



INTERVENTIONS FOR REDUCING COERCION IN MENTAL HEALTH FOR ADULTS: A SYSTEMATIC REVIEW AND THE IMPACT OF UPDATING

Kristin Thuve Dahm¹ --- Jan Odgaard-Jensen² --- Tonje Lossius Husum³ --- Kari Ann Leiknes^{4†}

^{1,2,3}Norwegian Knowledge Centre for the Health Services, St. Olavs plass, Pilestredet Park, Oslo

⁴Centre for Medical Ethics, Institute for Health and Society, University of Oslo, Kirkeveien, Oslo, Norway

ABSTRACT

Background: Reduction of use of coercive measures in Mental Health Care has been of increasing concern for patient organizations, governmental agents and health policy makers. *Aim:* To examine the effectiveness of psychosocial interventions intended to reduce coercion in mental health for adults. *Methods:* We conducted a systematic review in 2012 and update in 2013. Studies with control groups were included. Assessment of risk of bias and meta-analyses of randomized controlled studies was undertaken. The Grading of Recommendations Assessment, Development and Evaluation (GRADE) tool for evaluating the overall quality of evidence was used and expressed in four categories: high, moderate, low and very low. *Results:* Fifteen studies met the inclusion criteria. For the intervention Joint crisis plan, a reduction in the number of patients admitted involuntarily could not be verified by meta-analyses (RR 0.71 (95% CI 0.38–1.33), $P=0.28$). Quality of evidence was assessed as low by GRADE and the results should be interpreted with caution. Risk assessment of aggressive behaviour in acute psychiatric wards and counselling towards staff in high security wards seemed to reduce seclusion and restraint, but for these interventions meta-analyses was not feasible. *Conclusion:* Joint crisis plans for reducing coercion is unclear. Risk assessment and counselling towards staff may reduce coercion.

Declaration of interest None

Keywords: Coercion, Restrain, Involuntary, Mental disorders, Systematic review.

Abbreviations: CBA, Controlled Before and After; CI, Confidence Interval; EUNOMIA, European Evaluation of Coercion in Psychiatry and Harmonization of Best Clinical Practice; ITS, Interrupted Time Series; JOJ, Jan Odgaard-Jensen; KAL, Kari Ann Leiknes; KTD, Kristin Thuve Dahm; RCT, Randomized Controlled Trial; RR, Relative Risk; MHC, Mental Health Care; NOKC, The Norwegian Knowledge Centre for the Health Services; TLH, Tonje Lossius Husum.

Contribution/ Originality

This paper highlights the importance of updating previous systematic literature reviews. Newer studies added on made meta-analyses feasible, modifying earlier conclusions.

1. INTRODUCTION

With increased focus on user's rights and human rights, the use of coercive interventions in Mental Health Care (MHC) has been of increasing concern for patient organizations, governmental agents and health policy makers. In both somatic medicine and MHC, treatment of patients is primarily based on voluntary participation. The Helsinki declaration promotes patients' rights to self-determination and autonomy, and coercion comes into conflict with this principle. Coercive measures are therefore under Mental Health Act legal regulation in most countries.

In recent years national health plans have focused on reducing the use of coercive measures in MHC, such as in the Netherlands [1] and Norway [2]. Although reduction in use of coercive measures is an overriding goal, it has been claimed that reduction might compromise staff security and safety [3].

Research on the use of coercion in MHC has been sparse in most countries, including Norway [4]. Due to report of substantial regional differences, as well as variation between mental health care institutions in the use of coercive measures in Norway, the Norwegian Knowledge Centre for the Health Services (NOKC) was commissioned by the Norwegian Psychological Association to conduct systematic review, published in Norwegian as a NOKC report [5], on the available research on interventions intended to reduce coercion in mental health care. This commission was prompted by Norwegian health statistics reports [6] showing a large variation in the use of coercive measures between different health regions, and an absence of a general trend towards reduction over the years [6], notwithstanding a slight reduction in 2012 [7]. Geographical differences and variance between countries in coercive use has been reported [8]. This might be due to several factors, such as dissimilarities in practices of containment methods, health statistics, legislation, and organization of health services. Contributing factors behind coercion are most likely similar, making it meaningful to compare studies from different countries on coercive use under admission and in ways of dealing with aggression [9]. The context dependency of coercion use has been exposed by the EUNOMIA (European Evaluation of Coercion in Psychiatry and Harmonization of Best Clinical Practice) project study [10].

To date, there are three Cochrane reviews on the use of coercive measures in MHC [11-13]. The Cochrane review by *Sailas Eila and Fenton* [13] focused on the reduction of coercion, but had no findings. The other Cochrane reviews were on containment strategies [12] and involuntary out-patient treatment [11], also without findings. Although clearly different, the holistic approach taken in the report by NOKC *Dahm, et al.* [5] covered interventions intended to reduce involuntary admission as well as the reduction of coercive measures during hospitalization. The report [5] indicated that the current available research on the effectiveness

of interventions to reduce coercion is sparse. Considering the scarcity of research in this field and the high level of interest, we decided to update this report.

The objective of this paper was to undertake an update of the previous NOKC systematic review report [5] with the hypothesis that new studies added on to earlier analyses would strengthen previously presented results.

More specifically, by exploring the available literature through a new updated systematic literature search, the research questions were:

What are the effects of interventions with the intention of reducing the use of coercion for patients in the following settings: 1) Living in the community (preventing the use of involuntary admission), 2) Admitted to hospitals (preventing involuntary admission, use of coercive means/measures in the ward), 3) Under discharge (preventing further involuntary admissions).

