der Schaaf et al., 2013). On the contrary, more private space per patient, a higher level of comfort, and greater visibility on the ward decreased the risk of seclusion (van der Schaaf et al., 2013). Restraint episodes occurred more frequently during evening shifts than during the morning shifts in a study from the U.S. (Jacob et al., 2016).

Understandably, nurses' ability to empathize was associated with reduced use of seclusion and restraint, but staff training on mindfulness-based empathy showed no benefit for reduced use of restrictions (Yang et al., 2014). Furthermore, besides internal factors related to coercion use, some extramural factors that increased the risk of subjection to restrictive measures were recently identified. Such factors include involuntary admission and acute intoxication by a substance at admission (Andersen & Nielsen 2016).

2.3.4 Seclusion and restraint reduction

Legislative changes appear ineffective at reducing the use of seclusion and restraint (Keski-Valkama et al., 2007; Vruwink et al., 2012). Instead, other successful strategies exist that guide the development of organisations toward such goals. The common thread in the policies that succeed at reducing the use of seclusion and restraint is that they are based on several strategies (National Association of State Mental Health Program Directors (NASMHPD); Huckshorn 2006; Borckardt et al., 2011; Madan et al., 2014; Wieman et al., 2014; Espinosa et al., 2015; Bowers et al., 2015; Smith et al., 2015; Blair et al., 2016; Goulet et al., 2017). Moreover, they often target a change to the culture of care.

One largely used policy, the Six Core Strategies for Reducing Seclusion and Restraint Use (Huckshorn, 2006; NASMHPD), is a combination of measures that aim to change actions in organisations and to enhance interaction between staff and patients (Huckshorn 2006; Maguire et al., 2012; NASMHPD; Wieman et al., 2014; Smith et al., 2015). Leadership is considered the most important strategy of the Six Core Strategies, and involves development of the values and goals and establishment of an action plan for reducing the use of seclusion and restraint. Leaders must also identify and inform the individuals responsible for implementing the action plan, and support the goals constantly during the change in culture.

Data collection on the characteristics and use of restrictive measures, and use of the data during organisational development to inform practice is the second of the Six Core Strategies. Reducing the use of seclusion and restraint means a cultural change, which assumes workforce development, which is the third strategy. For example, new means of preventing conflicts in the units and knowledge on self-management skills are required for a successful reduction program.

The fourth of the Six Core Strategies is the use of seclusion and restraint reduction tools such as individual crisis planning for challenging moments. The fifth strategy enhances the patient's role in hospitals, which is essential for reducing seclusion and restraint. The sixth strategy uses techniques for debriefing on seclusion, restraint, and violence incidents. Debriefing includes a root cause analysis of the incidents and an evaluation to determine the kind of support required by a patient after seclusion and restraint episodes. The main principle behind the Six Core Strategies is constant quality evaluation and development (Huckshorn 2006; NASMHPD). These strategies are used in the USA, Europe, and Australia (Ching et al., 2010; Borckardt et al., 2011; Maguire et al., 2012; Wieman et al., 2014; Smith et al., 2015).

Another well-known policy, the Safewards model, consists of simple interventions for improving relationships between staff and patients (Bowers et al., 2015). The Safewards model is freely available on the Internet and comprises ten evidence-based interventions aimed at preventing conflicts in psychiatric units. One intervention that is suitable for use in psychiatric wards, is the calm down method, a box full of various easily-implemented supplies, such as herbal tea and massage balls. The Safewards model was developed in the UK and has been translated into several European languages (Safewards).

Abderhalden et al. (2008) and van de Sande et al. (2011) saw reduced hospital violence after using the Brøset Violence Checklist (BVC, originally developed by Almvik et al., 2000) as well as reduced use of restrictive measures, as a secondary result, in the units they studied. The risk assessment method they used is a combination of risk assessment and de-escalation segments. The risk assessment segment assesses "confusion, irritability, boisterousness, verbal threats, physical threats, and attacks on objects as either present or absent" (Almvik et al., 2000). The de-escalation segment is used if two of the risk factors are present. De-escalation techniques include general conversation directed at reducing aggression, meaningful things to do like walking outdoors, reduced demands, relaxation exercises, and techniques that involve milder forms of coercion such as confrontation regarding ward rules and increased medication dosages (Abderhalden et al., 2008).

Finally, some reports demonstrate that combinations of elements from the Six Core Strategies and the violence risk assessment method, and of the Six Core Strategies with changes to the patient's physical environment, reduce the use of seclusion and restraint (Borckardt et al., 2011; Madan et al., 2014; Blair et al., 2016). Jungfer et al., (2014) implemented a less restrictive hospitalwide policy that included one-to-one care in crisis situations, training on de-escalation strategies, implementation of psychotherapeutic approaches, and standardized crisis management for suicidal tendencies and aggression. Jungfer's team changed two closed wards into open wards and managed the percentage of patients with at least one seclusion episode less than normal at the hospital level (Jungfer et al., 2014). Implementing some elements of the Six Core Strategies also led to significantly reduced use of mechanical restraint in a small study from Spain (Guzman-Parra et al., 2016b), and in seclusion use in a small study from Australia (Ash et al., 2015), as well as significantly reduced duration of restraint use in Finland (Kontio et al., 2014). In the Spanish study, reduced use of mechanical restraint was achieved prior to developmental changes in the protocol for use of mechanical restraint (Guzman-Parra et al., 2015).

Single means of psychiatric treatment that have been associated with reduced use of restrictive measures is most often the means of medication. For example, early management using medication is associated with management without the use of seclusion and restraint (Goldbloom et al., 2010). Use of restraint was 5.5 times more frequent with patients whose

medication remained unchanged for the first 48 hours of hospitalisation (Goldbloom et al., 2010). Early use of clozapine, in a Romainian study, led to highly reduced rates of restraint use (Ifteni et al., 2017). In the Netherlands, seclusion had been replaced with increased use of enforced sedation or intramuscular haloperidol, with or without benzodiazepine; this practise did reduce use of seclusion or hospital violence in a 6-year-long prospective study (Verlinde et al., 2017). Yet, administration of haloperidol with benzodiazepine successfully reduced use of seclusion in a study by Georgieva et al. (2013). In the Netherlands, Boumans et al. (2014) implemented a process form for patients' care plans and managed to reduce the number of seclusion incidents and the total duration of seclusion, compared to control wards. This methodical approach was implemented as part of a seclusion reduction program in the study hospital. Use of sensory modulation with a sensory room successfully reduced the rate of seclusion use in an acute mental health inpatient unit in an Australian study. The sensory room was used in place of seclusion. In addition, sensory room use reduced self-rated distress (Lloyd et al., 2014).

Finnish patients suggested organisation of meaningful activities during psychiatric treatment and creation of a therapeutic atmosphere at the hospital, in addition to proper biological treatment and empathetic patient-staff interaction, as alternatives to seclusion and restraint (Kontio et al., 2012).

One challenge for reducing the use of seclusion and restraint is ensuring the reduction remains permanently. The national goal for seclusion use in the Netherlands was a 10% annual reduction from 2006 to 2013. They managed to achieve 9% reduction nationally, but the reduction was observed in only half of the hospitals (Vruwink et al., 2012; Noorthoorn et al., 2016). Substantial variation in reduced use of seclusion by acute mental health services and in general geographical areas was also found in Australia (Allan et al., 2017). Organisational turmoil may hamper the positive development on coercion reduction (Boumans et al., 2015). Racial and ethnic backgrounds were associated with more frequent subjection to coercion, thus challenging the culture of psychiatric treatment (Tarsitani et al., 2012; Smith et al., 2015).

Table 4. Selected studies and reviews on seclusion and restraint reduction.

Authors, country	Purpose	Study design and sample	Results relevant to study subject
Bowers, L., James, K., Quirk, A., SUGAR, Stewart, D. & Hodsoll, J. (2015) United Kingdom	To test the efficacy of the Safewards model on conflict and containment rates.	• A pragmatic cluster randomised controlled trial. • 31 randomly chosen wards at 15 randomly chosen hospitals, the rates of conflict and containment.	Conflicts reduced by 15% at the experimental wards compared to control wards; the rate of containment events reduced by 26.4%.
Goulet, M-H., Larue, C. & Dumais, A. (2017) Worldwide	To examine the effectiveness of seclusion and restraint reduction programs in mental health settings.	• A systematic review. • 23 articles, 2 RCTs. Information collected: Author, location, design, study purpose, setting, sample, length of follow-up, name of program, program component, outcomes and risk of bias.	The following are six key components of seclusion and restraint reduction programs: leadership, staff and patient training, post-incident review of seclusion and restraint, patient involvement, prevention tools, and therapeutic studies. Four of 23 studies showed decreased use of seclusion and restraint and one showed no change in violence rates. Other reduction programs are suggested.
Kontio, R., Pitkänen, A., Joffe, G., Katajisto, J. & Välimäki, M. (2014) Finland	To explore the impact of an eLearning course for personnel on seclusion and restraint rates and duration in psychiatry.	• Cluster-randomized intervention trial. • Two hospital districts in Southern Finland, 5 intervention and 5 control wards included.	A total of 1143 seclusion incodents and 140 mechanical restraint incidents. No significant change on seclusion and mechanical restraint rates, but duration of mechanical restraints decreased form median 36.0 h to 4.0 h ($p < 0.001$) in intervention wards.
Madan, A., Borckardt, J. J., Grubaugh, A. L., Danielson, C. K., McLeod-Bryant, S., Cooney, H., Herbert, J., Hardesty, S. J. & Frueh, B. C. (2014) The United States of America	To investigate whether reduction of seclusion and restraint use with multi-strategy program was sustained over time.	• Naturalistic, experimental study design. • 95 beds in five units, two-year baseline, 3.5-year study period and 4.5-year follow-up period, 3,040 seclusion and restraint incidents during 254,491 patient-days.	Statistically significant reduction in seclusion and restraint use sustained over a ten-year study period.
Maguire, T., Young, R. & Martin, T. (2012) Australia	To present the initiatives during a seclusion reduction project in a forensic hospital.	• A description of the Beacon Project for reducing the use of seclusion. • Thomas Embling hospital with 116 beds for pateints found not guilty by reason of impairment, sentenced and remanded prisoners, and patients referred from area mental health services that were deemed to be a risk to others. Time period: two years before the project, two years during the project and one year after the project.	The Six Core Strategies were effective in reducing the frequency and duration of seclusion.

To be continued

Table 4 continues

Authors, country	Purpose	Study design and sample	Results relevant to study subject
Noorthoorn, E., Voskes, Y., Janssen, W., Mulder, C., van de Sande, R., Nijman, H., Smit, A., Hoogendoorn, A., Bousardt, A. & Widdershoven, G. (2016) The Netherlands	To evaluate whether Dutch seclusion reduction goals were achieved.	• Retrospective register study. • National register data from 66 psychiatric hospitals, trends in number and duration of seclusion incidents and secluded patients between 2008 and 2013.	Number and duration of seclusion incidents decreased at the national level from 2008 to 2013. Change occurred in only half of the hospitals. Use of forced medication increased, suggesting it may have replaced the use of seclusion.
Smith, G., Ashbridge, D., Altenor, A., Steinmetz, W., Davis, R., Mader, P. & Adair, D. (2015) The United States of America	To assess the use of seclusion and restraint in the Pennsylvania state hospital system from 2001 through 2010 and to examine the correlation between seclusion and restraint use and hospital violence.	• A prospective study. • 14,430 containment procedures during 12,900 events involving 1,801 patients	Mechanical restraint and seclusion use decreased significantly during the study period. Physical restraint use varied, and the duration of physical restraint increased from a mean 4.3 minutes to 6.5 minutes. Assaults targeting patients declined slightly. Assaults targeting staff were unaffected. Unscheduled use of medication decreased.
Staggs, V. S. (2015a) The United States of America	To assess nationwide trends in use of seclusion and restraint in response to injurious assaults in psychiatric units in the U.S.	• No study design mentioned. • 438 psychiatric inpatient units in 317 U.S. hospitals, 8,002 injurious assaults from 2007 to 2013.	There were 0.62 assaults per 1,000 patient days. Seclusion was used after 17.0% of the assaults, and restraint was used in response to 31.4% of the assaults. The trend in the use of seclusion and restraint use in response to assaults did not decline.
Vruwink, F., Mulder, C., Noorthoorn, E., Uitenbroek, D. & Nijman H. (2012) The Netherlands	To establish whether the numbers of seclusion and involuntary medication changed significantly after the start of a nationwide program to reduce seclusion.	• A register study. • National numbers of seclusion and involuntary medication for 1998-2009 in the Netherlands, before and after the nationwide program for reducing the use of seclusion.	Seclusion use decreased significantly by 2% annually, but failed the national goal of 10% reduction nationally. Involuntary medication increased significantly during the nationwide program compared to the increase that occurred before it started.

2.4 THE RELATIONSHIP BETWEEN HOSPITAL VIOLENCE AND SECLUSION AND RESTRAINT USE

2.4.1 The relationship between restrictive measures and hospital violence during involuntary psychiatric treatment

The criteria for the use of seclusion and restraint in Finland's Mental Health Act connect the use of seclusion and restraint with hospital violence (Mental Health Act (1116/1990). In clinical reality, seclusion and restraint are used primarily because a patient threatens or perpetrates violence (Paavola & Tiihonen, 2010; Raboch et al., 2010; Bowers et al., 2011; Noda et al., 2013). One half to two-thirds of seclusion and restraint incidents occurred for these reasons (Paavola & Tiihonen 2010; Bowers et al., 2011). Agitation and disorientation are also considered reasons for seclusion and restraint, and have even been the main reason for seclusion and restraint (Kaltiala-Heino et al., 2003; Keski-Valkama et al., 2009; Larue et al., 2010). Patients also behave violently and are agitated or disoriented during, and even regardless of, seclusion (Larue et al., 2010).

