European Psychiatry 48 (2018) 51–57

Contents lists available at ScienceDirect

European Psychiatry

journal homepage: http://www.europsy-journal.com

Original article

Long-term reduction of seclusion and forced medication on a hospital-wide level: Implementation of an open-door policy over 6 years

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ARTICLE INFO

Article history:
Received 26 May 2017
Received in revised form 1st September 2017
Accepted 13 September 2017
Available online 10 January 2018

Keywords:
Acute psychiatric treatment
Aggression
Coercive treatment
Closed ward
Compulsory treatment
Open doors

ABSTRACT

Background: Psychiatric inpatient treatment is increasingly performed in settings with locked doors. However, locked wards have well-known disadvantages and are ethically problematic. In addition, recent data challenges the hypothesis that locked wards provide improved safety over open-door settings regarding suicide, absconding and aggression. Furthermore, there is evidence that the introduction of an open-door policy may lead to short-term reductions in involuntary measures. The aim of this study was to assess if the introduction of an open-door policy is associated with a long-term reduction of the frequency of seclusion and forced medication.
Method: In this 6-year, hospital-wide, longitudinal, observational study, we examined the frequency of seclusion and forced medication in 17,359 inpatient cases admitted to the Department of Adult Psychiatry, Universitäre Psychiatrische Kliniken (UPK) Basel, University of Basel, Switzerland. In an approach to enable a less restrictive policy, six previously closed psychiatric wards were permanently opened beginning from August 2011. During this process, a systematic change towards a more patient-centered and recovery-oriented care was applied. Statistical analysis consisted of generalized estimating equations (GEE) models.
Results: In multivariate analyses controlling for potential confounders, the implementation of an open-door policy was associated with a continuous reduction of seclusion (from 8.2 to 3.5%; $\eta_p^2 = 0.82$; odds ratio: 0.88) and forced medication (from 2.4 to 1.2%; $\eta_p^2 = 0.70$; odds ratio: 0.90).
Conclusion: This underlines the potential of the introduction of an open-door policy to attain a long-term reduction in involuntary measures.

1. Introduction

Psychiatric inpatient treatment is increasingly performed in settings with locked doors [1,2]. Legal status does not seem to be the crucial factor for admission to a locked ward [3] and locking policies are mainly determined by local tradition and highly variable between countries, hospitals and wards [4]. The decision to admit a patient to a locked ward is primarily driven by safety concerns, as locked doors are regarded as an effective measure for protection against the outside, control over patients, secure and efficient care and relief for relatives [2]. Following the medical-ethical guidelines of the Swiss Academy of Medical Sciences, the application of a coercive measure is indicated in cases where a risk of harm to the patient or others cannot otherwise be averted [5]. The constraints to personal freedom these treatment settings impose is ethically problematic and is acceptable from an ethical point of view only under certain conditions: the least restrictive alternative is used and its duration is kept to a minimum, the patient's rights are granted, patient's relatives or guardians are informed and the procedure follows established national and local protocols [6–8]. Locked door settings could also be justified if they would prevent the necessity of safety measures interfering further with personal freedom such as seclusion, restraint and forced medication.

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https://doi.org/10.1016/j.eurpsy.2017.09.008
0924-9338/

However, locked wards have well-known disadvantages [9,10]. Among others, patients' satisfaction with treatment and care may be lower than on open wards [11], the therapeutic atmosphere may be worse [12] and patients may feel confined and dependent [13]. In addition, recent data challenges the hypothesis that locked wards provide improved safety over open-door settings regarding suicide, absconding and aggression [14,15]. Furthermore, locked door settings might even increase the incidence of seclusion, restraint and forced medication, as increased rates of aggressive incidents have been connected to a punitive or threatening atmosphere on locked inpatient units [16]. In addition, closed doors are often used to replace the staff-patient contact, which again might lead to increased safety measures and involuntary treatment. On the contrary, the change to an open-door policy has shown the potential to reduce the incidence of these safety measures. This effect has been found in studies examining individual wards [17–21] and in a large observational data set from 21 German hospitals [22]. In addition, there is evidence that these effects cannot be fully attributed to shifts from recently opened to still closed wards [21]. Following this line of thought, the official statement of the ethics committee of the German Medical Association recommended the reduction of compulsory treatment and the reduction of closed wards in psychiatric settings [23].

However, several open questions that cannot be answered from the current literature remain: it is unsure whether the hospital-wide introduction of an open-door policy is associated with an enduring positive effect on seclusion and forced medication, or if there is a limited effect with return to previous levels. Furthermore, it is unclear what amount of reduction regarding safety measures is possible and how large the effect size of the complex intervention ''introduction of an open-door policy'' might be.

1.1. Aims and hypotheses of study

The aim of the present study was to examine if the introduction of an open-door policy in a hospital providing mental healthcare services is associated with the frequency of seclusion and forced medication and if yes, how enduring these associations might be. This led us to the following hypotheses:

- the introduction of an open-door policy is associated with a long-term reduction of the frequency of seclusion;
- the introduction of an open-door policy is associated with a long-term reduction of the frequency of forced medication.