2. METHODS

2.1. Data Sources and Search Strategy

A systematic search was undertaken in the following databases: Medline, Embase, PsycINFO, Cochrane Database of Systematic Reviews, Cochrane CENTRAL, CRD DARE, CRD HTA, SveMed+, Norart, CINAHL, ISI Social Science/Science Citation Index and TvangsPub (www.tvangspub.tvangsforskning.no). The search was finished June 2013. Terms used were coercion (including compulsory admission, seclusion, physical/mechanical restraint and involuntary medication) combined with relevant mental disorders and mental health care. Details of the search strategy are presented in Appendix I.

2.2. Inclusion and Exclusion

Inclusion criteria: Systematic reviews of high quality randomized controlled trials (RCT), prospective controlled trials and interrupted time series. The eligible population was adult patients (18 to 65 years old) with severe mental disorder, e.g. schizophrenia, bipolar disorder or severe personality disorder according to ICD-10 and DSM-IV. For patients with dual diagnoses (e.g. substance use and serious mental illness), the primary diagnosis had to be serious mental illness. We included adult patients exposed to coercion (e.g. mechanical restraint, physical restraint, involuntary medication and open area-seclusion), who were either compulsorily admitted and/or voluntarily admitted. We included all kinds of interventions intended to reduce compulsory admission or reduce the use of coercion for people under treatment in MHC. The interventions were divided into the following groups: i) *Organization* of the care: Increased availability in acute crisis, ambulant team, improved monitoring, change of ward environment. ii) *Staff*: Education of staff, improving attitudes, staff competence. iii) *Patient*: Client participation and autonomy. The primary outcomes were: *Involuntary admission* (number of patients or events, number of involuntary bed days), *involuntary medication/involuntary treatment* (number of patients, number of days), *mechanical restraint* (number of patients, duration in hours), *seclusion* (number of

patients, duration in hours), and *coercion* (involuntary medication, mechanical restraint and isolation).

Studies in all languages were included, but the abstract had to be in English or one of the Scandinavian languages. The following exclusion criteria were defined: studies without a control group, systematic reviews of low and moderate quality, population in dementia care or in the criminal justice (corrections) system.

2.3. Screening of Literature

Two reviewers independently checked the titles, and when available, the abstract of the studies identified by the electronic database search. All references appearing to meet inclusion criteria, including those with insufficient details, were requested in full text. Two reviewers independently extracted data from the retrieved full text article according to a pre-defined inclusion form. All discrepancies were resolved by consensus meeting and the final decision was made by the first author.

2.4. Data Extraction and Analysis

The following aspects were considered:

The first author (KTD) described the included studies according to population, comparison, outcome and main results in tables. The other reviewers (KAL, JOJ) checked that the information was relevant. Two reviewers independently rated the methodological quality of included studies using the Risk of Bias assessment tool developed by the Cochrane Collaboration [14].

We conducted meta-analysis (random effects model) in the ReviewManager™ (RevMan5.2) software program (www.reviewmanager.com), when studies were sufficiently similar in terms of design, population, interventions and outcomes. If the studies had sufficient data we calculated relative risk (RR) for dichotomous outcomes and mean difference (MD) for continuous outcomes. Statistical significance of differences between groups was tested by using a level of significance of 0.05. We calculated 95% confidence intervals (CI) for all estimates of effects.

In addition we assessed the methodological quality according to the recommendations of the Cochrane Collaboration Handbook [14]. The quality of the evidence was assessed using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) tool (www.gradeworkinggroup.org) [15]. GRADE assesses bias related to the effect estimate (the outcome in question) and judges the overall quality of evidence expressed by levels: high, moderate, low, and very low. The GRADE assessment tool indicates the extent to which we can have confidence in the estimate of effect, and this can be used when making recommendations on evidence-based treatment [16].

We organized the interventions by three settings, interventions for patients A) in the community, B) in hospital and C) about to be discharged.

3. RESULTS

3.1. Study Selection

The results in this paper are based on 13 included studies from the original Norwegian report [5], in addition to 2 new studies found in the literature update. The flow chart over number of included and excluded studies are given in Figure 1. In the updated search, 6 studies were retrieved in full text: 2 were included [17, 18] and 4 excluded [19-22].

