Short-term violence risk assessment in acute psychiatry -
A naturalistic prospective inpatient study

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Preface

Early in my career as a mental health nurse working in an acute psychiatric inpatient unit, I often heard comments from more experienced healthcare staff like *'he is about to explode'* or *'she will most likely become violent shortly'*. When I asked how they would know, they responded with comments like *'his eyes are so dark'* or *'it's just my gut feeling after all these years'*. Personal experiences with inpatient violence occurring *'out of the blue'*, along with violent episodes where close colleagues were harmed, left me with a feeling of inadequacy and a concern that only the experienced staff were able to predict episodes of inpatient violence. I felt a need to be able to identify more precisely which inpatients were high risk for becoming violent in order to better manage the risk, prevent the occurrence of violence and to help the inpatients not to commit violent acts that could be harmful to themselves and others and that they would be sorry for having have done and ashamed of later on.

These experiences made me especially interested in violence risk prediction, assessment and risk management, and for five years I was partly responsible for the risk management training for the mental healthcare staff at the acute psychiatric ward. During this time the ward implemented the use of a structured risk assessment judgment instrument as part of the admission procedure during the initial intake and admission to the ward and the use of short-term risk assessments during hospitalisation, as part of the standard daily records. I noticed that most risk assessment instruments were based on historical variables along with observations made by the healthcare staff. At the same time, I experienced that inpatients had valuable information both regarding their own risk of committing violence and what they described as efficient violence risk management.

My PhD project is a continuation of this long-term engagement and a desire to improve violence risk assessments and management in order to improve the treatment provided for people admitted to acute psychiatric inpatient units and to increase the safety of the inpatients and the mental healthcare staff working in such units.

The main topic of this doctoral thesis is risk assessment of violence in acute psychiatry with an emphasis on short-term risk assessment during hospitalisation. The thesis is part of a larger violence risk assessment research project conducted at the acute psychiatric ward at the Oslo University Hospital.

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Summary

Background: This doctoral thesis is based on a PhD project that was part of a larger prospective naturalistic research project: "Violence risk assessment in an acute psychiatric ward". Violence within the health sector is a global and increasing concern. Aggression and violence occurs frequently in mental healthcare settings and is perpetrated by both males and females. Current violence risk assessment methods seem to have reached an upper limit of accuracy. A broader approach to risk assessments is suggested, hence different perspectives may provide a deeper and improved understanding of patients' violence risk. Risk assessments in acute psychiatric settings must also be performed quickly, and predictions must be accurate over the short-term.

Aim: The overall aim of this doctoral thesis was to investigate an extended model for short-term violence risk assessments in acute psychiatric units. The thesis investigated patients' self-assessments of risk (SRS) as a risk marker for inpatient violence (Study 1), the association between short-term risk assessments with the Brøset Violence Checklist (BVC) and imminent violence throughout hospitalisation (Study 2), and whether an extended model combining BVC, SRS and single items from Violence Risk Screening 10 (V-RISK-10) provides improved short-term predictive accuracy compared to the BVC alone (Study 3).

Methods: The target population was all patients involuntarily and voluntarily admitted to an acute psychiatric ward in Oslo over one year between March 21, 2012, and March 20, 2013 ($N = 558$). Thirty patients withdrew from participation, resulting in an initial study sample of 528 patients from 717 admissions. In Study 1, logistic regression was conducted to investigate the predictive accuracy of SRS. Interaction analysis was used to investigate gender differences. In Study 2, logistic regression and generalised linear mixed model (GLMM) analyses were conducted to investigate the predictive accuracy of the BVC. Interaction analyses were conducted to investigate possible gender differences. In Study 3, stepwise multivariate GLMM analyses were conducted: (i) BVC, (ii) BVC + SRS. (iii) BVC + SRS + single items from V-RISK-10.

Findings: Patients who reported their risk of violence to be either moderate, high, don't know or refused to answer (positive predictor of SRS) were more than four and a half times more likely to be violent, compared with those who reported no or low risk. Interaction analysis showed significant gender differences with SRS as a stronger risk predictor for women (Study 1). Findings confirm that the BVC is a suitable short-term risk assessment instrument

throughout hospitalisation in acute psychiatric units, also when differentiating threats and physical violence, differentiating males and females and adjusted for diagnostic subpopulations and circadian variability. Interaction analyses displayed no significant differences in the association between males and females (Study 2). When adjusting for repeated measurements, an extended model for short-term risk assessment, consisting of BVC, SRS and Item 2 Previous and/or current threats in V-RISK-10 explained more of the imminent violence, compared to the BVC alone (Study 3).

Conclusions: This is the first attempt to investigate an extended model for short-term risk assessments by including inpatients' own risk assessments as part of the model. Inpatients' self-assessments may contribute as a risk marker for inpatient violence. The findings confirm the predictive validity of BVC when adjusted for repeated measurements. Findings also indicate that an extended model for short-term risk assessments explains more variance of imminent violence than short-term risk assessments with the BVC alone. Nonetheless, the results must be interpreted with caution, and a number of limitations should be borne in mind.

Sammendrag

Bakgrunn: Denne doktorgradsavhandlingen er basert på et doktorgradsprosjekt som var del av et større prospektivt naturalistisk forskningsprosjekt: «Voldsrisikovurdering i en akuttpsykiatrisk avdeling». Vold utført av pasienter og klienter er en global og økende utfordring innenfor helsesektoren. Aggresjon og vold er jevnlig forekommende innenfor psykiatriske døgnavdelinger og utføres av både menn og kvinner. Dagens metoder for voldsrisikovurderinger ser ut til å ha nådd en øvre grense for nøyaktighet. En bredere tilnærming til voldsrisikovurderinger er foreslått siden ulike perspektiver kan bidra til en grundigere og forbedret forståelse for pasienters voldsrisiko. Risikovurderinger i akuttpsykiatriske avdelinger må også kunne utføres raskt og være nøyaktig på kort sikt.

Hensikt: Den overordnede hensikten med doktorgradsavhandlingen var å undersøke en utvidet modell for korttids voldsrisikovurderinger i akuttpsykiatriske avdelinger. Avhandlingen undersøkte pasienters egenvurdering av voldsrisiko (SRS) som risikomarkør for vold under innleggelse (Studie 1), assosiasjonen mellom korttidsrisikovurderinger med Brøset Violence Checklist (BVC) og vold i nær fremtid (det neste vaktskiftet) gjennom hele sykehusoppholdet (studie 2) og i hvilken grad en utvidet modell for korttidsrisikovurdering bestående av BVC, SRS og enkeltledd fra Violence Risk Screening 10 (V-RISK-10) predikerer vold i nær fremtid mer nøyaktig sammenliknet med BVC alene.

Metode: Målgruppen for forskningsprosjektet var alle akuttinnlagte pasienter til en akuttpsykiatrisk avdeling i Oslo gjennom ett år i perioden 21. mars 2012 til 20. mars 2013 (*N* = 558). Totalt tretti pasienter trakk seg fra deltakelse, noe som resulterte i et utvalg på 528 pasienter (med totalt 717 sykehusinnleggelser). Studie 1 benyttet logistisk regresjon til å undersøke den prediktive nøyaktigheten til SRS. Kjønnsforskjeller ble undersøkt ved hjelp av interaksjonsanalyse. I Studie 2 ble det benyttet logistisk regresjon og generalisert lineær mikset modell (GLMM) analyser for å undersøke den prediktive nøyaktigheten for BVC. I studie 3 ble det benyttet stegvise GLMM analyser; (i) BVC, (ii) BVC + SRS, (iii) BVC + SRS + Enkeltledd i V-RISK-10.

Funn: Sannsynligheten for å utøve vold under sykehusoppholdet var mer enn fire og en halv gang høyere for pasienter som rapporterte egen risiko til å være, moderat, høy, ikke visste, eller nektet å svare på spørsmålet (positiv prediktor i henhold til SRS), sammenliknet med de som rapporterte ingen risiko eller lav risiko. Interaksjonsanalysen viste signifikante kjønnsforskjeller med SRS som en sterkere risikomarkør for kvinner (studie 1). Funnene

bekrefter at BVC er et egnet korttidsrisikovurderingsinstrument til bruk under hele sykehusinnleggelsen på akuttpsykiatriske avdelinger, også når man differensierer mellom trusler og fysisk vold, -mellom kvinner og menn og justerer for diagnosegrupper og døgnvariasjon. Interaksjonsanalysene viste ingen signifikante forskjeller i prediksjonen for BVC mellom kvinner og menn (Studie 2). En utvidet modell for korttidsrisikovurderinger bestående av BVC, SRS og ledd 2; Tidligere og/eller aktuelle trusler i V-RISK-10 forklarte mer av vold i nær fremtid sammenliknet med BVC alene (Studie 3).

Konklusjon: Dette er det først forsøket på å undersøke en utvidet modell for korttidsrisikovurderinger som inkluderer pasienters egenvurderinger som del av modellen. Pasienters egenvurdering av risiko for vold kan bidra som en risikomarkør for vold under innleggelse i akuttpsykiatriske avdelinger. Funnene bekrefter den prediktive validiteten til BVC også når det justeres for repeterte målinger. Funnene indikerer også at en utvidet modell for korttidsrisikovurderinger forklarer mer av variansen til vold i nær fremtid enn korttidsrisikovurderinger med BVC alene. Funnene må likevel tolkes med forsiktighet, og en rekke begrensninger bør tas i betraktning.

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Paper II:

Lockertsen. Ø., Varvin, S., Færden, A., & Vatnar, S. K. B. (2020). Short-term Risk Assessments in an Acute Psychiatric Inpatient Setting: A Re-examination of the Brøset Violence Checklist using Repeated Measurements –Differentiating Violence Characteristics and Gender. *Archives of Psychiatric Nursing, 35*(1), 17-26.
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Paper III:

Lockertsen, Ø., Varvin, S., Færden, A., Eriksen, B. M. S., Roaldset, J. O., Procter, N., & Vatnar, S. K. B. (2020). Risk assessment of imminent violence in acute psychiatry: A step towards an extended model. *The Journal of Forensic Psychiatry & Psychology, 31*(1), 41-63.
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Abbreviations

AIC	Akaike´s information criterion
ARAI	Actuarial risk assessment instrument
AUC	Area under the curve
BIC	Bayesian information criterion
BVC	Brøset Violence Checklist
CI	Confidence Interval
GLMM	Generalised Linear Mixed Model
ICD-10	The International Statistical Classification of Diseases and Related Health Problems -10th Revision
NPV	Negative predictive value
OR	Odds ratio
PPV	Positive predictive value
REK	Regional Committee for Medical and Health Research Ethics
ROC	Receiver operator characteristics
SOAS-R	Staff Observation Aggression Scale – Revised
SPJ	Structured Professional Judgment
SRS	Self-report Risk Scale (by patients)
SRS-d	Dichotomous version of the Self-report Risk Scale
V-RISK-10	Violence Risk Screening 10

Central concepts and designations

Acute psychiatry   Acute Psychiatric Inpatient Units provide high-intensity, acute psychiatric services 24 hours a day for individuals, 18 years old and older, experiencing acute psychiatric symptoms.

Aggression   Generally implies destructive or punitive behaviour directed towards other persons or objects.

Imminent violence   Violence which is about to happen (here: the imminent nursing shift).

Mental disorder   Comprises a broad range of problems, with different symptoms, generally characterised by some combination of abnormal thoughts, emotions, behaviour and relationships with others (here: mental and behaviour disorders according to the ICD-10).

Patient (in-)   A person who receives health services. In this thesis, *inpatient* refers to persons admitted to an acute psychiatric inpatient unit.

Risk assessment   Violence risk assessment is a clinical decision-making task that is being conducted in numerous legal and clinical settings in which the possibility of a person's future violent behaviour is of concern.

Risk factor   A variable associated with increased risk (here: of violent behaviour). Can be either static (historical and unchanging), stable dynamic (modifiable but unlikely but unlikely to change), or dynamic (can fluctuate with time and circumstances).

Violence   Either physical violence (physical act against another person, involving the use of body parts or objects, with a clear intention to cause physical injury to that person) or threats of violence (verbal and non-verbal communications conveying a clear intention to inflict death, physical injury or assaults upon another person).

1   Introduction

Violence in the health sector is a global and increasing concern (Gates, 2004; Kuehn, 2010; Llor-Esteban, Sánchez-Muñoz, Ruiz-Hernández, & Jiménez-Barbero, 2017), and workplace violence in healthcare settings is an occupational issue concerning care professionals (Martinez, 2016). Aggression and violence occur frequently in mental healthcare settings and is perpetrated by both male and female patients (Cutcliffe & Riahi, 2013; Duxbury, Hahn, Needham, & Pulsford, 2008). Acute psychiatric hospital environments are associated with increased risk of inpatient violence (Abderhalden et al., 2007), and studies have reported that 17% to 31% of patients admitted to acute psychiatric wards commit violence during hospitalisation (Bowers et al., 2011; Iozzino, Ferrari, Large, Nielssen, & de Girolamo, 2015). The majority of the inpatients are nonviolent. (e.g., Bowers et al., 2008). Nevertheless, accurate violence risk assessments are essential to identify the minority of patients with increased risk and to prevent violence from occurring. (e.g., Monahan, 2001; Singh, Desmarais, et al., 2016). Risk assessments are important in order to reduce the risk of harm to fellow inpatients and the mental healthcare staff and to reduce the potentiality of use of coercion, restrictive interventions and restraints towards inpatients who commit violence.

Over the last 30 years we have seen an acceleration of attempts to improve the ability of mental health professionals to assess and manage the risk of the patients from harming others (Haque, 2016). Most violence risk assessment instruments were developed in either forensic or prison settings (Monahan, 1984), but many have proven to be valid in general psychiatry as well (Douglas, Cox, & Webster, 1999; Harris, Rice, & Camilleri, 2004). Structured risk assessment instruments are often time-consuming, and relatively few are suitable in acute psychiatric settings, where assessments must be performed quickly and predictions must be accurate over the short term (Harris & Rice, 1997; Szabo, White, Cummings, Wang, & Quanbeck, 2015). Mental health professionals may be under time pressure to make decisions and may have less clinical and behavioural information available on admission, compared to in long-term clinical settings (Elbogen, Tomkins, Pothuloori, & Scalora, 2003; Newton, Elbogen, Brown, Snyder, & Barrick, 2012).

Associations between static patient factors and inpatient violent behaviour are weak, and it is important to consider dynamic factors such as a patient's current state and the context to reduce inpatient aggression and violence (Dack, Ross, Papadopoulos, Stewart, & Bowers, 2013). Fluctuating mental states and behaviour patterns among patients admitted to acute

psychiatric hospitals highlight the need for an assessment instrument to predict the potential for aggressive and violent events in a timely manner (Abderhalden et al., 2004; Almvik, Woods, & Rasmussen, 2000; Björkdahl, Olsson, & Palmstierna, 2006). Thus, risk assessment for imminent violence has been promoted as one strategy to prevent violence. Among the shortcomings in the literature on short-term risk assessment is the absence of studies pertaining to short-term risk assessments in acute psychiatric settings adjusted for repeated measurements.

Most structured risk assessment instruments achieve moderate accuracy in comparison studies, suggesting a 'glass ceiling' effect beyond which few instruments can improve (Coid et al., 2011; Yang, Wong, & Coid, 2010). Thus, there is a need for investigation into whether extended approaches may improve violence risk assessments (Singh, Serper, Reinharth, & Fazel, 2011). A review emphasised the importance of a multidisciplinary approach to violence risk assessments (Steinert & Whittington, 2013); hence different perspectives may provide a deeper and improved understanding of risk assessment. In spite of this, patients' self-perceptions of risk have rarely been emphasised as useful in violence risk assessment, and only a few studies have addressed the issue (Roaldset & Bjørkly, 2010; Skeem, Manchak, Lidz, & Mulvey, 2013). Another limitation in previous studies on risk assessment of imminent violence is the use of mental health professionals' observations without including patients' self-perceptions of risk. A more ethical approach to violence assessment takes patients' self-assessments into account (Roychowdhury & Adshead, 2014); nevertheless to date no studies include patients' self-perceptions of risk in short-term risk assessment models.

In this thesis, I will investigate patients' own risk assessments recorded at admission, as a risk marker for violence during hospital stay. I will further investigate the associations between short-term risk assessments conducted at the end of each nursing shift and imminent violence throughout hospitalisation. Finally, I will investigate the extent to which an extended short-term risk assessment model combining (a) short-term risk assessment, (b) patients' own predictions of violence and (c) single items from a structured clinical risk assessment instrument provides improved short-term predictive accuracy of violence compared to short-term risk assessments alone. Following that, I will present the study results and discuss the main findings and their implications.

2   Background

2.1   Contextualising the thesis

This chapter provides the scientific positioning of the thesis and the context in which the research project was conducted. Given the limited frame regarding length of the thesis, its scientific positioning is only briefly described.

2.1.1 Positioning the thesis

The thesis is based on a study design using a post-positivistic paradigm to understand the external world -- in this case, violence in an acute psychiatric setting. Elements of post positivism include being reductionistic and logical, emphasising empirical data collection, and being cause-and-effect oriented and deterministic based on a priori theories (Creswell, 2014). Post positivism is also a paradigm that emerges after *positivism*, which challenges the traditional notion of the absolute truth of knowledge (Phillips, & Burbules, 2000) and acknowledges that we cannot make absolute claims of truth about knowledge we have arrived at when studying the behaviour and actions of humans. In this study, the collected data are based on pre-coded instruments and observations made by mental healthcare staff. The study relied upon physicians', nurses', and patients' approaches to violence risk assessments; hence, the collected data were from all three perspectives. According to post-positivism, being objective is essential, and researchers must examine methods and conclusions for bias. Standards of validity and reliability are important (Creswell, 2014; Phillips, & Burbules, 2000). Limitations related to the choice of study design are discussed in Chapter 6.3.1.

2.1.2 Acute psychiatry

Acute psychiatric services and acute psychiatric inpatient units are organised differently in different countries (Bowers et al., 2008). In Norway, acute psychiatric inpatient units are part of the public healthcare system, serving inhabitants in Norway. Each acute psychiatric inpatient unit is responsible for a predefined catchment area and is obligated to admit patients referred for hospitalisation from that area. According to the Norwegian Mental Health Care Act of 1999, an individual can be referred to inpatient mental healthcare either voluntarily or involuntarily. For patients referred involuntarily, the institution must ensure that during the

first 24 hours, a psychiatrist or clinical psychologist affirms the legal basis for the admission. An involuntarily admitted patient can be retained either on observational status (up to 10 days) or under long-term confinement (Norwegian Directorate of Health, 2012). Thus, acute psychiatric inpatient units in Norway are normally locked wards. Most acute psychiatric inpatient units also have an open area seclusion as part of the acute psychiatric unit (Bjørkly, 1995). The open area seclusion is similar to Psychiatric Intensive Care Units (PICU): small units, with higher levels of nursing and other staff, built on an open-plan design to ease observation and regularly locked (Bowers et al., 2008). Mean staff to bed ratio (number of healthcare staff present at day shifts + afternoon shifts + night shifts divided by number of beds) in Norway is described as approximately 3.5 (*SD* = 0.8) (Husum, Bjørngaard, Finset, & Ruud, 2010).