2. Methods

2.1. General framework

The Department of Adult Psychiatry, Universitäre Psychiatrische Kliniken (UPK) Basel, University of Basel, Switzerland, provides psychiatric in and outpatient services for a population of about 190,000 people living in the city of Basel and the surrounding area. It has a health care mandate for psychiatric patients in the canton of Basel-City and basic healthcare insurance does not cover inpatient treatment in other cantons. During the 6-year study period (2010–2015), between 250 and 260 beds on 15 wards were available for inpatient treatment. In a clinic-wide approach to enable a less restrictive policy [12,21], six previously closed psychiatric wards were permanently opened beginning from August 2011. During this process, a systematic change towards a more patient-centered and recovery-oriented treatment standard including active family and caregivers involvement, the implementation of a new concept in cognitive behavioral therapy (individual and group therapy), the implementation of a primary nursing care delivery model, improved availability of pharmaco- and psychotherapy, teambuilding measures and de-escalation training for the personnel, was implemented (compare [24,25]).

Processes for the prevention of critical incidents, seclusion and forced medication were continuously monitored to ensure maximum safety for patients and personnel while reducing involuntary treatment [26]. The primary interdisciplinary team consisted of psychiatrists, psychologists and nurses. Table S1 summarizes the number of full-time employees per profession and per examined year and is available as an online-only supplement to provide an overview on staff-to-case ratio and team composition. Team members were aware of clinical monitoring but were not informed that a scientific evaluation of the data would be performed.

2.2. Study population

Inclusion criteria for the current study were inpatient status at the Department of Adult Psychiatry, UPK Basel, at least 18 years of age, and admission to one of the 15 wards between 01/2010 and 12/2015. Patients whose inpatient treatment had not been completed within the analysis period were excluded from the current study. Of the 17,615 inpatient cases available from 01/2010 to 12/2015, 17,359 (98.6%) were entered in the current analyses. No further in or exclusion criteria were defined to ensure a naturalistic sample.

2.3. Documentation and management of clinical data

Clinical and treatment data were continuously documented using the Medfolio software (current version: 2.2.0.2085; NEXUS AG, Villingen-Schwenningen, Germany) and extracted using HCe® Analytics software (Business Intelligence Connector 3 (BIC 3) for patient controlling; TIP Management AG, Dübendorf, Switzerland). Data on age, gender, marital status, nationality, housing situation, occupational situation, diagnoses according to the International Classification of Diseases, 10th revision (ICD-10 [27]), legal status, type of admission, psychopharmacological treatment and type of discharge were documented by the psychiatrists responsible for the respective patient.

Due to legal requirements, a detailed documentation of coercive measures was available. A definition of coercive measures can be found in the medical-ethical guidelines of the Swiss Academy of medical Sciences [5] and two types of coercive measures were recorded as main outcome parameters:

- first, forced isolation with or without psychopharmacological treatment was documented as ''seclusion'' and defined as the involuntary placement of an individual locked in a room alone, which may be set up especially for this purpose;
- secondly, forced intake of oral or application of intramuscular medication without forced isolation was documented as ''forced medication'' and defined as administering medication against the patient's will using restraint or strong psychological pressure (involving at least three staff members) [28].

Data on physical restraint, defined as mechanical restraint using belts or straps, were not available for the current analyses as this coercive measure is not used at the UPK Basel. Involuntary hospitalization constitutes an additional coercive measure. However, only public health officers and local authorities are allowed to initiate an involuntary hospitalization in the canton of Basel-City–although longer-term changes in their decisions and guidelines

https://doi.org/10.1016/j.eurpsy.2017.09.008 Published online by Cambridge University Press

might follow the introduction of an open-door policy in the hospital where they admit their patients, involuntary hospitalization therefore cannot be directly influenced by changes in hospital policies and was thus not chosen as an outcome parameter. It has, however, been included in the sample description and as a potential confounder in the multivariate analyses.

As data was documented during routine treatment and anonymized during data extraction, the current study was exempt from local ethics committee approval. Nevertheless, the study protocol has been peer-reviewed by an internal research committee at the Department of Adult Psychiatry, Universitäre Psychiatrische Kliniken (UPK) Basel, University of Basel, Switzerland. The current study was performed in accordance with all national and international legal regulations and with the Declaration of Helsinki in its current version.

2.4. Statistical analysis

Descriptive statistics are given in total numbers and percentages for nominal scaled variables as well as mean and standard deviation (SD) for ordinal and interval scaled variables. Group comparisons were performed via chi-square tests (nominal scale, parametric) and one-way ANOVAs (ordinal and interval scale, parametric). Due to the descriptive nature of the exploratory comparisons accompanying and enhancing the sample description (Tables 1–3), no correction for multiple testing was employed.

To investigate the association of seclusion and forced medication with the implementation of a least restrictive policy (main analysis), we performed a panel data analysis using generalized estimating equations (GEE) with the binary response variable "seclusion" and "forced medication" and the year of admission as

Table 1
Clinical and sociodemographic characteristics prior to and at admission ($n = 17{,}359$).

