

# How mental health service systems are organized may affect the rate of acute admissions to specialized care: Report from a natural experiment involving 5338 admissions

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## Abstract

**Objectives:** Studies on the dynamics between service organization and acute admissions to psychiatric specialized care have given ambiguous results. We studied the effect of several variables, including service organization, coercion, and patient characteristics on the rate of acute admissions to psychiatric specialist services. In a natural experiment-like study in Norway, we compared a “deinstitutionalized” and a “locally institutionalized” model of mental health services. One had only community outpatient care and used beds at a large Central Mental Hospital; the other also had small bed-units at the local District Psychiatric Centre.

**Methods:** From the case registries, we identified a total of 5338 admissions, which represented all the admissions to the psychiatric specialist services from 2003 to 2006. The data were analyzed with chi-square tests and Z-tests. In order to control for possible confounders and interaction effects, a multivariate analysis was also performed, with a logistic regression model.

**Results:** The use of coercion emerged as the strongest predictor of acute admissions to specialist care (odds ratio = 7.377, 95% confidence interval = 4.131–13.174) followed by service organization (odds ratio = 3.247, 95% confidence interval = 2.582–4.083). Diagnoses of patients predicted acute admissions to a lesser extent. We found that having psychiatric beds available at small local institutions rather than beds at a Central Mental Hospital appeared to decrease the rate of acute admissions.

**Conclusion:** While it is likely that the seriousness of the patients’ condition is the most important factor in doctors’ decisions to refer psychiatric patients acutely, other variables are likely to be important. This study suggests that the organization of mental health services is of importance to the rate of acute admissions to specialized psychiatric care. Systems with beds at local District Psychiatric Centers may reduce the rate of acute admissions to specialized care, compared to systems with local community outpatient services and beds at Central Mental Hospitals.

## Keywords

Mental health, health services research, service organization, acute psychiatry

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## Introduction

The deinstitutionalization of psychiatry over the last 50 years has involved a downsizing of central psychiatric institutions in favor of more outpatient- and community-based services.<sup>1</sup> The concept of “institutionalization” directs attention to the treatment of mentally ill people in institutions, and has often been related to criticism of the traditional asylums,<sup>2</sup> but even including criticism of paternalistic doctor–patient relationships, restrictive legal frameworks, and how patients adapt to life in psychiatric hospitals.<sup>3</sup> The process of deinstitutionalization

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may represent one of the most important social changes in recent time.<sup>1</sup> It has been driven by many factors, including the civil rights movement, the emergence of new community-based treatments, novel antipsychotic drugs, the high costs of institutional care, and in Norway -government funded disability pension supporting patients living in the community.<sup>3,4</sup>

Characterizing psychiatric services has been referred to as “a difficult and dangerous task” because of lacking theoretical concepts and methods, and also the possible confusion of treatment practice with the counting of consultations or beds.<sup>5</sup> Furthermore, clinical practice and the organization of services may affect each other in a dynamic relationship. The organization may be of importance to the treatment philosophy of staff and to professional practices, as seen in the classical finding on how the organization and scale of inpatient services were found to affect doctors’ utilization of inpatient care.<sup>6</sup> Likewise, a recent Norwegian study found that despite considerable overlap between local community and hospital staff with regard to attitudes and priorities, there were distinct differences between the units’ treatment profiles.<sup>4</sup> The staff working at a District Psychiatric Centre (DPC) placed a higher emphasis on cooperation with patients’ families and local general practitioners (GPs), while staff at a Central Mental Hospital (CMH) placed a higher emphasis on issues such as diagnostic assessment, medication, long-term treatment, and handling aggression. There appeared to be a “community” versus a “hospital” clinical culture.<sup>4</sup>

Another interesting issue has been whether deinstitutionalization has affected the rates of acute admissions to psychiatric specialized care.<sup>7,8</sup> Early studies suggested that a spectrum of care was needed to reduce over-occupancy of acute beds and to relocate inappropriately placed patients.<sup>9</sup> Reduced availability of beds has been found to be a risk factor for an increase in the rate of acute admissions. However, prior research has shown that this is likely to be multifactorial, with insufficient community-based mental health services as a contributing factor.<sup>10</sup> Subsequent studies on the dynamics between community care and acute admissions to psychiatric services have been few and yielded ambiguous results. Some have suggested that proactive and assertive community treatment could reduce the need of acute care,<sup>11–13</sup> and others that contact with community services do not affect this risk.<sup>14</sup> A previous study suggested that increased availability of local community bed-units reduced the rate of acute admissions.<sup>11</sup> In this study, we aim to examine the effect of different models of local psychiatric care, the use of coercion, and patient characteristics on the rate of acute psychiatric admissions to specialist psychiatric services. In a natural experiment-like study involving 5338 admissions to the specialized psychiatric services over a 4-year period, two different models of mental health services in Norway were compared.