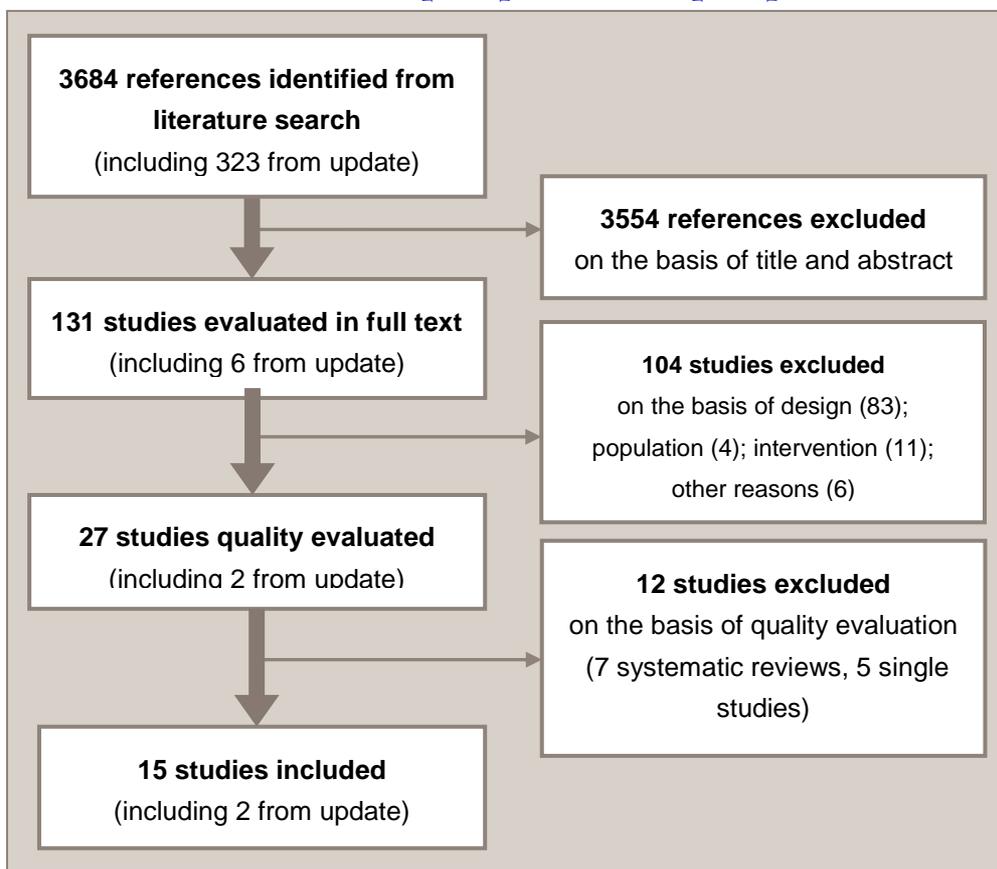


Figure-1. Flowchart of study selection process

3.2. Description of Studies

An overview of all included studies (N=15) is given in Table 1. An overview of full text excluded studies in the update (N=4) are listed in Appendix II.

Table-1. Overview of included studies

First author	Publication year	Country	Setting of intervention for patients
Thornicroft, et al. [18]	2013	England	A) in community
Staring, et al. [23]	2010	Netherlands	A) in community
Tyrer, et al. [24]	2010	Wales	A) in community
Ohlenschlaeger, et al. [25]	2008	Denmark	A) in community
			<i>Continue</i>

Davidson and Campbell [26]	2007	Northern Ireland	A) in community
Wierdsma, et al. [27]	2007	Netherlands	A) in community
Johnson, et al. [28]	2005	England	A) in community
Henderson, et al. [29]	2004	England	A) in community
Putkonen, et al. [17]	2013	Finland	B) in hospital
Van De Sande, et al. [30]	2011	Netherlands	B) in hospital
Ohlenschlaeger, et al. [31]	2007	Denmark	B) in hospital
Abderhalden, et al. [32]	2008	Switzerland	B) in hospital
Rosenman, et al. [33]	2000	Australia	B) in hospital
Pollack, et al. [34]	2005	USA	C) at discharge
Papageorgiou, et al. [35]	2002	England	C) at discharge

The number of intervention studies for patients in each category is as follows A) in the community (N=8), B) in hospital (N=5) and C) about to be discharged (N=2).

3.3. Risk of Bias

The randomization sequence and allocation concealment was adequate in six studies [18, 25, 29, 31, 32, 35]. The assessors were blinded in nine studies [17, 18, 23-25, 28, 29, 31, 33]. It was not possible to blind either patients or participants in the studies. Incomplete outcome data was adequately explained in six studies [17, 18, 23, 25, 29, 31]. Overall four studies [18, 25, 29, 31] were assessed to have low risk of bias, and seven studies to have high risk of bias. Risk of bias is presented in Appendix III. In this systematic review most of the studies had methodological shortcomings.

A) Patients in the Community

Results from studies for patients A) in the community (N=8) are given in Table 2.

Table-2. Interventions for patients in the community

First author	Study design (Number of patients)	Intervention Comparison	Outcome	Results ¹	Difference between groups P value
Thornicroft, et al. [18]	Randomised (569)	Joint crisis plan vs treatment as usual	Involuntary admission ² (18 months) Number of involuntary bed days ³	RR (95% CI) 0.92 (0.65–1.30) Joint crisis plan M(SD) 22.3(72.0) median (range) 0 (0-507) Control M(SD) 20.6(73.4) median (range) 0 (0-600)	P=0.62 P=0.72 mean P=0.53 median
Staring, et al. [23]	Randomised (109)	Treatment adherence vs treatment as	Involuntary admission ² (6 months)	RR (95% CI): 0.16 (0.02–1.31)	P=0.09

		usual			
Tyrer, et al. [24]	Ecological Observation Study	Crisis resolution team vs treatment as usual	Involuntary admission ⁴ (9 months) Number of involuntary bed days ³	CRT Change 33% Control Change 7% CRT Change 25% Control Change 13%	P=0.743 Not reported
Ohlenschlaeger, et al. [25]	Randomised (328)	ACT- team vs treatment as usual	Involuntary admission ² (12 months) Involuntary medication ² Mechanical restraint ² Number of involuntary bed days ⁵ Duration of involuntary medication in days ⁵ Duration mechanical restraint in hours ⁵	OR (95% CI) 1.21 (0.66–2.20) OR (95% CI) 1.16 (0.35–3.89) OR (95% CI) 1.34 (0.53–3.45) ACT-team M(SD) 48.9 (43.8) median 42.5 Control M(SD) 74.5 (70.4) median 55.0 ACT-team M(SD) 56.8 (34.0) median 46.0 Control M(SD) 31.2 (23.3) median 29.0 ACT-team M(SD) 19.4 (24.2) median 8.0 Control M(SD) 37.4 (50.3) median 17.3	P=0.54 P=0.81 P=0.53 Not significant Not significant Not significant
Davidson and Campbell [26]	Observation study (76)	ACT-team vs Community Mental Health team (CMHT)	Involuntary admission ⁶ (18 months)	ACT Pre/post M(SD) 0.8 (0.87)/ 0.3 (0.66) CMHT Pre/post M(SD) 1.0 (0.93)/ 0.5 (0.80)	Not applicable
Wierdsma, et al. [27]	Ecological Observation Study	Community-care network vs treatment as usual	Involuntary admission (1999–2001)	Network Std.R (95% CI) 115 (99–133) Control Std.R (95% CI) 148 (128–191)	Significant