	2010	2011	2012	2013	2014	2015	*P*-value
Percentage of closed beds	45.6%	32.4%	31.8%	22.3%	15.4%	8.5%	
Number of cases	2924	2848	2873	2989	2922	2803	
Age (years)	45.9 ± 16.9	46.9 ± 17.6	45.8 ± 17.1	45.8 ± 17.2	45.4 ± 16.5	46.3 ± 16.5	$P = .023$[a]
Gender (female)	1546 (52.9%)	1507 (52.9%)	1461 (50.8%)	1558 (52.1%)	1469 (50.3%)	1516 (54.1%)	$P = .042$[b]
Marital status							
Unmarried	1358 (46.4%)	1384 (48.6%)	1384 (48.2%)	1466 (49.2%)	1460 (50.2%)	1357 (48.5%)	$P = .159$[b]
Married	529 (18.0%)	476 (16.7%)	560 (19.5%)	573 (19.2%)	523 (18.0%)	573 (20.5%)	$P = .005$[b]
Separated/divorced	689 (23.6%)	605 (21.2%)	584 (20.3%)	633 (21.3%)	548 (18.9%)	573 (20.5%)	$P = .001$[b]
Widowed	187 (6.4%)	166 (5.8%)	139 (4.8%)	127 (4.3%)	136 (4.7%)	115 (4.1%)	$P < .001$[b]
Unknown	161 (5.5%)	217 (7.6%)	206 (7.2%)	179 (6.0%)	239 (8.2%)	180 (6.4%)	$P < .001$[b]
Nationality							$P = .015$[b]
Switzerland	2058 (70.4%)	2057 (72.2%)	2044 (71.1%)	2046 (68.5%)	2009 (68.8%)	1963 (70.0%)	
Other	866 (29.6%)	791 (27.8%)	829 (28.9%)	943 (31.5%)	913 (31.2%)	840 (30.0%)	
Housing situation							
Private residence	1173 (40.1%)	1109 (38.9%)	1069 (37.2%)	1131 (37.8%)	1071 (36.7%)	990 (35.3%)	$P = .004$[b]
Living together with others	1157 (39.6%)	1121 (39.4%)	1196 (41.6%)	1235 (41.3%)	1158 (39.6%)	1107 (39.5%)	$P = .279$[b]
Assisted living	261 (8.9%)	257 (9.0%)	248 (8.6%)	220 (7.4%)	229 (7.8%)	276 (9.8%)	$P = .012$[b]
Hospitalized or in penal institution	58 (2.0%)	127 (4.5%)	116 (4.0%)	117 (3.9%)	128 (4.4%)	136 (4.9%)	$P < .001$[b]
Homeless	90 (3.1%)	65 (2.3%)	66 (2.3%)	82 (2.7%)	76 (2.6%)	104 (3.7%)	$P = .009$[b]
Other	37 (1.3%)	32 (1.1%)	33 (1.1%)	32 (1.1%)	38 (1.3%)	22 (0.8%)	$P = .499$[b]
Unknown	148 (5.1%)	137 (4.8%)	145 (5.0%)	172 (5.8%)	222 (7.6%)	168 (6.0%)	$P < .001$[b]
Occupational situation							
Employed	533 (18.2%)	493 (17.3%)	541 (18.8%)	576 (19.7%)	503 (17.9%)	503 (17.9%)	$P = .256$[b]
In education or civilian or military service	111 (3.8%)	110 (3.9%)	120 (4.2%)	106 (3.5%)	94 (3.2%)	74 (2.6%)	$P = .030$[b]
Other types of regular work	176 (6.0%)	198 (7.0%)	161 (5.6%)	150 (5.0%)	130 (4.4%)	107 (3.8%)	$P < .001$[b]
Retirement/disability pension	1129 (38.6%)	1123 (39.4%)	1040 (36.2%)	1015 (34.0%)	1120 (34.9%)	1140 (40.7%)	$P < .001$[b]
Unemployed	605 (20.7%)	628 (22.1%)	685 (23.8%)	805 (26.9%)	720 (24.6%)	640 (22.8%)	$P < .001$[b]
Unknown	370 (12.7%)	296 (10.4%)	326 (11.3%)	353 (11.8%)	382 (13.1%)	339 (12.1%)	$P = .028$[b]
Main diagnosis (ICD-10)							
F0 organic, including symptomatic, mental disorders	150 (5.1%)	176 (6.2%)	156 (5.4%)	175 (5.9%)	141 (4.8%)	126 (4.5%)	$P = .045$[b]
F1 mental and behavioral disorders due to psychoactive substance use	781 (26.7%)	739 (25.9%)	681 (23.7%)	728 (24.4%)	656 (22.5%)	630 (22.5%)	$P < .001$[b]
F2 schizophrenia, schizotypal and delusional disorders	593 (20.3%)	518 (18.2%)	534 (18.6%)	535 (17.9%)	561 (19.2%)	559 (19.9%)	$P = .122$[b]
F3 mood (affective) disorders	812 (27.8%)	770 (27.0%)	864 (30.1%)	910 (30.4%)	904 (30.9%)	803 (28.6%)	$P = .004$[b]
F4 neurotic, stress-related and somatoform disorders	289 (9.9%)	335 (11.8%)	296 (10.3%)	325 (10.9%)	354 (12.1%)	429 (15.3%)	$P < .001$[b]
F6 disorders of adult personality and behavior	192 (6.6%)	198 (7.0%)	236 (8.2%)	223 (7.5%)	233 (8.0%)	184 (6.6%)	$p = .057$[b]
Other psychiatric diagnosis	46 (1.6%)	51 (1.8%)	46 (1.6%)	37 (1.2%)	44 (1.5%)	45 (1.6%)	$P = .678$[b]
No psychiatric diagnosis	61 (2.1%)	61 (2.1%)	60 (2.1%)	56 (1.9%)	29 (1.0%)	27 (1.0%)	$P < .001$[b]
Type of entry							$P < .001$[b]
Voluntary	2698 (92.3%)	2547 (89.4%)	2558 (89.0%)	2661 (89.0%)	2609 (89.3%)	2532 (90.3%)	
Involuntary	226 (7.7%)	301 (10.6%)	315 (11.0%)	328 (11.0%)	313 (10.7%)	271 (9.7%)	
Type of admission							
Patient's initiative	1289 (44.1%)	1289 (45.3%)	1292 (45.0%)	1317 (44.1%)	1287 (44.0%)	1343 (47.9%)	$P = .025$[b]
Admission by physician	998 (34.1%)	853 (30.0%)	919 (32.0%)	1099 (36.8%)	1145 (39.2%)	1044 (37.2%)	$P < .001$[b]
Other types of admission	596 (20.4%)	644 (22.6%)	614 (21.4%)	509 (17.0%)	440 (15.1%)	385 (13.7%)	$P < .001$[b]
Unknown	41 (1.4%)	62 (2.2%)	48 (1.7%)	64 (2.1%)	50 (1.7%)	31 (1.1%)	$P = .011$[b]
Triage to open or closed ward							$P < .001$[b]
Open	1200 (41.0%)	1226 (43.0%)	1691 (58.9%)	1888 (63.2%)	2304 (78.9%)	2462 (87.8%)	
Closed	1724 (59.0%)	1622 (57.0%)	1182 (41.1%)	1101 (36.8%)	618 (21.1%)	341 (12.2%)	

