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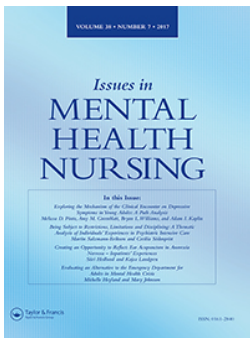
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Nursing Staff Factors Contributing to Seclusion in Acute Mental Health Care – An Explorative Cohort Study

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ABSTRACT

Background: Seclusion is a controversial intervention. Efficacy with regard to aggressive behaviour has not been demonstrated, and seclusion is only justified for preventing safety hazards. Previous studies indicate that nursing staff factors may be predictors for seclusion, although methodological issues may have led to equivocal results. **Objective:** To perform a prospective cohort study to determine whether nursing staff characteristics are associated with seclusion of adult inpatients admitted to a closed psychiatric ward. **Method:** We studied the association between nurses' demographics and incidence of seclusion during every shift. Data were collected during five months in 2013. Multiple logistic regression was used for analysis. **Results:** In univariable analysis, we found a non-significant association between seclusion and female gender, odds ratio (OR) = 5.27 (0.98–28.49) and a significant association between seclusion and nurses' large physical stature, OR = 0.21 (0.06–0.72). We found that physical stature is the most substantial factor, although not significant: OR_{adjusted} = 0.27 (0.07–1.04). **Conclusion:** Nurses' gender may be a predictor for seclusion, but it seems to be mediated by the effect of physical stature. We used a rigorous, census-based, prospective design to collect data on a highly detailed level and found a large effect of physical stature of nurses on seclusion. We found nurses' physical stature to be the most substantial predictor for seclusion. These and other factors need to be explored in further research with larger sample size.

Introduction



Background

Seclusion is an intervention still widely used in mental health care (Bak & Aggernaes, 2012; Janssen et al., 2014). There are large differences in the use of seclusion or other coercive interventions across countries in Europe (Bak & Aggernaes, 2012; Janssen et al., 2009; Steinert, Noorthoorn, & Mulder, 2014). Serious safety hazards in psychiatric hospitals – such as aggression and violence of patients against staff, fellow patients or goods – are the main reason to use coercive interventions (Happell et al., 2012).

Seclusion is a controversial intervention, and therapeutic effects have never been shown (Busch & Shore, 2000; Moran et al., 2009; Sailas & Fenton, 2000). On the contrary, patients reported negative effects such as anxiety, anger, feelings of being abandoned and traumatic experiences of being secluded (Fisher, 1994; Frueh et al., 2005; Van Der Merwe, Muir-Cochrane, Jones, Tziggili, & Bowers, 2013). Even in healthy subjects, seclusion

causes feelings of anxiety and suspicion (Kuosmanen, Makkonen, Lehtila, & Salminen, 2015). For this reason, the Dutch Ministry of Health, Welfare and Sports ordered in 2004 that Dutch mental health care should decrease seclusion rates by at least 10% each year (GGZ-Nederland, 2004). The use of seclusion and duration of seclusion episodes decreased more than 50% in 2012 compared to 2008 (Janssen et al., 2014). In 2012, 6.5% of the patients admitted in a psychiatric hospital in the Netherlands were secluded during their hospital stay, with a median duration of 17.7 hours per seclusion episode (Janssen et al., 2014). The Dutch Mental Health Act only permits seclusion in case of severe danger on a psychiatric ward due to aggressive or violent behaviour of patients, and the coercive measures must be used proportional, as short as possible, safe, humane and respectful (IGZ, 2011).