One main concern for reducing the use of seclusion and restraint is the unwanted risk of increased hospital violence. However, studies reporting increases in violence due to reduced use of these restrictive measures are rare. Rates of violence that are reported either remain unchanged or are reduced along with the use of seclusion and restraint (Smith et al., 2015; Goulet et al., 2017). A prospective study by Smith et al. (2015) in the U.S. had a sample of 12,900 records in 9 civil psychiatric hospitals from 2001 to 2010. This study, and another by Hayes and Russ (2016), demonstrated that use of seclusion and restraint continued to decrease during implementation of a new policy eliminating pro re nata (PRN, as needed) medication for patient agitation in acute care hospitals and in forensic psychiatry in Pennsylvania. These studies also showed that even after eliminating PRN medication, assaults in these hospitals and settings remained unaffected (Smith et al., 2015; Hayes & Russ, 2016). In another study at a forensic psychiatric hospital in Australia, significant reduction in the use and duration of seclusion was achieved but with no significant difference in the total number of hospital violence events (Ching et al., 2010).

Seclusion and restraint are still used in response to injurious assaults in psychiatric units, but they are not the only measures used in response to agitation or violence. For example, data from 317 U.S. hospitals from 2007 to 2013 showed that seclusion was used in response to 17% (n = 1,362) of assaults, and restraint in response to 31% (n = 2,515) of the assaults (Staggs, 2015a). In some situations, it would be unethical not to use seclusion where no better strategies were available for extremely disturbed patients (Cleary et al, 2010).

2.5 GAPS IN THE LITERATURE

Despite numerous publications on hospital violence and its associated risk factors, detailed analyses of violent behaviour in forensic psychiatry patients during the hospital stay are rare. Such analyses are valuable for assisting leadership intending to focus on forensic psychiatry patients. Information on seasonal variation in hospital violence is also lacking, as is information on the combination this variable with seasonal variation in the use of seclusion and restrait in general or forensic psychiatry. Data on seasonal variation in violent crimes is available, but data on hospital violence, in particular, is scarce. Knowledge about seasonal variation in hospital violence and the use of seclusion and restraint is essential for planning and implementing staff education programs and resources for suitable times of the calendar year. Analyses of patient behaviour and staff interventions during challenging situations in clinical reality are necessary, especially for special groups of patients in forensic psychiatric hospitals. Reports of successful seclusion and restraint reduction programs have been published, but randomised controlled

study designs on the subject are inadequate. These reports are needed to identify programs that are effective and safe.

3 The Aims of the Study

3.1 THE PURPOSE OF THE STUDY AND RESEARCH QUESTIONS

The overall aim of the dissertation was to develop the care of forensic psychiatric patients by identifying safe measures for reducing seclusion and restraint, and by investigating hospital violence and the use of seclusion and restraint. The contributory goals were: 1) to describe hospital violence in forensic psychiatry; 2) to investigate the clinical reasons for using seclusion and restraint; 3) to investigate what de-escalation techniques are used to help a patient before resorting to restrictive measures; and 4) to investigate methods for reducing the use of seclusion and restraint in forensic psychiatric settings.

The research questions were as follows:

Phase 1
1) How much violence occurs in forensic psychiatric hospital? (Original publication 2)
2) What are the main provokers of hospital violence in forensic psychiatry? (Original publication 2)
3) What legal status and gender factors are associated with violent behaviour in forensic psychiatry? (Original publication 2)

Phase 2
4) Does a month or season explain variation in hospital violence in forensic psychiatry? (Original publication 3)
5) Does a month or season explain variation in seclusion and restraint use in a forensic psychiatric hospital? (Original publication 3)

Phase 3
6) Do nursing staff use any de-escalation techniques prior to seclusion and restraint episodes? (Original publication 4)
7) What de-escalation techniques do nurses use prior to seclusion and restraint episodes? (Original publication 4)
8) What are the clinical reasons for using seclusion and restraint in forensic psychiatry? (Original publication 4)

Phase 4
9) Is the Six Core Strategies program an effective and safe intervention for reducing the use of seclusion and restraint in forensic psychiatric hospitals? (Original publication 1)

In Original publication 1 the following hypotheses were addressed:
H_0: There is no difference in seclusion and restraint rates and incidents of violence between intervention and control wards. (Intervention wards implemented the Six Core Strategies while control wards conducted the usual activities.)
H_1: Seclusion and restraint rates decrease with statistically significance and without increased violence in intervention wards compared to control wards.

4 Materials and Methods

4.1 METHODOLOGICAL APPROACHES

This study used a mixed methods approach. Altogether, this dissertation may be considered pragmatic because it comprises four studies, conducted during performance improvements in clinical practice that followed one another due to the need for further information about the previous study's findings. Both qualitative and quantitative methods were implemented during these studies (Muncey, 2009). The first and third original studies were quantitative, and the fourth used qualitative material and analyses, followed by classification counting. Data from the second original study was a combination of narrative descriptions of provocations for violence and statistics of violence. The cluster-randomised controlled study of seclusion-restraint reduction assumed positivistic ideas of the nature of reality (Polit & Beck, 2008). The intervention for the first study was implemented in a ward environment, which is exceptional for an original positivistic study design since total control of a ward environment is impossible. Table 5 describes the designs, samples, instruments, data collection methods, and analyses of the original publications.

Table 5. The designs, samples, instruments, data collection methods, and analyses of the original publications.

Aims	Design	Sample	Instrument	Data Collection Methods	Data Analysis	*
Describe hospital violence in forensic psychiatry	Explanatory retrospective register study	2007–2009 violence incidents (n = 840)	Purposefully designed classification form (the provokers for violence)	Violence incident register of forensic psychiatric hospital, QUANT and QUAL	Content analysis, Descriptive statistics, Poisson regression analysis QUANT and QUAL	2
Describe variation of hospital violence and seclusion and restraint use in forensic psychiatry	Explanatory longitudinal, retrospective register study	2007–2012 monthly violence incident rates and seclusion and restraint use	-	Violence incident register and statistics of seclusion and restraint of forensic psychiatric hospital, QUANT	Poisson regression analysis, QUANT	3
Investigate clinical reasons for seclusion and restraint and de-escalation techniques used	Descriptive, retrospective register study	Four-year period (June 1, 2009 – May 31,2013) seclusion and restraint episodes (n = 175)	Purposefully designed classification forms	Seclusion and restraint forms of forensic psychiatric hospital, QUAL	Content analysis, descriptive statistics, QUAL	4
Investigate how to reduce seclusion and restraint use in forensic psychiatry	Randomised controlled trial	2 intervention and 2 control wards	Six Core Strategies	Hospital statistics of seclusion, restraint, room observation and violence, QUANT	Poisson regression analysis and Binomial model, QUANT	1

* Original Publication Number

4.2 MATERIALS

4.2.1 The study setting

Niuvanniemi hospital is a forensic psychiatric setting, one of the two state-run hospitals in Finland. It has 284 beds for adult patients, which is 65% of the total beds available in forensic psychiatric hospitals in Finland. The state hospitals admit three groups of patients: patients who have committed a crime but have been found not guilty for reason of insanity, patients who are difficult and/or dangerous to care for in local hospitals, and patients who are undergoing forensic mental examination. All three patient groups have a history of serious and persistent violent behaviour.

4.2.2 Violent behaviour in a forensic psychiatric hospital in Finland (Original publication 2)

The database for this study reported in original publication 2 consisted of violent incident reports. There were 1,002 violent incident reports of physical violence during the three-year study period (2007–2009). Reports of verbal aggression (n = 117, 11.7%) were excluded from the dataset. Duplicate violent incident reports were also excluded (n = 45). Five hundred and two (502) individuals were treated or examined at the study hospital during the three-year study period. A total of 840 incidents of physical violence were reported during the study period. The perpetrators of hospital violence were divided into three different legal status groups: patients who had committed a crime but were found not guilty by reason of insanity (forensic patients), patients whose care was difficult or dangerous for local hospitals (civil patients), and patients subjected to forensic mental examination. An ethical evaluation for the study was obtained from the ethical committee of the Kuopio University Hospital District (65 // 2009).

4.2.3 Seasonal variation of hospital violence, seclusion and restraint (Original publication 3)

The data reported in original publication 3 consisted of violent incident reports and the hospital's statistics on use of seclusion and restraint over a six-year period (2007–2012). The monthly number of patient days was also calculated. Only physically violent incidents were included. An incident of violence was considered physical when bodily violence had been directed towards oneself, other people, or physical objects. In this study, the monthly incidences of acts of violence and the seclusion and restraint of patients were related to the monthly numbers of patient days. An ethical evaluation for the study was obtained from the ethical committee of the Kuopio University Hospital District (141 // 2008, 65 // 2009).

4.2.4 De-escalation techniques used and the reasons for seclusion and restraint (Original publication 4)

The data reported in original publication 4 consisted of four years (June 1, 2009 to May 31, 2013) of seclusion and restraint forms that are part of official patient records. The first (or initial) seclusion or restraint episode per patient during the study period was selected for the dataset. In addition, patient records from the first day of a seclusion or restraint episode were also investigated, to determine which de-escalation techniques were implemented to help patients prior to use of the restrictive methods. The cases were classified and counted. In this study, the triangulation data transformation model was used (Doyle et al., 2009), and the qualitative data was transformed into quantitative data after initial content analysis. The study was accepted by the ethical committee of the Kuopio University Hospital District (141 // 2008).

4.2.5 Cluster-randomised controlled trial of reducing seclusion and restraint in secured care of men with schizophrenia (Original publication 1)

The study described in original publication 1 included four high-security wards (N = 88 beds) for male patients, stratified by seclusion and restraint use. The wards were randomly assigned to two equal groups. Before randomisation, the wards were stratified into two groups, one with

high-level use of seclusion and restraint and one with low-level use, to avoid unbalanced comparisons. Data comprised the monthly duration of seclusion or restraint and the number of patient-days spent in seclusion, restraint or under room observation in intervention and control wards. This data was collected from hospital registers. Monthly incidents of physical violence were collected from the register of violence incident reports for the hospital. The effects of the interventions were studied by examining the hospital registers, so informed consent of the patients and staff was not required. This ward system study from the performance improvement project was accepted by the ethical committee of the Kuopio University Hospital District (141 // 2008, 65 // 2009).

The performance improvement intervention was based on the Six Core Strategies for Reducing Seclusion and Restraint Use (NASMHPD; Huckshorn 2006). During the first half of the year 2009, staff in the intervention wards was assisted in initiating the new practices; during the second half of the year, staff were assisted in maintaining the intervention. The task force was not involved in the ward or in treatment of the patients. Leadership was supported with weekly counseling and in daily post-event analyses of violent incidents, seclusion and restraint episodes, and successfully-managed challenging events. Staff in the intervention wards developed individual preventive strategies and alternatives to seclusion and restraint. The service-users were asked to help with development work. They recounted their own experiences of violence and seclusion and restraint in weekly meetings. They brainstormed with staff about ward rules and about new ways to decrease fear, violence, and coercion. Patients were offered meaningful things to do in the ward's courtyard. The statistics of seclusion, restraint, room observation, and violence were used to support the development process on many levels. These statistics were discussed in the wards as well as in the steering group for development work and in the general information meeting at the hospital. Individual information on violence and restrictive measures were used in counselling and to guide crisis prevention. Staff and patients tailored a crisis prevention tool, or a crisis plan, aimed at helping with individual crisis prevention in clinical practice.

4.3 METHODS

4.3.1 Violent behaviour in a forensic psychiatric hospital in Finland (Original publication 2)

For original publication 2, the main triggers of hospital violence were investigated using content analysis. The inductive approach for narrative descriptions of events was chosen because no relevant pre-existing descriptions of these factors were available, and the general goal was to obtain an overall sense of the issue (Elo & Kyngäs, 2008). Quantitative measures were assigned to supplement and extend the qualitative analysis, therefore the percentages of the provokers are reported. Data was analysed according to gender, age, and restrictive methods in further analysis. The Poisson regression model was used to determine whether there were significant differences in the prevalence of violence occurring in the different groups of patients. The number of incidents (a dependent variable) was related to the number of patient-days (an offset variable) in groups classified by gender and legal status (categorical variables) in the Poisson regression analysis (Armitage & Berry, 1994; Dunteman & Ho, 2006). A p-value less than 0.05 was considered statistically significant. Data management and analyses were calculated by SPSS for Windows 17.0.

4.3.2 Seasonal variation of hospital violence, seclusion and restraint (Original publication 3)

The data for original publication 3 were analysed with Poisson regression analysis to determine whether there were significant differences in the number of violent incidents and the numbers of seclusion and restraint episodes between the calendar months and seasons. Monthly rates of violent incidents and seclusion and restraint episodes were related to patient-days. In addition

to division by month, analyses were also divided into the four seasons to accommodate results comparisons with some previous studies that reported their results in four seasons. The months were grouped into the following four seasons: winter = December, January, February; spring = March, April, May; summer = June, July, August; autumn = September, October, and November. The Poisson distribution was assumed, and incidents occurred randomly over time. The Stata 13.1 statistical package, StataCorp LP (College Station, TX, USA) was used for the analyses.