Values are given as number (percentage) for nominal variables and in mean ± standard deviation for continuous variables. To enhance the interpretability of the sample description, *P*-values from exploratory analyses are presented.

[a] One-way ANOVA.

[b] χ^2-test.

https://doi.org/10.1016/j.eurpsy.2017.09.008 Published online by Cambridge University Press

Table 2
Clinical characteristics during treatment.

	2010	2011	2012	2013	2014	2015	*P*-value
Number of cases	2924	2848	2873	2989	2922	2803	
Psychopharmacological treatment							
Antipsychotics	1524 (52.1%)	1415 (49.7%)	1442 (50.2%)	1333 (44.6%)	1337 (45.8%)	1347 (48.1%)	$P < .001$[b]
Mood stabilizers	536 (18.3%)	477 (16.7%)	568 (19.8%)	442 (14.8%)	477 (16.3%)	505 (18.0%)	$P < .001$[b]
Sedatives	1197 (40.9%)	1183 (41.5%)	1133 (39.4%)	901 (30.1%)	861 (29.5%)	956 (34.1%)	$P < .001$[b]
Antidepressants	1344 (46.0%)	1352 (47.3%)	1323 (46.0%)	1303 (43.6%)	1297 (44.4%)	1237 (44.1%)	$P = .027$[b]
Treatment duration (days)	26.8 ± 37.3	27.5 ± 36.2	27.7 ± 35.0	27.3 ± 32.9	28.3 ± 32.5	24.2 ± 28.3	$P < .001$[a]
Type of discharge							
Both sides agree on discharge	2271 (77.7%)	2113 (74.2%)	2199 (76.5%)	2120 (70.9%)	2221 (76.0%)	2189 (78.1%)	$P < .001$[b]
Discharge w/o physician's consent	385 (13.2%)	431 (15.1%)	402 (14.0%)	480 (16.1%)	372 (12.7%)	310 (11.1%)	$P < .001$[b]
Discharge w/o patient's consent	129 (4.4%)	149 (5.2%)	155 (5.4%)	137 (4.6%)	121 (4.1%)	104 (3.7%)	$P = .019$[b]
Other	118 (4.0%)	140 (4.9%)	105 (3.7%)	77 (2.6%)	78 (2.7%)	71 (2.5%)	$P < .001$[b]
Unknown	21 (0.7%)	15 (0.5%)	12 (0.4%)	175 (5.9%)	130 (4.4%)	129 (4.6%)	$P < .001$[b]

Values are given as number (percentage) for nominal variables and in mean ± standard deviation for continuous variables. To enhance the interpretability of the sample description, *P*-values from exploratory analyses are presented.
[a] One-way ANOVA.
[b] χ^2-test.

Table 3
Descriptive statistics of outcome variables.

	2010	2011	2012	2013	2014	2015	*P*-value
Number of cases	2924	2848	2873	2989	2922	2803	
Seclusion							
Cases with at least one seclusion	239 (8.2%)	224 (7.9%)	164 (5.7%)	126 (4.2%)	125 (4.3%)	97 (3.5%)	$P < .001$[b]
Mean number of seclusion	5.1 ± 8.7	3.7 ± 4.3	3.3 ± 4.5	3.2 ± 3.2	2.6 ± 3.7	2.9 ± 3.4	$P < .001$[a]
Mean duration of seclusion (hours)	27.1 ± 16.4	25.7 ± 12.1	20.9 ± 7.6	21.3 ± 8.7	20.1 ± 7.2	18.2 ± 6.5	$P < .001$[a]
Forced medication (FM)							
Cases with at least one FM	70 (2.4%)	64 (2.2%)	67 (2.3%)	49 (1.6%)	34 (1.2%)	35 (1.2%)	$P < .001$[b]
Mean number of FM	2.3 ± 3.2	2.4 ± 3.6	3.3 ± 4.7	1.4 ± 0.7	1.2 ± 0.4	1.2 ± 0.5	$P = .003$[a]

Values are given as number (percentage) for nominal variables and in mean ± standard deviation for continuous variables. To enhance the interpretability of the sample description, *P*-values from exploratory analyses are presented.
[a] One-way ANOVA.
[b] χ^2-test.

independent variable (main analyses). Due to the dependency of our observations within subjects, we chose compound symmetry as our covariance structure in the model. Regarding other clinical and sociodemographic characteristics prior to and at admission as described in the descriptive statistics, there were significant differences for most variables, with fluctuations over time and no clear trend for an increase or decrease, indicating the need to control for these variables as potential confounders. Namely, we controlled for the following confounders:

- age;
- sex;
- marital status;
- nationality;
- housing situation;
- occupational situation;
- main diagnosis;
- type of entry;
- type of admission;
- triage to an open or closed ward at admission.

