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Original Article

Early detection of risk factors for seclusion and restraint: a prospective study

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Abstract

Aim: The study aims to examine the predictive power of static and dynamic risk factors assessed at admission to an acute psychiatric ward and to develop a prediction model evaluating the risk of seclusion and restraint.

Methods: Over 20 months, data on demographic and clinical characteristics, psychosocial functioning, level of insight, uncooperativeness, and use of coercive measures were collected prospectively on 520 patients at admission. Logistic regression analysis was used to develop a prediction model. The magnitude of the predictive power of this model was estimated using receiver operating characteristic analysis.

Results: The prediction model contained one static predictor (involuntary commitment) and two dynamic predictors (psychological impairment and uncooperativeness), with a high predictive power (receiver operating characteristic area under the curve = 0.83). The final risk model classified 72% of the patients correctly, with a higher sensitivity rate (80%) than specificity rate (71%).

Conclusion: Early assessment of patients' psychological impairment and uncooperativeness can help clinicians to recognize patients at risk for coercive measures and approach them on time with preventive and less restrictive interventions. Although this simple, highly predictive model accurately predicts the risk of seclusion or restraint, further validation studies are needed before it can be adopted into routine clinical practice.

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INTRODUCTION

Seclusion and chemical or physical restraint are coercive methods for managing acute, violent behaviour by psychiatric patients. These methods are controversial, and although their harm or benefit to treatment are still unproven,[1] they often have traumatic consequences for patients and staff.[2,3] Their use should therefore be avoided as much as possible. Lepping and colleagues[4] found that the success of avoiding coercive measures depends largely on nurses' ability to predict which patients are likely to engage in conflict behaviours. An active risk assessment is recommended as one of the core interventions for elimination of coercive practices,[5–7] but there is a lack of assessment tools developed to determine specifically the risk for seclusion and restraint. Previous studies[8,9] assessed the risk of coercive incidents with a tool developed to predict mainly violent incidents (i.e. Brøset Violence Checklist[10]). This is a logical choice based on the assumption that coercive incidents are used in the most extreme circumstances only when patients pose imminent risk of harm to themselves and others, as recommended by the European Council,[11] the Dutch Mental Health Act and international guidelines for best practices. However, there is enough evidence showing that coercive interventions are sometimes prompted by other reasons than violent behaviour and violent incidents are not

always followed by coercive interventions. Besides violence, other internal risk factors (i.e. those inherent to the patient) were repeatedly associated with coercive incidents, including the severity of psychiatric symptoms,[12–14] patient's agitation or disorientation,[15–18] younger age,[19–26] and involuntary admission status.[19,21,25,27] Furthermore, many researchers have concluded that the reasons for seclusion were often more related to interactional factors (i.e. staff/patient relations such us refusal of medication)[28,29] or external factors (i.e. environmental factors such as staffing levels, locked wards, type of shift when admission occurred or lack of single-bed rooms)[21,23,29–33] than to internal risk factors.

Therefore, we assessed the predictive power of a broader spectrum of risk factors than violence alone, aiming to develop an empirically and clinically relevant prediction model for identifying patients at risk for seclusion and restraint at admission. We think that such a model may help clinicians to detect patients at risk in an early stadium and approach them with preventive intervention for reducing the use of coercive measures.

METHODS

Hospital characteristics and data collection

This study was conducted on an acute ward in Mental Health Centre West North Brabant in The Netherlands that provides care to people in a catchment area of around 276 000 citizens. This psychiatric facility admits patients above 18 years of age. In exceptional cases, patients younger than 18 years of age were brought to the ward in an acute psychotic state during the weekend. They were temporarily admitted until they can be transferred to a suitable institution specialized in treatment of children & adolescents. Only patients experiencing their first hospitalization at this ward were included, resulting in 520 individual patients.