The demanding conditions on many of the acute psychiatric inpatient wards inhibit the staff's ability to provide safe, therapeutic care (Björkdahl, Palmstierna, & Hansebo, 2010; Currid, 2008). The tension between autonomy and paternalism is a continual challenge in mental health nursing (Alexander & Bowers, 2004; Hummelvoll, 1996), and nurses in acute psychiatric wards should be encouraged to reflect on how they integrate paternalistic nursing styles with person-centred care (Björkdahl et al., 2010). In previous studies, nurses working in acute psychiatric wards described feeling torn between their humanistic ideals and the demand for treatment efficiency in the harsh reality of their daily work (Björkdahl et al., 2010; Currid, 2008; Hummelvoll & Severinsson, 2001; Vatne & Fagermoen, 2007). In a Scottish qualitative study the included patients perceived the development of a nurse-patient relationship, where they could spend time talking to the nurses about their problems, as pivotal to the therapeutic potential of the acute ward (Stenhouse, 2011).

2.1.3 The concept of mental disorders

In the early 1960s, the Mental Health Programme of the World Health Organization (WHO) became actively engaged in a programme aiming to improve the diagnosis and classification of mental disorders (WHO, 1992). Mental disorders comprise a broad range of problems, with different symptoms. However, they are generally characterised by some combination of abnormal thoughts, emotions, behaviour and relationships with others (WHO, 2019a). The development of the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10) went through several major drafts, each prepared after

extensive consultation with panels of experts, national and international psychiatric societies, and individual consultants (WHO, 1992). The ICD-10 was introduced as the official Norwegian classification of mental disorders from 1997 (Malt, 2019, 30. januar), hence the concept of mental disorders as used in the thesis is mental and behaviour disorders according to the ICD-10 (WHO, 2004).

2.2 Human aggression

This chapter conceptualises aggression and violence. Correlations between mental disorders and violence are explored.

2.2.1 Conceptualising aggression

Human aggression has been studied in a wide range of disciplines. Studying aggression directly however is difficult, as it occurs sporadically and people often have reasons for not acknowledging or reporting it. Each scientific discipline has its own level of analysis and develops its own set of theories and methods to explain aggression (Bjørkly, 2006). There are more than 250 different definitions of aggression (Egidius, 2005), and it is difficult to define aggression independent of the context in which it occurs (Maguire & Ryan, 2007). Aggression generally implies destructive or punitive behaviour directed towards other persons or objects (Fernandez-Ballesteros, 2002). Aggression is often divided into two main categories: Premeditated aggression (instrumental violence) represents a planned behaviour with clear goals that are not typically associated with frustrations, immediate frustrations or stress. Impulsive aggression (reactive violence), however, is characterised by a high level of autonomic arousal, and it is precipitated by triggers soliciting negative emotions, such as insults, anger, depression and fear (Blais, Solodukhin, & Forth, 2014; Roaldset, 2010).

Aggression understood from different theoretical angles

Human aggression is a complex field to study, and the heterogeneous nature of the term *aggression* constitutes a major complicating factor (Bjørkly, 2006). Aggression can be understood from different theoretical angles. Psychoanalytical theory (Freud, 2003; Pedder, 1992) provides different explanations, for example, aggression as a natural drive, as a consequence of narcissistic injury or as a reaction to frustration due to external stimuli.

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Lorenz's ethological aggression theory (Lorenz, 2005) considers aggression as the instinct to fight in order to reproduce and to gain or protect territory, resources and food. Drive theories, however, encompasses theories that view aggression as a reactive phenomenon. The well-known frustration-aggression hypothesis first posited that any interference with an individual's goal-directed activities causes frustration, which may lead to aggression (Dollard, Miller, Doob, Mowrer, & Sears, 1939). From the perspective of social learning theories, aggression is not an instinct, but a result of social learning from experience or observation (Bandura, 1973). All violence is aggression, but many instances of aggression are not violent (Anderson & Bushman, 2002).

The traditional person-situation dichotomy has been questioned, and it has been suggested that it be replaced by an emphasis on the mutual impact of the two variables (Funder, 2006). The main idea is that aggression involves an influential and continuous interaction between individuals and the various situations they encounter (Bø Vatnar & Bjørkly, 2010). Such a shift toward an interactional perspective is particularly suggested in the research area of intimate partner violence, but requires more theoretical and empirical work (Winstok, 2007). Just such a continuous and influential interaction is a primary characteristic of the nurse-patient relationship in mental health nursing (Cleary, Hunt, Horsfall, & Deacon, 2012). Violence risk assessments, and especially short-term risk assessments, encompass the context and dynamic risk factors of both intrapersonal and interpersonal characteristics, and hence the suggested interactional perspective is particularly relevant for this thesis.

2.2.2 Conceptualising violence

The World Health Organization (WHO) defines violence as

> *The intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment or deprivation* (WHO, 1996).

Violence is acknowledged by WHO (1996) as a major global public health issue. Aggression and violence in described as parts of the same phenomenon with violent behaviour as an expression of human aggression (Anderson & Bushman, 2002). Violence is extremely heterogeneous in its nature and origin. Thus, it can be reactive and defensive or proactive and

predatory, impulsive or planned, motivated by affects, by thoughts (e.g., political or religious ideologies) or by material or immaterial benefits (Steinert & Whittington, 2013).

Between 8% and 38% of health workers suffer physical violence at some point in their careers. Many more are threatened or exposed to verbal aggression (WHO, 2019b). An Italian study found the relative risk of violence against employees within mental health services to be 22 times higher compared with other health services (Magnavita & Heponiemi, 2012), and the acute psychiatric hospital environment is one of heightened risk for aggression and violence (Abderhalden et al., 2007). Studies on aggression and violence often use different outcome measures. Physical aggression only against others is more common, but, in addition to aggression against others, some studies also include incidents of verbal threats, physical aggression against objects and aggression against self as outcome measures (Bowers et al., 2011; Dack et al., 2013).

The concept of violence as used in this thesis is based on definitions from previous studies (Dean et al., 2006; Monahan et al., 2005; Roaldset, 2010; Swanson et al., 2006). Violence may be characterised as physical violence, or threats of violence. *Physical violence* was conceptualised as a physical act against another person, involving the use of body parts or objects, with a clear intention to cause physical injury to that person. *Threats of violence* were measured as verbal and non-verbal communications conveying a clear intention to inflict death, physical injury, or assaults upon another person.

2.2.3 Mental disorders and violence

Community violence among persons with mental disorders

Violent behaviour involving patients with mental disorders (schizophrenia, mania, major depression and bipolar disorder) is found to be five times higher than in the general population (16 times higher in the presence of co-morbid alcohol/substance abuse) (Swanson, Holzer, Ganju, & Jono, 1990). These findings are in line with a 30-year longitudinal follow-up study in Sweden (Hodgins, Kratzer, & McNeil, 2002). Several studies and reviews indicate increased violence in the community perpetrated by persons with mental disorders (e.g., Hiday, 2006; Markowitz, 2011; Swanson et al., 2006), however not all studies adjust for co-occurring factors. Studies show that those experiencing "threat/control-override" (TCO) symptoms are at an increased risk of committing violence (Elbogen & Johnson, 2009; Link, Monahan, Stueve, & Cullen, 1999; Markowitz, 2011; Swanson et al., 2006; Teasdale, 2009).

As TCO symptoms describe a patient's feeling of being gravely threatened by someone who intends to cause harm and of an override of self-control through external forces, they were called threat/control-override (TCO) symptoms (Link & Stueve, 1994). Persons experiencing TCO symptoms may accept irrational thoughts as real, misperceive the actions of others as threatening and respond with violence (Link et al., 1999). Studies also show an increased risk of violence among those with multiple disorders, those with co-occurring substance use, and noncompliance with medication regimes that reduce troublesome symptoms (Markowitz, 2011).

Inpatient violence

Systematic reviews have found that the prevalence of violence varies significantly between studies and institutions (Dack et al., 2013; Davis, 1991; Nijman, Palmstierna, Almvik, & Stolker, 2005). This variance has been attributed to many factors, such as the great variety in incident-reporting practices, a lack of clear definitions as to what constitutes violence and lack of standard measurement instruments (Bowers et al., 2011; Irwin, 2006). However, although data were obtained in highly comparable ways, a review found substantial differences in violence rates (Nijman et al., 2005).

A large review found, not surprisingly, forensic settings to have substantially higher rates of violence (47.7%) than acute psychiatric wards (22.1%) or general psychiatric wards (26.2%) (Bowers et al., 2008). However, acute psychiatric hospital environment is associated with aggression (Abderhalden et al., 2007), and violence by patients is a common challenge on acute psychiatric units worldwide (Carr et al., 2008; Dack et al., 2013; Szabo et al., 2015). An older review found higher violence rates in acute psychiatric wards in the United States than in other nations (Davis, 1991), and a more recent review found the highest rates of patient violence in the United States (31.92%), United Kingdom (41.73%) and Sweden (42.90%) (Bowers et al., 2011). An important complicating factor for the review, however, was the variation in definitions of violence, and within studies it was commonly reported that official incident reports underreported the true extent of violence.

Inpatient violence in acute psychiatry

A safe environment is a prerequisite for meaningful recovery for acutely hospitalised patients, yet violence is endemic in acute psychiatric units (Szabo et al., 2015). Violent incidents occur

most frequently around the time of admission to psychiatric hospitals. A few weeks after discharge the risk of violence decreases and falls to the level of the general population within one year after discharge (Monahan, 2001). Reviews have described violence rates in acute psychiatric wards as ranging from 17% to 31% of the admitted patients (Bowers et al., 2008; Iozzino et al., 2015). However, estimates are extremely variable with figures between 8 - 44% (Dack et al., 2013). Lower violence rates are described in prospective studies from acute psychiatric wards in Norway (9 - 10%) (Hartvig, Roaldset, Moger, Ostberg, & Bjørkly, 2011; Mellesdal, 2003). Most incidents occur the first few days after admittance (Abderhalden et al., 2007; Grassi, Peron, Marangoni, Zanchi, & Vanni, 2001; Mellesdal, 2003), and a minority of patients is disproportionately responsible for multiple episodes of violence (Bowers et al., 2011; Mellesdal, 2003). A review found that approximately 45% of violent patients were involved in more than one incident, with each violent patient, on average, being responsible for four incidents (Bowers et al., 2011).

Consequences of inpatient violence

Violence in clinical psychiatry has a multitude of negative consequences for both patients and mental health professionals (Abderhalden et al., 2007; Dack et al., 2013). Patients perpetrating violence are also adversely affected, because seclusion and restraints are often used to manage aggressive behaviour, and inpatient violence can result in prolonged involuntary hospitalisations (Jeandarme et al., 2016).

Witnessing violence can also induce fear and uncertainty among fellow patients (Hamrin, Iennaco, & Olsen, 2009; Kennedy, Bresler, Whitaker, & Masterson, 2007). Violence can potentially affect the therapeutic milieu in profound, negative ways, traumatising and demoralising all involved (Kennedy et al., 2007; Szabo et al., 2015). Harmony among staff working on psychiatric units is useful in preventing violence (Cornaggia, Beghi, Pavone, & Barale, 2011), and positive therapeutic relationships between mental health patients and mental health professionals are essential for supporting recovery processes.

Workplace violence is a phenomenon affecting all healthcare professionals (Wolf, Delao, & Perhats, 2014) with nurses experiencing the highest rates; hence assault rates are strongly correlated with patient contact time (Phillips, 2016). One study found that 80% of nurses report feeling unsafe in their workplaces (Child & Mentes, 2010). Mental health professionals report stress-related sickness and poor work and treatment environments (Needham,

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Abderhalden, Halfens, Fischer, & Dassen, 2005). Healthcare staff subjected to or witnessing violence often experience significant physical and psychological effects. Consequently, they may leave their workplaces and some even their professions due to workplace violence (Edward, Ousey, Warelow, & Lui, 2014). Many nurses often view inpatient violence as part of the job (Child & Mentes, 2010), and in some settings where violent incidents occur frequently, a culture of acceptance of violence persists (Wolf et al., 2014).

2.3 Factors associated with inpatient violence

Factors related to increased inpatient violence risk are of great interest to clinicians, hence understanding these factors informs effective risk management and enables staff to select appropriate interventions (Szabo et al., 2015). Patient risk factors may be categorised in four categories: what a person is (e.g., age gender, race), what has been done to the person (e.g., pathological family environment, victimisation), what a person has (e.g., major mental disorder, personality disorder, substance abuse disorder) and what a person has done (e.g., prior crimes, violence) (Monahan et al., 2006). Patient risk factors can also be categorised according to whether they are static (e.g., historical and unchanging), stable dynamic (modifiable but unlikely to change), and acutely dynamic (modifiable and likely to change) (Andrews & Bonta, 2010). Examples include previous violence, marital status and environmental stress respectively (Brown & Singh, 2014). Below, static and stable dynamic risk factors are merged and presented as static factors; hence, stable dynamic risk factors tend to be static during hospitalisations in acute psychiatric settings. Gender is reviewed separately from the remaining static factors.

2.3.1 Static patient factors

Static risk factors for violence (e.g., early onset of violence and history of violence) are historical events or variables that are not amenable to change through planned intervention over time (Chu, Daffern, & Ogloff, 2013; Douglas & Skeem, 2005). A review and meta-analysis, which included 34 studies, investigated patient factors associated with psychiatric inpatient aggression (Dack et al., 2013). The study found inpatients who were younger, male, admitted involuntarily, not married and had a diagnosis of schizophrenia, a greater number of previous admissions, a history of violence, a history of self-destructive behaviour, and a history of substance abuse were more likely to be aggressive than non-aggressive during

hospitalisation (Dack et al., 2013). Several studies describe a history of substance abuse as a significant risk factor (Cornaggia et al., 2011), while other static factors associated with increased risk included brain injury and antisocial and other personality disorders (Hare, 1999; Neumann & Hare, 2008).

Gender

Women are less likely to be convicted of a violence offence than men (Sorrentino, Friedman, & Hall, 2016), and being male is strongly associated with violence in the community (Iozzino et al., 2015). Thus, gender differences have been of interest to researchers. The gender disparity in violence, however, decreases in the context of mental illness (Sorrentino et al., 2016), but several studies have described gender differences in violence within mental health settings. Several literature reviews describe increased risk of aggression and violence among male psychiatric inpatients compared to female inpatients (Bowers et al., 2011; Dack et al., 2013; Iozzino et al., 2015). At the same time, research has demonstrated that clinicians tend to underestimate female violence in general (Elbogen, 2016; Lidz, Mulvey, & Gardner, 1993) as well as in the acute psychiatric setting (Skeem et al., 2005). In addition, a Norwegian national census of patients in specialist mental health services (included both inpatients and outpatients) found that male patients had a higher risk of being violent than female patients (Ose, Lilleeng, Pettersen, Ruud, & van Weeghel, 2017). However, another review found that in terms of gender, there is not a large difference, but aggression seems to be directed towards others of the same sex (Cornaggia et al., 2011). One of the reviews that found being male associated with inpatient violence investigated solely studies from acute psychiatric settings (Iozzino et al., 2015). Thus, when the gender issue has been investigated in acute psychiatry, results appear inconclusive (Brown & Langrish, 2012; Daffern, 2007; Serper et al., 2005).

2.3.2 Dynamic patient factors

Dynamic risk factors for violence (e.g., active psychotic symptoms, antisocial attitudes, negative affect and present substance abuse/intoxication) are variables that are proximally associated with violence and can fluctuate with time and circumstances (Chu, Daffern, et al., 2013; Douglas & Skeem, 2005). Measures of dynamic risk factors are described to be more accurate than measures of static risk factors for short- to medium-term predictions of inpatient violence in forensic contexts (Chu, Thomas, Ogloff, & Daffern, 2011). Such dynamic

variables can be changed by deliberate intervention (Webster, Douglas, Belfrage, & Link, 2000), thereby reducing the level of risk for violence (Chu, Daffern, et al., 2013). Although most research on violence risk assessment emphasise static risk factors, associations between static factors and aggression are weak, and it is therefore important for staff to consider dynamic factors such as a patient's current state and the context to reduce inpatient aggression (Dack et al., 2013). Risk assessments must be performed quickly (Harris & Rice, 1997; Szabo et al., 2015), and monitoring for dynamic risk factors is the most promising target for risk reduction efforts (Douglas & Skeem, 2005). Patients admitted to acute psychiatric wards often present symptoms and behaviour patterns that fluctuate within hours (Douglas & Skeem, 2005; Linaker & Busch-Iversen, 1995; Vaaler et al., 2011); hence treatment and management decisions are required frequently (Daffern, 2007). Therefore, clinical decision making needs to be reviewed several times a day in a structured way, which underlines the importance of measuring dynamic risk factors.

2.3.3 Other significant factors associated with inpatient violence

Environmental and unit-related factors have a major role in influencing the risk of violence, and violence in psychiatric inpatient units appears to fluctuate throughout the day, with the highest incidence of violence occurring during staff shift changes (Szabo et al., 2015).

Patient-related factors cannot be taken out of context, and interpersonal variables, such as patient-patient and patient-staff interactions, may play an even more important role (Bowers et al., 2011). Patient-patient factors include physical contact and/or intrusion into one another's 'personal space', competition and retaliation (Szabo et al., 2015). Staff-related factors and environmental issues within units are also crucial (Bowers et al., 2011). Violence experienced by healthcare staff is associated with lower patient ratings of the quality of care, which indicates that violence is not merely an occupational health issue, but may have significant implications for the quality of care provided (Arnetz & Arnetz, 2001).

The literature also strongly identifies a relationship between ward rules and patient aggression (Alexander & Bowers, 2004; Ward & Gwinner, 2015). As well, ward rules in acute psychiatric inpatient wards may impede therapeutic engagement with patients (Isobel, 2015).

2.4 Assessing risk of violence

The Oxford Dictionary defines risk as 'the possibility that something unpleasant or unwelcome will happen' (Oxford University Press, 2019). Overall, most definitions of risk focus on outcome and probability. Violence risk assessment is a clinical decision-making task that is being conducted in numerous legal and clinical settings in which the possibility of a person's future violent behaviour is of concern (Douglas & Kropp, 2002). Violence prediction however is the assigning of a probability to a patient, indexing the likelihood of a patient's committing harm or a violent offence, within and/or outside hospital (Dolan & Doyle, 2000).

This chapter briefly presents the historical overview of violence risk assessments and reviews different approaches to risk assessments. The most commonly used risk assessment instruments within general psychiatric services, and acute psychiatric settings in particular, are presented. The chapter further presents different short-term risk assessment instruments relevant for acute psychiatric inpatient units. Patient involvement in violence risk assessments and the benefit in using multiple approaches in risk assessment are reviewed, as well as considerations regarding instruments relevant in the thesis.

