Argus: assessment and use of data in evaluating coercive measures in Dutch psychiatry

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2012

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Chapter 6.

Differences in seclusion rates between admission wards: does patient compilation explain?

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Published in: Psychiatric Quarterly: (2012) DOI: 10.1007/s11126-012-9225-3

Abstract

Comparison of seclusion figures between wards in Dutch psychiatric hospitals showed substantial differences in number and duration of seclusions. In the opinion of nurses and ward managers, these differences may predominantly be explained by differences in patient characteristics, as these are expected to have a large impact on these seclusion rates. Nurses assume more admissions of severely ill patients are related to higher seclusion rates. In order to test this hypothesis, we investigated differences in patient and background characteristics of 718 secluded patients over 5,097 admissions on 29 different admission wards over seven Dutch psychiatric hospitals. We performed an extreme group analysis to explore the relationship between patient and ward characteristics and the wards' number of seclusion hours per 1,000 admission hours. In a multivariate and a multilevel analysis, various characteristics turned out to be related to the number of seclusion hours per 1,000 admission hours as well as to the likelihood of a patient being secluded, confirming the nurses assumptions. The extreme group analysis showed that seclusion rates depended on both patient and ward characteristics. A multivariate and multilevel analyses revealed that differences in seclusion hours between wards could partially be explained by ward size next to patient characteristics. However, the largest deal of the difference between wards in seclusion rates could not be explained by characteristics measured in this study. We concluded ward policy and adequate staffing may, in particular on smaller wards, be key issues in reduction of seclusion.

Keywords

Seclusion, Patient characteristics, Contrasting wards

Introduction

Seclusion is a coercive measure frequently used to manage severe, behaviourally disturbed patients in psychiatric inpatients units. Seclusion is defined as placing a patient in a locked room being alone and able to move around but unable to leave due to a locked door (Janssen, et al. 2011, Steinert & Lepping, 2009). The use of seclusion is controversial and its therapeutic value is discussed (van de Werf & Lantink, 2009, Lendemeijer & Shortridge, 1997, Sailas & Fenton, 2002, Kaltiala, et al. 2003. Moreover, seclusion is valued as very invasive, having a negative impact, being traumatic for the patient as well as for nurses and psychiatrists and harming patient–therapist relationship (Fisher, 1994, Hoekstra, et al. 2004, VanderNagel, et al. 2009, Happell & Koehn, 2011). Patients themselves may experience seclusion as a violation of their autonomy (Hoekstra, et al. 2004) or as a punishment (Meehan, et al. 2004, Keski-Valkama, et al. 2009) or even as a form of torture (Veltkamp, et al. 2008). Despite the international debate on risks of seclusion in general (Bowers, et al. 2006) and side effects (Steinert & Schmid, 2004, Prinsen & van Delden, 2009) a widespread use of seclusion in the Netherlands is observed (Janssen, et al. 2008, 2009, 2011, Steinert, et al. 2009).

The use of seclusion is regulated in the Dutch Special Admission in Psychiatric Hospitals Act (the BOPZ) and restricted to treat aggressive behaviour of patient which cannot be treated otherwise. In addition the BOPZ distinguishes forced stay and forced treatment as opposed to many neighbouring countries (Legemaate, et al. 2007). In Dutch law, involuntary admitted patients may refuse treatment. Forced treatment, especially forced medication, is seen as a serious violation of patient's integrity. This discrepancy may very well contribute to higher seclusion figures in Dutch psychiatric hospitals (Janssen, et al. 2008, Steinert, et al. 2009). Debates in Dutch psychiatry focused on the need to drastically reduce the use of seclusion for a number of years (GGZ Nederland, 2004).

To enable evaluation of reduction efforts the Argus registration rating scale (Janssen, et al. 2008, 2011, GGZ Nederland, 2010) following international examples (Steinert & Lepping, 2009, Steinert, et al. 2006, Bowers, et al. 2010), was developed to count all used coercive measures. The ratings were completed by nurses on daily basis. Registration data were analyzed and presented in regular feedback sessions on a ward as well as a hospital level (Janssen, et al. 2011). Standardized and regular feedback, based on the feedback theory (Hattie & Timperly, 2007), next to monitoring outlier data was seen as a powerful stimulus for behaviour change in ward teams and therefore to strive for reduction of seclusion use (Donat, 1998, 2003, Fisher, 2003, Gaskin, et al. 2007). Regular feedback is also a stimulus for nurses to continue recording these measures (Huckshorn, 2004).