From November 2007 until August 2009, data on socio-demographic and clinical variables were collected prospectively from patients' records: they included the internal factors gender, age, ethnicity, admission state, and the external factor time of admission. By interviewing patients, we also assessed past coercive experiences, education level, marital status, and living and employment status. On the ward, the psychiatrist made a clinical diagnosis and assessed overall psychiatric and social functioning, using the Global Assessment of Functioning (GAF) scale.[34] The score varies from 0 to 100, and a higher score reflects better functioning. After training in the respective instruments (see below), nurses rated at admission patients' uncooperativeness with treatment, insight into the illness, as well as different aspects of the patients' psychological and social functioning. Data on the use of restrictive measures were extracted from the hospital database.

The local Medical Ethical Committee approved the research and waived the requirements for informed consent, as the research involved no risks to the patients, and as data were collected as part of a policy-control procedure.

Instruments

Kennedy Axis V was used to assess (i) psychological impairment; (ii) social skills; (iii) violence; (iv) activities of daily living and occupational skills; (v) substance abuse; (vi) medical impairment; and (vii) ancillary impairment.[35] These seven subscales capture the clinician's impression of the individual's overall level of functioning, rated from 10 to 100. A higher score reflects better functioning. We added an eighth subscale evaluating patient's motivation for treatment. The psychometric characteristics of the Dutch version of the Kennedy Axis V were found to be satisfactory.[36]

To determine patients' lack of judgment and insight at admission, we used item G12 of the Positive and Negative Syndrome Scale, defined as: 'impaired awareness or understanding of one's own psychiatric condition and life situation'. As far as recent research has stressed the importance of negative interactions between staff and patients as source of arising conflicts,[37,38] non-therapeutic relationships[39], and provoking patients' active refusal to comply,[40] we determined the quality of the staff–patient interaction by assessing patient's uncooperativeness using item G8 from the same scale. Uncooperative attitude is defined in the scale as 'active refusal to comply with the will of significant others (including the interviewer, hospital staff, or family), which may be associated with distrust, defensiveness, stubbornness, negativism, rejection of authority, hostility, or belligerence'. Both items are rated in a range of 7 degrees from 1 (absent) to 7 (extreme).[41]

Definitions of seclusion and restraint

For the purposes of the study and in line with routine practice, seclusion was defined as the placement of a patient in a locked room from which free exit is denied for a fixed period of time.

Chemical restraint refers to the administration of a rapid tranquilizer without the consent of the patient and with or without physical restraint.

Physical or mechanical restraint was defined as any physical means or mechanical device, which limited temporally the patient's movement, physical activity, or normal access to his or her body.

Statistical procedures

First we used logistic regression models to calculate the bivariate associations (odds ratios) between (i) the dichotomous outcome (seclusion/restraint yes or no) as a dependent variable, and (ii) all 23 patient-related variables as independent variables. The variables age and GAF score were divided into intervals to increase the clinical relevance of the findings. The same approach was used earlier by Stolker *et al*.[22] In addition, a multiple logistic regression was performed in a forward stepwise manner. To identify the best prediction model at statistical level $P = 0.05$, all independent variables were included.

To evaluate the predictive power of the selected prediction model, we computed the receiver operating characteristic (ROC) curve, a statistical method expressing the true accuracy of a prediction model or test. ROC is a plot of the hit rate (or sensitivity) as a function of the test's false alarm rate (1-specificity). There is always a trade-off between sensitivity and specificity; the former cannot be improved without worsening the latter (and vice versa). The area subtended by the ROC is a good overall index of the model's accuracy. The area under the curve (AUC) represents general predictive power, with 0.5 equalling non-prediction, 1.0 equalling perfect positive prediction and 0.0 equalling perfect negative prediction. We used the ROC to determine the cut-off point for the highest sensitivity and specificity rates. All calculations were performed using SPSS version 16.0 (SPSS Inc., Chicago, IL, USA).

RESULTS

Patient characteristics (Table 1)

The mean age of all patients was 40 years (SD = 13), distributed almost equally over the four age groups. The majority of the patients were male. Seventeen percent of the patients were of non-Dutch origin. Forty-four percent of them had two or more diagnoses, with a higher prevalence of mood disorders, followed by addictive disorders (alcohol or drugs), psychotic disorders, personality disorders and post-traumatic stress disorder. According to the clinical judgment of the ward psychiatrist, the mean GAF score at admission for all patients was 41 (SD = 13).