2.4.1 Brief historical overview

The scientific study of violence risk assessment evolved between the mid-1960s and late 1970s, in parallel with deinstitutionalisation, the increased use of voluntarily hospitalisations and the civil rights movement (Norko & Baranoski, 2005). The most common approach to assessing risk was by unstructured clinical judgment (Doyle & Dolan, 2002). Studies in the early 1970s revealed that the ability of psychiatrists and psychologists to predict violent episodes was overestimated (Monahan, 1984). The significant work by Paul Meehl outlined a debate among psychologists. He argued that unstructured clinical judgment was imprecise and argued that statistical (actuarial) methods should replace unstructured clinical judgments (Meehl, 1954). In the mid-1980s a 'second generation' of theories and policies of risk assessment evolved (Doyle & Dolan, 2002). This actuarial approach aimed at identifying an array of actuarial risk markers (Monahan, 1984). Research demonstrated that this approach was superior to unstructured clinical judgments (Douglas et al., 1999; Doyle & Dolan, 2002; Grove, Zald, Lebow, Snitz, & Nelson, 2000; Monahan, 1984). The third generation, Structured Professional Judgment (SPJ), attempted to bridge the gap between the unstructured clinical judgments and actuarial decision-making approaches (Dolan & Doyle, 2000; Douglas

& Kropp, 2002; Hart, 1998). Clinicians incorporated risk assessment schemes into their clinical routines to ground their assessments in factors that have been empirically linked to violence (Douglas et al., 1999). Thus, the SPJ moved the emphasis from prediction to risk management (Douglas & Kropp, 2002; Hart & Logan, 2011).

In Norway, until the early 1990s, violence risk assessment was primarily unstructured and conducted mostly in forensic settings. After 2000 the forensic field in Norway began to include risk management as an integrated part of risk assessment. However, the first national guidelines for violence risk assessment, which also included general psychiatry, were not published until 2007. In most respects, Norwegian risk assessment research, guidelines and practice are similar to those found in other countries in Europe and North America (Bjørkly, Hartvig, Roaldset, & Singh, 2014).

2.4.2 Approaches to risk assessments

The three basic approaches to reach opinions about violence risk -- unstructured professional judgment, actuarial decision-making and structured professional judgment -- refer to how information is weighted and combined to reach a final assessment, regardless of the information that is being considered and how it was collected (Grove, 2005; Meehl, 1954). The three approaches are presented below.

Unstructured clinical judgment

Within the framework of unstructured clinical judgment there are no constraints on the information the assessors may use to reach their decision (Monahan, 1984). More recent research has led to the general consensus that predictions based on unstructured clinical judgments are only slightly better than chance and that predictive competence varies considerably among clinicians (Lidz et al., 1993; Singh, Desmarais, et al., 2016; Singh, Grann, & Fazel, 2011).

Actuarial decision making

Actuarial methods are defined by a fixed algorithm or set of a priori decision-making rules (Meehl, 1954). Actuarial risk assessment instruments (ARAIs) are designed to predict a specific outcome (e.g., violence) in a specific population (e.g., psychiatric patients) within a

specific time frame, with predefined score rules (Bjørkly et al., 2014; Hart & Cooke, 2013). The hallmark of the actuarial approach is that, based on the information available to them, evaluators make an ultimate decision according to fixed and explicit rules (Meehl, 1954). ARAIs decisions are based on specific risk markers, selected because they have been demonstrated empirically to be associated with violence and coded in a pre-determined manner. The combination of risk markers forms a total risk score, which represents the prognosis of future violent behaviour expressed in probabilistic terms (Douglas et al., 1999; Hart & Cooke, 2013; Singh, Bjørkly, & Fazel, 2016). Various ARAIs for different types of violence have been developed since the 1990s with moderate to good levels of predictive accuracy (Dvoskin & Heilbrun, 2001; Yang et al., 2010). ARAIs are designed not to measure anything but solely to predict the future (Douglas et al., 1999). ARAIs have the advantage of transparency and direct empirical support (Grove, 2005), but the limited numbers of risk factors included and a tendency to focus on static factors limits the approach. Furthermore, crucial risk factors may be excluded if their value has not been empirically proven, and the decisions can be non-optimal when applied in different settings (Doyle & Dolan, 2002; Norko & Baranoski, 2005).

Structured professional judgment approach

The primary goal of the Structural Professional Judgment (SPJ) approach to risk assessment is to prevent future violence (Douglas & Kropp, 2002; Hart & Logan, 2011). According to the SPJ approach (Douglas et al., 2014; Singh, Bjørkly, et al., 2016), a comprehensive risk assessment needs to include both static and dynamic risk factors, describe the scenarios in which risk may be increased or reduced and also involve a professional clinical judgment of each factor's presence and relevance in each individual case. SPJ risk evaluation is guided and structured by evidence-based literature, but the overall risk decision is still based on a discretionary interpretation process (Bjørkly et al., 2014). SPJ manuals and guides have evolved over time to be more reflective of the complete risk assessment process, from the coding of risk factors to providing management recommendations (Douglas & Kropp, 2002). The SPJ approach to violence risk assessment has three phases: identifying facts, making meaning of those facts and then taking action (Douglas et al., 2014). There is broad international research consensus that structured violence risk assessment instruments provide more accurate predictions of violence than unstructured clinical judgments (Fazel, Singh, Doll, & Grann, 2012; Guy, Douglas, & Hart, 2015; Singh, Bjørkly, et al., 2016; Singh et al.,

2011). The primary disadvantage of SPJ is in the process by which the evaluator intuitively combines the risk factors and arrives at a judgment about risk (Quinsey, Harris, Rice, & Cormier, 2006). In principle, this process is not different from unstructured clinical judgment, except the specific risk factors are outlined. Such unbridled discretion could lead to inconsistent weighting of risk factors. Moreover, the process by which risk factors are translated into summary of risk estimates (i.e., low, medium and high risk) is not well studied relative to studying the risk factors numerically (Douglas & Reeves, 2009).

Comparing the actuarial and SPJ models

ARAIs are transparent and standardised, making them a time-effective procedure that, unlike many SPJs, does not require extensive training (Nicholls, Petersen, & Pritchard, 2016). However, ARAIs tend to be comprised of static factors that do not show positive change over time, limiting their utility and relevance to risk management (Douglas & Skeem, 2005; Dvoskin & Heilbrun, 2001; Nicholls et al., 2016; Yang et al., 2010). SPJ models are identified through theory and empirical research, giving the assessor specific parameters to consider. SPJ models are also less rigid and mechanical than ARAI models, allowing clinical expertise and insights to inform the ultimate determination of summary risk estimates (Nicholls et al., 2016). Neither ARAIs nor SPJs seem to show clear superiority regarding predictive accuracy for violent outcomes (Coid et al., 2009; Guy et al., 2015; Heilbrun, 2009). Regarding predictive efficacy, SPJs and ARAIs seem interchangeable (Yang et al., 2010). In sum there is virtually unanimous agreement that ARAIs and SPJs perform equally well in predicting violence (Guy et al., 2015; Nicholls et al., 2016) and a general consensus that unstructured clinical judgment is not evidence-based best practice (Fazel et al., 2012; Guy et al., 2015; Heilbrun, 2009; Nicholls et al., 2016). Yet the most common method used in acute psychiatric wards is unstructured clinical judgment (Daffern, 2007; Doyle & Dolan, 2002; Skeem et al., 2013).

2.4.3 Risk assessment instruments

During the past several decades, the science and practice of violence risk assessment has flourished (e.g., Monahan, 2001). As a result, more than 400 different violence risk assessment instruments are available (Singh, Desmarais, et al., 2016). Most instruments were developed in male-dominated populations like forensic and prison settings (Harris et al.,

2004; Monahan, 1984), but many have proven to be valid in general psychiatry as well (Douglas et al., 1999). Among the 20 most commonly used risk assessment instruments according to the International Risk Survey (Singh, Desmarais, et al., 2016), only 7 are recommended for general psychiatry. These are presented below.

Actuarial risk assessment instruments.

Three of the seven most commonly used risk assessment instruments within the general psychiatric setting are based on an actuarial approach: the Brøset Violence Checklist (BVC), the Classification of Violence Risk (COVR) and the Hare Psychopathy Checklist –Screening Version (PCL-SV). However, only one of the three instruments (COVR) provides prognosis of future violent behaviour expressed in probabilistic terms.

Brøset Violence Checklist (BVC): See Chapter 2.4.5 Short-term risk assessments for presentation of the BVC.

Classification of Violence Risk (COVR): The COVR is a computer-based instrument designed to predict the likelihood of violence in adult psychiatric inpatients upon discharge to the community (Monahan et al., 2006; Wilson, Singh, Leech, & Nicholls, 2016). The measure guides clinicians through a structured chart review, and a 5- to 10-minute interview with the examinee to assess violence risk. The software generates a report which contains a statistical estimate of the patient's violence risk and a list of the estimates the program took into account to produce the estimate. Total scores classify individuals into one of five risk categories, each of which has an estimated recidivism rate. COVR produces moderate levels of predictive validity when used to predict outpatient violence (Singh et al., 2011).

Hare Psychopathy Checklist-Screening Version (PCL-SV): The PCL-SV is an abbreviated version of the Hare Psychopathy Checklist-Revised (PCL-R) (Hare, 2003) and is a personality scale designed to screen for psychopathy in psychiatric inpatients (Hare, Hart, & Cox, 1995; Wilson et al., 2016). The PCL-SV is a 12-item scale that loads on to two factors: interpersonal and affective features (6) and impulsive and antisocial behaviours (6). Total scores are used to classify individuals into either non-psychopathic, psychopathic or as needing a full PCL-R assessment before classification can be made. The PCL-SV was not designed as a risk assessment instrument, but meta-analyses suggest assessments using the instrument predict violence in psychiatric populations (Douglas, Strand, Belfrage, Fransson, & Levander, 2005; Leistico, Salekin, DeCoster, & Rogers, 2008).

Structured professional judgment instruments

Four of the most commonly used risk assessment instruments within the general psychiatric setting are based on the structured professional judgment (SPJ) approach: the Historical-Clinical-Risk Management-20 (HCR-20), the Risk Assessment Management and Audit System (RAMAS), the Short Term Assessment of Risk and Treatability (START) and the Violence Risk Screening 10 (V-RISK-10).

Historical-Clinical-Risk Management-20 (HCR-20): The HCR-20 is designed to predict the likelihood of violence in adult forensic and general psychiatric patients (Douglas et al., 2014; Webster, Douglas, Eaves, & Hart, 1997; Wilson et al., 2016). Information gathered via file review and semi-structured interviews is used by a trained mental health professional to assess individuals on 20 items measuring three domains: historical factors, clinical factors and risk management factors. The HCR-20 has been validated in general and forensic psychiatric as well as in correctional settings with adults of all ages (Singh et al., 2011; Wilson et al., 2016). Version 3 of the HCR-20 (Douglas et al., 2014) introduced some sub items and allows for assessors to rate the relevance of items in addition to rating their presence or absence.

Risk Assessment, Management and Audit System (RAMAS): The RAMAS is designed to predict the likelihood of violence in mental health, criminal justice and social services (O'Rourke, Wrigley, & Hammond, 2018; O'Rourke, Hammond, Smith, & Davies, 1998; Wilson et al., 2016). Information is used to evaluate individuals on 66 different items measuring four domains: risk to self, risk to others, mental health risk and vulnerability. The instrument is intended for collaborative use by professionals in hospital, institutional, community and research settings to provide better protection for the public while improving care planning, treatment and management of people posing a risk to themselves or others (Wilson et al., 2016). When examined as separate scales (e.g., risk to self, risk to others) the psychometric properties of the scales are excellent and allow for discriminating risk assessment profiles to be drawn for individual patients (Hammond & O'Rourke, 2000).

Short Term Assessment of Risk and Treatability (START): The START is designed to predict the likelihood of violence, suicide, unauthorised leave, victimisation, self-harm, substance abuse and self-neglect over a short period of time (weeks to months) (Webster, Martin, Brink, Nicholls, & Desmarais, 2009; Wilson et al., 2016). The scheme includes 20 dynamic factors that are rated in terms of both vulnerability and strength (Desmarais, Nicholls, Wilson, & Brink, 2012). Finally, assessors make specific risk estimates (low, medium or high) about the likelihood of each one of seven outcomes of interest (Webster et al., 2009). Duration between

assessments using START should not exceed 3 months (Webster et al., 2009; Wilson et al., 2016). START demonstrates fair to excellent levels of predictive validity for violence risk (Desmarais et al., 2012; O'Shea & Dickens, 2014) and excellent interrater reliability (Desmarais et al., 2012).

Violence Risk Screening 10 (V-RISK-10): The V-RISK-10 is a SPJ instrument designed to predict the likelihood of violence in psychiatric patients, so that a more comprehensive violence risk assessment may be conducted or immediate risk management plans can be put in place (Hartvig et al., 2007; Wilson et al., 2016). The V-RISK-10 is a screening tool developed for acute and general psychiatry and consists of 10 items, measuring three domains: historical, clinical and risk management (Hartvig et al., 2011; Hartvig et al., 2007; Roaldset, Hartvig, & Bjørkly, 2011). The 10 items are (1) Previous and/or current violence, (2) Previous and/or current threats (verbal/physical), (3) Previous and/or current substance abuse, (4) Previous and/or current mental illness, (5) Personality disorder, (6) Shows lack of insight into illness and/or behaviour, (7) Expresses suspicion, (8) Shows lack of empathy, (9) Unrealistic planning and (10) Future stress situations. Each item is scored as no, maybe/moderate, or yes (Hartvig et al., 2007). Information gathered via file review and clinical observation is used to score patients. Total scores are used to aid clinical judgment when classifying individuals into one of three risk categories (low, moderate or high). Prospective studies have found the instrument to be as reliable and valid as more comprehensive instruments (Bjørkly et al., 2014), with particular usefulness in identifying low-risk patients (Hartvig et al., 2011). The instrument is being researched internationally (e.g., Zhou et al., 2016) and is recommended by the Norwegian Directorate for Health (2017) for screening or initial mapping of risk.

Table 1: Characteristics of Most commonly used Risk Assessment Instruments in General Psychiatry

		Characteristics				
Instrument	Items	Intended populations	Intended outcomes	Time (min)	Predictive validity AUC (95% CI)	Reference
Actuarial approach						
BVC	6	Acute Psychiatric inpatients	Violence	<5	0.82 (0.75-0.89) 0.88 (0.76-0.99)	(22) (21)
COVR	Variable	Acute Psychiatric inpatients	Violence	10-15	0.70 (IQR = 0.61-0.79)	(26)
PCL-SV	12	Acute psychiatric inpatients	N/A	45 (interview); 30 (file review)	0.67 (0.57-0.73)	(130)

Structured Professional Judgement approach						
HCR-20	20	Civil/forensic psychiatric patients	Violence	Unknown	0.70 (IQR = 0.64-0.76)	(133)
RAMAS	66	Mental health service users	Risk to others, risk to self, victimization	Unknown	N/A	
START	20	Civil/forensic psychiatric patients	Violence, suicide, self-harm, unauthorized leave, victimization, substance abuse, self-neglect	22-25	Strength, 0.76 (0.68-0.85); Vulnerability, 0.79 (0.71-0.87); risk estimate, 0.80 (0.72-0.88)	(137)
V-RISK 10	10	Non-forensic psychiatric patients	Violence	2-10	3 –months, 0.80 (0.75-0.86); 12 months, 0.75 (0.70-0.80)	(140)
					0.82 (0.78-0.86)	(73)

Adapted from the International Risk Survey (Wilson et al., 2016).

BVC = Brøset Violence Checklist. COVR = Classification of Violence Risk. PCL-SV = Psychiatry Checklist-Screening Version. HCR-20 = Historical-Clinical-Risk Management 20. RAMAS = Risk Assessment, Management and Audit System. START = Short-Term Assessment of Risk and Treatability. V-RISK 10 = Violence Risk Screening 10. IQR = Interquartile range.

2.4.4 Risk assessment in acute psychiatric settings

Relatively few instruments are suitable for acute psychiatric settings. In acute psychiatry, risk assessments must be performed quickly, and predictions must be accurate over the short term (Almvik et al., 2000; Harris & Rice, 1997; Szabo et al., 2015). Clinicians working in acute psychiatric settings may be under time pressure to make decisions, may lack advanced training and may not have access to predictive historical information (Elbogen et al., 2003). Often logistical constraints make it difficult to obtain much-needed information, or some patients may be too ill to provide accurate information (Elbogen et al., 2003; Gardner, Lidz, Mulvey, & Shaw, 1996).

Traditional actuarial models do not provide the near-term predictions required for treatment planning and intervention on acute units and generally do not lend themselves readily to clinical interventions (Szabo et al., 2015). Comprehensive SPJ instruments like HCR-20 are time-consuming and dependent on access to information that is normally unavailable to the acute psychiatric wards at admittance. Out of the most commonly used SPJ instruments, only

the V-RISK-10 is developed for structured clinical screening (Wilson et al., 2016). For the inpatient context the retrospectively estimated net time consumption for filling in the V-RISK-10 was estimated by the assessors in a group interview to be around 5 (2 –10) minutes (Hartvig et al., 2011), and hence it is highly suitable for acute psychiatric settings.

Most validated risk assessment instruments forecast only the long-term likelihood of future violence. Structured assessments that weight current clinical factors heavily have been shown to be more successful in the prediction of violence in the short term (Szabo et al., 2015). Instruments that use dynamic data are particularly important when managing violence risk, given that demographic and historical information does not change for many inpatients with violent histories who frequent psychiatric units and thus has little predictive power above a baseline awareness of danger (Kennedy et al., 2007). Therefore, instruments that primarily comprise static items offer little assistance except for admitting and pre-release risk assessments (Daffern, 2007).

2.4.5 Short-term risk assessments

Risk assessment systems in acute psychiatric inpatient settings should be responsive to fluctuations in level of risk so that interventions and management strategies change accordingly. A patient initially identified as high risk may not remain so throughout their admission and therefore not warrant the interventions that are determined by the initial risk assessment (Daffern, 2007). Risk assessment of imminent violence, premised on the identification of early warning signs, has been promoted as one strategy to prevent and manage violence (Abderhalden et al., 2008). Brief, simple screening instruments based on immediate clinical features and readily available information are more practically useful in acute settings (Abderhalden et al., 2008; Chu, Daffern, et al., 2013; Ogloff & Daffern, 2006). Examples of these types of instruments include the Brøset Violence Checklist (BVC) (Abderhalden et al., 2004; Woods & Almvik, 2002), the McNiel–Binder Violence Screening Checklist (VSC) (McNiel & Binder, 1994; McNiel, Binder, & Greenfield, 1988; McNiel, Gregory, Lam, Binder, & Sullivan, 2003) and the Dynamic Appraisal of Situation Aggression (DASA) (Chu, Thomas, Daffern, & Ogloff, 2013; Ogloff & Daffern, 2006). These instruments show significantly better predictive accuracy than either structured clinical judgment or actuarial ratings in forecasting near-term violence (Chu, Daffern, et al., 2013). The VSC focuses on static and stable dynamic risk factors and is designed for predictions of

violence for the following 72 hours (McNiel & Binder, 1994). The BVC (Almvik et al., 2000; Woods & Almvik, 2002) and the DASA (Ogloff & Daffern, 2006), however, were developed specifically to assess imminent violence (Chu, Daffern, et al., 2013).