The feedback sessions on the wards often raised questions among team managers and ward nurses about the impact of patient characteristics on the use of seclusion. Many assumed they admitted more severely

mentally ill patients than on similar wards, resulting in a frequent use of seclusion. From their point of view the admission of more severely mentally ill patients impaired successful reduction of seclusion. The key question in the current study is whether differences in the use of seclusion among wards may be attributed to composite differences in patient characteristics or to contextual effects such as ward characteristics.

Studies on secluded patients from 1990 onwards showed patient characteristics are consistently associated with seclusion. However, most of these studies took place on one or more wards in a single hospital. Few studies combined data from more than one hospital (Steinert, et al. 2006, Bowers, et al. 2010, Way & Banks, 1990, Betemps, et al. 1993, Demeestere, et al. 1995, Martin, et al. 2005, Bowers, et al. 2005). More than half of the secluded patients were male and in general secluded patients were relatively young (aged between 26 and 40 years) (Betemps, et al. 1993, Demeestere, et al. 1995, Forquer, et al. 1996, Kaltiala-Heino, et al. 2000). Substance use, manic symptoms, personality disorder and mental retardation were found to be associated with more seclusion (Fisher, 1994, Forquer, et al. 1996). A large deal of the patients exposed to seclusion suffered schizophrenia (Kaltiala-Heino, et al. 2000, 2003, Steinert, et al. 2006, Betemps, et al. 1993, Tunde-Ayinmode, et al. 2004, Stolker, et al. 2005). Substance abuse occurred in 10–33 % of patients secluded (Kaltiala-Heino, et al.2003, Tunde-Ayinmode, et al. 2004). Depressive disorders, however, were observed in only 3–10 % of secluded patients, which is less than may be expected (Tunde-Ayinmode, et al. 2004, Stolker, et al. 2005). Using the Global Assessment of Functioning Scale (GAF), that constitute the severity of illness of the patient (Stolker, et al. 2005), found an association between seclusion and lower levels of functioning.

Studies on seclusion data between similar wards over more than one hospital showed some differences in diagnosis and severity of illness of patient between the wards (Bowers, et al. 2005,2010). The findings of these studies seem to confirm the manager's assumption. Interesting were the observations of Way and Banks (1990) and Betemps et al. (1993) that hospitals may have characteristic restraint or seclusion rates independent of patient demographics or clinical presentation. These variations may reflect each hospital's style of preventing and/or handling disturbed behaviour. Moreover, Forquer et al. (1996) found that hospitals seclusion rates have an impact on the likelihood of being placed in seclusion. Bowers et al. (2004) stated that choices to a coercive measure are a result of a socialization process and the availability of such measures. The study of van Doeselaar et al. (2007) underlined the observations of Fisher (1994). They stated that the use of seclusion is related to habituation. Frequent use of seclusion blinds people to its negative effects (van Doeselaar, et al. 2007). On the other hand ward size, patient turn-over and staffing seem to influence the use of seclusion. Nijman and Rector (1999) found a positive correlation between turn-over on the ward and crowding with aggression on the ward. The large variety of factors influencing seclusion use underlines the impact of many other factors and opposes the assumption of the

nurses and managers. Recent Benchmark findings of the Dutch Argus case register on coercive measures observed great differences in seclusion incidents and duration between admission wards over hospitals (Noorthoorn, et al. 2010). It is questionable of the observed differences only can be attributed to patient characteristics as the nurses and managers assumed, or may reflect a ward or hospital style as Fisher (1994) stated. The current study examined patient characteristics related to a patient's risk of being secluded as compared between a substantial sample of admission wards. In the current study we make an effort to understand the contribution of patient and ward characteristics to the variance in seclusion use. This study is an effort to address the assumption of nurses and management that high seclusion rates are related to patient's illness and characteristics.