Several studies reported factors associated with seclusion in mental health care, which can be categorized into patient, nursing staff and unit characteristics. Larue, Dumais, Ahern, Bernheim, and Mailhot (2009) identified younger age, male

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gender and diagnosis of schizophrenia or bipolar disorder as patient characteristics associated with a higher risk of being secluded during an admission. Vruwink et al. (2012) and Tunde-Ayinmode and Little (2004) also found a younger age of patients to be associated with a higher risk of being secluded. Furthermore, aggression during previous admissions or prior to the current admission and involuntary admission are found to be associated with being secluded (Vruwink et al., 2012). Findings concerning the effect of nursing staff and unit characteristics on seclusion are equivocal. Nijman, Duangto, Ravelli, Merckelbach, and Vorel (1994) found no significant associations between seclusion and the nurses' gender, years of experience and patient-staff ratio in a closed long-stay psychiatric ward. Vollema, Hollants, Severs, and Hondius (2012) reported significant associations between seclusion and the subjective feelings of safety among nurses ($OR = 1.77, p = .005$). In other words, when nurses felt safer they were less likely to seclude a patient. Janssen, Noorthoorn, Linge, and Lendemeijer (2007) found male-female staff ratio and variability in the amount of professional experience in a team to be significantly associated with seclusion rates. More female nurses and low variety in the experience as a psychiatric nurse resulted in higher seclusion rates. On the other hand, Bowers et al. (2010) reported that seclusion was significantly associated with more male nurses on duty ($IRR = 1.30, p < .05$). Furthermore, lower patient/staff ratios were significantly associated with seclusion (Morrison & Lehane, 1995; Tunde-Ayinmode & Little, 2004), but not all authors found this association (e.g. Vollema et al. (2012) and Husum, Bjorngaard, Finset, and Ruud (2010)). These studies, however, all had methodological limitations, e.g., a retrospective or cross-sectional design and/or small sample size. Summarizing, previous studies indicate that not only patient but also nursing staff factors may be predictors for seclusion, although methodological issues may have led to equivocal results.

Objective

The objective of the study was to perform a prospective study to determine whether nursing staff characteristics are associated with seclusion of adult inpatients admitted to a closed psychiatric ward.

Methods

Study design

We conducted a naturalistic prospective cohort study. The manuscript was drafted using the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) reporting guidelines.

Ethical considerations

In our study, we used only anonymized data, obtained from the patients' medical chart. Data could not be traced back to either an individual patient or nurse. The nursing staff was informed about the study confidentiality and about the option not to reveal their personal information. By filling in

the case record form, the nurses gave their consent to the use of their anonymized details. The Medical Ethics Review Committee reviewed our study protocol and decided that no ethical approval was required according to the Dutch Medical Research Involving Human Subject Act (WMO).

Setting and participants

The study was conducted at a closed admission ward on the psychiatric department of an academic hospital in Amsterdam, the Netherlands.

All nurses working in the ward and all patients admitted to the ward during the data collection period were included in our study. The ward consists of two separate units, and each unit consists of six patient rooms and one seclusion room located outside the ward. Each patient has a private bedroom and bathroom. Both units have their own living room, conversation room, kitchen and a room where patients are allowed to smoke cigarettes. Both units have access to a central garden. The nursing station is situated at the centre of the ward and serves both units. Patients who are secluded are monitored closely; nurses check on them at least every 15 minutes (by camera or through a window in the door) and visit them regularly for basic care and activities.

The nurses at the ward are registered in the Dutch registration of health care professionals. All registered nurses are trained every six months in techniques of verbal de-escalation, safe physical restraint and the care for patients in seclusion rooms. Student nurses are included in our study, but always work on a supernumerary basis. Patients were aged 18–65 years and were mostly admitted to the ward on an involuntary basis, because of acute danger for the patient or their surroundings, due to their psychiatric condition.

Data collection and variables

Data were collected between 1 January 2013 and 30 June 2013. Our sample size was dependent on the admission rates and the number of nurses at the ward. By including all nurses and patients, we maximized the possible sample size for this study. For the current study, we wanted to include at least 20 incidents.

In the Netherlands, seclusion is defined as the restraint of a patient for care and treatment in a designated seclusion room (containing only a mattress and a blanket) approved by the Dutch Health Care Inspectorate (IGZ, 2011). Nursing staff characteristics were obtained by a case record form (gender, age, length, weight, registered nurse y/n, level of education, level of employment, years of employment, years of experience in mental health care, years of experience with seclusion, permanent staff/temporary staff, nurse manager y/n, senior nurse y/n).