Johnson, et al. [28]	Observation study (200)	Crisis resolution team vs treatment as usual	Involuntary admission ² a) 6 weeks b) 6 months	RR (95% CI) 0.75 (0.45–1.26) RR (95% CI) 0.98 (0.62–1.57)	P=0.28 P=0.95
Henderson, et al. [29]	Randomised (160)	Joint crisis plan vs treatment as usual + information leaflets	Involuntary admission ² (15 months) Number of involuntary bed days ³	RR (95% CI) 0.48 (0.24–0.95) Joint crisis plan M (median) 14 (0) Control M (median) 31 (0)	P=0.03 P=0.04

3.4. Effect on Involuntary Admission and Number of Involuntary Bed Days

Involuntary admission was reported in all studies, and the number of involuntary bed days was reported in four studies [18, 24, 25, 29]. We conducted a meta-analysis (see Figure 2) for involuntary admission, pooling available data from two studies [18, 29] examining the effect of Joint crisis plan, reporting a dichotomous measure of patients involuntarily admitted at least once. As is evident from the forest plot (Figure 2), a difference in patients involuntarily admitted could not be established between the two groups (RR 0.71, 95% CI 0.38–1.33, P=0.28). Both studies reported the number of involuntary bed days for the entire population.

One study [29] found a significant reduction in the number of involuntary bed days (median) for patients receiving joint crisis plan, compared to patients receiving standard care and an information leaflet. Another study [18] did not find a significant difference between joint crisis plans compared to usual care. For these outcomes the evidence quality assessed by GRADE was low. Results from an ecological observational study [27] indicated that Community care network compared to treatment as usual seems to reduce involuntary admission. For this comparison and outcome the evidence quality assessed by GRADE was *very low*. For the other interventions no difference could be established between the groups for either involuntary admission or the number of involuntary bed days.

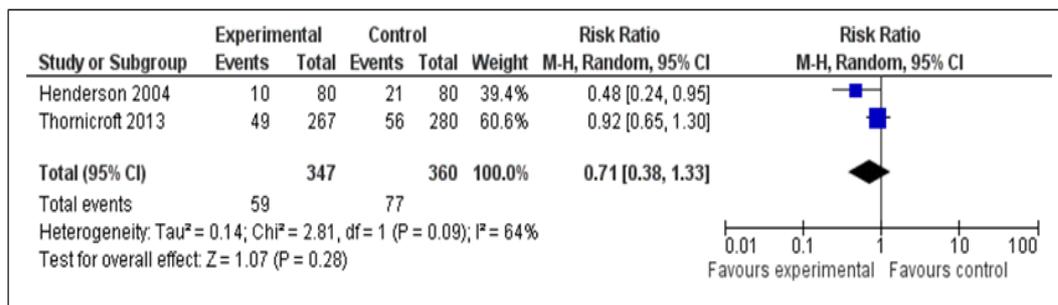


Figure-2. Forest plot involuntary admission joint crisis plans

3.5. Effect on Involuntary Medication Mechanical Restraint

One randomized trial [25] reported on involuntary medication, mechanical restraint and duration in hours. Evidence of a reduction in involuntary medication, mechanical restraint and duration of involuntary medication or mechanical restraint could not be established for patients with schizophrenia treated by ACT team compared to usual care. For these outcomes the evidence quality assessed by GRADE was *low*.

B) Patients in Hospital

Results from studies for patients B) in hospital (N=5) are given in Table 3.

Table-3. Interventions for patients in hospital

First author	Study design (Number of patients)	Intervention Comparison	Outcome	Results1	Difference between groups P value
Putkonen, et al. [17]	Cluster Randomised	Counselling staff vs usual care	Seclusion-restraint and room observation*	Intervention from 30% to 15% (corresponding 12% reduction per month) Control from 25% to 19% (corresponding 3% reduction per month)	P=0.001
			Seclusion-restraint duration in hour	Intervention from 110 hours to 56 hours per 100 patient days (corresponding 15% reduction pr. month) Control from 133 hours to 150 hours per 100 patient days (corresponding 9% increase per month)	P=0.001
Van De Sande, et al. [30]	Cluster randomised (458)	Risk assessment vs usual care	Seclusion incidence Secluded patient Seclusion duration in hour	RRR -15 % RRR + 8% RRR - 4.5 %	P>0.05 P>0.05 P<0.0001

Abderhalden, et al. [32]	Cluster randomised (973)	Risk assessment vs usual care	Coercion rate ²	Intervention Pre/post rate(95% CI) 2.40 (2.03, 2.83)/1.75 (1.47, 2.07) Change -27 % Control Pre/post rate(95% CI) 1.09 (0.88 ,1.34)/post 1.20 (1.00, 1.43) Change 10 %	P<0.001
Ohlenschlaeger, et al. [31]	Randomised (94)	Hospital-based rehabilitation vs ACT-team	Involuntary admission ³ (12 months) Involuntary medication ³ Mechanical restraint ³	RR (95% CI) 1.01 (0.52–1.94) RR (95% CI) 1.65 (0.29–9.20) RR (95% CI) 2.74 (0.57–13.13)	P=0.99 P=0.57 P=0.99
		Hospital-based rehabilitation vs treatment as usual	Involuntary admission ³ Involuntary medication ³ Mechanical restraint ²	RR (95% CI) 1.72 (0.73–4.04) RR (95% CI) 1.40 (0.25–7.81) RR (95% CI) 1.17 (0.35–3.93)	P=0.22 P=0.70 P=0.80
Rosenman, et al. [33]	Quasi-experimental (105)	Personal advocacy vs usual care	Involuntary admission ² (9mnd)	RR (95% CI) 0.51(0.29, 0.92)	P=0.02

3.6. Effect on Involuntary Admission

Involuntary admission was reported in two studies [31, 33]. None of the studies reported the number of involuntary bed days. One quasi-experimental study (13) reported significant reduction in involuntary re-admission for patients having personal advocacy compared with usual care (RR 0.51 95 % CI= 0.29, 0.92). The evidence quality assessed by GRADE for this outcome was *very low*.