Half the patients were admitted during the evening shift. The mean hospitalization period was 13 days, with a minimum stay of 1 day and a maximum stay of 125 days (SD = 16).

Use of coercive measures

Seventy-four patients (14%) underwent one or more coercive measure during their hospitalization. In over half of the cases, the measure was applied on the same day, directly after admission (58%). Forty-six patients (62%) were secluded only, 13 (18%) were involuntary medicated, 12 (16%) were both secluded and medicated, and three patients (4%) were secluded and mechanically restrained.

Bivariate associations between risk factors and use of coercive measures (Table 1)

The following internal factors were significantly associated with higher risk for seclusion and restraint: male gender, younger age, involuntary commitment, previous experience with coercive measures, psychotic disorder, lack of judgment and insight, and a GAF score below 35, indicating major impairment in functioning. Besides that, the likelihood of being coerced was marginally but significantly associated with impaired functioning according to all Kennedy subscales, except for the 'medical impairment' subscale. The interactional and external factors uncooperativeness and admission during the night shift also showed to be significantly associated with seclusion and restraint.

Multivariate associations between risk factors and use of coercive measures

A stepwise forward logistic regression was performed with occurrence of seclusion or restraint (dichotomously yes/no) as dependent variable, and all the characteristics listed in Table 1 as independent variables. The final model consisted of three significant predictors: psychological impairment, involuntary commitment, and uncooperativeness associated with occurrence of seclusion or restraint. Table 2 shows the odds ratios and the confidence intervals of the final model with $n = 499$.

ROC analyses, sensitivity and specificity

As Figure 1 shows, the predictive power of the final prediction model was significant and substantial, with an ROC AUC of 0.83 (95%CI: 0.775–0.886).

As the main purpose of risk assessment in mental health services should be to 'prevent' rather than just 'predict', we chose a cut-off point with the lowest percentage of false negatives, so we could

TABLE 1. Factors associated with the use of coercive measures in hospitalized patients (n = 520)