### *The mental health care system in Norway*

The present Norwegian system of mental health care is characterized by an extensive decentralization of both

outpatient and inpatient care. It is organized into three levels of administration: (1) primary care/GPs, (2) DPCs, and (3) CMHs.

The second level, with the DPCs, represents the cornerstone of the mental health care system. The DPCs are to provide local psychiatric services in defined geographic sectors, as well as to coordinate services offered by levels 1 and 3 to suit the needs of individual patients.<sup>15</sup>

The DPCs are a relatively new element, and often differ in outline and organization. While some offer mainly outpatient services and rely on inpatient units at the CMHs, others have integrated both outpatient and inpatient services at small local institutions. Such organizational varieties may have implications for patients’ patterns of care, and we have earlier studied how the general structure of mental health systems may affect various outcomes such as coercion, continuity of care, and utilization of beds.<sup>4,16–19</sup>

The two neighboring DPCs at Lofoten and Vesterålen in the Norwegian county of Nordland (the VeLo-project) are of particular scientific interest because of organizational dissimilarities of this kind with at the same time striking resemblances in catchment area characteristics.<sup>11</sup>

### *The catchment areas*

The regions consist of small coastal towns and villages based on modern industrial fisheries and agriculture, lately also tourism and some industry, and administrative institutions, educational institutions, and health care institutions, in line with modern European standards.

There are good communications to the county capital of Bodø, with one airport and two larger harbors in each of the areas. The flight time to Bodø from the two airports is 25–30 min.

The population in the two areas is quite homogenous and stable, but there are somewhat more inhabitants in Vesterålen (2005: 30,465; 2015: 30,419) than in Lofoten (2005: 22,469; 2015: 24,178).<sup>20</sup> The two populations are otherwise quite similar with respect to educational level, gender, and age.

By drawing on available statistics on demography and living conditions, we have previously examined the epidemiological characteristics of these two catchment areas. Based on a methodology of underprivileged areas,<sup>21,22</sup> we previously devised a “Care Need Index” (CNI) that was weighted for population size. The results suggested that need for health care was very similar in the two areas. To corroborate these epidemiological characteristics, we have previously compared the rates of persons on disability pension by psychiatric diagnoses, which were quite similar.<sup>11</sup>

Concerning primary care, the rate of GPs per 1000 inhabitants (above 18 years) is also quite similar in the two areas. In Lofoten, there are 1.3 GPs per 1000 inhabitants versus 1.4 GPs per 1000 inhabitants in Vesterålen.<sup>20</sup>

## The service systems

The two DPCs are arranged very differently. The one in Lofoten has mainly outpatient services in the local communities, and uses psychiatric bed services at the CMH in Bodø. It represents a system of services, with specialized teams working together despite being located at different branches of the health care system. All outpatient care is offered locally, at two outpatient clinics and two day-care units, and 90% of the inpatient stays are at the county's CMH. Only 10% of inpatients stays are local—at a six-bed branch of the local somatic hospital.<sup>16–19</sup>

At Vesterålen DPC, the inpatient and outpatient services are located together. With one outpatient clinic and three fully staffed local inpatient units, it resembles a more institution-based mental health system, with a high level of service integration. Only highly specialized care takes place outside these local institutions, at the county's CMH. Consequently, 70% of the total inpatient stays in Vesterålen are at the local community level at the DPC; only about 30% are referred further to the CMH.<sup>16–19</sup>

These two models of psychiatric mental health services may be termed a “locally institutionalized model” in Vesterålen, in contrast to the “deinstitutionalized model” in Lofoten.<sup>16–19</sup>