One randomized study [31] could not establish a difference in involuntary admission between hospital-based rehabilitation compared to ACT-team/treatment as usual for patients with the first episode of schizophrenia, and evidence quality assessment by GRADE was *low*.

3.7. Effect on Involuntary Medication, Mechanical Restraint, Seclusion and Coercion

Three cluster-randomized studies [17, 30, 32] reported on these outcomes. Two studies [30, 32] compared structured risk assessment versus usual care for patients in acute psychiatric wards. One of these studies [32] reported a significant reduction in the coercion rate (involuntary medication, mechanical restraint and isolation) between the groups ($p < 0.001$). The other study [30] could not establish a difference in isolation practice between the groups, but found a significant reduction in seclusion duration ($p < 0.001$). Meta-analyses for risk assessment was not feasible. A study [17] examined counselling and education of staff in high security wards compared to usual care. The high security wards included both civil patients and those with

criminal offense, with psychotic disorders and the study found a significant reduction in the use ($p=0.001$) and duration in hours ($p=0.001$) of seclusion-restraint. For all of the above comparisons and outcomes, evidence quality assessed by GRADE was low.

C) Patients at Discharge from Hospital

Results from studies in setting category C) about to be discharged ($N=2$) are given in Table 4.

Table-4. Patients at discharge from hospital

First author	Study design (Number of patients)	Intervention Comparison	Outcome	Results 1	Difference between groups P value
Pollack, et al. [34]	Observation study (290)	Involuntary outpatient commitment program vs No involuntary outpatient program	Involuntary admission ² (18 months)	RR (95 % CI) 2.38 (1.23–4.59)	$P=0.01$
Papageorgiou, et al. [35]	Randomised (161)	Advanced directives vs Treatment as usual	Involuntary admission ² (12 months)	RR (95% CI) 0.91 (0.49–1.72)	$P=0.78$

3.8. Effect on Involuntary Admission

Involuntary re-admission was reported in both studies [34, 35]. One randomised study [35] could not establish a difference in involuntary re-admission between advanced directives and usual care for in-patients about to be discharged from compulsory treatment ($p=0.78$). For this comparison and outcome evidence quality assessed by GRADE was low. One quasi-experimental study [34] reported a significant increase in involuntary re-admission for patients in involuntary outpatient commitment programs (RR 2.38 95 % CI=1.23, 4.59) compared to no involuntary outpatient program, and evidence quality assessment by GRADE was very low.

3.9. Effect on Involuntary Medication and Mechanical Restraint

No studies reported on these outcomes.

4. DISCUSSION

Our main finding is that a reduction in coercion with regards to the number of patients admitted involuntarily, could not be verified for the intervention “Joint crisis plan” for patients in the community (category A). In contrast to the findings from the original review [5] the new included studies seemingly changed the overall results. In this update meta-analysis was feasible but a difference between the groups could not be established ($P=0.28$). In the original review [5]

without meta-analyses, the results concerning joint crises plans appeared to be more significant in favour of joint crisis plan. Thus the hypothesis that previous reported results [5] would be strengthened was not confirmed; on the contrary, they were weakened. However, studies on coercion are complicated and context dependent [10], and results from a meta-analysis of poor quality (as good as they get) studies, even from the same country, must be interpreted with caution. A robust generalized conclusion is not possible on the basis of this result.

In spite of considerable evaluation and research effort on the topic of reducing coercion, many of the studies included in this review are small and the interventions are heterogeneous. Considering that the Cochrane review by *Sailas Eila and Fenton* [13] on the same topic as ours presented no results, the results presented here by us are of substantial importance. We too did not find studies focusing on negative effects of reducing coercion, such as greater risk of harm for working staff [3], or for the public in general. To what extent coercive measures are 'outcomes' at all, is a fundamental question of primary concern, since these measures are not characteristics of the patients, but the result of clinical decision making. Treating diverse coercive measures as patient-related outcomes of an intervention, is fraught with both conceptual and methodological difficulties.

Regular evaluation of aggressive behaviour for patients in hospital (category B) appears from our results to be an effective tool for reducing the use of restraint and seclusion in acute psychiatric wards. This has also been observed by others [36-38]. There exist several programmes and systematic methods for this risk assessment of aggression, such as "Patient Focused Intervention Model" [38] and "Early Recognition Method" [37]. Previous research indicates that one reason for the use of coercive interventions in MHC is as a way to deal with a patient's aggressive behaviour [9, 39]. Our results on counselling and education of hospital staff (category B) in high security wards also seem to reduce the use and duration of seclusion and restraint. A reason for this positive impact might be due to a change in staff attitudes [40]. This would most likely also apply to other types of wards, such as acute psychiatric wards. Since reduction in the use of coercion might reduce security for the staff [3], focus on methods for improving staff /patient communication will presumably reduce aggression, and the subsequent use of coercion. Similarly, training in self-regulation and de-escalation techniques will contribute to better cooperation and communication between staff and patients, and probably give more user participation and better facilitation. This in turn might reduce a patient's frustration and aggression. These two intervention types (risk assessment and counselling/education of staff) appear therefore to influence each other directly. The variation of coercive measures during hospitalization across different countries also demonstrate that coercive measures are not inevitable and are handled very differently.