Multiple imputations were used to estimate missing values for GEE analyses. To assess if this may have an impact on our findings, we performed GEE analyses without multiple imputation as sensitivity analyses. This yielded comparable results that are therefore not reported in the current manuscript.

All tests of significance were 2-tailed and *P*-values $< .05$ were considered significant. Effect size η_p^2 was calculated according to Levine et al. [29] and defined as small ($d = 0.2$–$.49$), medium ($d = 0.5$–$.79$), and large ($d \geq 0.8$). Statistical analyses were conducted using PASW Statistics 18.0 (Chicago, Illinois, USA).

3. Results

Overall, 17,359 cases were admitted and had completed treatment during the observation period. The percentage of closed beds available for inpatient admissions persistently decreased from 45.6% in 2010 to 8.5% in 2015. This organizational change is reflected in the growing percentage of cases admitted to open wards (from 41.0 to 87.8%) at relatively stable rates of involuntary admissions fluctuating from 7.7 until 11% of the cases. Table 1 shows the clinical and sociodemographic characteristics of the patients prior to and at admission.

From 2010 to 2015, the mean age of our sample ranged from 45.4 to 46.9 years and there was a slightly higher percentage of female than male subjects (50.3 to 54.1%). Percentages of widowed subjects decreased over time. The percentage of admitted patients with private residences also showed a decrease over time, whereas the percentage of employed patients was stable. While the percentage of cases with a main diagnosis of schizophrenia spectrum disorder and with "other psychiatric diagnosis" was stable over time, percentages of the remaining diagnostic categories and the group of cases with no main diagnosis of a psychiatric illness differed regarding the year of admission. There were significant differences regarding type of entry and the type of admission and the triage to an open ward showed an increase over time in our sample.

Table 2 shows the clinical characteristics of the included cases during hospitalization. There were significant differences in psychopharmacological treatment with an overall decrease of medication with sedatives and mean treatment duration ranged from 24.2 to 28.3 days with the lowest duration in 2015. Type of discharge showed significant fluctuations with no clear tendency for an in or decrease over the observation period.

https://doi.org/10.1016/j.eurpsy.2017.09.008 Published online by Cambridge University Press

Table 4
Generalized estimating equation (GEE) analysis with imputed missing values using multiple imputation and seclusion as dependent variable.

Seclusion	*B*	SE	df	*P*	95% CI	η_p^2
Year of admission	−0.128	0.028	1	<.001	−0.175 to −0.082	0.82
Sex	−0.044	0.090	1	.621	−0.193–0.105	n/a
Age	−0.015	0.003	1	<.001	−0.018 to −0.013	0.83
Marital status	0.055	0.017	1	.002	0.021–0.089	0.76
Nationality	0.239	0.097	1	.014	−0.046–0.433	0.71
Housing situation	−0.013	0.017	1	.455	−0.020–0.046	n/a
Occupational situation	0.053	0.018	1	.003	−0.017–0.088	0.75
Main diagnosis	−0.007	0.020	1	.710	−0.027–0.012	n/a
Type of entry	1.694	0.094	1	<.001	1.600–1.788	0.95
Type of admission	0.082	0.024	1	.001	0.035–0.130	0.77
Admission open/closed	1.698	0.131	1	<.001	1.567–1.830	0.84
Constant	252.011	56.058	1	<.001	149.537–354.485	0.82

CI: confidence interval; df: degrees of freedom; SE: standard error; n/a: not applicable.

Table 3 shows the descriptive statistics regarding the outcome variables seclusion and forced medication. The percentage of cases with at least one seclusion, the mean number of seclusions per case, the mean duration of a seclusion, the percentage of cases with at least one forced medication and the mean number of forced medications per case all showed a significant decrease from 2010 to 2015 in these exploratory analyses. Over the observation period, the percentage of cases affected by at least one seclusion dropped from 8.2 to 3.5% with a decrease in frequency from a mean of 5.1 to 2.9 seclusions per affected case and in the duration of seclusion from 27.1 to 18.2 hours. For forced medication, the percentage of affected cases decreased from 2.4 to 1.2% and the mean number of events per affected case was lowered from 2.3 to 1.2.

Table 4 shows the test statistic for year of admission as a predictor of seclusion controlled for sex, age, marital status, nationality, housing situation, occupational situation, main diagnosis, type of entry, type of admission, triage to an open or closed ward and adjusted for multiple hospitalizations of the same patient. As hypothesized, the application of seclusion showed a significant decrease over time with large effect size ($\eta_p^2 = 0.82$; odds ratio: 0.88). Hence, the probability for an admitted case to experience seclusion was reduced by 12% per year. Also, younger age, being separated, divorced or widowed, unemployment and Swiss nationality were associated with a higher probability of seclusion. On the other hand, voluntary admission, admission on patient's initiative and the admission to an open ward went along with a lowered probability of seclusion.