The BVC and the DASA comprise dynamic variables that are sensitive to change and easy to consider and score, allowing regular efficient appraisals of risk so that day-to-day treatment and management decisions that are affected by the likelihood of violence can be facilitated (Chu, Daffern, et al., 2013).

Dynamic Appraisal of Situation Aggression (DASA): The DASA is a seven-item violence risk assessment instrument that comprises strictly dynamic violence risk factors (Chu, Daffern, et al., 2013; Ogloff & Daffern, 2002; Ogloff & Daffern, 2006). The seven items are negative attitudes, impulsivity, irritability, verbal threats, sensitive to perceived provocation, easily angered when requests are denied and unwillingness to follow directions. Daily assessments using the DASA involve scoring each of the seven items for its presence (=1) or absence (= 0) in the 24 hours prior to assessment, and it takes less than five minutes to complete (Ogloff & Daffern, 2006). The DASA is to be used as a guide for assessing the likelihood of inpatient aggression and presents as a valid measure for appraising risk of imminent aggression in mainstream psychiatric inpatient settings (Griffith, Daffern, & Godber, 2013). The total score of the DASA represents an actuarial rating derived from the summation of the item scores (Chu, Daffern, et al., 2013), but the DASA should not be used in isolation from clinical judgment (Ogloff & Daffern, 2006). The DASA is considered an SPJ instrument, and the SPJ rating involves the consideration of the seven items and an assessor then giving a rating of Low, Moderate, or High depending on these seven items and other expert clinical considerations (Chu, Daffern, et al., 2013).

Brøset Violence Checklist
The BVC, which is also recommended by the Norwegian Directorate for Health (2017), was created as an instrument that can be used by hospital staff (nurses in particular) to predict acute episodes of violence among psychiatric inpatients (Almvik & Woods, 1998; Woods & Almvik, 2002). It was developed by using data from a large inpatient study (Linaker & Busch-Iversen, 1995) that empirically measured 55 behaviours exhibited by patients 24 hours before a violent incident. The BVC consists of the six most frequent behavioural changes recorded during a 24-hour period prior to a violent incident occurring: confusion, irritability,

boisterousness, physical threats, verbal threats and attacks on objects (Almvik & Woods, 2003). The BVC is scored for the presence (= 1) or absence (= 0) of these six behaviours. According to standard guidelines (Almvik & Woods, 1998; Woods & Almvik, 2002), a sum score of 0 (*none of the behaviours present*) suggests that the risk of violence is low. A score of 1 to 2 suggests that the risk is moderate and that preventive measures should be taken. A score of 3 or higher suggests that the risk of violence is very high, that immediate preventive measures are required and that plans for managing an attack should be activated (Almvik & Woods, 1998; Almvik et al., 2000). The BVC is developed from an actuarial approach (Wilson et al., 2016) to violence risk assessment, but the prognosis of future violent behaviour is not expressed in probabilistic terms. The BVC is also presented as belonging to the SPJ tradition, because it is a summary, non-actuarial assessment of risk for individual cases (Bjørkly et al., 2014; Wilson et al., 2016). One study added unstructured clinical judgment to the BVC (Abderhalden et al., 2006), while another emphasised that short-term risk assessments should include frequent mental health state assessments performed throughout the hospitalisation (van de Sande et al., 2013).

The BVC shows good inter-rater reliability, sensitivity and specificity (Almvik et al., 2000; Hvidhjelm, Sestoft, Skovgaard, & Bue Bjorner, 2014). The reported predictive validity, as measured by area under the receiver operating characteristic curve (ROC-AUC) (e.g., Abderhalden et al., 2006; van de Sande et al., 2011) and survival analysis (Björkdahl et al., 2006) for BVC were found to be comparable with SPJ and actuarial instruments specially developed for more comprehensive risk assessment (Hart & Logan, 2011). The issue regarding what is the appropriate statistical analysis for research on short-term risk assessment has been recently addressed (Maguire, Daffern, Bowe, & McKenna, 2017), and considerations regarding statistical analysis when repeated measurements are presented in Chapter 2.6.

Table 2: Instruments for Prediction of Imminent Violence

	BVC	DASA
Risk based on the following correlates:	Confusion	Negative attitudes
	Boisterousness	Impulsivity
	Irritability	Irritability
	Verbal threats	Verbal threats
	Physical threats	Sensitive to perceived provocation
	Attacks on objects	Easily angered when requests are denied
		Unwillingness to follow directions
Predicts violence over the following time frame:	24 hours	24 hours

Adapted from Szabo et. al. (2015).

BVC = Brøset Violence Checklist. DASA = The Dynamic Appraisal of Situation Aggression.

2.4.6 User involvement, self-reporting of risk and self-report questionnaires

Patients and mental health professionals often have very different perspectives (Tait & Lester, 2005) and user involvement is increasingly recognised as valuable and important in psychiatric settings (Stringer, Van Meijel, De Vree, & Van der Bijl, 2008), however with an emphasis on consultation rather than influence, partnership or control (Tait & Lester, 2005). Patients are experts, with an in-depth knowledge of psychiatric services and of living with a mental disorder. Each patient's experience of his or her mental disorder, initial contact with services or the journey through the mental health system is unique. These experiences are an important resource that can help to improve the individual treatment and care (Tait & Lester, 2005). Involving the patient in developing and implementing violence risk assessment and management has several benefits; thus it may lead to a better understanding of the patient's perspective (Eidhammer, Fluttert, & Bjørkly, 2014). Patient involvement could potentially be therapeutic for patients and increase insight into factors responsible for their aggressive and violent behaviours (Tait & Lester, 2005). Bem (1972) asserts that individuals come to understand their own attitudes, emotions and other internal conditions, partially by inferring

them from their observations of their own behaviours and the circumstances that prompt them. Almost three decades ago an interactional understanding of structured violence risk management was suggested to mitigate risk of violence in psychiatry (Bjørkly, 1993; Kalogjera, Bedi, Watson, & Meyer, 1989).

An alternative approach to violence risk assessments involves the use of self-report measures to assess subjective feelings connected with aggression or violence (Plutchik & van Praag, 1990). A patient's self-perception differs from the mental health professionals' observations. The individual's attention is focused outward toward situational cues rather than inward on his or her own behaviour (Bem, 1972). Aggressive and violent behaviour is considered socially unacceptable in most situations; hence participants will often underreport (McCloskey & Coccaro, 2003). The two most cited general aggression questionnaires are the Buss-Perry Aggression Questionnaire (BPAQ), and the State Trait Anger Expression Inventory (STAXI) (McCloskey & Coccaro, 2003). Several types of self-report scales are part of comprehensive tools used for risk assessments in psychiatry, such as the Self-Appraisal Questionnaire (Loza, Loza-Fanous, & Heseltine, 2007), the Classification of Violence Risk (COVR) (Monahan et al., 2006), the Early Recognition Method (ERM) (Fluttert, van Meijel, Nijman, Bjørkly, & Grypdonck, 2010) and the Personality Assessment Inventory (Gardner, Boccaccini, Bitting, & Edens, 2015).

The increasing focus on user involvement in psychiatric services has led to a growing demand for tools and methods to support this development (Stringer et al., 2008). Despite this, patients' self-perception of risk has rarely been emphasised as useful in violence risk assessment and only a few studies have addressed patients' direct judgment of violence risk (Roaldset & Bjørkly, 2010; Skeem et al., 2013). Skeem and co-workers found patients' self-perceptions of risk to perform as well as brief instruments in predicting violence after discharge and hence may be viewed as a component of future risk assessment (Skeem et al., 2013). To date no studies include patients' self-perceptions of violence risk in short-term risk assessment models. However, one recently conducted feasibility study (Lantta, Kontio, Daffern, Adams, & Välimäki, 2016) recommended more patient involvement in risk assessment research and violence prevention efforts.

Self-report Risk Scale (SRS)

Roaldset and Bjørkly (Roaldset & Bjørkly, 2010) developed a Self-report Risk Scale (SRS), which significantly predicted occurrence of inpatient violent threats (AUC = 0.73, 95% confidence interval (CI) = 0.61–0.85, $p < 0.001$) and violent acts (AUC = 0.68, 95% CI = 0.55–0.81, $p = 0.003$) in acute psychiatry. However, the sample was relatively small ($N = 428$), and the rate of inpatient violence was low (7.6%) compared with other studies, leading the authors to call for further studies. The original SRS is organised as two questions regarding the patients' opinions of their risk of harming others, both asked at admission: What is your own opinion of the risk that you will (a) threaten other people with acting violent? and (b) act violent against others? The patients were asked to choose one out of seven options: (0) No risk, will definitely not happen, (1) Low risk, will hardly happen, (2) Moderate risk, limited to certain situations, (3) High risk, in many situations, (4) Very high risk, almost permanent, (5) Don't know about the risk and (6) Won't answer about the risk (Roaldset & Bjørkly, 2010).

2.4.7 Multiple approaches in risk assessments

Meta-analyses have concluded that an upper limit seems to have been reached in the precision of existing violence prediction instruments. Most structured risk assessment instruments achieve moderate accuracy with an area under curve (AUC) value of 0.7 in comparison studies, suggesting a 'glass ceiling' effect beyond which few instruments can improve (Coid et al., 2011; Yang et al., 2010). Thus, there is a need for investigation into whether different and extended approaches may improve predictions (Singh et al., 2011). A review article also pointed to the importance of combining knowledge from different disciplines and perspectives regarding violence risk assessments (Steinert & Whittington, 2013). One of the limitations in previous studies on risk assessment of imminent violence is the use of professionals' observations without including patients' self-perceptions of risk. A more ethical approach to violence assessment takes patients' self-assessments into account (Roychowdhury & Adshead, 2014). The work on a new bio-psycho-social model of violence risk assessments, with its primary idea of overcoming the strictly separated theories of biological, psychological or social causation (Steinert & Whittington, 2013), indicates that we may be facing a paradigm shift where new theories are developed across previously defined models and perspectives. A combination of the BVC (Almvik et al., 2000), the V-RISK-10 (Hartvig et al., 2011) and the SRS (Roaldset & Bjørkly, 2010) represents a combination of different

perspectives on violence risk assessments: the nursing staffs', the physicians' and the patients' own perspectives.

2.4.8 Considerations regarding risk assessment instruments in the thesis

The setting and context of where the data for this thesis were collected influenced the choice of instruments included in it. The V-RISK-10 and BVC have both been validated for acute psychiatric settings. A recent literature review supported this choice of instruments, finding that the BVC and the V-RISK-10 provided the best assessments for violence in acute psychiatric settings (Anderson & Jenson, 2018). The study on SRS that showed promising results was also conducted in an acute psychiatric context (Roaldset & Bjørkly, 2010). The V-RISK-10, the BVC and the SRS were already implemented in the ward where the data collection was carried out. Given the aim of the thesis and the choice of method and design, all three instruments remained relevant.

2.5 Instruments for recording inpatient violence – risk of underreporting

When investigating violence risk assessments, the recording of inpatient violence is necessary. However, evidence suggests that violent incidents are underreported (e.g., Hvidhjelm, Sestoft, & Bjorner, 2014; Khoshknab, Tamizi, Ghazanfari, & Mehrabani, 2012; Szabo et al., 2015). Most frequently used instruments record aggression and consists of the Overt Aggression Scale (OAS) (Yudofsky, Silver, Jackson, Endicott, & Williams, 1986), the Modified Overt Aggression Scale (MOAS) (Kay, Wolkenfeld, & Murrill, 1988), the Social Dysfunctioning and Aggression Scale (SDAS) (Wistedt et al., 1990) and the most widely used instrument (Hvidhjelm, Sestoft, & Bjorner, 2014), the Staff Observation Aggression Scale-Revised (SOAS-R) (Nijman & Palmstierna, 2002; Nijman et al., 1999; Palmstierna & Wistedt, 1987). Recording inpatient aggression and violence seems to have an influence on the frequency, severity or the management of violence (De Niet, Hutschemaekers, & Lendemeijer, 2005). Several studies have shown that inpatient violence is reduced when an instrument for recording aggressive incidents is used (e.g., Nijman, Merckelbach, Allertz, & a Campo, 1997; Omérov, Edman, & Wistedt, 2002). This phenomenon is described as

'reporting fatigue', which may be promoted when an instrument is highly sensitive (De Niet et al., 2005). When healthcare personnel attempt to record all possible forms of aggressive incidents, it appears that their attention may actually be negatively affected (De Niet et al., 2005). In studies including more than one instrument, there seem to be underreporting for all included instruments (Hvidhjelm, Sestoft, & Bjorner, 2014; Tenneij, Goedhard, Stolker, Nijman, & Koot, 2009). One study found greater underreporting with the SOAS-R, compared to the OAS (Hvidhjelm, Sestoft, & Bjorner, 2014). On the other hand, the OAS does not give the same detailed information about an aggressive incident, as the SOAS-R does.

The SOAS-R is an incident-based scale which is to be completed each time a staff member witnesses aggressive behaviour by a patient (Nijman et al., 1999), and the assumption is that all aggressive incidents are documented with the instrument (Hvidhjelm, Sestoft, & Bjorner, 2014). There seems to be a decline in the number of incidents recorded after the implementation of the SOAS-R (Hvidhjelm, Sestoft, & Bjorner, 2014; Nijman et al., 2005; Tenneij et al., 2009), though reports of physical aggression seem to continue to be reported at the same rate throughout the study period, with verbal threats show a declining trend (Niet et al., 2005).

2.6 Considerations regarding statistical analyses

The Area Under the Curve (AUC) of the Receiver Operating Statistic (ROC) is the most commonly used measure of predictive accuracy in violence risk assessment research (Daffern, 2007). The ROC application to risk assessment research is less dependent on the base rate of violence than traditional measures of predictive accuracy (Douglas & Webster, 1999). The ROC plots the true positive rate (sensitivity) against the false positive rate (specificity). The index of predictive accuracy, the AUC, ranges from 0 (perfect negative prediction) to 0.50 (chance prediction) to 1.0 (perfect positive prediction) (Daffern, 2007). AUCs in the range 0.75 to 0.80 are considered moderate to large effect sizes (Nicholls, Ogloff, & Douglas, 2004). An AUC of 0.75 means that there is a 75% chance that a truly violent person will score higher than the cut-off for violence on the predictive instrument, and a truly non-violent person will score below the cut-off (Nicholls et al., 2004).

Statistical analyses in previous research on the BVC are usually ROC analyses (Abderhalden et al., 2004; Roger Almvik et al., 2000; Hvidhjelm, Sestoft, Skovgaard, et al., 2014) or ROC analyses combined with logistic regression (Chu, Daffern, et al., 2013; Hvidhjelm, Sestoft,

Skovgaard, et al., 2014). In previous studies where ROC analysis is used, all repeated assessments were included and treated as independent observations. This may lead to erroneous conclusions because when the same patient is measured repeatedly, the separate BVC scores will not be independent of each other. Logistic regression analyses entail a risk of bias because the analyses do not take into account the repeated nature of the observations (Coid, Kallis, Doyle, Shaw, & Ullrich, 2015) and incorrect conclusions regarding predictive accuracy. However, one study from forensic psychiatry accounted for repeated measurements in the logistic regressions by specifying the repeated nature of the observations with a compound symmetry structure for the working correlation matrix (Hvidhjelm, Sestoft, Skovgaard, et al., 2014). Another study calculated the daily highest BVC sum score and used survival analysis with an extended Cox model (Björkdahl et al., 2006).

Repeated measurements of short-term risk assessments will be clustered around each patient. Among the most widely used statistical models for such repeated measures are included mixed effect regression models and generalised estimating equations (GEE). Variations of these models have been developed for both discrete and continuous outcomes. The primary distinction between the two general approaches is that mixed effect models are full-likelihood methods, while GEE models are quasi-likelihood methods (Gibbons, Hedeker, & DuToit, 2010; Hanley, Negassa, & Forrester, 2003). The advantage of statistical methods based on GEEs is that they are computationally easier compared to full-likelihood methods and generalise quite easily to a wide variety of outcome measures with quite different distributional forms. The price of this flexibility, however, is that GEEs are more restrictive in their assumptions regarding missing data than are their full-likelihood counterparts (Gibbons et al., 2010). Mixed effect models analyses do not require complete data from all subjects and generate more appropriate estimates of the effect of treatment and their standard errors. Mixed effect models also provide great flexibility in analysis and allow for a wide variety of ways in which the successive observations are correlated with one another (Brown & Prescott, 2015). Thus, such models are useful when the data are clustered in some way (Rabe-Hesketh & Skrondal, 2010).

In risk assessment of imminent violence in acute psychiatric settings, there is a risk of missing data, and patients' lengths of stay in acute psychiatric units may vary a lot. Mixed effect regression models are more robust to the presence of missing data, including different number of assessments due to different lengths of hospital stay; hence a mixed effect regression model was chosen for the statistical analysis in this thesis. Since the outcome is a dichotomous

variable (violence vs non-violence), generalised linear mixed model (GLMM) analysis was chosen.

3   Aim of thesis

The overall aim of the thesis is to investigate and validate an extended model for violence risk assessment in acute psychiatric units. The thesis scrutinizes the combination of (i) structured clinical judgment along with (ii) short-term risk assessments and (iii) patients' own violence risk assessments.

3.1   Specific aims

I. To investigate whether patients' own assessments of their risk of committing violence contribute to improving violence risk assessments in acute psychiatric settings. The study specifically investigated

    (i)   the predictive accuracy of SRS recorded at admission, as a risk marker for violence during hospitalisation and

    (ii)   possible gender differences in the predictive accuracy of SRS recorded at admission. (Paper I).

II. To investigate the association between short-term risk assessment measured by the BVC (sum score and single items) at the end of nursing shifts and imminent violence when

    (i)   Differentiating threats and physical violence.

    (ii)   Differentiating males and females.

    (iii)   Treating the assessments as independent and adjusting for repeated measurements.

    (iv)   Adjusted for diagnostic subpopulations and circadian variability (Paper II).

III. To examine risk assessment of imminent violence by investigating whether an extended short-term risk assessment model combining

    (i)   short-term risk assessment with the BVC,

    (ii)   patients' own predictions of violence with the SRS and

    (iii)   the single items from V-RISK-10 would provide improved short-term predictive accuracy of violence compared to the BVC alone (Paper III).

4   Method

4.1   Study design and setting

This thesis is based on a naturalistic prospective inpatient risk assessment research project conducted at an acute psychiatric ward in Oslo (Norway). The ward had five units, with a total of 45 beds for all emergency mental health admissions, and served a catchment area of about 204 000 individuals older than 18 years. The thesis includes three studies from the research project.

4.2   Overall target population and samples in the separate papers

The risk assessment study included all patients involuntarily and voluntarily acutely admitted over one year between March 21, 2012, and March 20, 2013. The target population was 558 patients with a total of 755 admissions. Thirty patients withdrew from participation, resulting in an initial sample of 528 patients from 717 admissions.

For all studies, one admission was chosen for each patient. For patients with more than one admission, the first admission with recorded violence was chosen. For non-violent patients, the first admission was chosen. Because of missing records in different variables, there were different selections of patients and admissions in the final samples for the different studies.