For all other interventions, including for those patients about to be discharged (category C), the effect and quality of the evidence is uncertain. Contrary to the earlier Cochrane review by *Kisely, et al.* [11] on coercive measures in the community, with no findings, we found one study [34] in this category. Interestingly this revealed that patients discharged to the community on

involuntary commitment programs are re-admitted more often than those voluntarily discharged, but the evidence was of very low quality as evaluated by GRADE. Due to differences in inclusion criteria, containment strategy interventions as examined by Muralidharan and Fenton [12] in a Cochrane review, are not considered by us here. The fact that such Cochrane reviews have no findings [11, 12] reflects the sparseness of current research on the effectiveness of interventions to reduce use of coercion [5, 11, 12, 41]. Our results therefore contribute to increase knowledge on this topic.

Many of the included studies, (12 out of 15; 80%) focused on involuntary admission. The research compiled in this paper indicates that improvement of communication and lessening of conflict between health professionals and users, reduces the need for involuntary admission. The psychological aspect of improved communication may also lead to reduction in use of other coercive measures, such as different containment methods.

Even though it may seem that research contributions concerning programs aimed at reducing use of coercion in MHC mainly occur in the USA, many other countries are represented in this paper, such as Wales, the Netherlands, Finland, Denmark, Switzerland and Australia. This indicates a substantial global research interest. In spite of extensive research in the Nordic countries [4], no studies from Norway and Sweden met our inclusion criteria.

A diversity of interventions are revealed, such as joint crisis plans, risk assessment, ACT-team, crisis resolution team, involuntary commitment programs and the use of written patient contracts, such as booklets containing treatment options. Due to the heterogeneity of both study design and interventions, only one meta-analysis was feasible.

Overall the results of existing studies presented here are of low quality according to GRADE. The GRADE tool for methodological bias assessment in studies is also recommended for use in MHC [15]. However, it is not easy to know whether the overall assessment of low quality of evidence according to GRADE is indicative of a general problem with the GRADE tool in MHC, or a problem with the studies evaluated here. A few recommendations for MHC concerning interventions for reducing coercion are identified [1, 4, 37] in this review. However, they do not seem to be implemented in routine care. This reflects the fact that it is not easy for health planners and politicians to truly know which interventions are effective in this field.

For the time being, the interventions best supported by research seem to be: Joint crisis plan, regular evaluation of aggressive behaviour and counselling and education of staff. These interventions should be easy to implement in existing mental health services, and do not need organizational change in the services.

4.1. Clinical Implications

The use of joint crisis plan, ongoing risk assessment of aggressive behaviour, counselling and education of staff should be relative simple interventions to implement. They can easily be used in the existing MHC services, and do not require the development of new services. The proposed

interventions should fit easily into most national action plans. This study reveals a great need for more research on the topic.

4.2. Strengths and Limitations

One strength of this research work is the extensiveness of the systematic search in all relevant international databases. In this paper we have also included interventions directed towards staff, such as training and education in aggression de-escalation techniques and conflict resolution, which was not done in our earlier review [5]. This includes training staff in alternatives to coercive interventions. Another strength is the representation of many countries among the included studies, albeit that all studies are from Europe, the USA and Australia.

A limitation in this review is that the two additional studies found in the update are from the same country and the same group. No review can be better than the quality of the primary research that has been reviewed. The quality of evidence measured by GRADE is a challenge for clinical implementation in this field.

No matter how well studies are executed, GRADE discloses no more than low or very low quality, indicating that the results are less trustworthy. This does not necessarily mean that an intervention does not work, but also sets the utility of GRADE under debate. It means however that research activity should continue to target this very important issue in the future, with more well-designed RCT's.

A further limitation is the exclusion of studies without a control group, where information about other interventions might be lost. Information was sparse on how the reduction of the use of coercion might have other negative consequences. Qualitative studies and patient views on coercion were excluded. It is of vital importance to gain more knowledge on this topic, but due to the research question focus in this paper, such studies were not included.

5. CONCLUSION

The use of Joint crisis plans for reducing the number of patients admitted involuntarily is unclear. Risk assessment and counselling towards staff may reduce coercion. At present robust conclusions are not possible to draw. Further research is needed.

5.1. Competing Interests

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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6. CONTRIBUTORS

KTD and KAL designed the study and drafted the article, inspired by contributions from TLH. KAL supervised the research work. KTD and JOJ were responsible for the extraction of data and JOJ for the statistics and meta-analyses. All authors contributed to this paper and approved the final version.

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Appendix-1. Search Strategy

Embase, MEDLINE, PsycINFO Embase 1980 to 2013 Week 25: 192 Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) 1946 to Present: 40 PsycINFO 1806 to June Week 3 2013: 32	Cochrane CENTRAL	Cinahl	SveMed
1 involuntary treatment/ use psyh	MeSH descriptor: [Coercion] explode all trees	(MH "Coercion")	exp:"Coercion"
2 coercion/ use psyh,prmz	MeSH descriptor: [Restraint, Physical] explode all trees	(MH "Involuntary Commitment")	
3 Restraint, Physical/ use prmz	((restrain* or involuntar* or compulsor* or compulsion* or coercion* or coerciv* or coerced or forced or forcibl*) near/3 (treat* or interven* or care or admission* or admitt* or committ* or hospitaliz* or hospitalis* or patient* or medicat*)):ti,ab,kw	(MH "Restraint, Physical")	exp:"Restraint, Physical"
4 exp Physical Restraint/ use psyh	((constrained or constrain or restrain*) near/3 (physical* or mechanical* or treat* or patient* or care* or intervention)):ti,ab,kw	(MH "Patient Seclusion")	exp:"Commitment of Mentally Ill"
5 Involuntary Commitment/ use emez	coercion:ti or (coercion and treatment):ti,ab,kw	(MH "Patient Isolation+")	
6 ((restrain* or constrain or constrained or constrains or involuntar* or compulsor* or compulsion* or coercion* or coerciv* or coerced or forced or forcibl*) adj3 (treat* or interven* or care or admission* or admit* or committ* or hospitaliz* or hospitalis* or patient* or	MeSH descriptor: [Commitment of Mentally Ill] explode all trees	TI (coerc* or involuntary treatment or involuntary commitment or restraint* or seclusion or compulsory treatment) OR AB (coerc* or	tvang* or coercion* or skjerming or skjernet or tvång*