Table 5 shows the test statistic for the year of admission as a predictor of forced medication controlled for the same variables as mentioned for Table 4. Again, as hypothesized, the application of forced medication decreased significantly over time with a medium effect size ($\eta_p^2 = 0.70$; odds ratio: 0.90). Hence, the probability for an admitted case to experience forced medication was reduced by 10% per year. In addition, age, marital status, type of entry, type of admission and triage to an open or closed ward showed significant connections with the occurrence of forced medication. Younger age and being separated, divorced or widowed were associated with a higher probability of forced medication and voluntary admission, admission on patient's initiative and the admission to an open ward with a lowered probability of forced medication.

4. Discussion

This 6-year, hospital-wide, longitudinal, observational study examined potential associations of the introduction of an open-door policy with the frequency of seclusion and forced medication. To the authors' knowledge, this is the first study covering the introduction of an open-door policy with an observation period allowing assessment of the time course and stability of the accompanying changes.

Furthermore, the analysis of data on a hospital-wide level allowed controlling for shifts in patient distribution. As basic healthcare insurance in Basel-City does not cover inpatient treatment in other cantons and as the UPK Basel has a health care mandate for psychiatric patients in the canton of Basel-City without the possibility to decline admissions of specific patient groups, possible effects of shifts inpatient distribution on a canton-wide scale can be assumed to be negligible. Further strengths of this study include the high data quality due to prospective electronic documentation, the good generalizability of the results due to the inclusion of a general psychiatric patient collective

Table 5
Generalized estimating equation (GEE) analysis with imputed missing values using multiple imputation and forced medication as dependent variable.

Forced medication	*B*	SE	df	*p*	95% CI	η_p^2
Year of admission	−0.107	0.046	1	.021	−0.192 to −0.021	0.70
Sex	−0.050	0.137	1	.713	−0.087–0.188	n/a
Age	−0.020	0.004	1	<.001	−0.028 to −0.011	0.83
Marital status	0.080	0.026	1	.002	0.029–0.132	0.76
Nationality	0.202	0.147	1	.168	−0.085–0.490	n/a
Housing situation	−0.001	0.028	1	.959	−0.055–0.052	n/a
Occupational situation	0.011	0.032	1	.733	−0.052–0.075	n/a
Main diagnosis	−0.029	0.034	1	.403	−0.095–0.038	n/a
Type of entry	1.969	0.158	1	<.001	1.671–2.267	0.93
Type of admission	0.131	0.029	1	<.001	0.071–0.191	0.82
Admission open/closed	1.545	0.208	1	<.001	1.337–1.753	0.88
Constant	207.216	93.098	1	.026	33.123–381.309	0.69

CI: confidence interval; df: degrees of freedom; SE: standard error; n/a: not applicable.

https://doi.org/10.1016/j.eurpsy.2017.09.008 Published online by Cambridge University Press

covering all psychiatric diagnoses and the large number of patient cases examined.

The hospital-wide introduction of an open-door policy constitutes a complex intervention [24,25]. Most of the applied changes cannot easily be monitored using clinical data. However, our data show a prominent and continuous reduction in the availability of closed beds for inpatient treatment.

One of the often-named caveats against the introduction of an open-door policy is the fear that it might lead to premature treatment discontinuation with discharge of patients that are still endangered or dangerous, leading to safety problems and a revolving-door phenomenon with rising involuntary admissions. However, based on first evidence from the current literature [14,22], this may not be the case. Furthermore, the absence of clear longitudinal trends for involuntary admissions, treatment duration and type of discharge in our sample supports the notion that the introduction of an open-door policy did not have this effect in our sample.

Our main findings are in line with previous literature showing a decrease in involuntary measures following the introduction of an open-door policy on individual wards [17–20]. In addition, they are compatible with a recent study comparing hospitals without locked wards and hospitals with locked wards and showing that restraint or seclusion during treatment were less likely in hospitals with an open-door policy [22]. In addition, our results further support the findings from a previous study comparing two permanently open, two permanently closed and two newly opened wards in our hospital from 08/2010 to 07/2011 and from 08/2011 to 07/2012 [21]. These analyses showed a significant decrease in frequency of seclusion and forced medication for the newly opened wards, with a significant overall decrease of seclusion and no significant overall differences for forced medication. The current results expand on these findings, showing that the association of an open-door policy with reduced involuntary measures remains stable over an observation period of six years and that there is no return to previous levels.

As a patient shift to other hospitals is highly unlikely due to the local healthcare system conditions and as all 15 hospital wards were included in the current analyses, it is improbable that this positive development is counterbalanced by an increase in security measures or involuntary admissions in other hospitals. Personal communication maintained with the police, the public health officers and the local authorities during the introduction of an open-door policy revealed no signs of an increase of adverse events during the observation period, indicating that the decrease in involuntary measures did not come at the cost of an increased risk for the patients or the general population.

The overall frequency of seclusion and forced medication as reported in the literature varies considerably. In the EUNOMIA project, the percentage of patients receiving coercive measures in each country varied between 21 and 59% [28]. In a study conducted in 36,690 cases treated in several psychiatric hospitals in Germany, 9.5% of the cases were exposed to coercive measures [30]. In summary, the rates of seclusion (up to 8.2%) and forced medication (up to 2.4%) in our sample are compatible with the rates found in other studies. Nevertheless, further efforts could result in a still higher reduction of seclusion and forced medication, as, e.g., the mean duration of seclusion remained high (at a mean of 18 hours) compared to a mean duration of seclusion of about 20 minutes in the UK [31].