To assess whether a large or small physique of the nurse was a predictor of seclusion, we categorized 'physical stature' into three categories: small (smaller than a same sex person of similar age), average (comparable to a same sex person of similar age) and large (larger than a same sex person of similar age), based on length, weight and (observed) physique. Physical stature was visually determined by two independent assessors because of the subjective nature of this variable. They assessed the nurses by

looking at length, weight and width to determine whether the nurse had a small, average or large stature. The assessors had a substantial interobserver agreement (Cohen's $\kappa = .74$) (Landis & Koch, 1977). Consensus between both assessors was reached for the remaining cases. Patient characteristics were obtained from the electronic patient record and used to correct for possible confounding due to patient variance.

Data were collected three times every 24 hours at each turn of the shift. We selected these variables based on suggestions in existing literature on this subject (Abdul Rahman, Jarrar, & Don, 2015; Bowers et al., 2010; Husum et al., 2010; Janssen et al., 2007; Morrison & Lehane, 1995; Nijman et al., 1994; Tunde-Ayinmode & Little, 2004; Vollema et al., 2012) and based on our own hypothesis that nurses' stature may be an important factor.

The dependent variable (involuntary seclusion) was measured at patient level, and the predictor variables of interest were measured at nursing staff and unit level. Seclusion data were obtained from the Argus registration system, which contains information on involuntary admissions and coerced treatment. Its use is obligatory for every psychiatric hospital in the Netherlands. Argus provides reliable information of the number and duration of seclusions on the ward (Janssen, 2012). No voluntary seclusion was used on the ward during the study period.

Analysis

To assess staff characteristics predicting seclusion, we used a two-step approach proposed by Hosmer and Lemeshow (2000).

In the first step, we selected the predictors for the multiple logistic regression analysis. In this step, separate univariate logistic regression analyses with seclusion as dependent variable were conducted for each potential predictor. Nursing staff characteristics were collected for the nursing team working at the ward on shift level. The nursing staff characteristics are analysed in an aggregated manner. A propensity score is the predictive value of group membership and can be used to correct for multiple possible confounders (Rubin, 1997). The propensity score is found by predicting the exposed group membership from the patients' baseline characteristics by a logistic regression analysis and added to the prediction model.

Predictors with a p value $< .20$ in the first step were selected for the second step. In this second step, a multiple logistic regression model was conducted with the selected predictors of the first step and the propensity score. SPSS, version 19 (SPSS Inc. USA) was used for all analyses.

Bias

Staff participants were blinded for the hypotheses of our study to prevent performance bias. Patients at the ward were unaware of the study being performed. We included all patients and staff members at the ward to prevent selection bias. Our primary endpoint (involuntary seclusion) is an explicit, dichotomous endpoint, suitable for logistic regression analysis. We use multiple logistic regression analysis to correct for any confounding variables. We are conservative in using independent variables in our logistic regression model to prevent the model from overfitting.

Table 1. Nursing Staff Characteristics ($n = 47$).

Registered nurse, % (n)	80.9 (38)	Employment rate (hours per week), % (n)	
Male, % (n)	38.3 (18)	36 hours or more (full time)	25.5 (12)
Age (years), md (IQR)	35.8 (26.0)	20–32 hours	49.0 (23)
Length (centimetres), mean (SD)	174.3 (9.2)	20 hours or less	25.5 (12)
Weight (kilograms), mean (SD)	72.6 (13.6)	Employment at the ward (years), md (IQR)	2.8 (5.5)
Body Mass Index, mean (SD) [†]	23.8 (3.6)	Experience in mental health care (years), md (IQR)	4.0 (18.8)
Physical stature, % (n)		Experience with seclusion (years), md (IQR)	4.5 (13.5)
Small	17.0 (8)	Permanent staff, % (n)	
Average	53.2 (25)	Temporary staff	36.2 (17)
Big	17.0 (8)	Permanent staff	42.6 (20)
Educational level, % (n)		Permanent staff on other ward	21.3 (10)
Student	14.9 (7)		
MBO (EQF4/5)	25.5 (12)		
HBO (EQF 6)	53.2 (25)		

[†] Weight/length².