Methods and Materials

Data

All patients staying one or more days on the participating wards during 2008 were included. Data were gathered from closed admission wards serving admissions for the complete catchment area of mental health trust. These wards had in common the obligation to admit all patients from a catchment area with no prior selection nor any specific admission criteria. The hospitals patient administrations provided data collected in routine procedures. As collection procedures varied over hospitals, a limited number of items could be collected with a acceptable level of reliability. The database covered patient characteristics such as gender, date of birth, marital status, ethnicity, diagnosis (DSM IV) and GAF scores, along with information about patients' stay in the hospital in 2008, such as dates of admission, patients' transfers from ward to ward and if known date of discharge. Each ward provided data on the number of beds. Days of stay and patient turnover could be calculated from the admission data.

Data on seclusion use over seven hospitals were extracted from the Dutch Argus coercive measures case register. Data on seclusion contained information on the date and time of start and end of seclusion. With this information seclusion incidence and seclusion duration in hours was calculated in line with Janssen et al. (2011). Seclusion incidence was calculated by counting the number of sequences of discrete seclusion episodes not interrupted by more than 24 h. Seclusion duration was calculated by counting the duration of these discrete episode sequences. The reliability of the information was tested by comparison of registration data with concurrent sources, such as nurses and doctors notes, showing percentages of agreement between 85 and 96 % and Cohen's j between 0.64 and 0.92. This suggests that the Argus data were sufficiently reliable according to the criteria of Laundis and Koch (1977).

In the database on patient characteristics, the data were aggregated at the level of a patients' admissions within a ward. For a patient admitted more than once at a single ward, we chose to constitute one record

per patient at that ward, to limit the contribution of data generated by frequently readmitted patients. A patient admitted more than once on different wards obtained more records in the database for the various wards. The date of birth was used to calculate the age of patient in the year 2008. As primary diagnosis we used the diagnosis first mentioned on DSM IV axis 1 and axis 2 at the most recent date of evaluation. The axis 1 diagnoses was categorized in 7 categories, in line with Fould's hierarchical index (de Jong, et al. 1986) proposing a severity hierarchy in the diagnoses. In this hierarchy minor psychiatric disorders were used as reference category. Bipolar disorder, psychotic disorder or drug abuse disorder was seen as more severe. Missing diagnosis, which can occur if patient stayed too short on the ward that a diagnosis was not obtained, or delayed diagnosis were recoded in diagnosis unknown. Missing diagnosis was coded in the least severe category. Personality disorders, mental retardation and other diagnosis on axis 2 were categorized separately as a different variable. Per ward, diagnostic categories were expressed in percentages. Axis 2 diagnoses were expressed in percentages. On axis 5 only the GAF by admission was used.

In the same way, the Argus rating scale data was aggregated to the admission level. The total number of seclusion incidents as well as hours and days in seclusion were counted for each admission of the patient.

Univariate and Bivariate (Extreme Groups) Analyses

On each ward the seclusion incidence and the duration were calculated and standardized to number of incidence per 1,000 admissions and seclusion hours per 1,000 bed hours, in line with Janssen et al. (2011). First, to test the hypothesis of nurses and management that the high seclusion rates are related to patient's illness and patient characteristics an extreme group analysis (Preacher, et al. 2006) was performed. This technique can be used for exploratory purposes when comparing numbers of occurrences within groups. For analysis purposes, the sample was divided in two groups by a median split, with a cut-off point at a mean of 10 seclusion hours per 1,000 bed hours. We compared the patient characteristics and the diagnosis of the admitted patients between both groups, using the mean percentages per group of wards, by means of a student t test. Continuous patient characteristics, such as age and number of

readmissions were also tested by means of the t test. The GAF score was dichotomized in scores above and below 50, and again means percentages at a ward level were tested by means of student t test. To value the degree of difference between both groups Cohen's d (Cohen, 1988) was calculated. Medium effect sizes were valued as a notable difference, while small effect sizes were valued as a slight difference. These analyses were performed in SPSS, version 19.

Findings of extreme group analysis provide a mere impression. To understand the relationships between ward characteristics, patient background variables and diagnoses, these were included in a number of multivariate models.