4.3.3 De-escalation techniques used and the reasons for using seclusion and restraint (Original publication 4)

A content analysis was used for the study reported in original publication 4. An inductive approach was implemented to investigate the de-escalation techniques used by nursing staff to help patients during challenging situations and to gain control of their behaviour. Inductive approach was selected because the nursing culture varies between hospitals and the goal was to obtain an overall sense of the techniques used in the study hospital (Elo & Kyngäs 2008; Raboch et al., 2010). Further analysis was conducted by counting the frequency of use of each de-escalation technique. This analysis was done to supplement the qualitative analysis and to find out how systematically each measure was used. A deductive approach to content analysis was implemented first to investigate the reasons for use of seclusion and restraint. Classification of the reasons for use of seclusion and restraint followed the six categories previously used by Kaltiala-Heino et al. (2003) and Keski-Valkama et al. (2009): actual violence, threatened violence, damaged property, agitation/disorientation, undefined aggression/dangerousness, and unclassifiable. After discussions with a multiprofessional research team, the classifications were developed into four categories: direct harmful behaviour, threatened harmful behaviour, indirect harmful behaviour, and other reason. After further classification, the descriptive statistics of the categories were calculated, and cross tabulations of legal status and gender were performed. Descriptive statistics and Chi-Square tests were calculated using the IBM SPSS Statistics 20.

4.3.4 Cluster-randomised controlled trial of reducing seclusion and restraint in secured care of men with schizophrenia (Original publication 1)

This study reported in original publication 1 was a randomised clinical trial with intervention and control wards. The study was implemented at the ward level in two clusters. The effect of the intervention and the effect of the project on the entire hospital were measured. Monthly seclusion, restraint, and room observation days, seclusion and restraint durations, and number of physical violence incidents were collected. The parameters for the effects of the intervention were divided into 100 patient-days. The parameters for the effects of the project on the entire hospital were calculated by comparing the monthly seclusion/restraint durations during the information year, the intervention year, and the two proceeding years. The year 2007 was set as the reference year. The effects were observed by comparing the monthly incidence rate ratios (IRRs) in the intervention and control wards. IRR estimates were calculated using a Poisson regression model or a negative binominal regression model. Of the parameters studied, the reasons for staff sick-leave and the duration of staff sick-leave were considered, as were injuries to staff and patients. The patient flow from one ward to another and the use of medication during the project timeframe were also considered.

5 Results

In this section, the results are reported in four parts according to the original publications. The first subsection describes the degree of hospital violence, the main triggers for hospital violence, and the patient groups (based on gender and legal status) that behave violently in a forensic psychiatric hospital (original publication 2). The second subsection presents the seasonal variation in hospital violence and use of seclusion and restraint during a calender year (original publication 3). The third subsection describes the reasons for seclusion and restraint use and measures for helping patients before resorting to use of seclusion and restraint in a forensic psychiatric hospital (original publication 4). The fourth subsection describes the results of a cluster-randimized controlled trial that attempted reduction of seclusion and restraint use with the Six Core Strategies intervention to determine whether it is effective and safe for reducing use of seclusion and restraint in forensic psychiatry (original publication 1).

5.1 VIOLENT BEHAVIOUR IN A FORENSIC PSYCHIATRIC HOSPITAL IN FINLAND (ORIGINAL PUBLICATION 2)

During the study period reported in original publication 2, (2007–2009) 502 patients were treated or examined at the Niuvanniemi hospital, and 90 (17.9%) of them behaved violently according to violence incident reports. A total of 840 violence incidents were reported. Six main categories for provokators of violence were identified. The most frequently mentioned provokers involved situations in which: the patient was being helped with everyday functions (n = 277, 33%); the staff could not identify the provocation (n = 202, 24%), and the patient was asked to do something (n = 188, 22%). In 88 (11%) of the violence incidents, the patient was denied something and 36 (4%) incidents occurred in other verbal communication situations. Other identifiable triggers occurred in 26 (3%) incidents, and 23 (3%) incidents could not be categorized because of insufficient information. The following three categories (61% of the incidents) seemed inexplicable: the patient was being helped with everyday functions, other verbal communication, and violence occurring without an identifiable provocation.

Violent incidents were most frequently caused by civil patients (n = 755, 89.8%); criminal patients caused 78 (9.2%) incidents. Persons undergoing forensic mental examination seldom behaved violently (n = 7, 1%). When the number of violent incidents in each patient group was realted to patient days, the risk rate (RR) 11.963 (95% CI = 9.425–15.184) was counted for civil patients, compared to the RR of criminal patients which was 1. The difference was statistically significant with $p < 0.001$. Patients undergoing forensic mental examination rarely behaved violently rarely, with an RR of 1.971 (95% CI = 0.908–4.277, $p = 0.086$) which was not significant. While the male patients' risk rate was set to 1, the female patients' risk rate was 2.026 (95% CI = 1.729–2.347), and that was statistically significant with $p < 0.001$.

5.2 SEASONAL VARIATION OF HOSPITAL VIOLENCE, SECLUSION AND RESTRAINT (ORIGINAL PUBLICATION 3)

The study reported in original publication 3 found that 2,057 incidents of physical violence were committed during the six-year study period. A total of 707 patients were treated or examined at the Niuvanniemi hospital during this time, and the study period amounted to 598,773 patient-days. No statistically significant variations were found in institutional violence incidents between months ($p = 0.25$) or between seasons ($p = 0.23$). The incidence of violence was lowest

in May and highest in July. When analysed per 1,000 patient-days, the prevalence varied between 3.11 violence incidents in May (95% CI = 2.64 to 3.63) and 4.08 violence incidents in July (95% CI = 3.54 to 4.68). Although the seasonal variation was not statistically significant, more violent incidents occurred during the summer than during any other season.

Analysis of the prevalence of seclusion and restraint revealed statistically significant seasonal variation in both the monthly and seasonal prevalence. First, there was significant variation in the monthly prevalence of seclusion and restraint use. In January, the number of uses of seclusion and restraint was significantly lower than in other months ($p < 0.001$). The prevalence of seclusion and restraint use varied between 49.79 days / 1,000 patient-days in January (95% CI = 47.88 to 51.76) and 58.4 days / 1,000 patient-days in August (95% CI = 56.31 to 60.55). Second, when the months were grouped into the four seasons, the prevalence of seclusion and restraint use also varied with statistical significance ($p < 0.001$). This prevalence was significantly lower in the winter than in other seasons. The risk of use of seclusion and restraint was 7% higher in the spring than in the winter season (95% CI = 1.04 to 1.10).

5.3 DE-ESCALATION TECHNIQUES USED AND THE REASONS FOR USE OF SECLUSION AND RESTRAINT (ORIGINAL PUBLICATION 4)

During the four-year study period reported in original publication 4, 1,493 seclusion (1301) and restraint (192) episodes occurred. Seclusion was the main restrictive measure used. Of the 1,493 episodes involving restrictive measures (seclusion and/or restraint), 144 were the first episodes to occur for a given patient during the study period. Of these 144 initial restrictive measures per patient, 137 (95.1%) were seclusion episodes and the remaining 7 (4.9%) were restraint episodes. Given the small number of restraint episodes, seclusion and restraint episodes were analysed together. Almost half (n = 68, 47.2%) of the patients subjected to a restrictive measure had a legal status of difficult or dangerous patient. Patients undergoing forensic psychiatric care were the second largest group (n = 43, 29.9%), and the remaining 33 patients (22.9%) received forensic mental examination. Patients undergoing their initial restrictive measure were male in 105 (72.9%) episodes and female in 39 (27.1%) episodes. Cross-tabulation of patient group and gender revealed a significant difference ($x^2 = 14.299$, df = 2, $p = 0.001$). Male gender was most strongly in connection with the forensic psychiatric care group, and female gender was most strongly in connection with the group of difficult or dangerous patients.

Patients' harmful behaviour most frequently targeted other persons (n = 67, 46.5%). Only 35 (24.3%) episodes of harmful behaviour targeted the patient's self, and 10 (6.9%) episodes targeted both others and self. Ten (n = 10, 6.9%) harmful behaviour episodes were towards objects, and 22 (15.3%) episodes had no target or no clearly describable target. A cross-tabulation of gender with target of harmful behaviour revealed a significant difference ($x^2 = 13.940$, df = 4, $p = 0.007$). Male patients targeted other persons or have no clear target more frequently than expected, and female patients tended to target themselves.

In total, 113 incidents were included in the analysis of de-escalation techniques used. De-escalation techniques were used before patient subjection to restrictive measures in 101 (89.4%) reported cases. In 12 (10.6%) episodes, prior use of de-escalation techniques was not mentioned. The content analysis identified two main categories: measures to help (mentioned 150 times) and restrictions (mentioned 30 times). Several de-escalation techniques were mentioned prior to some of the restrictive episodes, suggesting the presence of 180 mentions of the use of de-escalation techniques in all. Table 6 presents the de-escalation categories.

Table 6. De-escalation techniques used: main categories and sub-categories (N = 180 de-escalation techniques prior to 113 seclusion and restraint episodes).

Main category	Sub-category	Sub-category	n
Measures to help			
	interaction	one-to-one discussion	74
	medication	giving medication earlier	2
		medication as needed	37
	facility arrangements	escorting to one's room	15
		moving to a closed ward	1
		one's own room	1
		escorting away from a space	1
	support	intensive observation	3
		one-to-one observation	9
	activating	meaningful things to do	1
		permission to smoke	4
	diminished demands		1
	provision of time to calm down		1
Restrictions			
	verbal direction		17
	giving more restrictions		2
	drug test from urine		3
	use of clothes that prohibit movement		2
	physical restraint[1]		4
	seclusion[2]		2

[1] = used prior to seclusion or restraint use; aimed to avoid them
[2] = used prior to restraint use; aimed to avoid it

A total of 144 episodes of restrictive measures were included for the analysis of the reasons for use of seclusion and restraint. The reasons were classified into the following four categories: 1) direct harmful behaviour, 2) threatening harmful behaviour, 3) indirect harmful behaviour, and 4) other reason.

Threatening harmful behaviour was the reason for 51 (35.4%) seclusion and restraint episodes and the most common reason cited for use of restrictive measures in this study (original publication 4). Examples from this category include verbal threats, voices urging violent behaviour and patients having difficulties not obeying the voices, non-verbal threatening behaviour, and tenseness. Threatening harmful behaviour targeted others, oneself, or objects. Direct harmful behaviour was the reason behind 43 (29.9%) seclusion and restraint episodes and the second most common reason for use of restrictive measures. This category included cases involving imminent violence before secluding or restraining the patient. The violent act targeted others, oneself, or objects.

Indirect harmful behaviour was the third most frequently cited reason for use of restrictive measures, and was reported as the reason for 42 (29.1%) episodes of seclusion and restraint, almost as many episodes as direct harmful behaviour. Indirect harmful behaviour included situations with no actual violence or threat for violence, but with behaviour that was indirectly harmful to others or the patient's self. Examples of this category include suspected or actual alcohol or drug use, return from absconding, scaring other patients, restlessness, polydipsia, and mean and noisy behaviour. One patient was secluded for one night to prevent eating or

drinking before sedation for electroconvulsive therapy. The fourth category, other reason, was the reported reason for seclusion and restraint in 8 episodes (5.6%). This category included cases for which there was no mention of a chance for harmful behaviour, but the patient was: displaying fulminant psychosis, restless, could not interact with others due to incoherence, fearful, and, for example, waiting for the approaching end of the world. In addition, this category included cases for which the voluntary room observation was changed to seclusion because of the patient's confused state of mind and inability to understand the voluntary nature of room observation.

Direct harmful behaviour was the reason cited for all 7 of the restraint episodes included in the analysis. As previously mentioned, the most common de-escalation measure was one-to-one discussion, and the most common reason for use of seclusion and restraint was threatening harmful behaviour. De-escalation had not been implemented prior to each episode when the reason for using restrictive measures was indirect harmful behaviour.

5.4 CLUSTER-RANDOMISED CONTROLLED TRIAL OF REDUCING SECLUSION AND RESTRAINT IN SECURED CARE OF MEN WITH SCHIZOPHRENIA (ORIGINAL PUBLICATION 1)

For the study reported in original publication 1, the two wards in the intervention cluster provided 1,306–1,400 patient-days per month distributed among 50 beds. The wards in the control cluster had 38 beds and produced 930–1,003 patent-days. The mean age of the patients was 40.2 years in the intervention wards and 38.4 years in the control wards.

The variables analysed in this study, including number of days during which seclusion, restraint and/or room observation were implemented, were related to patient-days. These days decreased in both the intervention wards (from 30% to 15% of the total patient-days, IRR over time = 0.88, CI = 0.86–0.90, $p < 0.001$) and the control wards (from 25% to 19% of total patient-days, IRR over time = 0.97, CI = 0.93–1.01, $p = 0.056$). The decrease was significant only in the intervention wards. The difference between the intervention and control groups was significant ($p = 0.001$) despite the rate being lower at the end of the study period (December) than at the beginning (July) in both the intervention wards (IRR=0.51, CI = 0.43–0.60, $p < 0.001$) and the control wards (IRR=0.77, CI = 0.63–0.94, $p = 0.009$).

Total time spent in seclusion and/or restraint, the second variable analysed, was related to patient-days. The total time decreased from 110 hours to 56 hours per 100 patient-days in the intervention wards (IRR over time=0.85, CI = 0.78–0.92, $p < 0.001$). By contrast, this duration increased in the control wards from 133 to 150 hours per 100 patient-days (IRR=1.09, CI = 0.94–1.25, $p = 0.24$). The difference between the two types of wards was significant ($p = 0.001$). Also, the difference between July and December was significant in both the intervention wards (IRR=1.14, CI = .1.05–1.23, $p = 0.001$) and the control wards (IRR=0.77, CI = 0.63–0.94, $p < 0.001$).