Description of the samples in the different studies

Study 1: In Study 1, 16 patients were excluded because of missing SRS data at admission. Seventeen reported incidents of violence were excluded from analyses because of incomplete recordings. After exclusions the final study sample consisted of $N = 512$ patients (55.3% women).

Study 2: After exclusions, because of incomplete recordings of violent episodes, duplicated registrations of violent episodes and multiple episodes of violence during nursing shifts, the sample consisted of $N = 528$ patients (55.7% women) with 23657 risk assessments with the BVC and 277 violent episodes.

<u>Study 3</u>: In Study 3, admissions with recordings of the BVC, SRS and V-RISK-10 were included. After exclusions due to missing recordings, duplicated recordings of violence incidents, multiple episodes of violence during nursing shifts and incomplete recordings of violent incidents, the final study sample consisted of $N = 508$ patients (55.3% women) with 22790 risk assessments with the BVC and 234 episodes of violence.

4.3 Procedure

Written information about the study was provided twice to each patient, after admission and before discharge. The physician on duty recorded SRS, V-RISK-10, and clinical and demographic variables as part of the admission procedure during the initial intake and admission to the unit. Additional clinical and demographic variables were registered at discharge and retrieved from hospital records.

All the nursing staff had prior familiarity with the BVC. The BVC was completed for all inpatients for all nursing shifts during each inpatient's entire hospital stay. Unlike the recommendations for BVC (Almvik et al., 2000), each patient's respective primary nurse completed the BVC at the end of each nursing shift instead of at the beginning as recommended. Thus, this was an already established procedure in the current ward and in accordance with previous studies on the BVC (Abderhalden et al., 2006; Abderhalden et al., 2008; Abderhalden et al., 2004; Chu, Daffern, et al., 2013). Given this procedure, the same person who completed the BVC did not record any respective associated violent episode.

In line with the two previous RCT studies on the BVC (Abderhalden et al., 2008; van de Sande et al., 2011), all violent episodes during hospitalisation were recorded by the staff, using the SOAS-R (Nijman et al., 1999). Because the SOAS-R had already been used on the wards for a year as part of another research project, staff taking part in data collection were experienced in use of the form. To compensate for possible underreporting (Hvidhjelm, Sestoft, & Bjorner, 2014), researchers recorded additional episodes of violence in the SOAS-R retrieved from hospital records (restraint forms and the daily reports).
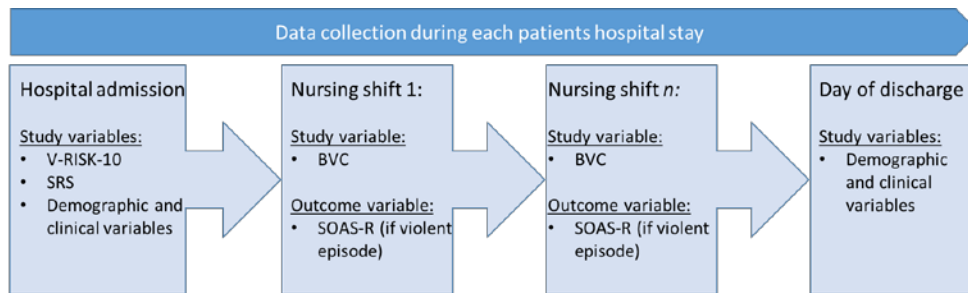
Figure 1 Data collection

4.4 Measures

<u>Demographics</u>: Information about age, gender, marital status, education, employment and accommodation were obtained from the hospital records.

<u>Clinical characteristics</u>: Information about main medical diagnosis according to ICD-10 (main diagnosis at discharge) and legal status at admission were obtained from the hospital records. Information about violence (i.e., violent threats and/or violent acts) as cause for the admission was recorded at admission in accordance with the definition of violence as *yes* (occurred), *no* (did not occur) or *don't know* (don't know whether episodes of violence/threats occurred).

Baseline Measures

Brøset Violence Checklist (BVC): The BVC was used for short-term risk assessments of imminent violence.

Self-report Risk Scale (SRS): To register patients' self-perceptions of their risk of committing violence during their hospital stay, a modified version of the Self-report Risk Scale (SRS) was used. The patients were asked to state their opinion regarding the risk that they would threaten others or act violently towards others during their hospital stay. They were asked to choose one of six response options to explain best their self-assessment of risk: *no risk* (will definitely not happen), *low risk* (is unlikely to happen), *moderate risk* (limited to certain situations), *high risk* (will happen in many situations), *don't know* and *won't answer*.

Violence Risk Screening 10 (V-RISK-10): The V-RISK-10 was used for violence risk assessments of violence during hospitalisation. As in previous studies (Hartvig et al., 2011; Roaldset, Hartvig, et al., 2011), 'don't know' scores showed a predictive power similar to maybe/moderate, so these groups were combined for analyses.

Outcome measures

<u>*Violent behaviour*</u>: Violence was defined and measured in accordance with those used in previous studies (Dean et al., 2006; Monahan et al., 2005; Roaldset, 2010; Swanson et al., 2006); *Physical violence* was measured as a physical act against another person involving the use of body parts or objects, with a clear intention (as it was perceived and interpreted by the person who was the target of the physical act) to cause physical injury to that person. *Threats of violence* were measured as verbal and non-verbal communications conveying a clear intention to inflict physical injury upon another person.

The Staff Observation Aggression Scale–Revised (SOAS-R) was used to record violence (Nijman et al., 1999). Recording of violence was limited to physical violence and verbal threats as defined above.

<u>*Violence during hospitalisation*</u>: The main outcome in Study 1 was occurrence of violent behaviour during hospitalisation. For patients with more than one episode of violence, the most severe episode was considered to be the most important in this context (i.e., because it conveyed potential harm to others) and was used as the index episode.

Violence during hospitalisation was also a secondary outcome in the preliminary analyses in Study 3, when scrutinising the association of patient characteristics, SRS and single items of the V-RISK-10 with violent behaviour.

<u>*Imminent violence*</u>: The main outcome measure in Study 2 and 3 was imminent violence, the occurrence of violent behaviour during the next nursing shift following assessment.

Table 3: Measures in the Different Studies

Measures	Study 1	Study 2	Study 3
Baseline measures			
SRS	X		X
BVC		X	X
V-RISK-10			X
Clinical and demographic variables	X	X	X
Outcome measures			
Violence during hospitalisation	X		X [a]
Imminent violence		X	X

[a] Secondary outcome

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4.5 Statistical analyses

Statistical analyses were carried out using IBM SPSS Statistics for Windows, Version 24.0, and Stata Statistical Software: Release 15. The Risk Assessment Guidelines for the Evaluation of Efficacy (RAGEE) were used to report the results for all three studies (Papers I - III) included in the thesis. The RAGEE was designed to increase consistency and transparency in the reporting of risk-assessment studies (Singh, Yang, & Mulvey, 2015). The statistical significance level was set at $p < .05$ for all procedures. To avoid skewed results, each patient was counted only once in the analyses, regardless of the number of times that he/she was admitted during the study period. In Paper I and Paper III, episodes of threats and physical acts were combined into a dichotomous outcome variable (any violence) to achieve a larger number of outcome episodes, to increase statistical power and to decrease the risk of Type II errors. Initially, Mann–Whitney U tests and independent *t* tests were conducted to test differences on continuous variables between groups and subsamples. Chi-square test and Fisher's exact test were used on categorical variables.

Statistical analyses carried out in order to investigate whether patients' own assessments of their risk of committing violence contribute to improving violence risk assessments (Paper I)

Preliminary analyses were conducted, based on the violence rates and the patients' self-perceptions of violence risk with the SRS. First, the SRS was treated as an ordinal variable with three categories: 0 (no risk), 1 (low risk), 2 (moderate risk + high risk + don't know + won't answer), but became insignificant. Thus, SRS was dichotomously coded in two different ways: low risk regarded as a reference, and low risk regarded as a risk predictor. Based on clinical judgment, the dichotomous SRS (SRS-d) with low risk as reference was used in the logistic regression analyses.

In order to investigate the predictive accuracy of patients' own risk assessments (SRS-d) recorded at admission, univariate binary logistic regression was conducted to estimate effect sizes as odds ratios (OR) for SRS-d and other variables associated with violence. Multivariate logistic regression was used to control for clinical and demographic variables significantly associated with violence. Clinical and demographic variables that differed significantly between violent behaviour groups in the univariate analysis were used as confounders in the multivariate analysis. Area under the curve (AUC) of the receiver operator characteristic

(ROC) was calculated to determine overall predictive accuracy. Further statistical analyses were performed to estimate (1) sensitivity, (2) specificity, (3) positive predictive value (PPV), (4) negative predictive value (NPV), (5) number needed to assess (NNA) and (6) likelihood ratio (LR). Interaction analysis was conducted to investigate gender differences in the SRS.

Statistical analyses conducted in order to investigate the association between short-term risk assessments and imminent violence (Paper II)

In order to compare the results with previous studies, logistic regression analyses were conducted to estimate effect size as odd ratios (OR) for BVC associated with imminent violence when differentiating threats and physical violence. Step 1 consisted of a univariate logistic regression. In Step 2 gender was added in a multivariate logistic regression, and interaction analysis was conducted to investigate possible differences between males and females. In Step 3 we adjusted Step 2 for diagnostic subpopulations and circadian variability. Interaction analyses were conducted to investigate possible gender differences.

Owing to the nature of the data, generalised linear mixed model (GLMM) analyses were conducted to determine whether the BVC predicts imminent violence when the observations are correlated. The GLMM analyses were conducted in equivalent steps as the logistic regression analyses. Intra-class coefficients and variance between patients were estimated for the respective GLMM analyses.

When treated as independent observations, additional statistical analyses were performed to estimate (1) sensitivity, (2) specificity, (3) positive predictive value (PPV), (4) negative predictive value (NPV), (5) number needed to assess (NNA) and (6) likelihood ratio (LR). ROC analyses were also conducted to determine the overall predictive accuracy. Stata's "roccomp procedure" was used to compare possible difference in AUC for males and females.

Statistical analyses conducted in order to investigate whether an extended short-term risk assessment model would provide improved predictive accuracy (Paper III)

In order to examine whether an extended short-term risk assessment model combining short-term risk assessments with the BVC, patients' self-perceptions of risk with the SRS and single items from V-RISK-10 would provide improved short-term predictive accuracy compared to short-term risk assessment alone, the statistical analyses were conducted in four stages.

GLMM analyses were conducted to determine whether the BVC-ordinal predicts violence when the observations are correlated. All analyses (stages 1-4) were conducted for both SRS, with don't know and won't answer treated as missing, and SRS-d (No risk and low risk = reference. Moderate risk, high risk, don't know and won't answer = risk). GLMM analyses were conducted for the BVC as a categorical variable from 0-6, and as an ordinal variable (0 = low risk, 1-3 = moderate risk, 4-6 = high risk).

Stage 1 consisted of a GLMM analysis of the association between short-term risk assessments with the BVC-ordinal and imminent violence. Intra-class coefficients (ICC) and variance between patients were estimated. The ORs determined the likelihood that the patients would be violent, depending on their BVC-ordinal scores.

In *stage 2*, separate univariate logistic regression analyses were conducted to estimate the association between (i) patient characteristics and violent behaviour during the hospitalisation, (ii) patients' self-perception of risk by SRS-d and violent behaviour during the hospitalisation and (iii) single items in V-RISK-10 and violent behaviour during the hospitalisation.

In *stage 3*, two separate multivariate logistic regression analyses were conducted: One analysis in which all patient characteristics significant in the univariate analysis were included and another wherein all V-RISK-10 single items significant in the univariate analysis were included.

In *stage 4*, stepwise multivariate GLMM analyses were conducted in order to build an extended model of the BVC. The extended model consisted of three steps: (i) BVC-ordinal alone, (ii) BVC-ordinal and SRS-d and (iii) the final extended model in which BVC-ordinal, SRS-d and Item 2 Previous and/or current threats from V-RISK-10 were included. The extended model was adjusted for all patient characteristics significant in the multivariate logistic regression analyses conducted in *stage 3*. ICC and variance between patients were estimated.

Akaike's information criterion (AIC) and Bayesian information criterion (BIC) were used as fit indices to estimate the quality of the models. AIC and BIC estimate the quality of each model, relative to each of the other candidate models. AIC and BIC estimate the relative information lost by a given model: The less information a model loses, the higher the quality of that model (Burnham & Anderson, 2002).

Generalised linear mixed models (GLMMs)

The term 'generalised' indicates that a variety of distributional assumptions are possible (Normal or Gaussian, binomial, Poisson, etc.) to handle outcomes of different types. The term 'linear' indicates that the predictors enter the model together as a linear combination. Finally, the term 'mixed' indicates the method by which correlated outcomes are modelled as correlated (McCulloch & Neuhaus, 2015). GLMMs are based on extending the fixed effects GLM to include random effects, random coefficients and covariance patterns. (Verbeke & Molenberghs, 2013). An advantage of using GLMM, compared to generalised estimating equations (GEE), is the ability to derive person-specific predictions based not only on the covariates but also on the outcomes observed for that person (Gibbons et al., 2010; McCulloch & Neuhaus, 2015).

The AIC (Akaike, 1974; Vrieze, 2012) or BIC (Schwarz, 1978; Vrieze, 2012) is used to select a model.

AIC = -2loglikelihood +2k, where k is the number of parameters estimated.

BIC = -2loglikelihood + log(N)xk, where N is the number of observations.

The complexity of the model is measured by 2k for AIC and with log(N)xk for BIC. In summary the BIC procedure leans more than AIC towards lower-dimensional models (when there are eight or more observations) (Schwarz, 1978).

4.6   Ethical approvals

The study was approved by the Privacy Department at Oslo University Hospital (E-phorte No. 2011/22191), and the Regional Committee for Medical and Health Research Ethics (REK) in Norway (2011/2555/REK sør-øst B). The approval from REK granted exemption from asking for patients' informed consent to participate but required all patients to be informed about their participation and right to withdraw. All patients were informed twice, verbally and in writing, about both the study and their right to withdraw, both during their hospital stay and at discharge. Computing and storage of data were conducted in accordance with procedures at Oslo University Hospital. Data were de-identified before being plotted in the database.

5 Synopsis of results

Table 4 displays the distribution of patient characteristics for the violent subsamples in all three papers included in the thesis.

Table 4: Distribution of Patient Characteristics for the Violent Subsamples in Papers I-III

	Paper I			Paper II			Paper III		
Variable	All (%)	Violent (%)[a]	P	All (%)	Violent (%)[a]	p	All (%)	Violent (%)[a]	P
Patients	512	81 (15.8%)		528	77 (14.6%)		508	73 (14.4%)	
Gender			0.001			0.001			<0.001
Men	229 (44.7%)	50 (21.8%)		234 (44.3%)	48 (20.5%)		227 (44.7%)	47 (20.7%)	
Women	283 (55.3%)	31 (11.0%)		294 (55.7%)	29 (9.9%)		281 (55.3%)	26 (9.3%)	
Age (years), mean/median	40.8 / 37.5	40.7 / 35	0.957	40.88 / 37.5	40.56 / 36	0.802	40.82 / 38	40.92 / 37	0.936
Stay days mean/median	12.3 / 3.0	38.6 / 30	<0.001	16.22 / 4	40.75 / 33	< 0.001	16.16 / 4	40.58 / 33	<0.001
Main diagnoses according to ICD 10[b]			<0.001			<0.001			<0.001
F10-19 substance abuse	84 (16.4%)	19 (22.6%)	0.062	87 (16.5%)	18 (20.7%)	0.077	84 (16.5%)	16 (19.0%)	0.181
F20-29 psychosis	126 (24.6%)	33 (26.2%)	0.000	132 (25.0%)	36 (27.3%)	< 0.001	129 (25.4%)	35 (27.1%)	<0.001
F30-31 bipolar	56 (10.9%)	11 (19.6%)	0.406	60 (11.4%)	9 (15.0%)	0.923	56 (11.0%)	8 (14.3%)	0.985
F32-39 depression	59 (11.5%)	4 (6.8%)	0.043	65 (12.3%)	4 (6.2%)	0.040	62 (12.2%)	4 (6.5%)	0.058
F40-49 neurotic stress-related and somatoform disorders	68 (13.2%)	2 (2.9%)	0.002	69 (13.1%)	2 (2.9%)	0.003	67 (13.2%)	2 (3.0%)	0.004
F60-69 personality disorders	49 (9.6%)	5 (10.2%)	0.257	49 (9.3%)	3 (6.1%)	0.078	47 (9.3%)	3 (6.4%)	0.101
Other or no diagnoses	70 (13.7%)	7 (10.0%)	0.151	66 (12.5%)	5 (7.6%)	0.085	63 (12.4%)	5 (7.9%)	0.120

[a] Distribution of patient characteristics for the non-violent subsamples are displayed in the respective papers.
[b] ICD 10 = International Statistical Classification of Diseases and Related Health Problems 10th Revision.

5.1 Paper I

The aim was to investigate whether patients' assessments of their risk of committing violence contribute to improving violence risk assessments in acute psychiatric settings. The study specifically investigated (i) the predictive accuracy of SRS recorded at admission, as a risk marker for violence during hospitalisation and (ii) possible gender differences in the predictive accuracy of SRS recorded at admission.

Of the violence episodes, 9.9% consisted solely of verbal threats, while the remaining 90.1% consisted of physical violence (often combined with verbal threats). A total of 79.9% reported no risk or low risk of committing violence during hospitalisation, while only 1.4% reported moderate risk or high risk. A total of 8.6% reported don't know, and 10.2% responded won't answer. Patients who reported their risk of violence to be either moderate, high, don't know or won't answer (increased risk according to SRS-d) were more than four and a half times more likely to be violent (OR = 4.65, 95% CI = 2.79–7.74) compared with those who reported no risk or low risk.

Interaction analysis showed significant gender difference in the SRS-d with OR = 3.16 (95% CI = 1.11–9.00, $p = 0.032$), hence stratified analyses were conducted. The ORs were 2.74 (95% CI = 1.40–5.39, $p = 0.003$) for men and 8.66 (95% CI = 3.89–19.29, $p < 0.001$) for women. Women with a positive prediction on the SRS-d were more than four and a half times more likely to become violent, after controlling for involuntarily admitted and history of violence. Men with a positive prediction on the SRS-d were more than two and a half times more likely to become violent, after controlling for involuntarily admitted.

AUC values were 0.60 (95% CI = 0.51–0.70, $p = 0.027$) for men and 0.71 (95% CI = 0.60–0.82, $p < 0.001$) for women. Sensitivity of the SRS-d was .40 for men and .55 for women; specificity was .80 for men and .88 for women. According to the likelihood ratio (LR), women with a positive prediction from the SRS-d were almost four and a half times more likely to become violent. For men, this value was just over twice as likely. PPV was .36 for men and .35 for women; NPV was .83 for men and .94 for women.

5.2 Paper II

The aim of this paper was to investigate the association between short-term risk assessment measured by the BVC (sum score and single items) at the end of nursing shifts and imminent violence when (a) differentiating threats and physical violence, (b) differentiating males and females, (c) treating the assessments as independent and adjusting for repeated measurements and (d) adjusted for diagnostic subpopulations and circadian variability.