4.1. Limitations

The current study has a number of methodological limitations. Due to the observational character of the data without comparison group, it remains unclear what amount of the decrease in seclusion and forced medication can be attributed to the introduction of an open-door policy. However, the National Association for Quality Development in Hospitals (ANQ), which monitors the incidence of seclusion and forced medication for all hospitals in Switzerland starting from 2012, found no general trend for an increase or decrease [32]. Still, further research employing study designs with control groups, preferably in a randomized controlled trial design, is encouraged to verify our findings. On the other hand, this kind of trial is difficult to realize due to ethical constraints and comes with its own limitations (e.g., concerning the validity of the comparison groups, which may be influenced by effects of the personnel and the treatment approach and concerning selection effects imposed by informed consent and in and exclusion criteria, limiting transferability of the findings to clinical routine) [33].

Whereas the minimal in and exclusion criteria, the inclusion of all wards in a general psychiatric hospital and of patients with the whole spectrum of psychiatric diagnoses improves the generalizability of our findings, treatment on locked wards and involuntary measures inherently depend on the local and national situation regarding healthcare system and legal framework. It is, therefore, unclear to which degree our findings may be transferable to other systems with differing conditions.

Furthermore, clinical routine data were used for the current analyses. Although they were prospectively entered in an electronic documentation system and it is known that data quality and completeness is sufficient for scientific analyses, only basic clinical data were available. It would have been of additional use for the current study to have more detailed information regarding, e.g., history of aggression, aggressive incidents during inpatient treatment, psychopathology and adherence to treatment. In addition, reporting on adverse events pertaining to the general population was only available via personal communication and sources of quantitative data were often unavailable, incomplete, or heterogeneous. However, this is a common problem and similar limitations exist for other research on our topic [14,22].

5. Conclusion

In this 6-year, hospital-wide, longitudinal study, the implementation of a least restrictive policy was associated with an ongoing, clinically relevant, statistically significant, high effect strength reduction in seclusions and a medium effect strength decrease in forced medication. This underlines the potential of the introduction of an open-door policy to attain a long-term reduction in coercive measures.

Ethics committee approval

According to current legal regulation, no approval from the local ethics committee was required for the current study.

Role of funding source

This work was supported by the Swiss Academy of Medical Sciences and the Gottfried and Julia Bangerter-Rhyner foundation (CGH) and the research fund of the UPK Basel (LH and CGH). The funding body had no role in the design, collection, analysis, or interpretation of data; in the writing of the manuscript; or in the decision to submit the manuscript for publication.

Authors' contributions

UEL and CGH designed the study and LH and CGH wrote the initial draft of the paper. DF and CGH collected the data. LH, DF, AS

https://doi.org/10.1016/j.eurpsy.2017.09.008 Published online by Cambridge University Press

and CGH analyzed and interpreted the data. All authors have contributed to, read and approved the final version of the manuscript. LH and CGH had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

Disclosure of interest

The authors declare that they have no competing interest.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.eurpsy.2017.09.008.