A third variable, the number of incidents of physical violence, was analysed. These incidents of violence decreased in the intervention wards from 1.1% to 0.4% of total patient-days (IRR over time=0.92, CI = 0.79–1.05, $p = 0.23$), and in the control wards from 0.1% to < 0.01% (IRR over time=0.90, CI = 0.64–1.23, $p = 0.51$). The difference between the two types of wards was not significant ($p = 0.91$).

Finally, the effect of the project at the hospital level was also analysed. Monthly seclusion and restraint time increased during the two years before project implementation and decreased during project implementation for the entire study hospital.

6 Discussion

6.1 DISCUSSION OF THE MAIN RESULTS

6.1.1 Violent behaviour in a forensic psychiatric hospital in Finland (Original publication 2)

During the study period for the study reported in original publication 2, 2007–2009, there were 2.95 incidents of physical violence per 1,000 patient-days at the study hospital. This is almost 5-fold the rate of physical violence incidents reported by Staggs et al. (2015a) which was 0.62 assaults per 1,000 patient-days from 2007–2013. This difference may be explained by the facts that Staggs analysed a large sample from 317 psychiatric hospitals in the U.S. with a different population from the special group of forensic psychiatry inpatients Finland. Although the study results show a high number of violent incidents at the study hospital, most of these violent incidents were performed by difficult or dangerous patients. These patients should first be treated at local hospitals. The risk rate (RR) for those patients was 11.96 (95% CI = 9.43–15.18), compared to a risk rate of 1 for forensic patients ($p < 0.001$). Patients undergoing forensic mental examination rarely behaved violently (RR = 1.97), and the difference in risk rate between these patients and forensic patients was not significant. It was previously known that differences in prevalence in violent behaviour exist between different patient groups in forensic psychiatry. Patients with current disruptive behaviour and without criminal court orders reportedly exhibited more violent behaviour than those with criminal court orders in the Netherlands (Verstegen et al., 2017).

The number of violently-behaving patients aligned with the results of a meta-analysis by Iozzino et al. (2015). In the present study, 17.9% of patients behaved violently, and in the analysis by Iozzino et al. (2015) which included data from 23,972 patients, the prevalence was 17%. However, the data for the meta-analysis included patients receiving treatment in psychiatric wards or hospitals that admitted acute psychiatric patients and excluded forensic hospitals and wards (Iozzino et al., 2015).

The main provokers of violence investigated in the present study were previously identified in a systematic review (Papadopoulos et al., 2012). Hospital violence was most frequently triggered by different patient-staff interaction situations, and commonly triggered by other identifiable provokers like an argument with someone. This study found that for 61% of violent incidents staff did not recognise associated behavioural or emotional cues. One third of the incidents occurred when staff helped the patient with everyday functions, as the patient wished. The patients' symptoms were evident during many of the incidents, but these were not considered provokers of violence. The systematic review by Papadopoulos et al. (2012) reported no clear cause for one third of violent incidents, a much smaller proportion than that with no clear cause in the present study. The large number of unexpected incidents discovered in the present study might result from the treatment culture, which may not have been as individualised as possible. A greater awareness of patients' thoughts may be helpful. Another possible explanation is that violent incidents are likely documented in reports before patients or staff can assess the triggers and their reactions, and incident reports do not give a complete picture of the situation.

The present study found that female patients' risk rate for violence was twice as high as that of male patients (female RR = 2.026 compared to male patients RR = 1), when the rates of violent incidents were related to patient-days for each gender group. This finding aligned with the results of a meta-analysis by Dack et al. (2013). The meta-analysis showed that, in forensic wards, male patients were more likely to be in the non-aggressive group than in the aggressive group, and furthermore, male patients' behaviour was less likely to be repeated and more often

occurred only once (Dack et al., 2013). Another study by Dickens et al. (2013b) showed that female patients were six times more involved in violent incidents than male patients in low- and medium-security facilities when accounting for patient-days. Moreover, de Vogel et al. (2015) and Verstegen et al. (2017) saw results that aligned with forensic psychiatry findings in The Netherlands.

6.1.2 Seasonal variation in hospital violence and use of seclusion and restraint (Original publication 3)

As reported in original publication 3, no significant variations in hospital violence between the months or the seasons were identified during the six-year study period running from the beginning of 2007 to the end of 2012. This finding corroborates the results reported by Verstegen et al. (2017). Interestingly, seasonal variations in seclusion and restraint use during the same period were statistically significant between the months and the seasons. Use of seclusion and restraint use was least prevalent in January and most prevalent in August. These variations in seclusion and restraint use matched the results of a previous study (Paavola & Tiihonen, 2010).

The results of this study on variations in hospital violence disagree with previously reported statistically significant seasonal peaks in violent crimes in community settings (Tiihonen et al., 1997; Morken & Linaker, 2000a; McDowall et al., 2012; Sisti et al., 2012). Seasonal variations in violent crimes, mostly perpetrated by non-psychotic individuals, may be explained by variations in neuroendocrine cycles, especially serontonergic system (Tiihonen et al., 1997; Praschak-Rieder et al., 2008; Tiihonen et al., 2017). In forensic psychiatry inpatients, the serotonergic cycle is affected by severe mental illness and the corresponding treatment; this may explain the lack of seasonal variation in hospital violence.

The significant variations in use of seclusion and restraint may be explained by variations in the same serotonergic cycle, but in staff members instead of in patients. Use of restrictive measures peaks in the middle and at the end of the summer season and drops in the winter. This pattern matches the pattern of variation in violent crimes in the general community (Tiihonen et al., 1997; McDowall et al., 2012; Sisti et al., 2012; Tiihonen et al., 2017). This observation highlights the importance of constant leadership throughout the year.

6.1.3 De-escalation techniques used and reasons for use of seclusion and restraint (Original publication 4)

In the study reported in original publication 4, de-escalation was defined as redirection of the patient to a calmer condition amidst a challenging situation in order to avoid confrontation, and offering choices to the patient when he/she is angry (National Intitute for Health and Care Exellence, 2015). Some definitions exclude PRN medication, seclusion, restraint, and emergency medication outside of the definition of de-escalation techniques (Hallett & Dickens, 2015), but these techniques were included in this study on de-escalation.

In this study, de-escalation was used prior to nine out of ten seclusion and restraint episodes. De-escalation techniques were divided into two main categories: measures to help patients, and restrictions. These categories were also identified in a previous study from England (Hallett & Dickens, 2015). The most frequently used de-escalation techniques in the present study were one-to-one discussion and medication, including PRN medication and administration of medication earlier than the scheduled time. The same de-escalation techniques were used with most patients. In addition, many de-escalation techniques were mentioned less frequently but described the content of de-escalation used.

The main category “measures to help” included sub-categories like escorting a patient to his/her room, moving a patient to a closed ward, arranging a single room, escorting a patient away from a particular space, intensive observation, one-to-one observation, arranging meaningful activities for the patient, permitting smoking, diminishing demands, and giving a

patient time to calm down. These measures were the same as those previously published for preventing high risk situations (Abderhalden et al., 2008), except for arrangement of meaningful activities.

The second main category "restrictions" included discussions during which staff verbally directed a patient, delivery of additional restrictions, urine drug test orders, use of clothes that prohibit movements, use of physical restraint, and seclusion. The two last-mentioned sub-categories were reported by staff even though they are actual restrictions. Physical restraint was used before seclusion and mechanical restraint, and the staff aimed to avoid using these measures. Seclusion was used before mechanical restraint episodes, and again, staff aimed to avoid the use of restraint. They were the strategien, staff ahd reported, and for that reason they were included into results. Drug test from urine and using clothes which prohibits the movements were not included into Abderhalden et al.'s study (2008).

De-escalation techniques are criticised because they usually concentrate on verbal and cognitive means of regulating emotions (Sutton et al., 2013). Roberton et al. (2012) argued that evidence of their efficacy is lacking and that the theoretical basis of aggression is overlooked in many studies of violence prevention (Roberton et al., 2012). Roberton's latter argument regarding neglect of the basis of aggression is demonstrated in the current study, but Sutton et al. (2013) and McCann et al. (2015) present exceptions to Roberton's argument. The value of the theoretical basis of aggression for implementing the results of studies in clinical practice is its provision of structure for understanding what may be happening in complicated situations involving violence. The theoretical basis of aggression may provide: deeper insight on the roots of complex problems, and a pathway that could therapeutically help patients to learn to self-regulate their emotions. Future hospital violence studies should account for the theoretical basis of aggression.

Threatened harmful behaviour was the most common reason for using seclusion and restraint on a patient, and when counted together with direct harmful behaviour, the two categories provided the reasons for 65.3% of seclusion and restraint episodes. This finding supports a previous study conducted at the same hospital (Paavola & Tiihonen, 2010), a study conducted in ten European countries (Raboch et al., 2010), and a Japanese study (Noda et al., 2013). Yet other publications report agitation or disorientation as the main reasons for using seclusion and restraint (Kaltiala-Heino et al., 2003; Keski-Valkama et al., 2009; Larue et al., 2010). The studies by Kaltiala-Heino et al. (2003) and Keski-Valkama et al. (2009) were conducted in Finland and used different patient groups, including patients with alcohol delirium. Inclusion of this latter group of patients may explain their reports of agitation / disorientation being the primary reasons for use of restrictive measures.

One third (34.7%) of the reasons for using seclusion and restraint on patients included cases in which no actual or threatening violence occurred but the patient's behaviour was indirectly harmful to others or the patient's self, or the patient was displaying fulminant psychosis. These cases provided an opportunity for trying interventions other than seclusion and restraint.

6.1.4 Cluster-randomised controlled trial on reducing seclusion and restraint use in secured care of men with schizophrenia (Original publication 1)

This study, reported in original publication 1, investigated whether reducing use of seclusion and restraint with the Six Core Strategies was efficient and safe. This is the first, published, randomised, controlled study design on seclusion and restraint reduction using any program to provide care for patients with severe mental illness and a history of violence. Previous studies report on programs that were successful at reducing work with non-randomised study designs in forensic psychiatry (Ching et al., 2010; Maguire et al., 2012) and other psychiatric care settings (Wieman et al., 2014; Smith et al., 2015). Programs that proved effective for seclusion and restraint reduction were combinations of several strategies (Goulet et al., 2017); this aligns with the findings of the present study.

The number of hours spent by patients in seclusion and restraint decreased significantly in the intervention wards and increased in the control wards. The difference between the intervention and control wards showed high statistical significance. During the same study period, violence decreased in the intervention wards and in the control wards, but this finding was not significant. These results together corroborate previous study results from a forensic psychiatric hospital in Australia that used multiple strategies for reducing seclusion, as did the present study (Ching et al., 2010). A prospective study from the U.S. with a sample of 12,900 records in nine civil psychiatric hospitals from 2001 to 2010 also produced similar findings. The U.S. study reported significant reduction in seclusion and restraint use but no effect on patient-to-staff assaults (Smith et al., 2015). The Safewards model reduced the rates of containment per ward shift (Bowers et al., 2015). Altogether, these study results provide evidence of the possibility of effectively and safely reducing the use of seclusion and restraint with severl different models.

A common feature in the programs that have effectively reduced the use of seclusion and restraint, such as the Six Core Strategies and the BVC, is that they tackle risk behaviour in patients. The BVC's de-escalation effort, previously described in Section 2.2.4, and the Six Core Strategies include crisis planning by both patient and staff with the goal of helping the patient to relax and to regulate his/her emotions in challenging situations or conditions (Huckshorn 2006; NASMHPD). Another strength of these programs may be patient involvement, which is strongly present in the Six Core Strategies and the Safewards model (NASMHPD; Huckshorn 2006; Bowers et al., 2015).

6.2 STUDY STRENGTHS AND WEAKNESSES

Mixed methods research in healthcare has roots in the complexity of dilemmas that are solved by a range of professionals who share a mutual goal to improve the health and wellbeing of individuals (Halcomp et al., 2009). The four studies comprising this dissertation were executed by authors with backgrounds in several disciplines. Except for original publication 1, the data collection methods, analyses, and syntheses of the results from these studies were mixtures of qualitative and quantitative study traditions. The mixtures of these traditions were required to achieve the depth of information gathered on hospital violence and reduction of seclusion and restraint use. Scientifically rigorous strategies were appled to ensure the study quality. The goal was to ensure that data collection and analysis were reliable and valid (Giddings & Grant, 2009). Strategies from both qualitative and quantitative traditions are applied in mixed method research (Giddings & Grant, 2009). The limitations of quantitative reseach may be identified by evaluating study design, sampling, measurement and data collection (Burns & Grove, 2009). Limitations in qualitative research may be found by evaluating credibility, transferability, dependability, and confirmability (Lincol & Guba, 1985).

This section addresses the strengths and weaknesses of the four studies included in this dissertation. These studies were executed at one forensic psychiatric hospital in Finland, a potential weakness given the limited ability to make an accurate generalisation. On the other hand, the target population was a small group of psychiatric inpatients that actually represents two-thirds of the patients treated or examined in forensic psychiatric hospitals in Finland.

The following strategies were implemented during study planning to ensure a quality study design. The number of violent incidents was analysed after related to the number of patients-days for the legal status and gender groups in original publication 2. This strategy ensured that the analysis provided information on the prevalence of violence in different patient groups and prevented bias from the number of occupied beds. Although sample size calculations are typically performed in quantitative research, such a calculation was performed for original publication 4 which was a qualitative analysis. Sample size calculations were also performed during study planning for practical reasons and, when appropriate, to avoid overly large and

uneconomical study material (original publication 4). Finally, during analysis of the data for original publication 4, the sample size diminished when some of the study material was excluded. This study material was excluded to avoid bias caused by the researcher's incompatible choices, since the material did not represent the phenomenon being studied (original publication 4; Sund, 2008).