medicat* or power or behav* control)).tw.		involuntary treatment or involuntary commitment or restraint* or seclusion or compulsory treatment)	
7 ((restrain* or constrain or constrained or constrains) adj3 (physical* or mechanical*)).tw.	((((mental* next ill) or psychiatric*) near/2 commitment*) or (involuntary next commitment)):ti,ab,kw	S1 or S2 or S3 or S4 or S5 or S6	#1 OR #3 OR #4 OR #6
8 coercion.ti. or (coercion and treatment).tw.	MeSH descriptor: [Patient Isolation] explode all trees	(MH "Experimental Studies+")	exp:"Mental Disorders"
9 exp "commitment (psychiatric)"/ use psyh	(seclud* or seclusi*):ti,ab,kw	(MH "Quasi-Experimental Studies+")	exp:"Mental Health Services"
10 "Commitment of Mentally Ill"/ use prmz	#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9	(MH "Prospective Studies+")	#8 OR #9
11 (((mental* ill or psychiatric*) adj2 commitment*) or involuntary commitment).tw.	MeSH descriptor: [Anxiety Disorders] explode all trees	(MH "Randomized Controlled Trials")	#7 AND #10
12 Patient Isolation/ use prmz or patient seclusion/ use psyh	MeSH descriptor: [Dissociative Disorders] explode all trees	TI (study or trial or analys*) OR AB (study or trial or analys*)	
13 (seclud* or seclusi*).tw.	MeSH descriptor: [Eating Disorders] explode all trees	S8 or S9 or S10 or S11 or S12 or S13	
14 or/1-13	MeSH descriptor: [Mood Disorders] explode all trees	S7 AND S13	
15 exp anxiety disorders/ or exp dissociative disorders/ or exp eating disorders/ or exp mood disorders/ or exp personality disorders/ or exp "schizophrenia and disorders with psychotic features"/ or exp somatoform disorders/ [Medline]	MeSH descriptor: [Personality Disorders] explode all trees	(MH "Mental Health")	
16 15 use prmz	MeSH descriptor: [Schizophrenia and Disorders with Psychotic Features] explode all trees	(MH "Mental Health Services+")	
17 adjustment disorder/ or exp anxiety disorder/ or exp behavior disorder/ or exp dissociative disorder/ or exp mood disorder/ or exp neurosis/ or exp personality disorder/ or exp psychosis/ [Embase]	MeSH descriptor: [Somatoform Disorders] explode all trees	(MH "Mental Disorders+") OR (MH "Adjustment Disorders+") OR (MH "Mental Disorders, Chronic") OR (MH "Neurotic Disorders+") OR (MH "Personality Disorders+") OR (MH "Psychophysiology Disorders+") OR (MH "Psychotic Disorders+") OR (MH "Psychiatric Emergencies")	

<p>18 17 use emez</p>	<p>(severe mental disorder* or severe mental illness* or anxiety disorder* or dissociative disorder* or eating disorder* or mood disorder* or personality disorder* or schizo* or psychot* or psychosis* or somatoform disorder* or depression* or anxiety or traumatic stress disorder* or ptsd or suicidal or behavio* disorder* or behaviour* disorder* or borderline or antisocial):ti,ab,kw behaviour*</p>	<p>(MH "Affective Symptoms+") OR (MH "Agitation") OR (MH "Compulsive Behavior") OR (MH "Depersonalization") OR (MH "Eating Disorders+") OR (MH "Hysteria") OR (MH "Self-Injurious Behavior") OR (MH "Self Neglect") OR (MH "Social Behavior Disorders+") OR (MH "Stress+") OR (MH "Suicide+")</p>	
<p>19 exp affective disorders/ or exp anxiety disorders/ or exp chronic mental illness/ or exp dissociative disorders/ or exp eating disorders/ or exp hysteria/ or exp neurosis/ or exp personality disorders/ or exp psychosis/ or schizoaffective disorder/ or exp Impulse Control Disorders/ or exp Mental disorders due to general medical conditions/ [PsycInfo]</p>	<p>MeSH descriptor: [Mental Health Services] this term only</p>	<p>TI (severe mental disorder* or severe mental illness* or anxiety disorder* or dissociative disorder* or eating disorder* or mood disorder* or personality disorder* or schizo* or psychot* or psychosis* or somatoform disorder* or depression* or anxiety or traumatic stress disorder* or ptsd or suicidal or behavio* disorder* or behaviour* disorder* or borderline or antisocial) OR AB (severe mental disorder* or severe mental illness* or anxiety disorder* or dissociative disorder* or eating disorder* or mood disorder* or personality disorder* or schizo* or psychot* or psychosis* or somatoform disorder* or depression* or anxiety or traumatic stress disorder* or ptsd or suicidal or behavio* disorder* or behaviour* disorder* or borderline or antisocial)</p>	
<p>19 exp affective disorders/ or exp anxiety disorders/ or exp chronic mental illness/ or exp dissociative disorders/ or exp eating disorders/ or exp hysteria/ or exp neurosis/ or exp personality disorders/ or exp psychosis/ or schizoaffective disorder/ or exp Impulse Control Disorders/ or exp Mental disorders due to general medical conditions/ [PsycInfo]</p>	<p>MeSH descriptor: [Mental Health Services] this term only</p>	<p>TI (severe mental disorder* or severe mental illness* or anxiety disorder* or dissociative disorder* or eating disorder* or mood disorder* or personality disorder* or schizo* or psychot* or psychosis* or somatoform disorder* or depression* or anxiety or traumatic stress disorder* or ptsd or suicidal or behavio* disorder* or behaviour* disorder* or borderline or antisocial) OR AB (severe mental</p>	