Multivariate Modelling

The extreme group analysis allowed us to explore which factors affect seclusion rates. However, for appropriate modelling we will need more sophisticated techniques (Preacher, et al 2006). Therefore, we augmented the results from the extreme group analyses by multivariate modelling. We constructed models for two dependent variables:

(1) The number of seclusion incidents.
(2) The proportion of time being secluded.

The number of seclusion incidents was modelled utilizing a multilevel version of Poisson regression taking the admission duration into account as an exposure variable. The proportion of time being secluded was obtained by dividing the patients' total seclusion time by the patients' total admission time and was modelled by a multilevel Generalized Linear Model fitting a binomial model with the logit link. These two outcome variables were regressed on patient characteristics such as age, sex or diagnosis at level one and ward as well as hospital identification variables as well as ward size at level two. The number of hospitals was not large enough to provide a third level of random effects.
Instead, we added fixed effects for hospitals.
Multilevel modelling is done for two reasons. When a dataset is hierarchically organized (patients stay in wards, which are part of hospitals), one should control for the clustering of similar observations at each level to prevent biased results. In addition, it enables the identification of the level at which relationships really occur, thus clarifying the nature of potentially causal connections. In the current analysis, models were produced through a staged process of backward selection, deselecting the least significant model at each stage. We present only the final models of both regression analyses. These analyses were performed in STATA, version 12.

Results

This study was carried out in seven Dutch psychiatric hospitals serving rural and urban areas in the Netherlands. These hospitals had a total annual admission number of approximately 10,000 admissions,

and a catchment area of approximately 2.8 million inhabitants. In total, 29 acute admission wards were included containing 8–45 beds each.

The wards had seclusion facilities on the own ward or in the building were the ward was housed. Hospitals participating in the study used the same, standardised Argus rating forms to count seclusions measures (Janssen, et al. 2011, GGZ Nederland, 2010).