Results

Participants

The total group of nurses ($n = 47$) consisted of subgroups of permanent staff of registered nurses ($n = 20$), registered nurses with a temporary employment ($n = 18$) and student nurses ($n = 9$). Nurses were mostly female (61.7%) with a median age of 35.8 years. Twelve of the nurses worked full time (25.5%). The nurses worked for a median of 2.8 years at the ward and had a median of four years of experience in clinical mental health care (Table 1).

In our sample, data were missing for two nurses; each of them was present in one shift during our study period. We could not assess the physical stature of four nurses, because these participants worked at the ward for a very short period of time.

Outcome data

We recorded 23 seclusions, from which we excluded two events because the patients were secluded while staying at another unit of the psychiatric department. Thirteen patients from our sample were secluded (1–3 times) during the study period (27.1%).

Patients who were secluded more often were admitted after an aggressive incident ($p = .010$) or admitted for the first time to a psychiatric hospital ($p = .002$). Patients who were secluded also had (surprisingly) significantly higher scores in the Global Assessment of Functioning compared to the patients who were not secluded during their admission ($p = .004$) (Table 2). To adjust for potential confounding due to these imbalances, we corrected the association of the possible predictors and seclusion with the propensity score (an aggregated variable of patients' characteristics). Secluded patients (median = .01310; IQR = .0157) and non-secluded patients (median = .00079; IQR = .0059) differed significantly in their propensity scores ($U = 61.07$; $p < .001$).

Table 2. Patient Characteristics ($n = 48$).

	Total patients $n = 48$	Secluded patients $n = 13$	Non-secluded patients $n = 35$	p
Male, % (n)	56.3 (27)	61.5 (8)	54.3 (19)	.785 ⁺
Age (years), md (IQR)	37.2 (23.8)	46.8 (32.2)	35.9 (22.2)	.486 ⁺⁺
Length admission (days), md (IQR)	19.0 (24.5)	21.5 (27.8)	14.0 (21)	.384 ⁺⁺
Dutch citizen, % (n)	75.0 (36)	69.2 (9)	77.1 (27)	.864 ⁺
Involuntary admission, % (n)	77.1 (37)	92.3 (12)	71.4 (25)	.126 ⁺
White European ethnicity, % (n)	45.8 (22)	61.5 (8)	40.0 (14)	.660 ⁺
Primary diagnosis, % (n)				.456 ⁺
Psychotic disorder	77.1 (37)	76.9 (10)	77.1 (27)	
Bipolar disorder	8.3 (4)	15.4 (2)	5.7 (2)	
Major depressive disorder	6.3 (3)	7.7 (1)	5.7 (2)	
Other	8.3 (4)	0	11.4 (4)	
Substance abuse as secondary diagnosis, % (n)	43.8 (21)	46.2 (6)	42.9 (15)	.975 ⁺
Personality disorder as secondary diagnosis, % (n)	8.3 (4)	7.7 (1)	8.6 (3)	.758 ⁺
Intellectual impairment as secondary diagnosis, % (n)	10.4 (5)	7.7 (1)	11.4 (4)	.781 ⁺
Seclusion in patient history, % (n)	20.8 (10)	15.4 (2)	22.9 (8)	.271 ⁺
Admission after aggressive incident, % (n)	25.0 (12)	46.2 (6)	17.1 (6)	.010 ⁺
Patients with aggressive incidents in history, % (n)	31.3 (15)	23.1 (3)	34.3 (12)	.397 ⁺
GAF score at admission (GAF), md (IQR)	35.0 (10.0)	40.0 (5.0)	35.0 (10.0)	.004 ⁺⁺
First admission at psychiatric hospital, % (n)	20.8 (10)	46.2 (6)	11.4 (4)	.002 ⁺⁺

⁺ Pearson's Chi-square test.

⁺⁺ Mann-Whitney U -test.