Original publication 4 used purposive sampling instead, in which only one episode for each patient subjected to seclusion or restraint was included as part of the study material. Purpose sampling also helped avoid an overly large and uneconomical sample size. For original publication 4, seclusion episodes ordered by another hospital were excuded from the study material because reports on these episodes would not have listed any reasons for seclusion at the study hospital. Purposive sampling hinders generalisation of study results, even though it ensured qualitative diversity within the results which made it a relevant choice for original publication 4 (Burns & Grove, 2009). Purposive sampling ensured that the study material included seclusion and restraint episodes from different individuals and different wards.

Randomisation was implemented in original publication 1, with two groups of wards that both used seclusion and restraint. The rates of use of seclusion and restraint were investigated, and the two wards that used them most formed one cluster. The other two wards formed a second cluster. Intervention wards were selected by randomly picking one ward from each cluster. This protocol was implemented to enhance study design validity and to avoid selection bias (Giddings & Grant, 2009). The intervention wards could not be blinded for practical reasons (the content of the intervention). Instead the control wards remained unaware that they were the control wards. Evidence of content validity was provided by using a multiprofessional group of experts to choose variables (Giddings & Grant, 2009).

The following strategies ensured the quality of data collection. In addition to staff-structured coding of violent incident reports, the narrative descriptions of all the violent incident reports were also read by a researcher to enhance reliability of the data and to ensure consist and stable data (original publications 2 and 3; Giddings & Grant, 2009). This strategy ensured that incidents of verbal aggression were reliably excluded from the final data. Furthermore, duplicate reports of a given incident were also excluded from the final data. Reliability of the measurements in original publication 1 were enhanced by following seclusion, restraint and violence incidents online during the project, and comparing these incidents to data from the registers.

The credibility of qualitative research may be enhanced first with elements that enable others to follow the logic of data interpretation. Second, readers of the study must be enabled to evaluate the representativeness of the data (Lincoln & Guba, 1985). Readers were provided with descriptions of the study settings and patient groups (in forensic psychiatry in Finland) in all four publications to enable their evaluations of the representativeness of these studies and their findings (Giddings & Grant, 2009). Researchers should look for sources that are not easily accessible but relevant for the study purpose to enhance representativeness of data (Burns & Grove, 2009). In original publication 4, categories of the de-escalation techniques were created using both seclusion and restraint forms (there was a question about the measures used to help patients prior to implementing seclusion and restraint), supplemented with patient files that were written on the same date (original publication 4).

The main limitation of the data in these studies was the possibility of under-reporting violent incidents, since the incident reporting system is retrospectively used as research material (original publications 2 and 3). Woods et al. (2015) found that half of incidents that occurred were recorded in an incident reporting system in their study of hospital violence. One unique attribute of the present study was its definition of hospital violence, which included threatening behaviour (Woods et al., 2015). More serious violent incidents are probably more frequently reported than verbal violence. The data in these studies included only physical violence incidents. The limitation resulting from use of an incident reporting system would be completely avoided if the data were collected by observing such incidents in clinical reality, or

by prospectively collecting the data, as was done in the seclusion and restraint reduction study. This was not possible in all the studies for practical reasons. The main triggers of violence were collected from the staff's point of view since they report the incidents. These triggers might look different if the patients were asked (original publication 2).

Original publication 4 includes limitations due to use of a register for the study. Secondary analysis of register material, originally written to keep records in a patient file, may influence the findings (original publication 4; Sund, 2008). The content of patient files is well-regulated in Finland, but the study material is still dependent on how well the staff described the measures they performed (original publication 4). Another limitation of the study in original publication 4 is that the categories of de-escalation techniques were created and analysed by one researcher. These categories were concrete and simple to code, and they described de-escalation from the staff's perspective (original publication 4). As Muncey (2009) points out, a researcher brings his/her own knowledge and belief system to a body of scientific work, and must be aware of that. Staff perceptions of de-escalation were included in original publication 4, even if they were partly out of the researcher's preconception of the content of de-escalation. For example, physical restraint and seclusion use were included as sub-categories of de-escalation because they were mentioned in response to a question about measures for helping a patient prior to use of seclusion and restraint; physical restraint and seclusion more frequently considered restrictions than de-escalation techniques (original publication 4).

The following strategies ensured the quality of the analyses. Statistical scientists were consulted for the statistical analyses for all four original publications. During the analyses, comments from multiprofessional authors on the analyses and results enhanced dependability (original publications 2, 3, and 4; Lincoln & Guba, 1985). In addition, auditability of the content analyses was established by providing examples of factors and categories that were reported on in the publications (original publications 2 and 4; Giddings & Grant, 2009). Two coders evaluated and enhanced the reliability of the analysis of the reasons for seclusion and restraint use (Polit & Beck, 2008; Burns & Grove, 2009; Hallgren, 2012). A proportion (20%) of the seclusion and restraint episodes were coded by two authors. Agreement on the final codes was calculated using the Kappa Statistic (K). Cohen's Kappa was 0.91 (95% CI = 0.78 - 0.99); this value is considered very good (Landis & Koch, 1977; original publication 4).

The results of these four studies must be generalised with caution due to the limited sample sizes (original publications 1, 3, 4). Data was collected over relatively short periods and from only one forensic psychiatric hospital (original publications 1, 2, 3, and 4). For example, a permanent cultural change is not possible in six months (original publication 1).

6.3 IMPLICATIONS FOR CLINICAL PRACTICE, LEADERSHIP AND ORGANISING SERVICES

These studies address the patient group at the highest risk of violent behaviour during forensic psychiatric care in Finland. This information should be accounted for when planning Finnish social and healthcare reform. The group of difficult or dangerous patients, whose psychiatric care has been impossible to arrange in local hospitals, are the most violent during care in a forensic psychiatric hospital in Finland. Special skills on their treatment are needed. The fact is that a small group of patients perpetrated most of the violent incidents occurring in the study hospital. Treatment of this group shoud be specialised; this might be beneficial for organisation in units where staff is educated on these problems. The study also highlighted that hospital violence occurs mainly in situations that do not include conflict. In clinical practice, it is essential for staff to create alliances with patients and to account for patients' individual triggers as well as individual measures to help calm patients down in challenging situations. The study of the de-escalation techniques highlighted a need for developing more individualised patient care.

The Six Core Strategies for seclusion and restraint reduction proved efficient and safe even for the care of patients with severe mental illness and a history of violent behaviour. A study on seasonal variation of hospital violence revealed no linear relationship between seclusion and restraint and hospital violence. This latter result along with previous longitudinal studies of seclusion and restraint reduction demonstrate how essential leadership is for reduction work. One explanation for the fact that hospital violence and seclusion and restraint do not vary together is the variance in serotonergic neurotransmission among staff. In light of knowledge from national studies of seclusion reduction, successful reduction varies among hospitals and geographical areas. One reason for the success in this field may be high leadership involvement in the reduction work.

7 Conclusions

- This dissertation provided new evidence on variation in hospital violence incidents among different patient groups being treated at forensic psychiatric hospitals in Finland. Hospital violence was mostly performed by other patients than those who had committed a crime and were ordered to psychiatric treatment instead of sentenced to prison. In the future this group of patients, whose care has been difficult or dangerous to organise in local psychiatric wards, must be accounted for when reforming social and healthcare in Finland.
- Even among special, small groups of inpatients at a forensic psychiatric hospital, hospital violence is mostly perpetrated by a few constantly violent patients. Strategies for reducing the use of restrictions and enhancing recovery of these few violent patients, and individual measures to help patients gain control over their behaviours, must be included in special training for staff. For these reasons, there are privileges to organising treatment for these patients in units specialised to care for violently behaving patients.
- This dissertation provided new information on concurrent seasonal variation of hospital violence and seclusion and restraint use in the same patients. No seasonal variations in hospital violence were evident with concurrent variation on seclusion and restraint use. Serotonergic transmission of staff may explain this difference in variation, but this explanation challenges the justifiable use of seclusion and restraint, and leadership. Investment in developing treatment of patients with a history of violence is in the best interest of violently behaving patients, other psychiatric inpatients and the staff.
- This dissertation provided evidence of the fact that seclusion and restraint use does not stop hospital violence. Restrictive measures are not a long-term solution for aggression management. Instead aggression management for patients should be addressed via therapeutic means. Furthermore, patient gender should be accounted for when developing care programs for violent patients.
- This dissertation provided randomised controlled evidence of the efficacy and safety of any strategy in reducing seclusion and restraint use during involuntary forensic or general psychiatric treatment. Seclusion and restraint reduction can be implemented without increasing hospital violence by using a combination of strategies, including means of leadership, development of patient individualised care, and staff training.

Recommendations for future research:

- Case studies of the pathways from violent acts to restrictive measures, and towards better emotion management are needed. These case studies would guide treatment of patients with constant violent behaviours by providing examples of the options of psychosocial care that have been worth trying, and how to proceed if treatment occasionally fails.
- More in-depth studies on the relationship between violent acts and restrictive measures are required to gain more detailed information on the safety and efficacy of restrictive measures.
- Data should be prospectively collected via observation to avoid the inherent weaknesses of register study of violent incidents.
- Comparative study of patient and staff perspectives of the reasons for and triggers of hospital violence should be conducted.

- Longer follow-up times after seclusion and restraint reduction are necessary, as are larger samples from different patient groups.
- Randomised controlled studies on the effectiveness of psychosocial treatments for preventing violence are needed.
- Development of treatment for violent patients would be a benefit of researching hospital violence in gender groups.

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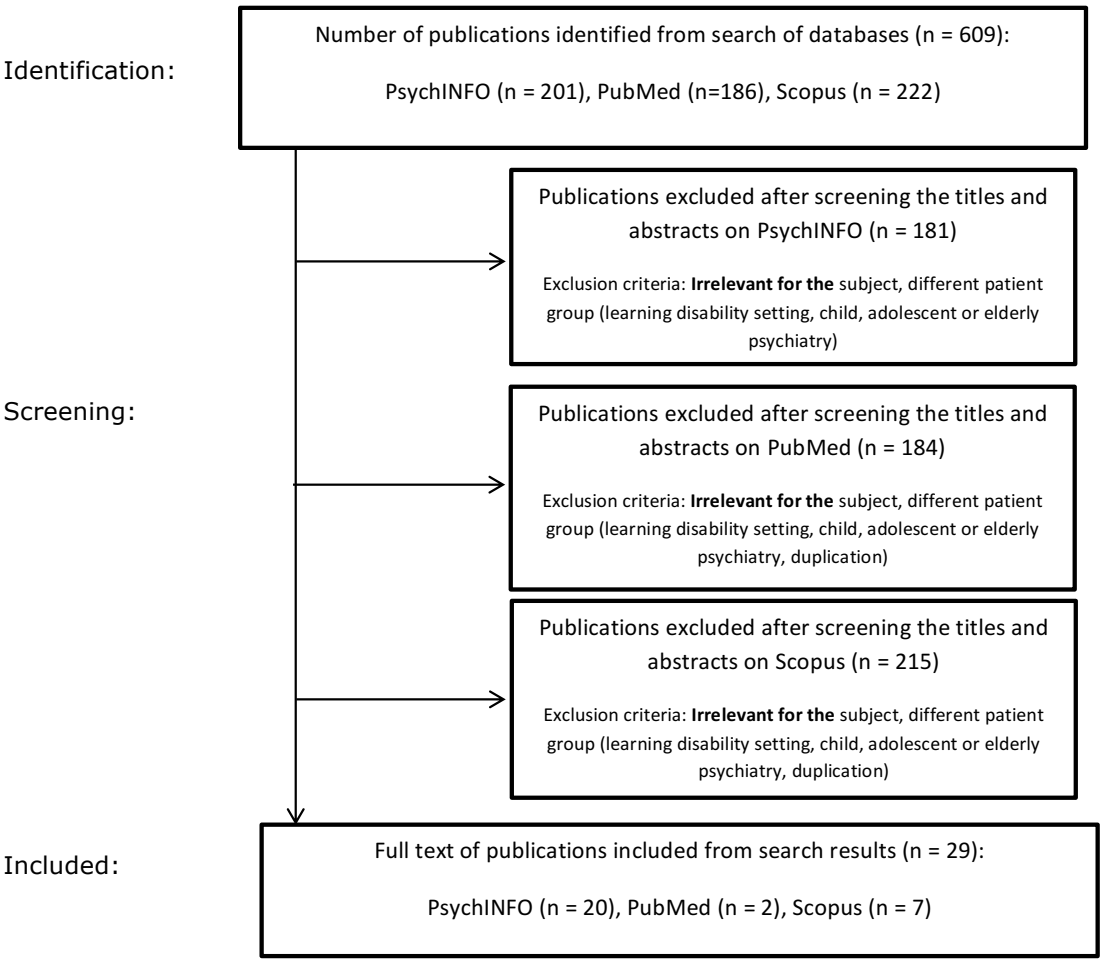
APPENDICES

Appendix 1. Flow chart for search of violence publications



Appendix 2. Publications on descriptions of and risk factors for hospital violence.