		disorder* or severe mental illness* or anxiety disorder* or dissociative disorder* or eating disorder* or mood disorder* or personality disorder* or schizo* or psychot* or psychosis* or somatoform disorder* or depression* or anxiety or traumatic stress disorder* or ptsd or suicidal or behavio* disorder* or behaviour* disorder* or borderline or antisocial)	
20 19 use psyh	MeSH descriptor: [Community Mental Health Services] explode all trees	TI (mental health care or mental health services or aggressiv* or aggression* or delusion* or violent or violence or suicidal) OR AB (mental health care or mental health services or aggressiv* or aggression* or delusion* or violent or violence or suicidal)	
21 (severe mental disorder* or severe mental illness* or anxiety disorder* or dissociative disorder* or eating disorder* or mood disorder* or personality disorder* or schizo* or psychot* or psychosis* or somatoform disorder* or depression* or anxiety or traumatic stress disorder* or ptsd or suicidal or behavio* disorder* or behaviour* disorder* or borderline or antisocial).tw.	MeSH descriptor: [Emergency Services, Psychiatric] explode all trees	(MH "Psychiatric Units")	
22 mental health services/ or community mental health services/ or emergency services, psychiatric/	(mental health service* or mental health care):ti,ab,kw	(MH "Hospitals, Psychiatric")	
23 22 use prmz	MeSH descriptor: [Affective Symptoms] explode all trees	(MH "Psychiatric Emergencies")	
24 exp mental health care/ use emez or mental health center/ use emez	MeSH descriptor: [Aggression] this term only	TI (psychiatric unit* or psychiatric hospital*) OR AB (psychiatric unit* or psychiatric hospital*)	
25 exp mental health services/ use psyh	MeSH descriptor: [Delusions] explode all trees	S15 or S16 or S17 or S18 or S19 or S20 or S21 or S22 or S23 or S24	

26 (mental health service* or mental health care).tw. or ((psychiatric* or mental) adj3 (unit* or ward* or hospital* or departement* or institution* or center or centers or centre or centres)).mp.	MeSH descriptor: [Depersonalization] explode all trees	S14 AND S25 Limiters - Exclude MEDLINE records; Published Date from: 20120101-20130731
27 psychiatry/ use emez,prmz,psyh	MeSH descriptor: [Depression] explode all trees	
28 aggressive behavior/ or attack behavior/ or patient violence/	MeSH descriptor: [Obsessive Behavior] this term only	
29 28 use psyh	MeSH descriptor: [Paranoid Behavior] explode all trees	
30 affective symptoms/ or aggression/ or delusions/ or depersonalization/ or depression/ or obsessive behavior/ or paranoid behavior/ or schizophrenic language/ or exp self-injurious behavior/ or stress, psychological/	MeSH descriptor: [Schizophrenic Language] explode all trees	
31 30 use prmz	MeSH descriptor: [Self-Injurious Behavior] explode all trees	
32 (aggressiv* or aggression* or delusion* or violent or violence).tw. or suicidal*.mp.	MeSH descriptor: [Stress, Psychological] explode all trees	
33 or/16,18,20-21,23-27,29,31-32	(aggressiv* or aggression* or delusion* or violent or violence or suicidal*):ti,ab,kw	
34 14 and 33	#11 or #12 or #13 or #14 or #15 or #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30 or #31 or #32 or #33	
35 (coerc* or restrain* or seclusion).ti. and (mental* or psychiatric*).tw. and (reduc* or prevent*).ti.	#10 and #34	
36 34 or 35	coercion or involuntary):ti and (mental* or psychiatr*):ti,ab	
37 (rct or random* or ((clinical* or control* or follow up or followup or longitud* or prospectiv* or intervention* or retrospective*) adj2 (trial* or study or analy*)) or cohort* or time series or patient series or (control group* or (compar* adj2 (stud* or group*))))).mp.pt.	#35 or #36 from 2010 to 2013	
38 36 and 37		
39 remove duplicates from 38		
40 (animal behavior/ or animal experiment/ or animals/ or animal/) not (human/ or humans/)		
41 39 not 40		
ISI Web of Knowledge		
TS=("involuntary treatment" or coercion or restraint or "Involuntary Commitment" or "forced treatment" or seclusion or "involuntary hospitalization" or "involuntary medication" or "forced medication") AND TS=(mental* or psychiatric* or psychot* or chizo* or "personality disorder*") AND TS=(study or trial or analysis)		
PubMed		
(coercion OR restraint OR "involuntary treatment") AND (mental or mental* OR psychiatric OR psychiatric*) AND (trial OR study OR analysis) AND publisher [sb]		

Norart (forebygg* OR mindre OR mer OR reduser* OR økning) and norartemne=tvang*
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Appendix-2. Excluded studies (N=4)

First author, publication year	Design	Reason for exclusion
Burns [41] 2013	RCT	Two different types of coercion compared (Section 17 vs Community treatment orders)
Georgieva [19] 2013	RCT	Two different types of coercion compared (involuntary medication vs seclusion)
Huf [20] 2012	RCT	Two different forms of coercion compared (physical restraint vs seclusion room)
Knutsen [41] 2013	Retrospective	Register data, no intervention

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