Variable	Total†	Patients without coercive experience	Patients with coercive experience	Unadjusted odds ratio (95% CI)
	n = 520 (%)	n = 446 (86%)	n = 74 (14%)	
		n (%)/Mean (SD)	n (%)/Mean (SD)	
Gender	518			
Male	273 (53)	223 (82%)	50 (18%)	2.2 (1.3–3.7)**
Female	245 (47)	222 (91%)	23 (9%)	1.0 (reference)
Average age	516			
16–30‡	138 (26)	109 (79%)	29 (21%)	2.6 (1.3–5.4)**
31–40	107 (21)	91 (85%)	16 (15%)	1.7 (0.8–3.8)
41–50	145 (28)	128 (88%)	17 (12%)	1.3 (0.6–2.8)
>50	130 (25)	118 (91%)	12 (9%)	1.0 (reference)
Marital status	501			
Unmarried	381 (76)	323 (85%)	58 (15%)	0.7 (0.4–1.4)
Married	120 (24)	106 (88%)	14 (12%)	1.0 (reference)
Living status	504			
Living alone	264 (52)	227 (86%)	37 (14%)	0.9 (0.5–1.5)
Living together	240 (48)	203 (85%)	37 (15%)	1.0 (reference)
Employment status	468			
Employed	59 (13)	52 (88%)	7 (12%)	0.8 (0.4–2)
Unemployed	409 (87)	352 (86%)	57 (14%)	1.0 (reference)
Education	446			
Low	227 (51)	196 (86%)	31 (14%)	1.9 (.6–5.5)
Middle	168 (38)	141 (84%)	27 (16%)	2.3 (0.7–6.8)
High	51 (11)	47 (92%)	4 (8%)	1.0 (reference)
Ethnicity	507			
1st and 2nd generation immigrants	88 (17)	70 (79%)	18 (21%)	1.7 (0.9–3)
Dutch origin	419 (83)	365 (87%)	54 (13%)	1.0 (reference)
Legal status	504			
Involuntary	128 (25)	79 (62%)	49 (38%)	9.9 (5.7–17.5)***
Voluntary	376 (75)	354 (94%)	22 (6%)	1.0 (reference)
Coercive experience during previous hospitalizations	464			
With	61 (13)	70 (77%)	21 (23%)	2.4 (1.4–4.4)**
Without	403 (87)	332 (89%)	41 (11%)	1.0 (reference)
Age of illness onset	431	31 (14)	28 (12)	0.9 (0.9–1)
Diagnosed patients	507			
Psychotic disorder	103 (20)	75 (73%)	28 (27%)	2.9 (1.7–5)***
Mood disorder	152 (29)	132 (87%)	20 (13%)	0.8 (0.5–1.5)
Personality disorder	99 (19)	89 (90%)	10 (10%)	0.6 (0.3–1.2)
Addiction	145 (28)	127 (88%)	18 (12%)	0.8 (0.5–1.5)
PTSD	24 (4)	22 (92%)	2 (8%)	0.5 (0.1–2.3)
GAF§	479			
<35	128 (27)	95 (74%)	33 (26%)	4.5 (1.8–11)**
35–54	267 (56)	240 (90%)	27 (10%)	1.5 (0.6–3.7)
≥55	84 (17)	78 (93%)	6 (7%)	1.0 (reference)
Lack of judgment and insight	511	2.9 (1.4)	4.4 (1.6)	1.97 (1.6–2.4)***
Subscales Kennedy Axis V				
Psychological impairment	516	51 (15)	39 (12)	0.9 (0.9–0.95)***
Social skills	517	65 (16)	54 (17)	0.9 (0.9–0.97)***
Violence	516	60 (21)	48 (20)	0.9 (0.96–0.98)***
Activities of daily living or occupational skills	511	62 (19)	54 (19)	0.9 (0.96–0.99)**
Substance abuse	509	70 (24)	62 (26)	0.9 (0.97–0.99)**
Medical impairment	511	77 (16)	75 (16)	0.9 (0.97–1)
Ancillary impairment	508	72 (17)	66 (16)	0.9 (0.96–0.9)**
Motivation for treatment	500	69 (20)	45 (22)	0.9 (0.9–0.96)***
Uncooperativeness	517	2.4 (1.3)	4.1 (1.8)	1.95 (1.7–2.3)***
Type admission shift	514			
Evening shift: 3.30 PM until 10.30 PM	262 (51)	225 (86%)	37 (14%)	1.4 (0.7–2.5)
Night shift: 10.30 PM until 7 AM	95 (18)	75 (80%)	20 (20%)	2.2 (1.1–4.4)*
Day shift: 7 AM until 3.30 PM	157 (30)	140 (89%)	17 (11%)	1.0 (reference)

*P < 0.05; **P < 0.01; ***P < 0.001.
†Because some of the clinical files were incomplete, the n and the percentage of respondents vary across the variables.
‡The association was still significant (P < 0.01) when compared with the rest of the patients (1.9 (1.2–3.3)).
§Global Assessment of Functioning (GAF) as assessed by the psychiatrist at the ward.
PTSD, post-traumatic stress disorder.

TABLE 2. Results of multivariate logistic regression analysis: significant risk predictors of seclusion and restraint

	OR (95% CI)
Psychological impairment	0.96*** (0.93–0.98)
Involuntary commitment	4.66*** (2.47–8.82)
Uncooperativeness	1.37** (1.12–1.67)

$R^2 = 0.35$ (Nagelkerke); $^{**}P < 0.01$; $^{***}P < 0.001$.

detect as many patients as possible who were potential candidates for seclusion and restraint. The definitive model predicted 72% of the cases correctly, with a higher sensitivity rate (80%: predicting the patients who were at risk for seclusion or restraint) than specificity rate (71%: patients who did not meet the criteria for seclusion and restraint, who were correctly indentified as such). At this cut-off point (0.0910331), the false positive rate for the model was 25% and the false negative rate was 3%.

DISCUSSION

We found that two internal factors (i.e. psychological impairment and involuntary commitment) and one interactional factor (i.e. and uncooperativeness) significantly predicted the use of coercive measures on an acute psychiatric ward. The importance of assessing psychological impairment when predicting coercive events is not only supported by our and by earlier findings,[12,13] but it is also consistent with the most Mental Health Acts that postulate that the acute danger has to arise from patient's psychopathology in order to be a legally justifiable reason for seclusion or restraint.