Authors, country	Purpose	Study design and sample	Results relevant to subject
Bader, S. M., Evans, S. E. & Welsh, E. (2014) United States of America	To identify rates of inpatient aggression and describe the severity of aggression on forensic psychiatric inpatient facility.	• No study design mentioned. • 52,109 documented acts of aggression between 2009 and 2013 in a 1,500-bed forensic psychiatric hospital.	Increase in violence during meal, medication and shift change times. Violence targeted patients in 62% of incidents, and staff members in 38% of incidents. More violent acts occurred during fall and winter than during spring and summer, but severity of violence remained unchanged. More severe violence occurred during the swing shift than in the morning and overnight shifts ($p = 0.001$) and when staff members worked overtime ($p = 0.050$).
Bader, S. M. & Evans, S. E. (2015) United States of America	To define predictors of severe and repeated aggression by comparing patients who repeatedly exhibited violent behavior, leading to major or severe injury to the victim, to patients who had no documented acts of violence during inpatient care.	• No study design mentioned. • 31 patients in maximum security hospital in California, between July 2010 and July 2011.	The predictors of violence were: diagnosis of personality disorder, suicide attempts, and psychiatric hospitalization as a juvenile.
Dack, C., Ross, J., Papadopoulos, C., Steward, D. & Bowers, L. (2013) Worldwide	To combine previous study results of inpatient aggression and assess the strength of associations between patient factors and aggressive behavior and between patient factors and repetitive aggressive behavior.	• A systematic review and meta-analysis. • Empirical articles and reports of comparison studies of aggression and non-aggression in adult psychiatry.	Factors associated with inpatient violence: young age, male gender, involuntary admission, not being married, a diagnosis of schizophrenia, previous admissions, a history of violence, a history of self-destructive behavior, and history of substance abuse. The factors associated with repetitive aggression: not being male, history of violence and history of substance abuse.
Danivas, V., Lepping, P., Punitharani, S., Gowrishree, H., Ashwini, K. Reveesh, B.	To examine the prevalence of inpatient violence and coercive measures connected to	• An observational study. • 229 reported incidents of violence in 20 bedded, acute psychiatric ward, violent episodes and coercive	229 violent incidents, 63% of admitted patients. 27% of patients subjected to intravenous injections. Relatives provoked 35% of the violent incidents and were the

N. & Palmstierna, T. (2016) India	violence, to analyse factors influencing coercive measures, and to explore the role of non-professional caregivers on violence and coercive measures.	measures during 30 days.	target in 56% of incidents. Relatives of other patients were involved in 14% of incidents. Patients' relatives were involved in managing the aggression in 35% of incidents. More common use of coercive measures when staff was targeted by violence.
de Vogel, V., Stam, J., Bouman, Y. H. A., Ter Horst, P. & Lancel, M. (2015) The Netherlands	To gain insight into the group of women in forensic psychiatry.	• Retrospective multicentre, register study • The files of 275 female patients in four Dutch forensic psychiatric hospitals were compared to 275 male patients.	Women had more complex histories of victimization, more frequent diagnoses of personality disorder, had committed homicide and arson more frequently and were less likely to commit sexual offenses than male patients. Women were more often involved in inpatient violence than male patients.
Dickens, C:, Piccirillo, M. & Alderman, N. (2013a) United Kingdom	To compare staff and patient attitudes toward management of aggression and violence in a forensic psychiatric service.	• A prospective, cross-sectional, comparative survey design. • MAVAS scale for staff (n = 72) and patients (n = 98)	Patients were more optimistic about the modifiability of aggressive behavior, especially male patients and those with personality disorder.
Flannery, R. B. Jr., Wyshak, G., Tecce, J. J. & Flannery, G. J. (2014) Worldwide (except the United States)	To assess the characteristics of assaultive psychiatric patients in community and inpatient settings.	• A review. • Literature searches on PubMed and PsychINFO from 2000 to 2012, adult patients, English language, raw data for the total number of violence incidents and basic characteristics of patients available. A total of 45 studies, and 30,500 patients included.	Male and female patients with schizophrenia, affective disorders, personality disorders and other diagnoses presented the greatest worldwide risk for community and inpatient violence.
Hermanstyne, K. A. & Mangurian, C. (2015) Worldwide	To explore the evidence of behavioral interventions reducing inpatient violence.	• A systematic literature review. • Search on PubMed/Medline databases, English language, adult patients, behavioral strategies targeted to violent behavior. 13 articles were found.	There is a lack of evidence of efficacy of behavioral strategies on violence reduction, and on the prevalence of violence in inpatient units. Two RCTs might help guide development of programs to reduce violent behavior.
Kelly, E. L., Subica, A. M., Fulginiti, A., Brekke, J. S. & Novaco, R: W.	To examine the interplay between staff dispositional and	• A cross-sectional survey. • 348 staff members of a large public forensic hospital.	99% reported verbal conflict with patient, 70% reported being assaulted during the previous 12 months. Verbal conflict with

(2014) the United States of America	interpersonal factors associated with patient violence.		other staff was reported by 92%.
Lavelle, M., Steward, D., James, K., Richardson, M., Renwick, L., Brennan, G. & Bowers, L. (2016) United Kingdom	To explore the factors that influences the use of de-escalation and its success with conflict management.	• A retrospective case note analysis. • 522 patients on 84 acute psychiatric units in a randomly selected 31 hospitals in London and surrounding area, patients' involvement in conflict or containment was recorded during the two weeks post-admission, between July 2009 and March 2010.	53% of the patients experienced de-escalation during the first two weeks in psychiatric care. De-escalation was successful in 60% of the cases. Successful de-escalation preceded fewer and less aggressive conflict events compared with unsuccessful events. Patients with history of violence were more often experienced de-escalation and it was more often unsuccessful.
Lee, J., Ogloff, J. R. P., Daffern, M. & Martin, T. (2015) Australia	To assess the impact of aggression and work stress on posttraumatic stress and distress prior to (N = 97) and after (N = 107) a patient killed two other patients at a forensic psychiatric hospital.	• A cross-sectional study, self-report questionnaire. • 97 nurses prior to and 107 after double homicide in a forensic psychiatric hospital.	Few differences in posttraumatic stress and distress before and after the homicides, but the nurses who worked at the homicide unit seemed at increased risk of developing posttraumatic disorder.
Novak, T., Scanlan, J., McCaul, D., MacDonald, N. & Clarke, T. (2012) Australia	To examine the outcomes associated with introduction of a sensory room in an acute inpatient psychiatric unit.	• A pilot prospective study. • 75 visits to the sensory room in a 40-bed acute psychiatric unit, self-rated distress level, clinician-rated behavior, and rates of aggression and seclusion use.	Self-rated distress and clinician-reported disturbed behavior reduced significantly, but rates of seclusion and aggression did not. One patient noted increased distress in the sensory room.
Olsson, H., Audulv, A., Strand, S. & Kristiansen, L. (2015) Sweden	To attempt to understand inpatients' experiences of decreased and increased risk for violent behavior.	• Interpretive description. • Semi-structured interviews with 13 forensic psychiatric inpatients, who were less aggressive and had been successfully placed to lower level of security services.	The patient's own strategies to avoid violence were working to increase personal insight, manage aggression, cope with illness and address warning signs. The staff's attitudes were central to reducing or increasing violent incidents. Patients valued staff's availability to them and staff's ability to make them feel respected. In challenging situations patients wanted to be treated respectfully, for example, by talking privately with staff, and not in front of other patients,

			and staff not challenging back when the patient was exhibiting challenging behaviour.
Papadopoulos, C., Ross, J., Stewart, D., Dack, C., James, K. & Bowers, L. (2012) Worldwide	To investigate the types of prospectively recorded antecedents of aggressive and violent incidents and to estimate the proportion of violence they each account for.	• A systematic literature review. • Peer-reviewed journal articles, book chapters or reports with primary empirical data, English language, between 1960 and 2009.	59 studies reported antecedents which were categorized into 9 themes. Staff-patient interaction was the most common theme, occurring prior to 39% of the incidents. Other themes: Patient-patient interaction, patient conflict behaviors, external/personal, structural issues, patient behavioral cues, patient emotional/mood cues, patient symptoms, and no clear cause.
Renwick, L., Lavelle, M., Brennan, G:, Steward, D., James, K., Rickhardson, M., williams, H. Price, O. & Bowers, L. (2016) United Kingdom	To examine whether there were identifiable precursors to violent incidents leading to staff injury, and whether staff characteristics were associated with injury.	• A register study. • 552 incident reports from 25 organizations in national database of injuries at work that resulted in formal sick leave between October 2011 and March 2013.	Serious workplace injuries tended to be infrequent. Actual injury rate was less than 1% of total assaults. Injury occurred either from direct patient assault during physical interventions by staff to manage aggression. Aggression and threats of violence were common precipitants to physical restraint, and staff injury increased if assault preceded physical restraint. Healthcare workers were most usually victims. Retaliation, victim provocation, victim intrusiveness, and perceived injustice were important precursors, as was medication administration.
Renwick, L., Steward, D., Rickhardson, M., Lavelle, M., James, K., Hardy, C., Price, O. & Bowers, (2016) United Kingdom	To examine sequences of aggressive incidents in conjunction with other conflict and containment methods used to explore particular profiles to aggressive incidents.	• A retrospective register study. • 522 adult psychiatric inpatients from 84 acute wards in the UK, 1,422 incidents of aggression (verbal, physical, and physical against objects).	Four sequences of aggressive incidents: solo aggression, aggression-rule breaking, aggression-medication and aggression-containment. Management of aggression in variable; some patient factors linked to specific clusters but these do not explain the variation.
Selenius, H., Leppanen Ostman, S. & Strand, S. (2016) Sweden	To investigate the prevalence of self-harm and the type of inpatient aggression among female forensic psychiatric patients, and to study whether self-harm before	• A register study. • 130 female forensic patients from a high security hospital.	88% of female patients had self-harmed at least once during their life; 57% exhibited violent physical and/or verbal behaviour towards others during inpatient care. Self-harm before admission to hospital was unrelated to hospital violence but self-harm during care was significantly associated with

	and during forensic psychiatric care is a risk factor for inpatient aggression.		verbal and physical aggression towards staff. Self-harm is more dynamic than historical risk factors for inpatient violence.
Staggs, V. S. (2015) the United States of America	To examine association between staffing levels of registered nurses and non-registered nurses in psychiatric units and the rate of injurious assaults against staff, other patients and total rate of injurious assaults.	• A register study. • 2011-2013 National Database of Nursing Quality Indicators data from 461 adult inpatient units in 327 hospitals in the US; monthly RN and non-RN staffing hours per patient day; monthly assaults against patients and staff.	Higher values of non-RN hours per patient day were associated with higher rate of assaults against staff, other patients and total rate of injurious assaults. Higher values of RN hours per patient days were associated with higher rate of assaults against staff and lower rate of assaults against patients.
Staggs, V. S. (2016) the United States of America	To determine whether injurious assaults are higher in months when unit staffing levels are higher or lower than average, when each unit serves as its own control.	• A register study. • 2011-2013 National Database of Nursing Quality Indicators data from 480 adult and 90 geriatric units in 361 US hospitals; monthly assault odds were modeled as functions of unit staffing; monthly RN and non-RN staffing hours per patient day; monthly assaults against patients and staff.	RN or non-RN staffing was not a significant predictor for assaults; no consistent trend of assaults being higher at below or above-average staffing levels. "There was little evidence that monthly deviations in unit staffing are associated with the odds of an injurious assault on a unit. This suggests that staffing-assault rate associations in previous studies of monthly data are largely attributable to between-unit rather than within-unit staffing differences."
Stewart, D. & Bowers, L. (2013) United Kingdom	To examine, how frequently patients were involved in incidents of verbal abuse, shouting, making threats, showing anger or making racist comments.	• Cross-sectional, retrospective case note study. • 522 patients from 84 acute psychiatric wards in 31 randomly-selected hospitals in London and surrounding area; data on conflicts and containment measures during the first 2 weeks after admission; Patients between July 2009 and March 2010; standardized data collection with Patient Staff Conflict Checklist.	1,398 incidents of verbal aggression, reported half of the sample. Types of verbal aggression: abusive language, shouting, threats, expressions of anger and racist comments. Staff was the most frequent target for aggression. A history of violence and previous substance abuse were associated with verbal aggression.
Stewart, D. & Bowers, L. (2015) United Kingdom	To examine incidents of alcohol and illicit drug use among inpatients in	• Cross-sectional, retrospective case note study. • 522 patients from 84 acute	38 incidents of alcohol use and 28 incidents of drug use during the two weeks. No connection between physical violence and

	acute psychiatric wards and association between substance use and inpatient violence or other forms of aggression.	psychiatric wards in 31 hospitals in London and surrounding area; data on conflicts and containment measures during the first 2 weeks after admission.	alcohol or drug use but there was an association on verbal aggression.
Sutton, D., Wilson, M., Van Kessel, K. & Vanderpyl, J. (2013) Australia	To evaluate the acceptability, implementation, and impact of sensory room.	• A pilot interview study, an inductive qualitative study. • Interview of staff's and discharged patients' opinions of sensory modulation room.	Modifications to the environment and the use of shooting stimuli and moderate arousal promote an ability to adaptively regulate emotions by facilitating a calm state, enhancing interpersonal connection between staff and patients, and supporting self-management. General Aggression Model discussed.
Tolisano, P., Sondik, T. M. & Dike, C. C. (2017) the United States of America	To describe a positive behavioral approach in forensic psychiatric settings, two case descriptions.	Two case examples of the implementations of a positive behavioral approach. Case 1: Baseline (four weeks) and active treatment period (three months) data were compared. Case 2: Baseline (three months) and active treatment data (six months) were compared.	Five key components of a positive behavioral approach: a behavioural consultation team, identification of the functions that influence behaviour, skills-based program, measurement of effectiveness with data collection, and acceptance of regular hospital administration oversight to monitor and review positive behavioral supports. The model can be implemented in forensic psychiatric settings successfully. Case 1: decline in the use of restraints. Case 2: decline in self-harming behavior and aggression toward others.

Appendix 3. Hospital violence risk assessment publications.