BVC sum scores and all single items were significantly associated with imminent violence when differentiating threats and physical violence for males and females, both when treated as independent observations and when adjusted for repeated measurements. Interaction analyses

showed no significant gender difference in the association between BVC sum scores and imminent violence differentiating threats and physical violence, nor gender differences when adjusting for diagnostic subpopulations and circadian variability. The results displayed a threshold in the association from BVC = 3 to BVC = 4 (3 times more strongly associated for threats and 4 times for physical violence -- when adjusting for repeated measurements from OR = 5.13 to OR = 20.27).

All single items were significantly associated with imminent violence, with *physical threats* as the most potent and *confusion* as the least potent single item. *Irritability* was significantly more strongly associated with imminent physical violence among females when treated as independent observations but not when adjusting for repeated measurements.

ROC analyses displayed moderate to large effect sizes ($> 75\%$) for BVC sum score both for imminent threats and imminent physical violence, with no significant difference between males and females. However, the effect sizes were due to high specificity rather than sensitivity.

5.3 Paper III

Paper III investigates whether an extended short-term risk assessment model combining (i) short-term risk assessment with the BVC, (ii) patients' own predictions of violence with the SRS and (iii) the single items from V-RISK-10 provides improved short-term predictive accuracy of violence compared to the BVC alone.

The BVC-ordinal, SRS-d and Item 2 Previous and/or current threats from V-RISK-10 remained significant in the stepwise development of an extended model for short-term risk assessment. The final extended model is displayed as Step 3 in Table 5. The AIC and BIC decreased both when adding SRS-d (Step 2) and when adding Item 2 from V-RISK-10 Previous and/or current threats (Step 3) in the development of the extended model for short-term risk assessment. For the extended model, the ICC was 0.34 (95% CI = 0.24-0.47), and the variance between patients was 1.31 (95% CI = 1.01-1.70). All components of the final extended model remained significantly associated with imminent violence when controlled for gender.

Table 5: Stepwise Multivariate Generalised Linear Mixed Model (GLMM) Analyses of BVC, the Extended Model and the Extended Model Controlled for Gender

	OR	95% CI	*P*	AIC	BIC
Step 1: BVC alone				**2089.01**	**2121.14**
BVC (sum score of 0 as reference)			<0.001		
Sum score 1-3	3.45	(2.41-4.94)	<0.001		
Sum score 4-6	20.46	(13.20-31.72)	<0.001		
Step 2: BVC + SRS-d				**2079.63**	**2119.80**
BVC (sum score of 0 as reference)			<0.001		
Sum score 1-3	3.31	(2.32-4.74)	<0.001		
Sum score 4-6	19.26	(12.46-29.79)	<0.001		
SRS-d	2.89	(1.54-5.44)	0.001		
Step 3: BVC + SRS-d + Item 2 from V-RISK-10 [a]				**2053.54**	**2109.78**
BVC (sum score of 0 as reference)			<0.001		
Sum score 1-3	3.00	(2.11-4.27)	<0.001		
Sum score 4-6	17.22	(11.24-26.39)	<0.001		
SRS-d	2.01	(1.09-3.70)	0.025		
V-RISK-10, Item2: Previous and/or current threats			<0.001		
Maybe/moderate/don't know	5.05	(2.35-10.87)	<0.001		
Yes	7.49	(3.32-16.89)	<0.001		
Step 3: controlled for gender [b]				**2050.50**	**2114.78**
BVC (sum score of 0 as reference)			<0.001		
Sum score 1-3	2.99	(2.10-4.25)	<0.001		
Sum score 4-6	17.25	(11.25-26.45)	<0.001		
SRS-d	2.12	(1.16-3.89)	0,015		
V-RISK-10, Item2: Previous and/or current threats			<0.001		
Maybe/moderate/don't know	4.58	(2.13-9.82)	<0.001		
Yes	6.02	(2.65-13.67)	<0.001		
Male gender	1.93	(1.08-3.45)	0.026		

BVC = Brøset Violence Checklist. SRS = Self-report Risk Scale. AIC = Akaike's information criterion. BIC = Bayesian information criterion. V-RISK-10 = Violence Risk Screening-10

[a] Item 7 in V-RISK-10 became non-significant. [b] The following patient characteristics became non-significant: Only primary school, Stay days, Involuntary admitted and Violence as caused for the admission.

5.4   Supplementary analyses

Some further analyses were conducted for this thesis to elaborate findings in the papers regarding the SRS. As when transforming the SRS into a dichotomous variable SRS-d, we included the *don't know* and *won't answer* as risk factors. Among the analysis conducted, but not included in Paper I, were binary univariate logistic regression analyses of SRS-d with violence during hospitalisation, excluding those who reported *don't know* and *won't answer*. Calculations excluding only those who reported *don't know* did not modify the association substantially, OR = 5.30 (95 % CI = 2.88 – 9.75, *p* < .001), but calculations excluding both those who reported *don't know* and *won't answer* became insignificant, OR = 3.32 (95% CI = .624 – 17.62, *p* = .159). The alternative dichotomous SRS with only *no risk* as reference was more weakly associated with inpatient violence when excluding *don't know* and *won't answer,* OR =2.03 (95% CI = 1.05 – 3.93, *P* = .035), however the association was significant.

5.4.1 Supplementary post hoc analyses

Supplementary post hoc analyses were conducted to investigate possible confounders; thus a positive score according to SRS-d mainly resulted from patients who either reported *don't know* or refused to answer. Initially we conducted correlation analyses to explore associations between single items in V-RISK-10. Due to the rather explorative transformation into SRS-d, a multivariate regression analysis was conducted post hoc to control for the Single Items 6 *Shows lack of insight into illness and/or behaviour* and 7 *Expresses suspicion* in V-RISK-10. Thus, one cannot rule out the possibility that Item 6 might have influenced patients' ability to report their risk and Item 7, whether patients were willing to share information. The multivariate logistic regression analyses were conducted on the sample in Paper III and results are displayed in Table 6.

Table 6: Multivariate Logistic Regression of the Association of SRS-d with Violence during Hospitalisation Controlled for Item 6 and Item 7 in the V-RISK-10

Variable	OR	95% CI	*p*
SRS-d (No and low risk as reference)			
Moderate, high, don't know and won't answer	2.27	1.28-4.01	.005
Single Item 6 in V-RISK-10: Lack of insight			.002
Maybe/moderate/don't know [a]	2.84	1.08-7.47	.034
Yes	5.22	2.00-13.66	.001
Single Item 7 in V-RISK-10: Suspiciousness			.002
Maybe/moderate/don't know [a]	3.64	1.74-7.61	.001
Yes	3.37	1.47-7.73	.004

SRS-d = Self-report Risk Scale dichotomous. V-RISK-10 = Violence Risk Screening 10. [a] *don't know* combined with *maybe/moderate* in accordance with previous studies (Hartvig et al., 2011; Roaldset, Hartvig et al., 2011)

6 Discussion

At the outset of the following discussion, main findings of the included papers are presented, followed by the findings in relation to each of the aims of the thesis. Further on, the methodological considerations, strengths and limitations are discussed, followed by relevant ethical considerations. Finally, clinical implications are dealt with.

6.1 Main findings

The overall main findings for all three papers displayed the following:

I.   Results indicated that patients' self-perceptions of their violence risk may contribute to violence risk assessments in an acute psychiatric context as a risk marker for violence during hospitalisation.

   o   Interaction analysis showed significant gender differences in the SRS-d. Women with a positive prediction on the SRS-d were more than four and a half times more likely to become violent, after controlling for involuntarily admitted and history of violence. Men with a positive prediction on the SRS-d were more than two and a half times more likely to become violent, after controlling for involuntarily admitted.

II.   Results confirm that the BVC is a suitable short-term risk assessment instrument throughout hospitalisation in acute psychiatric units, as well as when differentiating threats and physical violence, differentiating males and females and adjusting for diagnostic subpopulations and circadian variability. Interaction analyses displayed no significant differences in the association between males and females. The findings point to modified interpretations of the BVC sum scores when the assessments are conducted at the end of each nursing shift and the observation period is set to the imminent nursing shift with BVC ≥ 4 indicating high risk.

III. When adjusted for repeated measurements, an extended model for short-term risk assessment, consisting of BVC-ordinal, SRS-d and Item 2 Previous and/or current threats in V-RISK-10, explained more variance (how much of the recorded violence that could be explained by the model) of the imminent violence, compared to BVC alone.

6.2 Discussion of main findings

6.2.1 Prevalence of violence

The violence rate of about 15% (see Table 4) for all inpatients was quite similar to what has been found in previous reviews from acute psychiatric wards (Bowers et al., 2011; Iozzino et al., 2015). The violence rate was higher than previously reported in prospective studies conducted in Norway (Hartvig et al., 2011; Mellesdal, 2003), but the data collection took place in the capital of Norway; hence, large city effects may have affected the violence rate. Being male was identified as a significant predictor of violence, which is in accordance with various other studies (e.g., Dack et al., 2013). Still the numbers of violence incidents were relatively low, especially for the female sub sample. Thus, the combination of sample size and prevalence of violence limits the validity of results from the stratified analyses conducted on smaller subsamples.

6.2.2 Patients' self-reported risk of future violence

The findings that inpatients' self-reported risk of future violence may contribute to violence risk assessments as a risk marker for violence during hospitalisation is consistent with the previous study (Roaldset & Bjørkly, 2010). So is both the pattern of the results and the high number of false negatives. The low sensitivity and high specificity make patients' self-perceptions of risk not suitable for screening, although the relatively high positive predictive values indicate that patients' positive risk predictions could be of clinical importance.

Low values in the *moderate risk* and *high risk* made these categories difficult to analyse, hence the SRS was transformed post study (thoroughly explained in Paper I). The interpretation of SRS differs from Roaldset and co-workers (Roaldset & Bjørkly, 2010) which treated solely *no risk* as reference. Based on clinical judgment, the dichotomous SRS (SRS-d) with *no risk* and *low risk* as reference was used in the logistic regression analyses. The consequence of this interpretation is a larger number of false negatives and a smaller number of true positives, thus increasing the specificity and reducing the sensitivity.

The fact that only seven patients reported *moderate risk* or *high risk* supports Skeem and co-workers' (Skeem et al., 2013) suggestion regarding having unfamiliar persons ask for patients' self-perceptions of risk. If inpatients expect an association between their self-reported risk and their hospital care, this could affect their answers. Motivational effect may

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obtain as the inpatients seek to protect their esteem or defend against perceived threats (Bem, 1972). If individuals with increased self-reported risk for violence are, for example, fearful or worried about a longer hospital stay or afraid that they could be treated with physical restraints, seclusion and coercive practices, this may also affect their answers. Among patients diagnosed with schizophrenia, lower self-reflectiveness, worse clinical insight and delusion severity are found to be significant predictors of violence (Ekinci & Ekinci, 2013). This might contribute to explaining why patients' *don't know* or *won't answer* were associated with increased risk of inpatient violence among those diagnosed with psychosis.

If inpatients' self-perceptions were recorded after the healthcare staff had established relationships with the inpatients, it might have affected the scorings. Both the context in which the patients were asked about SRS and the results call into question whether there was a lack of trust in these relationships. On the other hand, recording the SRS later during the hospitalisation would have reduced the clinical relevance of the study because of the high number of violence incidents the first days after admission.

The transformation of SRS into SRS-d

In the process of transforming SRS into a dichotomous variable, those who reported *don't know* and *won't answer* were included as risk factors along with those who reported *moderate* and *high risk*. The inclusions of these factors is supported by the practice within the SPJ tradition whereby it is common to interpret scorings on single items where there is a lack of information, other than a true negative score, as potentially increased risk (e.g., Douglas et al., 2014; Singh, Bjørkly, et al., 2016). Nevertheless the SRS-d was not significantly associated with violence during hospitalisation excluding those who reported *don't know* and *won't answer*, while the alternative dichotomous SRS with solely *No risk* as reference was more weakly associated, but significant.

One can ask whether patients who report don't know or refuse to answer about their own risk of violence are actually measuring their self-assessment or, rather, whether their responses are a measure of suspiciousness, lack of insight or a result of non-compliance during the admission procedure. If the latter is the case, then the SRS-d should correlate with either Single Item 6 (Shows lack of insight into illness and/or behaviour) or Item 7 (Expresses suspicion) in the V-RISK 10. The post hoc multivariate logistic regression analyses showed that the SRS-d was significantly associated with violence during hospitalisation when

controlled for both items. The association, however, decreased from OR = 3.92 to OR = 2.27, and consequently the effect as a risk marker for inpatient violence decreased accordingly.

Possible gender differences in patients' self-reported risk of violence

The patients' self-reported risk of violence was significantly associated with violence for both genders, but interaction analyses showed significant differences in how men and women assessed their own risk. The gender differences and self-reported risk of violence as a possible stronger predictor for women is of particular interest because clinicians tend to underestimate women's violence potential (Skeem et al., 2005). To the author's knowledge, no previous study has investigated gender differences in patients' self-perception of violence risk. If men in general are more assertive and have higher self-esteem (Kling, Hyde, Showers, & Buswell, 1999), while women tend to score higher on anxiety and trust (Feingold, 1994), then women may self-report more accurately and honestly than men. Stress has also been reported to increase men's risk taking, while the opposite effect is described for women (Lighthall, Mather, & Gorlick, 2009). Summarised, if men are more impulsive (Cross, Copping, & Campbell, 2011) and the admittance process increases their stress, they may also be more likely to ignore self-risk. The results however, are subject to limitations which are discussed in Chapter 6.3.

6.2.3 Short-term risk prediction of imminent violence adjusted for repeated measurements

Associations of BVC with imminent violence

BVC sum scores and all single items were significantly associated with imminent violence when differentiating threats and physical violence for males and females, both when treated as independent observations and when adjusted for repeated measurements. The results are in line with previous research but also confirm that the BVC is a suitable short-term risk assessment instrument throughout hospitalisations.

The BVC was more strongly associated with imminent physical violence than imminent threats, but with overlapping confidence intervals. The lower number of imminent threats resulted in wider confidence intervals; thus results should be treated more cautiously. When adjusting for repeated measurements, the associations became weaker but with more reliable

ORs. Summarised, the associations of BVC with both imminent threats and imminent physical violence showed the same pattern.

A BVC sum score of 4 was about 4 times more strongly associated with imminent physical violence (and 3 times more strongly for threats) compared to a BVC sum score of 3. These results do not correspond to the original described interpretations of sum scores (Almvik et al., 2000) and indicate that BVC = 3 should be interpreted as moderate risk rather than high risk when the observations are conducted at the end of nursing shifts and the observation period is set to the imminent nursing shift. A shorter observation period, as in the present study, also supports more dynamic management strategies and raises the probability of identifying high-risk situations.

Interaction analyses showed no significant gender difference in the association between BVC sum scores and imminent violence differentiating threats and physical violence, nor gender difference when adjusting for diagnostic subpopulations and circadian variability. Thus the BVC seems to be a suitable short-term risk assessment instrument for both males and females.

All single items were significantly associated with imminent violence, with *physical threats* as the most potent and *confusion* as the least potent single item. When treating the assessments as independent measurements, the single item *irritability* was significantly more strongly associated with imminent physical violence among females. However when adjusting for repeated measurements, there were no significant differences between males and females. This might indicate that the use of logistic regression analysis entails a risk of bias and incorrect conclusions when measuring patients repeatedly. This is also an issue that has been addressed previously (Coid et al., 2015).

Other predictive measures

When investigating the predictive accuracy of BVC treated as independent measurements, the ROC analysis and corresponding AUC values displayed moderate to large effect sizes. AUC as a performance indicator, however, has clinical limitations. Two instruments, one that is useful for identifying 'high risk' patients and another that is useful for identifying 'low risk' patients, may produce the same AUC (Fazel & Bjørkly, 2016). If the respective instruments were used for the same purpose, they would lead to very different false-positive and false-negative decisions that would affect safety and the use of restrictive measures. The moderate to large effect sizes in our study are due to high specificity rather than sensitivity. The low

sensitivity and PPV may indicate that the BVC is better for identifying patients who are not potentially at risk for imminent violence; hence the BVC alone seems less suitable as a screening instrument for imminent violence. Our results are in accordance with a recent systematic review and meta-analysis from a forensic context that also found high specificity and NPV from the short-term risk assessment instruments reviewed in their study (Ramesh, Igoumenou, Vazquez Montes, & Fazel, 2018).

How to interpret the predictions

The risk of inpatient violence is dynamic, and an interactional perspective (Winstok, 2007) on short-term violence risk assessments seems appropriate. Thus, an interactional perspective emphasises both the intrapersonal and interpersonal aspects as important in the person-situation interaction prior to and during episodes of violence. The BVC was developed within the actuarial approach (Wilson et al., 2016) where evaluators make ultimate decisions according to fixed and explicit rules. However, the BVC does not take environmental, interpersonal and clinical factors into account. When risk is assessed at the end of nursing shifts, different interpersonal and environmental factors will be present during the observation periods. Chu and co-workers added other expert clinical considerations to the assessments with the DASA (similar to the BVC) but this did not improve the predictive validity for the instrument (Chu, Daffern, et al., 2013). Nevertheless, if one considers the BVC as an ARAI, a patient with a given score would automatically be regarded as either high, moderate or low risk without considering other factors. Interventions based solely on high risk according to the BVC sum score could easily give rise to the use of restrictive measures towards the respective patient. Such simplification could easily give rise to frustration in the patient who, taking the whole patient situation into consideration, might benefit by less restrictive interventions at the time. Given the low sensitivity and PPV (even though these are based on analyses that treated the measurements as independent), high sum scores alone should not be used to justify any intervention, particularly when it restricts a patient's access to treatment opportunities. Chu and co-workers state that short-term risk instruments should be used to provide a systematic approach to daily violence risk considerations and to assist staff assessments (Chu, Daffern, et al., 2013). Treating the BVC as a structured professional judgement instrument, by including the mental healthcare staffs' professional clinical judgement to each assessment, might be clinically helpful. When conducting a risk assessment at one nursing shift, there will always be additional relevant factors present during the following nursing shift that affects the risk.

Nevertheless, healthcare staff should take into account that patients with BVC sum scores (according to the GLMM analyses) of 4 or higher in our study had more than 15 times greater risk of committing imminent threats or physical violence compared to those assessed with BVC sum scores of zero.

6.2.4 Towards an extended model for short-term risk of imminent violence

When adjusting for repeated measurements, the fit indices (AIC and BIC) show that an extended model for short-term risk assessment, consisting of BVC-ordinal, SRS-d and Item 2 Previous and/or current threats in V-RISK-10, explained more variance of the imminent violence compared to short-term risk assessments with BVC alone. When controlling for gender, all items remained significant components of the extended model. Adding gender to the model gave mixed results according to the fit indices. The explained variance increased, according to the AIC, but not according to the BIC. Adding gender weakened the OR of Item 2 in V-RISK-10, but did not modify the BVC-ordinal, nor the SRS-d. Thus the extended model was not substantially altered by adding gender. The ROC-AUC of BVC alone is similar to previous studies; however, the decreased marginal distribution of violent behaviour when using the GLMM, limits the comparability of the predictive validity for the extended model compared with other short-term risk assessment studies. Nevertheless, as already described, the present study takes into account the repeated nature of the observations; hence, results have decreased the risk of erroneous conclusions and bias, compared to previous studies using ROC-AUC and logistic regression.