References

[1] Bowers L, Haglund K, Muir-Cochrane E, Nijman H, Simpson A, Van Der Merwe M. Locked doors: a survey of patients, staff and visitors. J Psychiatr Ment Health Nurs 2010;17(10):873–80.
[2] Haglund K, von Knorring L, von Essen L. Psychiatric wards with locked doors – advantages and disadvantages according to nurses and mental health nurse assistants. J Clin Nurs 2006;15(4):387–94.
[3] Hoyer G, Kjellin L, Engberg M, Kaltiala-Heino R, Nilstun T, Sigurjonsdottir M, et al. Paternalism and autonomy: a presentation of a Nordic study on the use of coercion in the mental health care system. Int J Law Psychiatry 2002;25(2):93–108.
[4] Rittmannsberger H, Sartorius N, Brad M, Burtea V, Capraru N, Cernak P, et al. Changing aspects of psychiatric inpatient treatment. A census investigation in five European countries. Eur Psychiatry 2004;19(8):483–8.
[5] Swiss Academy of Medical S. Medical-ethical guidelines: coercive measures in medicine. Swiss Med Wkly 2015;145:w14234.
[6] Lutzen K. Subtle coercion in psychiatric practice. J Psychiatr Ment Health Nurs 1998;5(2):101–7.
[7] Lind M, Kaltiala-Heino R, Suominen T, Leino-Kilpi H, Valimaki M. Nurses' ethical perceptions about coercion. J Psychiatr Ment Health Nurs 2004; 11(4):379–85.
[8] Huber CG, Sowislo JF, Schneeberger AR, Flury Bodenmann B, Lang UE. Empowerment – a new pathway toward de-stigmatising mental illness and psychiatry. Schweiz Arch Neurol Psychiatr 2015;166(7):224–32.
[9] Lang UE, Walter M, Borgwardt S, Heinz A. About the reduction of compulsory measures by an "open door policy". Psychiatr Prax 2016;43(6):299–301.
[10] Schneeberger AR, Huber C, Lang UE. Open wards in psychiatric clinics and compulsory psychiatric admissions. JAMA Psychiatry 2016;73(12):1293.
[11] Muller MJ, Schlosser R, Kapp-Steen G, Schanz B, Benkert O. Patients' satisfaction with psychiatric treatment: comparison between an open and a closed ward. Psychiatr Q 2002;73(2):93–107.
[12] Blaesi S, Gairing SK, Walter M, Lang UE, Huber CG. Safety, therapeutic hold, and patient's cohesion on closed, recently opened and open psychiatric wards. Psychiatr Prax 2015;42(2):76–81.
[13] Haglund K, von Essen L. Locked entrance doors at psychiatric wards – advantages and disadvantages according to voluntarily admitted patients. Nord J Psychiatry 2005;59(6):511–5.
[14] Huber CG, Schneeberger AR, Kowalinski E, Frohlich D, von Felten S, Walter M, et al. Suicide risk and absconding in psychiatric hospitals with and without open door policies: a 15-year, observational study. Lancet Psychiatr 2016;3(9):842–9.
[15] Schneeberger AR, Kowalinski E, Fröhlich D, Schroeder K, Von Felten S, Zinkler M, et al. Aggression and violence in psychiatric hospitals with and without open door policies: a 15-year naturalistic observational study. J Psychiatr Res 2017;95:189–95. https://doi.org/10.1016/j.jpsychires.2017.08.017.
[16] Bowers L, Jarrett M, Clark N. Absconding: a literature review. J Psychiatr Ment Health Nurs 1998;5(5):343–53.
[17] Lang UE, Hartmann S, Schulz-Hartmann S, Gudlowski Y, Ricken R, Munk I, et al. Do locked doors in psychiatric hospitals prevent patients from absconding? Eur J Psychiat 2010;24(4):199–204.
[18] Cibis ML, Wackerhagen C, Muller S, Lang UE, Schmidt Y, Heinz A. Comparison of aggressive behavior, compulsory medication and absconding behavior between open and closed door policy in an acute psychiatric ward. Psychiatr Prax 2016.
[19] Fan Z, Huang J, Wu Q, Jiang S. Comparison of standard locked-ward treatment versus open-ward rehabilitation treatment for chronic schizophrenic patients. A one-year controlled trial in Canton. Br J Psychiatry Suppl 1994;24:45–51.
[20] Steinert T, Eisele F, Goeser U, Tschoeke S, Uhlmann C, Schmid P. Successful interventions on an organisational level to reduce violence and coercive interventions in inpatients with adjustment disorders and personality disorders. Clin Pract Epidemiol Ment Health 2008;4:27.
[21] Jungfer HA, Schneeberger AR, Borgwardt S, Walter M, Vogel M, Gairing SK, et al. Reduction of seclusion on a hospital-wide level: successful implementation of a less restrictive policy. J Psychiatr Res 2014;54:94–9.
[22] Schneeberger AR, Kowalinski E, Fröhlich D, von Felten S, Borgwardt S, Lang UE, et al. Aggression, seclusion and restraint in psychiatric hospitals with and without closed wards: a 15-year observational study. Br J Psychiatry 2017 [under review].
[23] Wiesing U. Stellungnahme der Zentralen Kommission zur Wahrung ethischer Grundsätze in der Medizin und ihren Grenzgebieten (Zentrale Ethikkommission) bei der Bundesärztekammer: Zwangsbehandlung bei psychischen Erkrankungen. Dtsch Arztebl 2013;110(26):A1334–8.
[24] Sollberger D, Lang UE. Psychiatry with open doors: part 2: therapeutic challenges. Nervenarzt 2014;85(3):319–25.
[25] Sollberger D, Lang UE. Psychiatry with open doors: part 1: rational for an open door for acute psychiatry. Nervenarzt 2014;85(3):312–8.
[26] Sharfstein SS. Commentary: reducing restraint and seclusion: a view from the trenches. Psychiatr Serv 2008;59(2):197.
[27] WHO. ICD-10: The ICD-10 Classification of mental and behavioural disorders: clinical descriptions and diagnostic guidelines. Geneva: World Health Organisation (WHO); 1992.
[28] Raboch J, Kališová L, Nawka A, Kitzlerová E, Onchev G, Karastergiou A, et al. Use of coercive measures during involuntary hospitalization: findings from ten European countries. Psychiatr Serv 2010;61(10):1012–7.
[29] Levine TR, Hullett CR. Eta squared, partial eta squared and misreporting of effect size in communication research. Hum Commun Res 2002;28(4):612–25.
[30] Steinert T, Martin V, Baur M, Bohnet U, Goebel R, Hermelink G, et al. Diagnosis-related frequency of compulsory measures in 10 German psychiatric hospitals and correlates with hospital characteristics. Soc Psychiatry Psychiatr Epidemiol 2007;42(2):140–5.
[31] Steinert T, Lepping P, Bernhardsgrutter R, Conca A, Hatling T, Janssen W, et al. Incidence of seclusion and restraint in psychiatric hospitals: a literature review and survey of international trends. Soc Psychiatry Psychiatr Epidemiol 2010;45(9):889–97.
[32] National Association for Quality Development in Hospitals (ANQ). Nationaler Vergleichsbericht Stationäre Psychiatrie Erwachsene 2013; 2014 [Available from: http://www.anq.ch/messergebnisse/ergebnisse-psychiatrie/].
[33] Schneeberger AR, Huber CG, Lang UE. Open wards in psychiatric clinics and compulsory psychiatric admissions. JAMA psychiatry 2017. https://doi.org/10.1001/jamapsychiatry.2016.1738.