Authors	Purpose	Study design and sample	Results relevant to subject
Chu, C. M., Daffern, M. & Ogloff, J. R. P. (2013) Australia	To compare predictive validity of three violence risk assessment measures (BVC, DASA, HCR-20 clinical scale).	• A prospective study design. • 3449 daily risk ratings of 70 high secure forensic psychiatric inpatients, between 1 June 2002 and 31 October 2002, in three units total of 40 beds.	DASA and BVC were acceptable to predictive validity and were more accurate than HCR-20 Clinical scale for predicting inpatient aggression.
de Vries Robbé, M., de Vogel, V., Wever, E. C., Douglas, K. & Nijman H. L. (2016) The Netherlands	To assess differences in dynamic risk factors and protective factors between different stages of forensic psychiatric care, and to investigate the predictive validity of risk factors and protective factors for aggressive incidents among forensic psychiatric inpatients.	• A prospective clinical evaluation. • 399 risk assessments (HCR-20 and SAPROF) of 185 male and female forensic psychiatric patients.	The HCR-20 and SAPROF scores showed good overall predictive validity for inpatient violence. The combination of risk factors and protective factors was a good predictor of inpatient violence for different groups of patients.
Hogan, N. R. & Olver, M. E. (2016) Canada	To evaluate whether HCR-20V3, VRAG-R, START, VRS and PCL-R are applicable to the assessment of risk for inpatient aggression in forensic psychiatry.	• A study design not mentioned. • 99 adult forensic inpatients' files.	HCR-20V3, START, VRS showed significant pretreatment - posttreatment differences and pretreatment scores demonstrated predictive validity accuracy for inpatient violence (AUC = .68 to .76). Dynamic scores demonstrated incremental predictive validity for inpatient violence after controlling for static risk factors. They showed concurrent associations with reductions in inpatient violence after controlling to baseline for risk.
O'Shea, L. E., Picchioni, M. M. & Dickens, G. L. (2016) United Kingdom	To examine the predictive ability of the START for a range of adverse outcomes and to examine whether the vulnerabilities, protective factors or risk factor have	• Pseudo-prospective cohort design. • 200 adults in a secure mental health hospital, 3-month risk event incidence of each patient.	Specific risk estimates predicted aggression, self-harm and victimization. Patients with higher vulnerability scores and inverted strength scores were at increased risk for performing violence.

	incremental validity over one another.		
Woods, P., Olver, M. & Muller M. (2015) Canada	To examine on what extent implementation of BVC predicts inpatient aggression on a psychiatric unit.	• A study design not mentioned. • 2898 BVC ratings from 46 inpatients in a forensic mental health unit.	Strong predictive accuracy for BVC and slide rule in single analysis and combined together (.68 - .73) in dementia, psychosis and substance use disorders.

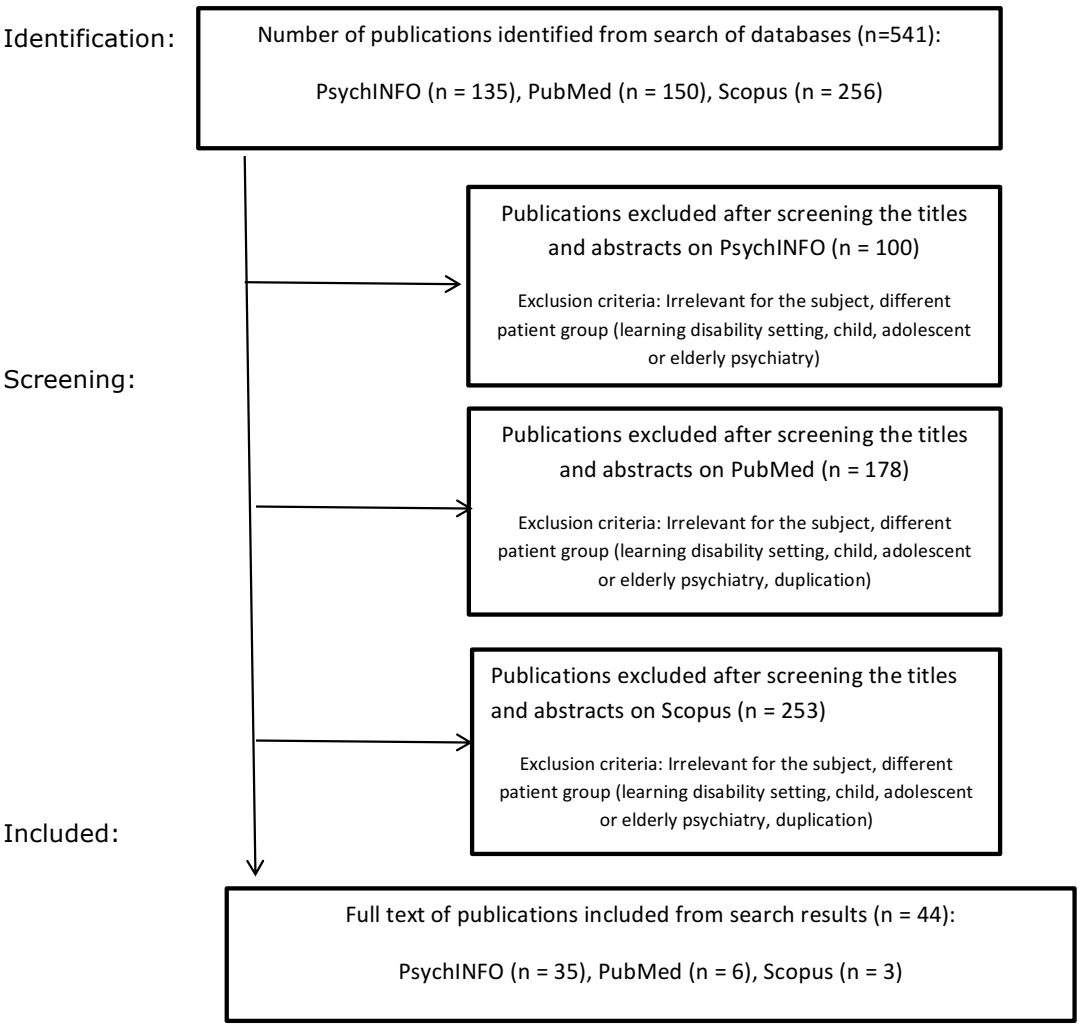
Appendix 4. Publications, which are related to reduction of hospital violence and de-escalation.

Authors, country	Purpose	Study design, sample	Results relevant to subject
Abderhalden, C., Needham, I., Dassen, T., Halfens, R., Haug, H-J. & Fisher, J. (2008) Switzerland	To assess whether a structured risk assessment reduces violent incidents and use of coercion in psychiatric inpatient care.	• A randomised controlled trial. • 14 acute psychiatric admission wards were the units of randomisation.	Adjusted risk ratios suggested 41% reduction in severely aggressive incidents and 27% decline in the use of coercive measures (forced injection, seclusion and mechanical restraint).
Chalmers, A., Harrison, S., Mollison, K., Molloy, N. & Gray, K. (2012) Australia	To reflect the implementation of sensory-based approaches within a psychiatric unit.	• A prospective intervention study. • 109 patients with 126 visits to a sensory room, 29-bed psychiatric unit, 10-month study period from July 2009 to April 2010.	Preliminary results showed significant reduction in distress levels during the visit to the sensory room. Patients said the sensory room reduced the following problems: anxiety (39%), restlessness (22%), agitation (17%), and distress (15%).
Darmedru, C., Demily, C. & Franck, N. (2017) Worldwide	To conduct a systematic review of the effectiveness of cognitive remediation and social cognitive training in the management of violent and aggressive behaviours of patients with schizophrenia.	• A systematic review. • Cochrane Library and Science Direct databases, with combination of search terms: schizophrenia, cognitive remediation and violence. 11 studies.	Cognitive remediation therapy and social cognitive training are promising for supporting patients in managing violence.
Hermanstyne, K. A. & Mangurian, C. (2015) Worldwide	To explore evidence of behavioural interventions to reduce inpatient violence.	• A systematic literature review. • Search on PubMed/Medline databases, English language, adult patients, behavioural strategies targeting violent behaviour. 13 articles found.	There is a lack of evidence of efficacy of behavioural interventions on reducing prevalence of violence in inpatient units. Two RCTs might help guide development of programs to reduce violent behavior.
Novak, T., Scanlan, J., McCaul, D., MacDonald, N. & Clarke, T. (2012) Australia	To examine the outcomes associated with the introduction of a sensory room in an acute inpatient psychiatric unit.	• A pilot prospective study. • 75 visits to a sensory room in a 40-bed acute psychiatric unit, self-rated distress levels, clinician-rated behaviour and rates of aggression and seclusion use.	Self-rated distress and clinician-reported disturbed behaviour reduced significantly, but rates of seclusion and aggression did not. One patient noted increased distress in sensory room.
Nurenberg, J. R., Schleifer, S. J., Shaffer,	To determine animal-assisted therapy effects	• RCT • 90 patients with recent hospital	Interventions were well tolerated. Equine-assisted psychotherapy reduced

T. M., Yellin, M., Desai, P. J., Amin, R., Bouchard, A. & Montalvo, C. (2015) the United States of America	on violent behaviour and related measures among long-term psychiatric patients.	violence or highly regressed behavior, ten weekly group therapy sessions of standardised equine-assisted psychotherapy, canine-assisted psychotherapy, enhanced social skills psychotherapy or regular hospital care.	violence incidents for several months. Need for one-to-one clinical observation reduced by both canine- and equine-assisted therapies.
Olsson, H., Audulv, A., Strand, S. & Kristiansen, L. (2015) Sweden	To attempt to understand inpatients' experiences of decreased and increased risk for violent behaviour.	• Interpretive description. • Semi-structured interviews with 13 forensic psychiatric inpatients who were less aggressive and had been successfully placed in lower levels of security services.	The patients' own strategies to avoid violence were working to increase personal insight, manage aggression, cope with illness and address warning signs. Staff attitudes were central to reducing or increasing violent incidents. Patients valued staff's availability to them and liked when staff made them feel respected. In challenging situations patients wanted to be treated respectfully, for example, by talking privately with staff, not in front of other patients, and by staff not challenging back when the patient was exhibiting challenging behaviour.
Sutton, D., Wilson, M., Van Kessel, K. & Vanderpyl, J. (2013) Australia	To evaluate the acceptability, implementation, and impact of a sensory room.	• A pilot interview study, an inductive qualitative study. • Interview of staff's and discharged patients' opinions of sensory modulation room.	Modifications to the environment and the use of shooting stimuli to moderate arousal and to promote an ability to adaptively regulate emotions via facilitating a calm state, enhancing interpersonal connection between staff and patients and supporting self-management. General Aggression Model discussed.
Tolisano, P., Sondik, T. M. & Dike, C. C. (2017) the United States of America	To describe positive behavioural approaches in a forensic psychiatric setting, two case descriptions.	• Two case examples of the implementations of positive behavioural approach. • Case 1: Baseline (four weeks) and active treatment period (three months) data were compared. Case 2: Baseline (three months) and active treatment data (six months)	Five key components of positive behavioural approach: A behavioural consultation team, identification of the functions that influence behaviour, skills-based programs, measurement of effectiveness with data collection, and acceptance of regular hospital administration oversight to monitor and

		were compared.	review positive behavioural supports. The model can be implemented in forensic psychiatric settings successfully. Case 1: decline in the use of restraints. Case 2: decline in self-harming behavior and aggression toward others.
van de Sande, R., Nijman, H., Noorthoorn, E., Wierdsma, A., Hellendoorn, E., van der Staak, C. & Mulder, C. (2011) The Netherlands	To evaluate the effect of risk assessment on the number of aggression incidents and time in seclusion in acute psychiatric wards.	• A cluster-randomised controlled trial. • Four wards, two intervention and two control wards, 40-week period (n=597 patients).	The number of aggressive incidents (RRR = -68%) decreased significantly. Duration of seclusion decreased significantly more in intervention wards than in control wards (RRR = -45%). The number of seclusion episodes or patients did not decrease.

Appendix 5. Flow chart for search of seclusion and restraint publications



Appendix 6. Seclusion and restraint reduction publications.