The single items (Item 2 *Previous and/or current threats* and Item 7 *Expresses suspicion*) in V-RISK-10 associated with violence during hospitalisation in a multivariate logistic regression is similar to previous results (Item 2, 6 and 7) for the inpatient context (Hartvig et al., 2011). The explanation of why Item 2 of the two static factors is more likely to increase the prediction of imminent violence is not evident. Two of the six items in the BVC and Item 2 in V-RISK-10 concern threats made to others and might record some of the same phenomena. Item 2 in V-RISK-10 might explain more of the imminent violence conducted by those patients who tend to threaten others prior to potential violence. Within the framework of developing an extended model of risk prediction, addressing possible differences concerning

threat as a precursor to physical violence compared to physical violence without a precursor threat needs further investigation.

The explanation for why inpatients' self-perception of risk, a static risk factor (stable dynamic), is more likely to increase the prediction of imminent violence in an acute psychiatric setting remains unclear. However, restrictive interventions may be viewed as unnecessary and provocative by patients at low risk and might therefore increase their risk (Maguire, Daffern, Bowe, & McKenna, 2018). If patients who are not aware of their risk experience restrictive interventions due to increased risk according to the BVC, they might experience the interventions as unnecessary and provocative.

According to both the AIC and the BIC, Item 2 *Previous and/or current threats* in V-RISK-10 added more to the model compared to what the SRS did. Both the SRS and the BVC are characterised by high specificity and low sensitivity. The GLMM analyses reduced the marginal distribution of violent incidents; hence it was not possible to analyse sensitivity in order to be comparable with previous studies. Whether including Item 2 *Previous and/or current threats* in V-RISK-10 contributed to increasing the sensitivity therefore remains unclear.

The three instruments included in the extended model represent three different perspectives on violence risk assessments and are discussed further in Chapter 6.5.3.

6.3 Methodological considerations, strength and limitations

6.3.1 Choice of design

Combining qualitative and quantitative methods results in more comprehensive and unbiased conditions and might produces research projects that are more accurate and reliable (Creswell & Tashakkori, 2007). In-depth interview, focus group and participant observation are among those qualitative methods of inquiry commonly used in mental health (Whitley & Crawford, 2005). Qualitative research, with its focus on shared construction of meaning with participants and flexibility in design, method and process, allows subjects to communicate their experiences directly, rather than through a researcher, risking transformation of the original communication (Razafsha et al., 2012). At the same time research with a quantitative design

or studies with a sequential mixed method design may well form the basis for future explorative qualitative studies (Creswell, 2014).

Investigating patients' self-assessments of their own violence risk with the chosen method is to some extent a reductionistic way of treating the inpatients' own understandings. Patients may be uncertain about what to answer, and the method does not allow patients to answer, for instance, whether there are specific situations that might increase their risk or if there are certain people they have difficulties interacting or cooperating with. Though a qualitative study within a phenomenological tradition might well have produced different valid and important insights, a post positivism paradigm, like the one used in this thesis, also contributes substantial insights.

The mental healthcare staff's humanistic ideals are given less attention. A stronger focus on mental health nursing and person-centred care may well have brought different and comprehensive insights more relevant to mental health nursing and the patients in care regarding establishing conditions necessary for the promotion of patients' growth and development. On the other hand, the broader perspective adds to the field's knowledge, which may be part of a basis for future explorative research from a holistic mental health nursing perspective.

6.3.2 Design sample setting and data collection

The prospective naturalistic design is a strength. Prior to the data collection a power analysis was conducted. A significant sample size, few patients who withdrew from participation and low amounts of missing data were all strengths. Another strength was the inclusion of all patients during a complete calendar year; hence, the sample was not affected by possible seasonal variations.

The procedure for selecting the first admission with recorded violence for inpatients with multiple admissions affected the violence rate. Other studies from acute psychiatric settings also included patients with violence recorded during only one admission to the violent subsample (e.g., Mellesdal, 2003). The procedure for this study was chosen to achieve a larger power and is similar to other studies from acute psychiatric settings (Roaldset, Bakken, & Bjørkly, 2011; Roaldset, Hartvig, Linaker, & Bjørkly, 2012). Some studies do not, however, describe the selection of index admission (e.g., Hartvig et al., 2011; van de Sande et al., 2011), and the chosen procedure in the present study increased the transparency of the results.

Data collection in a single hospital is a strength, given the number of patients included and the reduced potential for dissimilarities regarding how the nursing staff interpreted patients' behaviours and scored the BVC. Data collection in a single hospital made it more likely that the data would be collected in the same way in all five included units. It also limited the possibility of different interpretations of all recorded variables. The healthcare staff were instructed in the same procedure, thereby reducing the risk of different ward-cultural understandings of variables. However, the data collection was conducted in five different units, and the large number of nurses who completed the BVC (each patient's primary nurse at every nursing shift) increases the risk of bias.

One limitation in using staff observations might be the healthcare staffs' limited capability to observe patients' behavioural changes and to account for their observations. This limitation was, however, reduced by healthcare staffs' familiarity with the risk assessment instruments and the SOAS-R. Another limitation of using staff observations is the risk of staff not observing relevant data during shifts characterised by frequent admissions of patients, overcrowding in the units or other unforeseen events.

6.3.3 Baseline measures

The modifications from the original SRS are small; hence, the results are highly comparable with the previous study on SRS. The recording of SRS at admission is a limitation and may well have influenced how patients reported the SRS. Having a stranger asking patients to predict their own violence has been described as not likely to elicit accurate self-perceptions (Skeem et al., 2013).

Transforming the SRS into a dichotomous variable is also a limitation; thus violence risk is not categorical, but, on the contrary, more like a continuum from very low to very high (e.g., Douglas et al., 1999; Singh et al., 2011). Violence risk is also dynamic depending on different individual, historical and dynamic risk factors (e.g., Dickens, O'Shea, & Christensen, 2020; Douglas & Skeem, 2005). Each patient's vulnerability, the presence of different interpersonal, environmental and unit-related factors (Szabo et al., 2015) and protective and moderating factors (Roychowdhury & Adshead, 2014) may affect risk.

The high number of patients that reported *don't know* is a limitation. Patients may report don't know or refuse to answer about their own risk of violence for several reasons, including suspiciousness (corresponds to Item 7 in the V-RISK-10), lack of insight (corresponds to Item

6 in the V-RISK-10) or as a result of non-compliance during the admission procedure. In Paper III, based on a multivariate logistic regression analysis of single items in the V-RISK-10, Item 7 (Expresses suspicion) was initially included in the construction of the extended model. However, the item did not remain significantly associated with imminent violence and was not included in the final model. Paper I did not control for neither items in the V-RISK-10. Thus, this is an important limitation to both papers, and even more cautious conclusions may have been appropriate. Despite a weaker association for SRS-d with violence when controlling for Items 6 and 7 in V-RISK-10, the post hoc analyses decreased the limitation to some extent. The choice of cut-off for SRS as a dichotomous variable may, however, be criticised because the alternative dichotomous SRS remained significantly associated with violence during hospitalisation, excluding those who reported *don't know* and *won't answer*, while the SRS-d did not.

The recording procedure of the BVC (at the end of nursing shifts) did not follow the original suggestions for the instrument (Almvik et al., 2000; Woods & Almvik, 2002). This makes comparisons of the results with the original studies more difficult. The choice of procedure also modifies how interpersonal relationships affect the results. Interpersonal risk factors between the inpatient and the inpatient's primary nurse, who conducts the short-term risk assessment, may affect the short-term risk (Bowers et al., 2011; Szabo et al., 2015). During the observation period, however, other interpersonal risk factors may have been present.

6.3.4 Outcome measure

Limitations related to the definition and interpretation of violence

Violence is very heterogeneous (Steinert & Whittington, 2013), and it is appropriate to see violence as part of a continuum (Lorettu, Nivoli, Milia, & Nivoli, 2020). A lack of consensus about appropriate outcome measures has been identified as a major barrier to evaluation of mental health services (Chambers et al., 2009), and the use of different outcome measures is described as a challenge in psychiatric in-patient aggression (Dack et al., 2013).

Quite a few definitions of violence, including the definition from WHO (1996), also include violence against self. The most frequently used instruments to record aggression, including the SOAS-R (Nijman et al., 1999), OAS (Yudofsky et al., 1986) and the MOAS (Kay et al., 1988), record physical aggression against self. Aggression against self was not included in the original SOAS (Palmstierna & Wistedt, 1987), but was added in the revised version (SOAS-

R) (Nijman et al., 1999). The severity scores of the SOAS-R range from 0 to 22. Scores of 0 to 7 indicate mild aggression severity, 8 to 15 moderate severity, and 16 to 22 severe severity (Nijman et al., 2005). Outcome has been reported in differing terms: according to the scale (e.g., Abderhalden et al., 2004; Iennaco, Whittemore, & Dixon, 2017; Rechenmacher, Muller, Abderhalden, & Schulc, 2014), as "any aggression" (e.g., van de Sande et al., 2011), as "severe violence" (a score of 9 or more which indicates that physical pain or injury was inflicted) (e.g., Abderhalden et al., 2008; Björkdahl et al., 2006; Hvidhjelm, Sestoft, Skovgaard, et al., 2014) and as "verbal threats, threatening behaviour and harm" (e.g., Hvidhjelm, Sestoft, & Bjorner, 2014). From the studies of the BVC included in a systematic review of short-term risk assessment instruments (Dickens et al., 2020), eight reported the outcome as "any aggression", and six, as "physical aggression against people", while one study reported on both.

The choice of definition in the thesis based on previous studies (Dean et al., 2006; Monahan et al., 2005; Roaldset & Bjørkly, 2010; Roaldset, Hartvig, et al., 2011; Swanson et al., 2006) is rather narrow and conservative. However, the choice of definition affects the prevalence of violence, and a possible use of other more inclusive definitions might well have covered additional episodes. Patients may voice threats of violence, from unspecified, vague threats (e.g. ''I just feel like I want to hurt or kill someone'') to targeted homicidal threats toward an individual (e.g. ''I am going to kill my wife'') (Petit, 2005). Indirect or more subtle threats may be categorised as aggression and may well be perceived as both frightening and more threatening compared to direct threats like those included in this thesis. The narrow, conservative definition of violence used in this thesis may be a limitation since it does not include such indirect or subtle threats, but it may also a strength as the definition is clearly and objectively formulated.

Even though violence is a heterogeneous phenomenon, threats and physical violence were merged and treated as a dichotomous outcome variable in two of the papers (I and III). The choice of violence as a dichotomous variable must be criticised.

The procedure of the most severe episode as index episode was chosen because the respective episode was considered the most important in this context (because it conveyed potential harm to others). The outcome variable differentiates threats and physical violence in Paper II. However, the choice of index episode in Paper II is a limitation. The fewer included threats of violence compared to physical violence may well be due to the choice of index episode.

The definition of imminent violence in the thesis as violence during the imminent nursing shift, challenges direct comparisons with the original studies and the recommendations regarding interpretation of BVC sum scores. Thus, risk increases as the time frame increases, giving a greater opportunity for risk to be realised (Scurich, 2016). A recent systematic review and meta-analysis on short-term risk assessments also recommends the adoption of a definition of imminent risk as the 24-hr period following assessment (Dickens et al., 2020), which is in accordance with the original suggestions for the BVC (Almvik et al., 2000).

Underreporting of violence

The risk of underreported violent episodes is a limitation. Underreporting is common (Hvidhjelm, Sestoft, & Bjorner, 2014). There are variations in the underreporting among the mental healthcare staff (di Giacomo et al., 2020), and the variations are affected by the professionals' occupational and communication skills (Bilici, Sercan, & Tufan, 2013). If staff consider inpatient violence as part of the job (Child & Mentes, 2010), a culture of acceptance of violence may persist (Wolf et al., 2014), especially in units where violent incidents occur most frequently. Thus, the risk of underreporting may have increased.

The use of additional sources to gather information from hospital records and hospital protocols of coercive measures may, however, have contributed to decreasing the underreporting of incidents.

Preventive interventions

A prospective naturalistic design might result in implementation of preventive measures (Chu et al., 2011). This issue has repeatedly been discussed in the literature, stating that the interpretation of false positive predictions is hampered by the fact that mental health professionals have an obligation to intervene when patients are assessed with high risk (Abderhalden et al., 2004). The staff were not actively blinded to recordings of BVC, SRS, or V-RISK-10. To obtain information regarding the SRS and V-RISK-10 they would have had to check the medical records of each inpatient. The BVC recordings, on the other hand, were recorded and communicated at each nursing shift. BVC sum scores 1 and 2 were interpreted as moderate risk, suggesting preventive measures, while sum scores of 3 and more suggested very high risk requiring immediate preventive measures and the activation of plans for handling an eventual attack (Almvik et al., 2000). One can assume such interventions were

considered sufficient by the healthcare staff to secure effective risk management in order to prevent violent behaviour; hence, they most likely reduced the risk of violence. This underlines the potential confounding by efficient risk management, indicating an underestimation of the sensitivity and PPV. The naturalistic design might have turned 'true positives' into 'false positives', due to efficient risk management, and thereby weakened the predictive validity. The exact number of 'incorrect false positives' due to efficient risk management, however, is difficult to estimate. Implementing BVC is described as significantly reducing the incident rates of violent episodes (Abderhalden et al., 2008; van de Sande et al., 2011); nevertheless a more recent study did not find such significant reduction when accounting for the clustering effect within both inpatients and wards (Hvidhjelm et al., 2016).

Several additional preventive interventions may also have affected the outcome. Some interventions alter the risk of violence while other reduce the risk.

If patients have the impression of being taken control of, or even of being coerced by staff into a specific behaviour, hostile reactions are likely to emerge (Richter, 2006). Hence interventions by healthcare staff in order to avoid inpatient self-harm might escalate situations and give rise to patient behaviour recorded as violence against others. Despite the instructions to record episodes limited to physical violence and verbal threats in accordance with the definitions, one cannot rule out that recordings are included where the healthcare staff recording each incident forgot to code violence against self and only coded threats or physical violence.

Neither of the included papers adjusted for any kind of medication treatment, neither ordinary prescriptions, forced medications, the use of Pro Re Nata (PRN) medication nor the use of a prescription drug. Forcing patients to take medication may well increase the risk of violence. Requests by healthcare staff for patients to take PRN medication can also lead to conflicts (Bowers et al., 2015) and may be associated with an increased likelihood of inpatient violence (Maguire et al., 2018). Not to receive prescription drugs such as sedatives during hospitalisation may, for those who are dependent on or regularly use drugs or prescription drugs, can also increase the risk of aggression and violence.

The use of restrictive interventions may also affect the risk of violence. Interventions may be unsuitable for the patient or the situation and may lead to the use of reactive and restrictive practices (Taylor et al., 2011). More restrictive interventions have been described as being

unnecessary and provocative for patients at low risk and might therefore increase these patients' risk for violence (Maguire et al., 2018). Whilst nurses in acute psychiatry profess to work within a recovery paradigm, assessing risk has become focused on policy, procedure and providing defensible decisions (Taylor et al., 2011). When nurses feel torn between their humanistic ideals and the demand for treatment efficiency (Björkdahl et al., 2010; Currid, 2008; Hummelvoll & Severinsson, 2001; Vatne & Fagermoen, 2007), it might affect their choice of intervention. The lack of focus on risk management and preventive interventions is a limitation; thus the use of preventive interventions affect the outcome.

6.3.5 Additional factors affecting the risk that are not accounted for

There are several additional factors affecting the risk of violence that are not accounted for in the thesis. In particular an extended model for short-term risk assessment should take into account the environmental factors and unit-related factors such as the ward milieu and interpersonal factors including, especially, the quality of therapeutic relationships. Protecting and moderating factors (Roychowdhury & Adshead, 2014) and factors related to the mental healthcare staff are also given little attention even though patients consider staff behaviour as a central cause of violence, describing it as provocative and disrespectful (Cutcliffe & Riahi, 2018). There is also a lack of focus on healthcare staffs' communication skills as a potential prevention strategy (Baby, Gale, & Swain, 2018), as well as on triggers of individual violence, though imminent violence can be triggered very easily even with a therapeutic approach (Rocca, Villari, & Bogetto, 2006). The lack of accounting for all these highly relevant factors is a limitation. Inclusion of The Six Core Strategies (Huckshorn, 2004) developed to reduce the use of seclusion and restraints, or particularly the SafeWards Model (Bowers, 2014) may also have been appropriate. The SafeWards Model explains the differences between wards in their conflict and containment rates. The Model also introduces new concepts and describes new domains as part of the explanation (Bowers, 2014). Most importantly, the Safewards Model identifies a large number of aspects of staff actions that can impact on the likelihood of conflict or containment incidents (Bowers et al., 2015), that are not accounted for.

6.3.6 Statistical analyses

The choice of statistical analysis to adjust for repeated measurements is a strength. The GLMM is less sensitive to missing data, compared to GEE models. On the other hand, the choice of statistical method is a limitation regarding the ability to compare the results with previous studies (the analyses do not provide ROC-AUC, which is commonly used in previous studies). The use of multiple statistical methods to nuance the results also strengthened the reliability; hence it is in accordance with recent recommendations for risk assessment studies (Singh et al., 2015).

Risk of statistical errors

The transformation of SRS into SRS-d was rather explorative; hence, it increased the risk of Type 1 errors. The very low number of patients who reported moderate and high risk, along with the low number of violent episodes in the respective categories, alter this risk. If the non-significance of low risk in SRS treated as an ordinal variable is due to Type II error, low risk should be considered a risk predictor instead of being treated as reference.

To merge verbal threats and physical violence reduces the risk of Type 2 errors, but it also increases the risk of Type 1 errors.

The fewer included threats of violence compared to physical violence may well be due to the choice of index episode, and the relatively few episodes of threats increases the risk of Type 2 errors in Paper II.

Risk of confounding factors

Our findings give measures of strengths of association between the baseline and outcome variables in each of the papers included. Confounding variables are variables that affect both the independent and the dependent variable. We controlled for clinical and demographic variables that differed significantly between the violent and the non-violent group in Paper I and sociodemographic and variables related to the hospital stay in Paper III. However, the aforementioned number of factors affecting the risk not accounted for increases the risk of confounding factors that may have influenced the results in all three papers.

6.3.7 Generalisability

External validity refers to the extent to which the results can be generalised to other settings, other people and over time; hence external validity is improved by the prospective naturalistic design. For effectiveness to be demonstrated there needs to be naturalistic, prospective research on the accuracy of healthcare staff's assessments in their normal treatment setting (Fazel & Bjørkly, 2016). Among the issues involved in external validation is considering whether the validation has been done in a population of interest. Validation sample populations should have characteristics similar to derivation samples, and the outcome should be of interest (Fazel & Wolf, 2018). The BVC and V-RISK-10 are validated and highly suitable for acute psychiatric settings (Anderson & Jenson, 2018), and the SRS, too, has been studied in an acute psychiatric setting. Hence all of these are suitable for the studies included in this thesis, and all three papers included in the thesis contribute to further validation of the respective instruments.