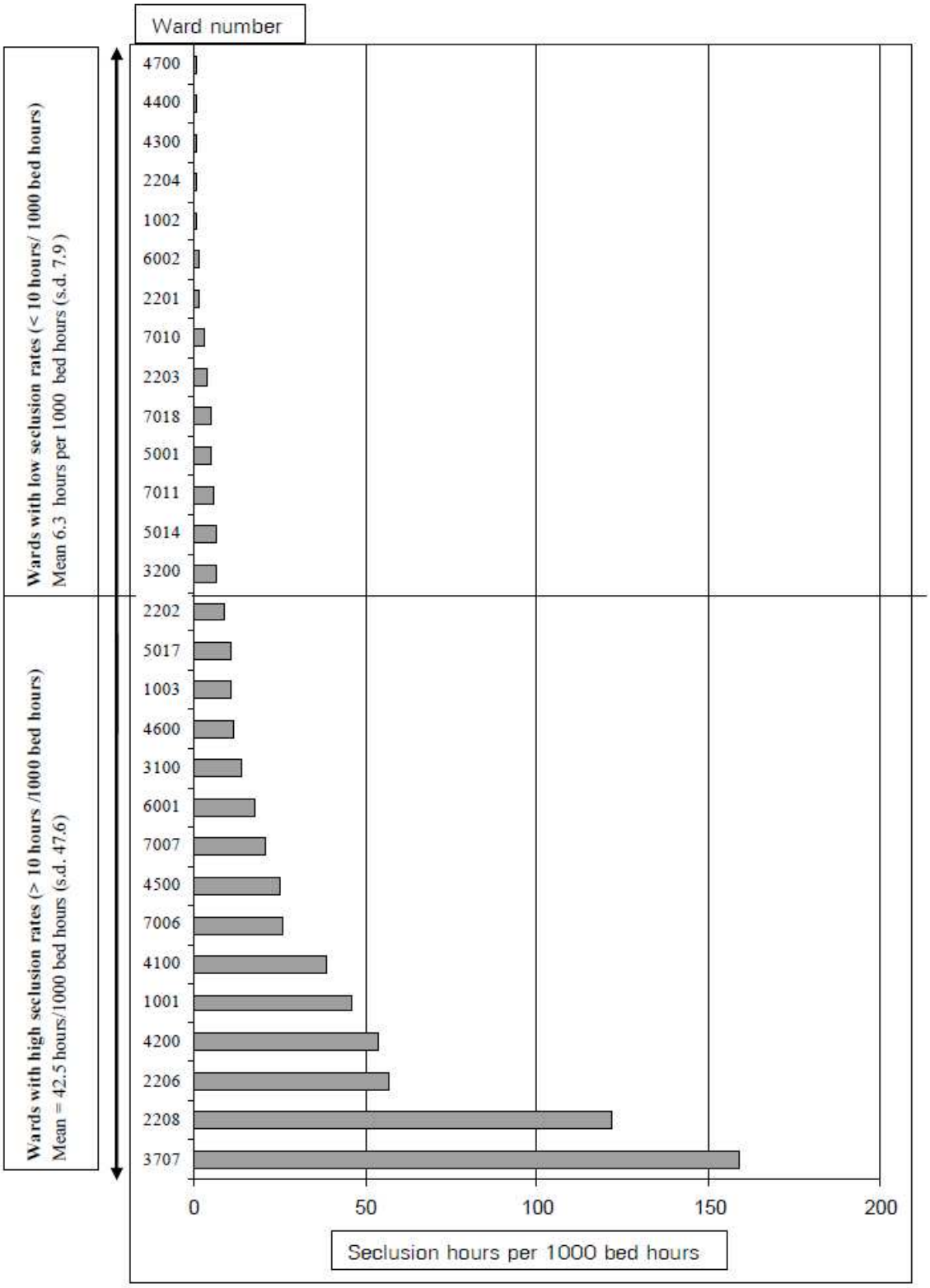
The seven hospitals provided data of 5,097 patients on admission wards between January 1st 2008 and January 1st 2009 of which 2,022 patients (=40 %) were admitted more than once (up to 39 times). The number of readmissions differed strongly per ward. Consequently, some wards may have admitted more patients having been treated in the past with which nurses may have been familiar. Other wards admitted more unknown 'new' patients. Regarding all 29 wards, patients had a total length of stay of 310,919 days (mean = 61 days, sd 82 days, median = 28 days). Slightly more female (50.2 %) than male (49.8 %) patients were admitted. The mean age was 41 years (sd 14 years) and the mean GAF score was 46 (sd 17). With respect to diagnosis on axis 1, about 32 % of the patients had a schizophrenic disorder, in 26 % the diagnosis was unknown or delayed, 12 % had a mood disorder and 8 % had a bipolar disorder. Some wards showed less patients with bipolar disorders or drug abuse as primary diagnoses, while others showed more schizophrenic disorders, diagnosis unknown or minor psychiatric disorders.

Extreme Group Analysis

Of the 5,097 patients that were admitted to the wards, 614 patients (12 %) experienced 1,610 incidents of seclusion with a mean duration of 124 h (sd 392 h). The mean seclusion hours per 1,000 bed hours was 17 (sd 153). The number of seclusion hours per 1,000 bed hours varied strongly between the wards (see Fig. 1). The 15 wards with lower seclusion rates showed a mean of 6.3 h per 1,000 bed hours while the 14 wards higher seclusion showed a mean of 42.5 h per 1,000 bed hours. In Table 1 these groups of wards are compared on a number of variables.Concerning patient characteristics, wards with the higher seclusion rates have more males on the wards and more foreign patients than wards with lower seclusion rates. Although not significant, the Cohen's d value shows reasonable differences when compared to wards with low seclusion rates. Wards with the higher seclusion rates also showed somewhat higher percentages of schizophrenia, diagnosis unknown and drugs abuse. The percentages of anxiety disorders, bipolar disorders, psycho-social problems, psycho-organic disorders and personality disorders were somewhat higher on the wards with low seclusion rates. Only the diagnosis mood disorders differ significant between both groups of wards. Although not significant, a reasonable difference was found on the diagnosis schizophrenia, diagnosis unknown, and anxiety disorders between both groups of wards. The mean GAF scores on the wards with low seclusion rates proved to be higher than in the wards with

high seclusion rates. So, in general, characteristics of patients admitted differed between wards with high as opposed to wards with low seclusion hours per 1,000 bed hours.