Main results

A higher (although not significant) proportion of female nurses present at the ward increased the odds of a patient being secluded, OR (95% CI) = 5.27 (0.98–28.49). Furthermore, a larger mean physical stature of the shifts' nursing team reduced the odds of seclusion, OR = 0.21 (0.06–0.72). This suggests that the presence of female nurses was associated with higher chance of seclusion of patients, while the presence of nurses with large physical stature was associated with significantly lower chance of seclusion during their shift. These were also the only variables with a univariate p value $\leq .20$ as predictor for seclusion (Table 3).

Male and female nurses differed significantly in age ($U = 351.00$; $p = .008$), i.e. male nurses were significantly older than female nurses. To assess whether this confounded the relation between the proportion of female nurses and seclusion, we added the mean age of the nursing staff present in the shift to the regression model with the proportion of female nurses and the propensity score as independent variables and found a small increase of the odds ratio (OR) for female nurses, OR_{adjusted} = 5.48 (0.95–29.62). We concluded that age did not confound this relation according to the rule of thumb that a factor is a confounder when the adjusted effect estimate differs at least 10% from the unadjusted effect (Bliss, Weinberg, Webster, & Vieira, 2012).

Male and female nurses also differed significantly in physical stature ($U = 282.50$; $p = .026$). Male nurses had significantly

larger physical statures than female nurses. To assess whether this difference in physical stature biased the relation between the proportion of female nurses and seclusion, we added the mean physical stature of the shifts' nursing team to the regression model with proportion of female nurses and the propensity score as independent variables. The decrease of the OR for the proportion of female nurses, OR_{adjusted} = 2.71 (0.44–16.71), suggested that the mean physical stature did confound the relation between proportion of female nurses and seclusion as this differed more than 10% from the unadjusted effect estimates. In the model with the proportion of female nurses and the propensity score as independent variables, we found a large (although at a trend level) effect for the mean physical stature of the shifts' nursing team, OR_{adjusted} = 0.27 (0.07–1.04).

Discussion

Key results

We found a substantial (although at a trend level) association between seclusion and gender and a substantial and significant association between physical stature and seclusion. Physical stature, controlled for gender, may be an important characteristic of nurses predicting seclusion. The effect of nurses' gender is in line with the findings of Vollema et al. (2012) but not in accordance to the findings of Janssen et al. (2007) and Bowers et al. (2009). We found no significant association between

Table 3. Results of Univariate Regression Analysis.

	β	SE	Wald (df = 1)	p	Odds ratio (95% CI)
Age of nursing staff	−0.014	0.030	0.200	.655	0.99 (0.93—1.05)
Physical stature	−1.561	0.627	6.187	.010	0.21 (0.06—0.72)
BMI	0.091	0.158	0.330	.565	1.10 (0.80—1.49)
Proportion of female nurses	1.663	0.861	3.731	.053	5.27 (0.98—28.49)
Educational level	0.008	0.446	<0.001	.986	1.01 (0.42—2.41)
Experience in mental health of nursing staff	−0.023	0.038	0.373	.541	0.98 (0.91—1.05)
Length of employment of nursing staff	−0.112	0.094	1.417	.234	0.89 (0.74—1.08)
Level of employment (full time vs. part time)	−0.142	0.242	0.344	.558	0.87 (0.54—1.39)

nurses' age and seclusion (in line with Nijman et al. (1994)) and for the nurses' experience in mental health care, but contrary to Janssen et al. (2007). We did not find previous studies on the effect of nurses' physical stature on seclusion. Because of the lack of previous evidence on this matter, we consider this the most important new finding of this study.

We found no significant effect of patient-staff ratio on seclusion though we hypothesized that patient-staff ratio would be significantly related to seclusion risk, in accordance to Tunde-Ayinmode and Little (2004) and Morrison and Lehane (1995). However, the fact that we found no effect on patient-staff ratio may be due to the lack of variance in patient-staff ratio in our sample, or due to the small sample size.