The sample in these studies all came from the same Norwegian city, which may be a limiting factor to the generalisability of the findings. That the sample consists of patients admitted to a single hospital is also a limitation to the studies' generalisability. It cannot be ruled out that there could be specific factors that affect solely the population living in that hospital's catchment area, and if a non-representative sample were used, then conclusions might be reached that do not reflect reality (Fazel & Wolf, 2018). The results might also be affected by environmental or organisational factors in the acute psychiatric ward where the data collection was carried out. How well staff are trained in violence management as well as the culture in the hospital could also affect the outcome. Men and women may also have been admitted for different criteria, resulting in different characteristics for each gender in our samples.

The Norwegian setting is also a limitation to generalisability to other countries, as other countries have different contexts, mental healthcare acts and staff to bed ratios. For example, the nursing staff to bed ratio seems to be lower in both the USA (Staggs, 2019) and England (Bowers & Crowder, 2012; Bowers & Flood, 2008), although published staff to bed ratios from Norway (Husum et al., 2010) do not distinguish between different kinds of professionals. Norway is a rich country with rather well-functioning mental healthcare services, and one might expect lower staff to bed ratios in countries with lower incomes. Mental health unit staffing has received some attention in relation to patient violence and staff use of coercive measures, though effects of staffing on these outcomes remain poorly

understood (Bowers & Crowder, 2012; Staggs, 2019). Nevertheless, adequate mental health nurse staffing in hospitals is a critical component of quality inpatient care (Hanrahan, 2012).

6.4 Ethical considerations

Inpatient care is influenced by the outcomes of violence risk assessments. Performing risk assessments, without patients' full knowledge, requires certain ethical considerations. False positives and false negatives have significant implications for patients' individual care and the well-being of others (Ryan, Nielssen, Paton, & Large, 2010). Categorising patients admitted to acute psychiatric wards into low or high risk diverts resources from patients categorised as low risk, even though a significant proportion of patients categorised as low risk do commit harmful acts (Ryan et al., 2010). Not all tests that can distinguish between high and low risk groups are useful for screening (Large & Mullin, 2011). The World Health Organisation (WHO) and others have published guidelines outlining when screening is worthwhile (Wilson, Jungner, & WHO, 1968). The risk of stigmatising patients with positive test results for increased potential for physical violence must be considered and should be avoided (Rechenmacher et al., 2014). However, interventions made by unstructured risk assessments also have ethical implications and a risk of prejudice and stigmatising patients.

Determining what is an acceptable level for sensitivity and specificity in violence risk assessments has been a topic of debate and is an issue that both Paper II and Paper III have dealt with. The cut-off for high risk in BVC-ordinal is elevated compared to the original suggestions (Almvik et al., 2000). This entails a larger number of false negatives resulting in an increased risk of the healthcare staff and fellow patients being subjected to violence. False positive cases also imply risk of unnecessary interventions. Conversely, a positive consequence of an elevated cut-off is a decreased number of false positives; hence, fewer truly non-violent patients are stigmatised and exposed to unnecessary de-escalating interventions. De-escalating interventions should be proportionate to the risk of harm posed by the respective patient (Price & Baker, 2012), and approaches that are too rigid, unnecessary or excessively restrictive are known to increase the risk of violence (Duxbury, 2002).

Patients admitted to acute psychiatric inpatient units are a vulnerable group, and doing research on vulnerable groups requires certain ethical considerations. The exemption from asking for patients' informed consent to participate that was granted the researchers required

an even greater focus on the ethics. A substantial proportion of the patients admitted to acute psychiatric inpatient units are referred and admitted involuntarily, and a significant proportion have different mental disorders involving some kind of psychosis. An important criterion for being involuntary admitted is, in addition to having a severe mental illness (or that the physician that refers the patient assesses a suspicion of such illness), that the patient is at increased risk for others or self. Hence, a non-insignificant proportion of involuntary admitted patients may have an increased risk of violence toward others. Normal characteristics among patients with psychoses may have been an obstacle to consenting to participate in the respective study. For instance, paranoid delusions might have been an obstacle to giving a written consent. Additionally, a significant proportion of the patients may not have been able to consent to the study. Given these possibilities, doing a study based on written consent might have made the study sample non-representative.

The naturalistic design required that data collection did not intervene in any patient's hospital examinations or treatment. All data were registered during ordinary examinations and treatments in the ward, and all patients received treatment as usual. Thus, the study involved neither any disadvantage nor risk for the patients. On the contrary, the study may have increased the quality of care and treatment for patients admitted to their respective acute psychiatric inpatient units as a result of increased knowledge and competence among the healthcare staff. Such increased knowledge and awareness may have benefited patients by increasing their attention regarding their own violence risk and may have assisted patients to develop strategies to manage their own risk. If future violence risk assessments in acute psychiatric settings are able to include patients' self-perceptions, doing so might emphasise empowerment and be a step towards treating patients as more equal partners.

6.5 Clinical implications

6.5.1 The impact of dynamic and static patient factors

Short-term risk assessments may be relatively accurate because they manage to account for a patient's current mental state, fluctuating environmental variables (Nijman, Merckelbach, Evers, Palmstierna, & à Campo, 2002) and the interaction between individuals in various situations. Nevertheless, short-term risk assessments seem to be characterised by high specificity and NPV as opposed to violence risk assessment instruments for longer observation periods (Ramesh et al., 2018). Short-term risk assessment instruments like the

BVC are incapable of predicting violence beyond 24 hours (Ogloff & Daffern, 2006). Hence it is reasonable to expect that a combination of risk assessment measures may be required to formulate an individual's short- to long-term potential for violence risk (Chu et al., 2011).

6.5.2 Risk assessment as part of the foundation for efficient risk management

Risk assessment is a reasonable strategy for decreasing violence and reducing the use of seclusion and restraint (Gaynes et al., 2017) and may help to determine the best intervention for reducing the potential for violent behaviour (Cowman, Björkdahl, Clarke, Gethin, & Maguire, 2017). Moreover, accurate violence risk assessment is part of the foundation for efficient risk management. Although risk assessment research has focused on the need to provide interventions when patients' risk for violence is elevated, it is also important to note that risk assessment might be particularly valuable for patients whose risk for violence is low. A low risk rating should encourage staff to facilitate greater access to liberty and reduce restrictive interventions (Maguire et al., 2017). Nevertheless, if healthcare staff are able to identify warning signs of inpatient violence, such as dynamic risk factors associated with imminent violence, their confidence in violence risk management increases (de la Fuente, Schoenfisch, Wadsworth, & Foresman-Capuzzi, 2019). On the other hand, if patients have individual warning signs of inpatient violence that are predominantly of an intrapsychological nature, it is likely that these signs will be inaccessible to healthcare staff's observations. Without user involvement and cooperation, important information that may inform treatment and risk management plans might be ignored (Fluttert et al., 2013).

6.5.3 Combination of different approaches in short-term risk assessment

Although the proposed extended model has several limitations as discussed above, it might contribute to improved understandings of risk assessments and how to approach short-term risk assessments in the future. The model combines three different approaches to violence risk assessments: (i) the physicians' perspectives, (ii) the nurses' perspectives and (iii) the patients' own perspectives. The V-RISK-10 is typically administered at admission by the physician on duty (Eriksen et al., 2016), while the BVC is normally assessed by the nursing

staff (Almvik et al., 2000), and the SRS is assessed by the patients. The physicians' approach represented by the V-RISK-10 assessed at admission might be more objective, since the physician would have to rely on written documentation (where this applies) and information gathered in an often first-time meeting. The nursing staffs' approach represented by the BVC might be influenced by the relatively close observations brought about by proximity to the patients, whereas later, in the hospital stay, a closer relationship might also contribute to more open and honest behaviour.

One cross-national, multi-site mixed methods study found that while mental healthcare staff considered risk assessment as central to their efforts, they still appeared to exclude patients from meaningful discussions about the assessments (Coffey et al., 2019). Involving patients in their own violence risk assessments is a means of helping patients understand why interventions are necessary (Kumar & Simpson, 2005). On the other hand, by denying patients access to knowledge about their risk, the staff are effectively excluding the patients from participation in decisions about their care (Coffey et al., 2019). Successful inclusion in the therapeutic process may contribute to empowerment, which can also have a positive impact on the development of therapeutic relationships (Hamann, Leucht, & Kissling, 2003). Positive therapeutic relationships between patients and mental health professionals are essential for supporting the recovery processes, and fear of violence can undermine and erode such confidence (Ward, 2013). Being open and non-judgmental about these issues is likely to help establish a relationship based on partnership between patients and mental health professionals (Kumar & Simpson, 2005), and positive therapeutic relationships are helpful for preventing violence (Gilburt, Rose, & Slade, 2008). Use of patients' own risk assessment as part of the complete risk assessment requires interaction with patients and implies a greater emphasis of patients' own assessments compared to current practice. However, to involve patients in discussions about risk factors and risk assessments is challenging and requires greater training and support to encourage staff to develop the skills to undertake such sensitive and important work with confidence (Coffey et al., 2019).

6.5.4 Implications for practice

Given the ethical imperative to treat all patients with dignity, it is crucial to correctly identify patients at high risk so that staff can quickly investigate and implement strategies to meet their treatment needs. This is particularly important in acute psychiatric settings for at least two

reasons: comprehensive clinical and violence risk information may not always be readily available and patient management must be balanced against staffing and treatment limitations unique to each setting (Gaynes et al., 2017). Increased knowledge regarding violence and violence risk assessments might also reduce stigmatisation related to mental disorders and people admitted to acute inpatient psychiatric units. A given patient may not understand his or her risk or may choose not to accurately report it. For these reasons, self-perceptions should be viewed as a component of — not a replacement for — risk assessment (Skeem et al., 2013). However, the findings point toward possible new generation, more comprehensive short-term risk assessment instruments that emphasise several approaches to risk assessment. Such possible new instruments might not only emphasise dynamic patient risk factors, but also include static factors and patients' own risk assessments as valuable components of short-term risk assessment. Such a possible future shift in paradigm has similarities with the proposed interactional perspective, which emphasises the mutual impact of both the patient and the situation in which the violence emerges (Funder, 2006). A strengthened emphasis on both the relationships between patients and mental healthcare staff and on the interaction in which violence occurs represents a broader focus on short-term risk assessments.

7 Conclusion and future research

To my knowledge this is the first attempt to investigate an extended model for short-term risk assessments by including inpatients' own risk assessments as part of the model. Inpatients' self-assessment of their violence risk may contribute to violence risk assessments in an acute psychiatric context, as a risk marker for violence during hospitalisation, but findings should be treated with caution due to limitations. This study confirms the predictive validity of the BVC as short-term risk assessment instrument for inpatients throughout hospitalisation in acute psychiatric units. Results indicate that an extended model for short-term risk assessments explain more variance of imminent violence than short-term risk assessments with the BVC alone. However, the reductions in the AIC and the BIC were small, and the results are subject to limitations. The proposed model is only a primary version, and there are several missing factors that are not taken into account. Before this model or similar approaches can be recommended, findings need to be confirmed in further studies from other populations and countries.

Future research – some suggestions

Regarding patients' own risk assessments of future violence:

o To understand patients' self-perceptions of risk better, the issue should be approached qualitatively. A complementary qualitative study would increase knowledge about patients' views regarding being included in risk assessments.
o Further research is recommended to investigate the SRS more thoroughly. The high number of patients who reported don't know and refused to answer should be scrutinised.
o Further research is recommended in order to investigate how the SRS may be better designed (e.g. as a dichotomous or ordinal variable).
o Further research on the SRS in other settings and populations is also recommended.

Regarding short-term risk assessment of imminent violence:

o To reduce the risk of erroneous conclusions or bias, future studies on short-term risk assessments should use statistical analyses that account for the repeated measurements; thus repeated measurements will not be independent of each other.

Regarding extended models for short-term risk assessments:

- o Further studies are also recommended to investigate whether extended, more comprehensive models for short-term risk assessment which include different approaches and perspectives would provide better violence risk prediction than short-term risk assessments with the BVC alone.

Finally, to improve violence risk management in order to reduce inpatient violence, it would be useful also to know how patients themselves interpret the situations that result in violence, their motives for violence and their considerations of how to prevent further violent episodes. Such knowledge may best be obtained by interviewing those who commit inpatient violence; hence a mixed-methods study combining quantitative and qualitative data in a convergent parallel design is recommended. In the convergent parallel design, the researcher uses concurrent timing to implement the qualitative and quantitative components during the same phase of the research process, prioritises the methods equally, keeps the components independent during analysis and then mixes the results during the overall interpretation (Creswell & Clark, 2018).

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The original Self-report risk scale (SRS):

(Roaldset & Bjørkly, 2010)

Patients were asked four questions (ABCD), at admission and before discharge:

What is your own opinion of the risk that you will:

A: try to hurt or injury yourself, without intention   0 - 1 - 2 - 3 - 4 - 5 - 6
    to kill yourself
B: try to kill yourself   0 - 1 - 2 - 3 - 4 - 5 - 6
C: threaten other people with acting violent   0 - 1 - 2 - 3 - 4 - 5 - 6
D: act violent against others   0 - 1 - 2 - 3 - 4 - 5 - 6

…for the time you will stay in the ward /
…for the first 3 months after discharge from the ward

   0 = no risk, will definitively not happen   4 = Very high risk, almost permanent risk
   1 = low risk, will hardly happen   5 = Don't know the risk
   2 = moderate risk, limited to certain situations   6 = Won't answer about the risk
   3 = high risk, in many situations

The modified version of the Self-report Risk Scale (SRS) used:

The patients were asked to state their opinion of the risk that they would threaten others, or act violently towards others, during their hospital stay.

They were asked to choose one of six response options to explain best their self-assessment of risk:

0. No risk (will definitively not happen)

1. Low risk (is unlikely to happen)

2. Moderate risk (limited to certain situations)

3. High risk (will happen in many situations)

4. Don't know the risk

5. Won't answer about the risk

The original Self-report risk scale (Roaldset & Bjørkly 2010), and the modified version used in the PhD-thesis

Information regarding participation in the research project *"Violence risk assessment in an acute psychiatric ward"*

Background
The purpose of this research project is to develop better knowledge of which factors that may cause risk of aggressive behaviour, and to increase our competence. All patients who are admitted in the ward are included in the project. Those who after discharge receive further treatment at a community mental health centre (DPS) or Avdeling for førstegangspsykoser (AFP) participate in the project for one year after discharge from the acute ward.

The projects impact on you
The data information used in the project is taken from the medical journal. It will not be registered any other information or used any other instruments. The project will not affect you as a patient in any way, and will not affect the assessment and treatment that is offered during and after your hospital stay.

Possible advantages and disadvantages
You will not have any special advantages of the project but experience from the project may later lead to benefits to patients in the future.

What happens to the data information?
The samples and the information recorded about you will only be used as described in the purpose of the project. All information will be processed without name and identity number. A code connects you to your data information and samples through a list of names. Only authorized personnel involved in the project have access to the list. The code will be deleted no later than 2019. It will not be possible to identify you in the results of the project when they are published. You have the right to access the information that has been collected about you. You also have the right to correct the information. If you do not want to participate you have the right to request that your data information is deleted from the project. You do not have to give any reason and it has no consequences for the further treatment you receive at the hospital. Oslo University Hospital w/ CEO is the data controller for the project.

The Project Manager is psychiatrist John Olav Roaldset, Oslo University Hospital. Implementation Manager is the Clinic Manager Marit Bjartveit, Klinikk Psykisk helse og avhengighet, Oslo University Hospital. Project coordinators and managers of the project are Physician Bjørn Magne S. Eriksen and Special Nurse Øyvind Lockertsen, both employed by the psychiatric acute admission ward (phone 22118420, acute psychiatric ward, the reception).

John Olav Roaldset	Marit Bjartveit
Bjørn Magne S. Eriksen	Øyvind Lockertsen

Informasjon om deltakelse i forskningsprosjektet

"Voldsrisikovurdering i en akuttpsykiatrisk avdeling"

Bakgrunn

Hensikten med prosjektet er få bedre kunnskap om hvilke forhold som kan gi risiko for aggressiv atferd, og å øke kompetansen vår på dette feltet. Alle pasienter som blir innlagt i avdelingen inngår i prosjektet. De som etter utskriving får videre behandling ved distriktspsykiatriske sentre eller ved Avdeling for førstegangs psykoser fortsetter i prosjektet i et år etter utskriving fra akuttavdelingen.

Hva innebærer studien?

De opplysningene som blir brukt i prosjektet blir hentet fra pasientjournalen. Det blir ikke brukt andre skjema eller instrumenter, og som pasient vil du ikke merke noe til prosjektet. Prosjektet vil ikke virke inn på den utredning og behandling som blir tilbudt under- og etter oppholdet ditt i avdelingen.

Mulige fordeler og ulemper

Du vil ikke ha noen spesielle fordeler av studien, men erfaringer fra studien vil senere kunne være til nytte for andre pasienter.

Hva skjer med prøvene og informasjonen om deg?

Prøvene tatt av deg og informasjonen som registreres om deg skal kun brukes slik som beskrevet i hensikten med studien. Alle opplysningene vil bli behandlet uten navn og fødselsnummer/direkte gjenkjennende opplysninger. En kode knytter deg til dine opplysninger og prøver gjennom en navneliste. Det er kun autorisert personell knyttet til prosjektet som har adgang til navnelisten og som kan finne tilbake til deg. Koden blir senest slettet 2019. Det vil ikke være mulig å identifisere deg i resultatene av studien når disse publiseres. Du har rett til å få innsyn i hvilke opplysninger som er registrert om deg. Du har videre rett til å få korrigert eventuelle feil i de opplysningene vi har registrert. Dersom du ikke ønsker å delta kan du trekke deg fra studien og innsamlede opplysninger blir slettet. Du trenger du ikke å oppgi noen grunn, og det får ingen konsekvenser for den videre behandlingen du får ved sykehuset. Oslo universitetssykehus v/ adm dir er databehandlingsansvarlig for studien.

Prosjektleder er psykiater John Olav Roaldset, Oslo Universitetssykehus. Gjennomføringsansvarlig er klinikkleder Marit Bjartveit, Klinikk psykisk helse og avhengighet, Oslo Universitetssykehus. Prosjektkoordinatorer og daglige ledere av prosjektet er konstituert overlege ved mottaksenheten, Bjørn Magne S. Eriksen og spesialsykepleier ved mottaksenheten Øyvind Lockertsen (telefon til begge 22118420, akuttpsykiatrisk ekspedisjon).

John Olav Roaldset	Marit Bjartveit
Bjørn Magne S. Eriksen	Øyvind Lockertsen

Paper I

Paper II

Paper III

Lockertsen, Ø., Varvin, S., Færden, A., Eriksen, B. M. S., Roaldset, J. O., Procter, N., & Vatnar, S. K. B. (2020). Risk assessment of imminent violence in acute psychiatry: A step towards an extended model. *The Journal of Forensic Psychiatry & Psychology, 31*(1), 41-63.
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