It was also not surprising that involuntary commitment proved once again to be a stable internal risk factor, as found earlier (see Introduction): in order to become eligible for involuntary treatment, patients simultaneously have to suffer from a mental disorder, pose a danger to themselves or others that cannot be prevented in an outpatient setting, and refuse admission. Although the first two risk criteria need to be met for secluding or restraining patients, coercive measures are not used with all involuntarily admitted patients, but only with those who refuse to cooperate with staff at admission, as found earlier.[42]

Cooperativeness is actually a loaded term in the psychiatric context where it could be seen, again, as simply submission to the power of staff or as a rather authoritative approach to gaining patients' compliance with the rules in the ward. An individualized approach in implementing the ward's rules might produce less disagreement, and automatically lead to less ward conflicts: evidence indicates an important relationship between nurse–patient interaction and rule implementation,[43] and also between effective rules structure and staff–patient disagreements.[44]

As emphasized earlier,[38] not all disagreements between staff and patients count as conflict and should be followed by containment measures; instead, such measures should be used only when a disagreement involves behaviours that may cause harm to others or the patients themselves. As the main therapeutic goal of psychiatric admission is to treat symptoms and to restore adequate behaviours, as well as to promote social engagement, some of the assertive non-conformity on the part of the patient should be seen as both healthy and a therapeutic advance. This argument suggests that staff should tolerate a level of uncooperativeness that would not lead to serious adverse consequences such as harm to others or the self. Although such a tolerant approach is not consistent with a conceptual framework of strong paternalistic policy,[45] it is certainly consistent with a therapeutic environment based on negotiation, open communication, mutual understanding and respect.

Further, we found that violence marginally predicted the risk of seclusion and restraint (see Table 1) and it did not remain a significant predictor when adjusted for the effect of other variables. If we assume that the violence subscale of Kennedy Axis V was sensitive enough to identify aggressive behaviour, our study confirmed earlier findings[15,18] that, despite legal regulations and recommendations in the international literature,[6] less serious reasons than violence can trigger seclusion and restraint. There are evidences showing that in reaction to stress or threat (e.g. conflicts between staff and patients), people showed the tendency to offer solutions before considering all available alternatives[46] and their cognitive processes were restricted.[47] If staff feel threatened, they may become less objective when assessing the probability of patients' uncooperativeness to escalate into severe violence. In such situations, they may incline towards containing uncooperative patients to secure the safety at the ward, without considering less restrictive alternatives, even if there are no clear signs of violence. Especially when staff feel less confident with their de-escalation and interpersonal/communication skills or by low staffing levels,[48] the containment of uncooperative patients may seem the only alternative.

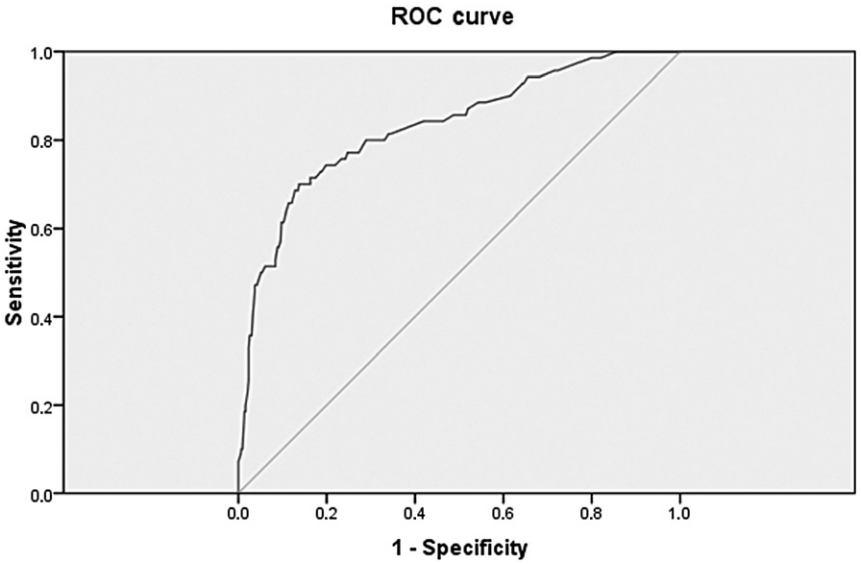

FIGURE 1. Receiver operating characteristic curve (ROC) of three risk predictors for seclusion and restraint. Diagonal segments are produced by ties.