Figure 1. Seclusion hours per 1,000 bed hours per ward



In the comparison between wards with low and high seclusion rates per 1,000 per bed hours (Table 1) the most striking difference was found on the number of admissions and number of patients admitted. The wards with low seclusion figures had more admissions and admitted more patients than the wards with high seclusion figures. Turn-over figures showed that on wards with low seclusion in the year 2008 on each available bed 22.4 patients were admitted, in contrast to 16.3 patients on the wards with high seclusion use (Table 1). The patients on the wards with high seclusion rates stayed about 200 h longer compared to the patients on the wards with low seclusion figures. On wards with low seclusion rates 155 patients were secluded. On wards with high seclusion rates a threefold of patients was secluded compared
to the wards with low seclusion rates. These patients had a about a fourfold of seclusion incidents and seclusion episodes.

Table 1. Comparison between wards with low and high seclusion rates on patient and ward characteristics

	Wards with low seclusion rates (n = 14)		Wards with high seclusion rates (n = 15)		T-test df =27	Cohen's D
		s.d		s.d		
Patient characteristics						
Age	40.8	(3.6)	41.3	(3.6)	-0.39	-0.1
Male (%)	49.6	(11.9)	57.8	(10.0)	2.01	0.7
Non-western ethnicity (%)	5.3	(3.6)	7.0	(4.9)	-1.08	0.4
Diagnosis axis-1						
Unknown (%)	24.1	(11.6)	28.3	(15.6)	-0.82	0.3
Miscellaneous (%)	4.6	(3.1)	4.1	(2.8)	0.51	0.2
Anxiety disorders (%)	8.3	(5.3)	5.7	(5.8)	1.26	0.5
Mood disorders (%)	13.2	(6.5)	8.4	(4.7)	2.26*	0.8
Bipolar disorders (%)	7.9	(3.5)	7.2	(3.5)	0.49	0.2
Schizophrenic disorder (%)	33.2	(13.7)	36.4	(16.4)	-0.57	0.2
Psycho-organic disorders (%)	3.8	(4.3)	3.3	(3.3)	0.35	0.1
Drugs abuse (%)	4.8	(5.2)	6.5	(5.1)	–0.89	0.3
Diagnosis axis-2 (%)	23.1	(14.8)	23.5	(8.3)	-0.09	0.0
GAF score above 50 (%)	46.3	(5.1)	42.7	(5.3)	1.85	0.7
Ward characteristics						
Number of beds	22.1	(11.6)	17.5	(6.4)	1.30	0.5
Number of admissions per patient	2.2	(1.0)	2.1	(1.4)	0.12	0.0
Turn-over on the ward	22.4	(13.8)	16.3	(12.3)	1.24	0.5
Number of admissions at the ward	456	(340)	275	(183)	1.76	0.6
Number of seclusions incidents per ward	27.4	(23.6)	85.6	(56.5)	–3.66**	-1.1
Seclusion hours per admission on ward	2.8	(2.8)	36.1	72.3	-1.79	-0.6
Seclusion hours per 1000 bed hours	6.3	(7.9)	42.5	(47.6)	–2.91**	1.0

Values in parenthesis are standard deviation values

* $p < 0.05$

** $p < 0.001$

Table 2. Outcome of Poisson multi-level modeling on number of seclusion incidents and generalized linear multi-level modeling on seclusion duration proportion