Authors, country	Purpose	Study design, sample	Results relevant to subject
Ash, D., Suetani, S., Nair, J. & halpin, M. (2015) Australia	To describe implementation of a recovery-based practise model into a psychiatric intensive care unit and report changes in seclusion rates.	• No study design mentioned. • A 10 bed PICU in South Australia, number of secluded patients and duration of seclusion from July 2011 to June 2012 (109 patients, average duration 4 hours) compared from July 2012 to July 2013. Exit interviews.	Positive aspects included approachable, helpful staff and a safety care plan; negative aspects included lack of patient involvement on decisions about admission to the unit, medications, non-smoking policy and the use of seclusion and restraint. Number of secluded patients and total number of seclusion incidents decreased significantly.
Blair, E., Woolley, S., Szarek, B., Mucha, T., Dutka, O., Schwartz, H., Wisniowski, J. & Goethe, J. (2016) The United States of America	To describe an intervention designed to decrease seclusion and restraint and evaluate program effectiveness.	• A pilot study, pre- and post-intervention measurements. • Baseline: 3,884 admissions at 120-bed psychiatric inpatient service; 8,029 admissions after intervention was implemented. Frequency and duration of seclusion and restraint events and violent incidents were compared.	The number of seclusions and the duration of seclusion per admission decreased. Restraints did not decrease significantly. The mean seclusion and restraint duration increased significantly.
Borckardt, J. J., Madan, A., Grubaugh, A. L., Danielson, C. K., Pelic, C., G., Hardesty, S. J., Hanson, R., Herbert, J., Cooney, H., Benson, A. & Frueh, B. C. (2011) The United States of America	To examine the effect of systematic implementation of behavioural interventions on the rate of seclusion and restraint in an inpatient psychiatric setting.	• Experimental study design. • A variant of the multiple-baseline design, randomised assignment of interventions across inpatient units. Each unit served as its own control. 3.5-year period between baseline and implementation of the interventions (behavioural and environmental) in five inpatient units in one psychiatric hospital	82.3% decrease in the use of seclusion and restraint. Changes in physical environment were associated with decreased use of seclusion and restraint regardless of when and where it was implemented.
Boumans, C., Egger, J., Souren, P. & Hutschemaekers, G. (2014) The Netherlands	To examine the effect of the methodological work approach on the use of seclusion at intensive treatment of inpatients with psychosis and substance-use disorders.	• A prospective register study, quasi-experimental, non-equivalent control group design. • A 21-bed psychiatric unit in the Vincent van Gogh psychiatric hospital in Venray, the Netherlands, control group of three wards with similar patients (severe mental	The intervention wards achieved more reduction on seclusion incidents and duration of seclusion than control wards. Methodological approach to treatment planning was effective in reducing seclusion use on patients with psychosis and substance-use disorders.

		illness and distruptive or dangerous behavior, 45 beds). The number of incidents, and duration of seclusion, related to 1,000 patient-days.	
Boumans, C., Egger, J., Bouts, R. & Hutschemaekers, G. (2015) The Netherlands	To investigate staff variables as well as seclusion parameters during an innovation project, against the background of an institutional program to reduce the use of coercive measures.	• A prospective, quasi-experimental register study, non-equivalent control group design. • A 21-bed psychiatric unit in the Vincent van Gogh psychiatric hospital in Venray, the Netherlands, control group of three wards with similar patients (severe mental illness and distruptive or dangerous behavior, 45 beds). The number of incidents, and duration of seclusion, related to 1,000 patient-days, staff variables (attitudes towards seclusion PATS-Q, work engagement, vignettes on evaluating tendency to seclude) 14 – 40 participants, and violence rates.	Reduced use of seclusion was achieved with the innovation project, but during the organisational turmoil the staff's work engagement scores decreased and the use of seclusion increased.
Bowers, L., James, K., Quirk, A., SUGAR, Stewart, D. & Hodsoll, J. (2015) United Kingdom	To test the efficacy of the Safewards model on conflict and containment rates.	• A pragmatic cluster-randomised controlled trial. • 31 randomly-chosen wards at 15 randomly-chosen hospitals, the rates of conflict and containment.	Conflicts reduced 15% in the experimental wards compared to control wards, the containment events rate reduced 26.4%.
Bullock, R., McKenna B., Kelly, t., Furness, T. & Tacey, M. (2014) Australia	To determine the relationship between sociodemographic and clinical characteristics, and the use of seclusion for patients who did not benefit from reduced seclusion efforts.	• A retrospective cross-sectional quantitative research design. • 469 patients admitted to two five-bed intensive care areas in 50-bed psychiatric inpatient unit with two 25-bed wings in Australia. 88 of 469 admitted patients were secluded.	Seclusion trend decreased during the two-year study period; decreasing trend observed over the first year and stabilization over the second year with limited change in the rates of seclusion. Clear association of age under 35 years, risk of violence to others (OR 2.15, $p < 0.01$) and history of seclusion (OR 2.39, $p < 0.01$) was observed in patients who required seclusion despite the reduction program.
Espinosa, L., Harris, B.,	To improve the milieu for	• No study design mentioned.	Rates of seclusion and restraint and time

Frank, J., Armstrong-Muth, J., Brous, E., Moran, J. & Giorgi-Cipriano, J. (2015) The United States of America	psychiatric inpatients.	• 15 inpatient psychiatric units in the New York area. Rates of seclusion and restraint, time on 1:1 observation, patient and staff satisfaction, violent incidents, staff and patient injury.	in 1:1 observation reduced, patient and staff satisfaction increased, violent incidents, and, finally, staff and patient injuries decreased. Positive results have lasted 10 years.
Georgieva, I., Mulder, C. & Noorthoorn, E. (2013) The Netherlands	To evaluate whether seclusion and coercive incidents would decrease if involuntary medication was the first choice for intervention.	• A randomised clinical trial. • 659 admissions, coercive measures were used on 85 of the admitted patients.	Relative risk of seclusion if in the involuntary medication group was lower than risk of receiving involuntary medication if in the seclusion group.
Goldbloom, D., Mojtabai, R. & Serby, M. (2010) The United States of America	To examine the role of early medication management in preventing seclusion and restraint.	• Case-control study, based on review of existing medical records. • 39 patients with seclusion or restraint in case group compared with 39 patients of control group, from July 2001 to June 2006.	Patients whose standing medication remained unchanged during the first 48 hours were restrained 5.5 times as often as patients whose medication was increased or patients who received new presciptions.
Goulet, M-H., Larue, C. & Dumais, A. (2017) Worldwide	To examine the effectiveness of seclusion and restraint reduction programs in mental health settings.	• A systematic review. • 23 articles, 2 RCTs. Information collected: Author, location, design, study purpose, setting, sample, length of follow-up, name of program, program component, outcomes, and risk of bias.	Six key components of seclusion and restraint reduction programs: leadership, staff and patient training, review after incidents of seclusion and restraint, patient involvement, prevention tools, therapeutic studies. Decreased violence rates in 4/23 studies and no change in one study. Reduction programs suggested.
Guzman-Parra, J., Garcia-Sanchez, J., Pino-Benitez, I., Alba-Vallejo, M. & Mayoral-Cleries, F. (2015) Spain	To determine if the introduction of a regulatory protocol contributed to reducing the use of mechanical restraint.	• A retrospective comparative analysis of mechanical restraint episodes. • One acute psychiatric ward in Spanish hospital, with 42 beds, analysis of the frequency and duration of mechanical restraint episodes, in 2005 and 2012.	The average duration of mechanical restraint reduced significantly from 27.91 to 15.33 hours. Mechanical restraint rate per year reduced but not significantly.
Guzman-Parra, J., Aguilera-Serrano, C., Garcia-Sanchez, J., Pino-Benitez, I., Alba-Vallejo,	To evaluate the effectiveness of a multimodal intervention (based on Six Core	• A retrospective comparative study, before and during the intervention. • One acute psychiatric ward in Spanish hospital, with 42 beds,	Significant reduction in mean number of mechanical restraints per 1,000 patient-days post-intervention year compared to pre-intervention year, p = .005. The

M., Moreno-Küstner, B. & Mayoral-Cleries, F. (2016a) Spain	Strategies©) to reduce the use of mechanical restraint.	analysis of the frequency and duration of mechanical restraint episodes. 1,575 admissions, 249 mechanical restraint episodes over two years (2012-2013).	probability of mechanical restraint decreased after implementing the intervention (OR 0.587, p = 0.003) The percentage of restrained patients decreased from 15.07% to 9.74%.
Hayes, A. & Russ, M. (2016) The United States of America	To examine the impact of eliminating intramuscular medication for agitation on patient and staff safety in acute psychiatry.	• A retrospective chart review. • A total of 16,061 unscheduled medication administrations during 15-month study period, 7.5 months before policy change and 7.5 months after.	Intramuscular PRN medication for agitation decreased by about half, assault rate was unchanged, and seclusion and restraint rates continued to decrease.
Jungfer, H-A., Schneeberger, A., Borgwardt, S., Walter, M., Vogel, M., Gairing, S., Lang, U. & Huber, C. (2014) Switzerland	To examine the effects of the change from closed wards to open wards on frequency of seclusion and forced medication in hospital-wide setting.	• Longitudinal, observational register study. • 2,838 inpatients, 2-year hospital-wide data.	On hospital level, the percentage of patients with at least one seclusion episode significantly decreased after 2 wards were unlocked (p = 0.016), but no significant difference in forced medication. On newly opened wards, the percentage of secluded patients decreased significantly from 15.9% to 0.3% meanwhile the number of forced medication decreased from 4.9% to 0. On closed wards, the number of forced medications increased significantly from 3% to 5.4%.
Kontio, R., Pitkänen, A., Joffe, G., Katajisto, J. & Välimäki, M. (2014) Finland	To explore the impact of an eLearning course for personnel on seclusion and restraint rates and duration in psychiatry.	• Cluster-randomized intervention trial. • Two hospital districts in Southern Finland, 5 intervention and 5 control wards included. A total of 1143 seclusion incodents and 140 mechanical restraint incidents.	No significant change on seclusion and mechanical restraint rates, but duration of mechanical restraints decreased form median 36.0 h to 4.0 h (p < 0.001) in intervention wards.
Lloyd, C., King, R. & Machingura, T. (2014) Australia	To determine whether use of a sensory modulation environment reduced the level of distress experienced by patients and whether availability of a sensory modulation room would reduce the use of	• Naturalistic study design, repeated measures design in the first study, a prospective quasi experimental design in the second study. • The exact numbers of sample not reported. In the first study one acute adult mental health unit, the patients who used sensory room during 6 months period. Two acute	The rate of seclusion decreased in intervention unit significantly compared to control unit. Duration of seclusion did not change. Self rated distress decreased significantly.

	seclusion.	adult mental health unit with 20 beds in Australia, one intervention unit and one control unit in the second study, one year study period (2011). Seclusion rates and duration from register.	
Madan, A., Borckardt, J. J., Grubaugh, A. L., Danielson, C. K., McLeod-Bryant, S., Cooney, H., Herbert, J., Hardesty, S. J. & Frueh, B. C. (2014) The United States of America	To investigate whether reduction of seclusion and restraint use with multi-strategy program was sustained over time.	• Naturalistic, experimental study design. • 95 beds in five units, two-year baseline, 3.5-year study period and 4.5-year follow-up period, 3,040 seclusion and restraint incidents over 254,491 patient-days.	Statistically significant reduction in seclusion and restraint use sustained over the ten-year study period.
Maguire, T., Young, R. & Martin, T. (2012) Australia	To present the initiatives during a seclusion reduction project in forensic hospital.	• A description of the Beacon Project for reducing the use of seclusion. • Thomas Embling hospital with 116 beds for patients found not guilty by reason of impairment, sentenced and remanded prisoners, and patients referred from area mental health services that are deemed a risk to others. Time period: two years before the project, two years during the project and one year after the project.	The six core strategies were effective in reducing the frequency and duration of seclusion.
Noorthoorn, E., Voskes, Y., Janssen, W., Mulder, C., van de Sande, R., Nijman, H., Smit, A., Hoogendoorn, A., Bousardt, A. & Widdershoven, G. (2016) The Netherlands	To evaluate whether Dutch seclusion reduction goals were achieved.	• Retrospective register study. • National register data from 66 psychiatric hospitals, trends in number and duration of seclusion incidents and number of secluded patients between 2008 and 2013.	Number and duration of seclusion decreased at the national level from 2008 to 2013. Change occurred in only half the hospitals. Use of forced medication increased, so may have replaced the use of seclusion.
Smith, G., Ashbridge, D., Altenor, A., Steinmetz, W., Davis, R., Mader, P. & Adair, D. (2015) The United States of	To assess the use of seclusion and restraint in the Pennsylvania state hospital system from 2001 through 2010 and	• A prospective study. • 14,430 containment procedures during 12,900 events involving 1,801 patients	Mehanical restraint and seclusion use decreased significantly during the study period. Physical restraint use varied during the years, and the length of physical restraint increased from mean

America	to examine the correlation between seclusion and restraint use and hospital violence.		4.3 minutes to 6.5 minutes. Assaults targeting patients declined slightly. Assaults targeting staff were unaffected. Unscheduled medication use decreased.
Staggs, V. S. (2015a) The United States of America	To assess nationwide trends in use of seclusion and restraint in response to injurious assaults in psychiatric units in U.S.	• No study design mentioned. • 438 psychiatric inpatient units in 317 U.S. hospitals, 8,002 injurious assaults from 2007 to 2013.	Use of restraint with devices decreased, as did duration of restraint. There were 0.62 assaults per 1,000 patient-days. Seclusion followed 17.0% of assaults and restraint followed 31.4%. The trend in seclusion and restraint use in response to assaults did not decline.
Vruwink, F., Mulder, C., Noorthoorn, E., Uitenbroek, D. & Nijman H. (2012) The Netherlands	To establish whether the numbers of seclusion and involuntary medication changed significantly after start of a nationwide program to reduce seclusion.	• A register study. • National numbers of seclusion and involuntary medication for 1998-2009 in the Netherlands, before and after the nationwide program for reducing use of seclusion.	Seclusion use decreased significantly by 2% annually, but failed the national goal of 10% reduction nationally. Involuntary medication increased significantly during the nationwide program compared to the increase before the program.
Yang, C-P., Hargreaves, W. & Bostrom, A. (2014) The United States of America	To examine whether greater nursing staff skills and motivation reduce seclusion and restraint use and whether empathy training can further this effect in an acute inpatient psychiatric unit for Asian patients.	• No study design mentioned. • 1,098 shifts, 79 (7.2%) with seclusion or restraint incidence. Evaluation of staff member's ability to engage patients in a respectful, caring, therapeutic relationship.	Presence of more strongly empathetic nursing staff impacted the decrease in use of seclusion and restraint. Staff training did not enhance the effect.

SATU TUOVINEN

Involuntary care of psychiatric patients restricts their human and constitutional rights. On the other hand, it is impossible to separate use of restriction from hospital violence and its impact on targeted patients. This study aim to identify the factors associated with hospital violence in a forensic psychiatric setting, and to investigate whether reducing use of seclusion and restraint is possible and safe in forensic psychiatry.

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