A previous study showed that feelings of unsafety among nurses on the ward measured retrospectively were related to seclusion (Vollema et al., 2012). However, to measure this prospectively may make nurses more aware of their feelings of feeling unsafety that may influence the probability of seclusion. Obviously, the occurrence of an aggressive incident influences feelings of unsafety of nurses. By introducing feelings of safety as a possible risk factor for the occurrence of seclusion, we may also influence feelings of unsafety and could therefore bias the association. For this reason, we did not include this factor in our prospective study. Nevertheless, hazardous behaviour is the primary criterion for seclusion. This will affect the feelings of safety of the nurse, and we do recognize its importance on the use of seclusion and other coercive measures.

Strengths and limitations

Previous studies on this matter collected data retrospectively (Janssen et al., 2007; Nijman et al., 1994; Vollema et al., 2012), used a cross-sectional design (Bowers et al., 2010) or primarily addressed patient-staff ratios (Morrison & Lehane, 1995; Tunde-Ayinmode & Little, 2004). One of the strengths of our study is that we used a rigorous, census-based, prospective design to collect data. Moreover, data collection took place on a highly detailed level; we collected data on a level of shift, so we could confirm that the analysed nurses were present at the time the event took place. We also analysed all patient charts for events, instead of only analysing the events reported by nurses.

However, the findings of our study should be interpreted in the light of the following limitations. The first and main limitation is that we performed this study with a relatively small sample size, so the statistical power is limited. Therefore, despite the fact that we found large effects, replication is needed. The second major limitation is that we performed this study in a single hospital, restricting the generalizability of our results, although stature and gender may not be very context sensitive. Finally, logistic regression analysis assumes that the nurses within the team were independent data sources, which was probably not the case. Nurses within a team will influence each other when working together in a shift. In future studies with enough statistical power, multilevel logistic regression analyses must be considered.

Generalisability

Our study was performed at a closed admission ward in an academic hospital. Because this admission ward has an obligation to accept involuntary admissions from Amsterdam and surroundings, we propose that our findings are generalizable to closed admission wards of non-academic clinics as well. Legislations of psychiatric admissions in the Netherlands are identical for academic and non-academic hospitals.

Interpretation

We found substantial effect sizes for proportion of female nurses (OR = 5.27) and large mean physical stature of the shifts' nursing team (OR = 0.21) on seclusion. Physical stature seems to be a more robust factor in the multiple regression model suggesting that the main part of the association between the proportion of female nurses and seclusion is mediated by physical stature. Because of the small sample size, we are cautious with the interpretation of these findings. Therefore, in future research, the influence of stature and factors associated with stature as well as unit characteristics like patient-staff ratio should be evaluated in studies with a larger sample size.

Creating a safe environment in psychiatric admission wards is an important challenge of professionals worldwide. Several initiatives for reducing coercion and for improving quality of care have started in the recent years, e.g., the High Intensive Care model in the Netherlands (Mierlo van, Bovenberg, Voskes, & Mulder, 2013) and Safewards internationally (Bowers, 2014; Bowers et al., 2014). Both initiatives emphasize the importance of the interaction between nurses and patients.

If our result that the sex and stature of nurses is related to seclusion is replicated in a larger study, this may have practical implications. We propose that raising awareness of the influence of nurses on (the reduction of) coercive measures needs further exploration. Aggression and violence both have a possible interactional component, and research and innovation should not focus on patients alone. The composition of nursing teams can be influenced by policy makers and may be a factor of interest when taking the next step in further reducing coercive measures in mental health care. When our main results are replicated in an independent study, we should consider adaptations in nursing team composition. This may contribute to the goal of diminishing seclusion as a coercive measure in mental health care as much as possible. Seclusion and other coercive measures in mental health care are a threat to patients' safety and should be used with great caution. Article 5, section 1 in the European Convention for the Protection of Human Rights and Fundamental Freedoms declares that no person should be deprived of its liberty. As section 1e states, in case of severe psychiatric disorders, lawful seclusion is sometimes necessary. It does not alter the fact that national and international standards in using coercion in mental health care should be focussed on preventing coercion by all means possible. By gaining more knowledge concerning risk factors for coercion and seclusion, we aim to contribute to the international goal of banning seclusion from mental health facilities.

Disclosure of interest

No conflict of interest has been declared by the author(s).

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