			Poisson multilevel modelling with number of days admitted as exposure (outcome = number of incidents)					Generalized linear multilevel modelling (binomial family, logit link function) (outcome = proportion of seclusion hours of total admission hours)				
		Variables in the model	IRR	z	p-value	95% CI (IRR)		OR	z	p-value	95% CI (IRR)	
						lower bound	upper bound				lower bound	upper bound
Level 2 variables	Ward characteristics	Constant	0.02	-6.18	**0.000**	0.00	0.06	0.03	-4.69	**0.000**	0.01	0.13
		Hospital 1*	1					1				
		2	2.33	1.32	0.187	0.66	8.18	1.71	1.02	0.306	0.61	4.78
		3	1.62	0.95	0.341	0.60	4.33	0.60	-1.07	0.284	0.24	1.52
		4	0.56	-0.91	0.360	0.16	1.96	0.80	-0.40	0.686	0.26	2.41
		5	0.34	-1.96	**0.050**	0.11	1.00	0.67	-0.77	0.438	0.24	1.86
		6	0.57	-0.76	0.445	0.13	2.42	0.33	-1.25	0.213	0.06	1.87
		7	1.61	0.50	0.618	0.25	10.62	1.45	0.50	0.620	0.34	6.25
		Beds per ward	0.93	-2.22	**0.026**	0.88	0.99	0.93	-3.01	**0.003**	0.88	0.97
Level 1 variables	Patient characteristics	Male gender	0.82	-3.69	**0.000**	0.74	0.91	1.31	1.04	0.297	0.79	2.16
		Age below 35 years	1.39	6.07	**0.000**	1.25	1.55	1.60	1.92	0.055	0.99	2.58
		Global Assessment of Functioning (GAF)	0.70	-6.36	**0.000**	0.63	0.78	0.49	-2.77	**0.006**	0.29	0.81
		Score	1					1				
		DSM IV Axis 1** Minor psychiatric	2.01	7.44	**0.000**	1.67	2.42	2.96	2.36	**0.018**	1.20	7.28
		disorders	2.36	7.29	**0.000**	1.87	2.98	4.16	2.67	**0.008**	1.46	11.84
		Unknown	1.68	5.66	**0.000**	1.40	2.01	2.84	2.32	**0.020**	1.18	6.88
		Bipolar disorder	0.82	-1.16	0.245	0.59	1.14	2.05	1.07	0.286	0.55	7.63
		Schizophrenic disorder	1.18	2.40	**0.016**	1.03	1.36	1.06	0.17	0.863	0.54	2.06
		Drug abuse										
		DSM IV Axis 2										

Model fitting:	model McFaddens R^2	log-likelihood		model McFaddens R^2	log-likelihood	
	null model (= no predictors)	-4980		null model (= no predictors)	-389.8	
	patient characteristics only	-4490	0.098	patient characteristics only	-370.5	0.049
	ward characteristics only	-4261	0.144	ward characteristics only	-370.4	0.050
	patient and ward chars.	-4126	0.171	patient and ward chars.	-355.4	0.088
	random effects only	-3805	0.236	random effects only	-372.1	0.045
	random effects and ward chars.	-3794	0.238	random effects and ward chars.	-367.3	0.058
	random effects, ward and patient chars. (= model presented)	-3697	0.258	random effects, ward and patient chars. (= model presented)	-354.3	0.091
	fixed effects only	-3650	0.267	fixed effects only	-342.0	0.122
	fixed effects and patient chars	-3554	0.286	fixed effects and patient chars	-331.4	0.150

* The reference category for hospital is the hospital with the lowest rates before controlling for ward and patient characteristics.

** The reference category for DSM IV Axis I is 'Minor psychiatric disorders, such as depressive disorders, anxiety disorders or adjustment disorders'

Multilevel Analyses

Table 2 shows the effects of ward and patient characteristics in terms of incident rate ratios (IRRs) taking the multilevel structure into account. The model for the number of seclusion incidents (Table 2 on left side) shows effects from both ward characteristics and patient characteristics. The table shows ward size, male gender, age below 35 years, a High GAF score, diagnosis unknown, a bipolar disorder, schizophrenia and personality disorder predicted number of incidents. A model with patient characteristics only corresponded to McFadden's pseudo R2 of 0.098, while a stepwise analysis of the contribution of wards, ward characteristics and patient characteristics to the final model showed the pseudo R2 to increase from 0.236 from ward effects only, to 0.238 by adding ward characteristics to 0.258 by adding patient characteristics. This demonstrates that three-quarters of the variability of the outcome is predicted by ward effects not measured. Measured ward effects such as hospital and number of beds added very little variability. Also patient characteristics added only slightly to variability of outcome. Comparison of the multi-level outcome to straightforward Poisson and Generalized Linear Models regression (not presented) also showed for a great deal comparable predictors underlining the power of these findings.