Limitations of the study

Firstly, as our prediction model was constructed on data collected in a single ward, there are questions about the generalizability of our findings. Two recent studies[14,49] showed that, even after correction for patient characteristics, differences in use of coercive measures were explained by substantial between-ward variance. Hence, our prediction model should be validated.[50]

Secondly, we used observational scales to evaluate some of the potential risk factors. Although the nurses were well trained to assess patients' condition on the basis of the same criteria, such scales involve subjective estimates, which can vary according to personal values and individual interpretations of challenging behaviour. Unfortunately, as the majority of the coercive measures were used on the first day of admission, we must presume that these patients were not cooperative enough to fill in self-rating scales. Similarly, because it is the clinical staff who decides when to seclude or restrain patients, their assessment should be taken into account when a method of risk prediction for seclusion and restraint is developed.

Thirdly, we used only the violence subscale of Kennedy Axis V to detect aggressive behaviour. To assess the risk of violence, future research on assessing the risk of seclusion and restraint should use a more specific instrument, such as the Broset Violence Checklist.[10]

Finally, we did not estimate the predictive value of some external/environmental factors such us as staffing levels or type of the ward, which have already been proven to increase significantly the risk for seclusion and restraint.[23,30–33]

Clinical implications

To magnify the clinical relevance of risk assessment tools, they should be used for the purpose of developing interventions.[51] This means there should be a strong predilection for tools that include dynamic, changeable parameters (e.g. uncooperativeness and psychological functioning) and less static factors, which cannot be changed with clinical intervention (e.g. involuntary commitment). The likelihood of seclusion and restraint may be reduced by clinical interventions focused on improving psychological functioning (e.g. through medication), and also by improving working alliance.

Stolker and colleagues[22] found that seclusion was significantly delayed in patients with psychotic disorders who used antipsychotics during the first week after admission. Similarly, Goldbloom and colleagues[26] found that an early pharmacological intervention can reduce the incidence of seclusion and restraint among high-risk patients early in their hospitalization. However, previous research also showed that the success of pharmacological treatment depends on how compliant patients are: patients who refused medication fared worse than compliant patients, were more assaultive, required more seclusion and restraint, and needed longer hospitalizations.[52,53]

To improve patient compliance, and create and sustain a stable therapeutic relationship during

treatment, staff should be well trained in how to negotiate with an agitated patient and how to apply appropriate de-escalation techniques proactively,[54] also because less trained mental health workers become easier victims of psychiatric patient assaults.[55] They should also be able to estimate whether a patients' uncooperativeness is due to a serious psychological impairment or it concerns assertive non-conformity and whether this uncooperativeness has the potential to escalate into violent behaviour or not. Some studies have already shown how the use of seclusion and restraint can be successfully reduced by training staff in crisis interventions, or in non-violent alternatives to restraint such as de-escalation techniques.[7,56–63] These interventions may become even more successful when they are combined with a structural risk assessment.

As far as this and other studies showed that the most coercive incidents occurred during the first hospitalization days,[64–66] a structural risk assessment should start immediately after admission on an acute inpatient psychiatric unit and continue during the whole hospitalization period on a daily or a weekly basis.

CONCLUSIONS

Our model for assessing the risk of seclusion or restraint is simple, accurate and highly predictive, including two dynamic risk factors. We think that besides violent behaviour, psychological impairment and patients' uncooperativeness should be assessed. It may help mental heath professionals to improve their ability to detect patients at risk for seclusion and restraint and to approach them on time with preventive less restrictive interventions. However, before this model is adopted into routine clinical practice, further validation studies are required.

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