Results on seclusion duration proportion (Table 2 on the right side) show roughly the same predictors, such as ward size, high GAF score, diagnosis unknown, a bipolar disorder and schizophrenia. Again we observed by inspection of McFadden's R2, that most of the variability was explained by ward characteristics not measured. Notable is that wards with more beds (for example especially in hospital 5) have lower seclusion proportion.

Discussion

This study aimed to investigate whether the characteristics of patient populations within wards can explain differences in seclusion rates between wards. Patients on wards with high seclusion figures showed more often lower GAF scores and more often an unknown diagnosis or diagnosis of psychosis. In the wards with lower seclusion rates, secluded patients were less often male, had less often a psychosis and somewhat more mood, anxiety and personality disorders. However figures on patient characteristics showed some differences between both groups of wards. On average the patients stayed somewhat longer on the wards with high seclusion figures. The seclusion figures on the wards with low and high seclusion rates showed a greater contrast. Both the multivariate as well as the multilevel analyses confirmed that differences at the patient level indeed could explain some of the differences in seclusion incidents as well as seclusion hours within separate wards. The multilevel analyses, on seclusion incidents as well as seclusion duration imply contextual characteristics and to a

small extent patient characteristics predict the number of seclusions and seclusion hours within separate wards. This is in line with Steinert and Lepping (2009) in their Germany study and contrary to Bowers et al. (2010) in the UK. These findings may be valued as reasonably robust, as the straightforward analysis showed in general the same predictors found in the multilevel analyses. However, the effect of patient characteristics seems far smaller than in the perception of team nurses and ward managers.

The outcome at level two showed the differences between the contrasting wards seem to be related to the smaller size of the ward; they might, however, also be related to ward determinants not included in this study. The finding on ward size is counterintuitive, as it might be expected that a smaller ward does provide more intensive patient care and therefore greater opportunity to avert seclusion, when sufficiently staffed (Bowers & Flood, 2008). Even though the size of this effect on seclusion incidents is small, also the low bed provision rate may have some influence on this outcome. These findings suggest that the findings on the wards with limited seclusion hours may be attributable to a ward policy to minimize the use of seclusion, as reported by Huckshorn (2004), Bowers et al. (2010), Husum et al. (2010) and Martin et al. (2005). Possible ward characteristics needing further study could be for example ward space per patient, patient autonomy, admission turn-over, safety procedures and risk assessment.

The study confirms previously reported high figures in Dutch seclusion use (Janssen, et al. 2005), in better-measured data. The results do, however, show a large variance between wards. Some wards showed reasonably low figures, comparable to figures in England or Germany (Janssen, et al. 2009, Steward, et al. 2010, others showed far higher numbers. This large variance underlines the necessity to investigate ward level determinants of these differences.

A major limitation of the study is the relatively small number of hospitals (n = 7) and wards (n = 29) which were included, although this study is still much larger than many others in the literature. Indeed, ward characteristics seem likely to explain much of the variance in seclusion rates. Data on patient characteristics and diagnosis as well as a number of the contextual variables were derived from hospital databases, of unknown accuracy. A major problem in the database is the substantial portion of zero's in both outcome variables. The large number of variables in the univariate analyses may have

resulted in identifying some variables by chance alone, although the application of multilevel statistical analysis will have led to greater accuracy. Finally, the study focused primarily on patient characteristics leaving out a number of possibly relevant ward and contextual variables. Despite these limitations, we identified a number of characteristics at the ward as well as at the patient level were related to the number of incidents and hours in seclusion per time admitted.

Conclusions and Recommendations

This study investigated differences in seclusion use between 29 admission wards. The findings show ward predicts most of seclusion use at the patient as well as ward level. A number of patient characteristics however do contribute to the final model. In future studies, more data about more hospitals are necessary, both at ward level and at hospital level. At ward level, variables like staff-numbers, mix and training, ward facilities, ward function (short or long stay), ward size and ward initiatives in reduction of seclusion may be relevant. At the hospital level, variables like the degree of urbanization of the catchment area, population density and nurse recruitment policies, as well as competition between hospitals within the same catchment area may determine outcome.

Conflict of interest

None for any author.

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