In earlier studies, we have found that the hospitalization rates were very similar for the two models. Vesterålen had a population rate of 7.7 inpatients per 1000 and Lofoten 8.4 per 1000. Both areas had a bed-utilization rate of ca. 1 per 1000 inhabitants. This implies that the utilization of inpatient beds is almost the same in the two areas, regardless of the availability of local or central inpatient units.<sup>11,16</sup>

## Methods

By drawing on the County of Nordland's case registries for their psychiatric specialist services, we did an ecological case study of the locally institutionalized psychiatric services at Vesterålen DPC versus the more deinstitutionalized outpatient-oriented services at Lofoten DPC, with a secondary analysis of health databases. The patient registries from the psychiatric services at both the local DPCs and the CMH contributed to the analysis and were originally linked by the use of the 11-digit personal identification number assigned to all Norwegian citizens. The datasets were subsequently anonymized for further analyses and publication of results and all analyses in the present work were conducted only on anonymized data. Permission to perform the VeLo 1 study was obtained from the Regional Committee for Medical and Health Research Ethics, the Norwegian Data Protection Agency, and the Directorate of Health.

From these case registries, we identified a total of 5338 admissions, which represents all the admissions to the psychiatric specialist services over a 4-year period, from 2003 to 2006.

The registries contain clinical information of diagnoses according to the International Classification of Diseases—10th Revision (ICD-10) system, and variables for gender, age, home address, type of admission (acute/elective), level of care (outpatient/inpatient), and coercion (voluntary/involuntary admission).

To get sufficient sizes for statistical analysis, we merged diagnoses into larger categories as follows: (1) “psychiatric observation,” (2) substance abuse disorders, (3) psychoses, including those suffering from affective psychotic disorders but excluding organic psychotic disorders and substance-related psychoses, (4) mood/affective disorders, (5) anxiety disorders, (6) anorexia, (7) personality disorders, and (8) “others” (including organic psychosis and delirium, dementia, hyperkinetic disorders, and “social problems”).<sup>18</sup>

Data were distributed over the two service systems with univariate analyses of differences by chi-squares and Z-tests. A multivariate analysis was done in order to control for possible interactions and confounders, or selection biases of patients into the two models. In a logistic regression model, “Acute admission” (y/n) was selected as the dependent variable, and all other significant variables were entered stepwise as predictors. For “Diagnoses,” the category of “Others” was used as contrast based on a theoretical consideration of its non-clinical information, as well of its size. The continuous variables were log-transformed before they were entered into the model because of skewed distributions.

## Results

The analysis revealed that the deinstitutionalized system (Lofoten) had a significantly higher percentage of acute admissions to specialized psychiatric services (35.0% vs 24.5%) than the locally institutionalized system of Vesterålen. Significant differences in rates were also found for age and gender, as well as for most diagnoses and ratio of involuntary admissions. There were no differences in level of care, that is, the total share of outpatient versus inpatient admissions (Table 1).<sup>18</sup>

To further disentangle involuntary (coerced) admissions from acute admissions, we cross-tabulated acute admissions (N=1520) by coerced versus voluntary admissions. Several significant differences emerged. For example, while acute patients with psychosis relatively more often were coerced, acute patients suffering from anorexia, anxiety, or affective disorders were relatively more often voluntary. Table 2 also illustrates that most acute admissions were not coerced, indicating that although there was considerable overlap between these types of admissions, there were also important differences.

This difference in rate of acute admissions to specialized services may reflect several differences in the sample, including in the organization of services and differences in patient populations. The multivariable analysis confirmed the significance of several variables on acute admissions.

**Table 1.** Patient- and treatment characteristics of all admissions in a deinstitutionalized versus a locally institutionalized model of mental health services.

Service system	Deinstitutionalized	Locally institutionalized	p-value
Admission type			
Emergency	707 (35.0%)	813 (24.5%)	0.000
Elective	1315 (65.0%)	2503 (75.5%)	
Age	38.0 (SD = 13.3)	39.5 (SD = 13.1)	0.000
Gender			
Female	1118 (55.3%)	1988 (60.0%)	0.001
Male	904 (44.7%)	1328 (40.0%)	
Diagnosis			
Observation	339 (16.8%)	917 (27.7%)	0.000
Substance abuse	255 (12.6%)	135 (4.1%)	0.000
Psychosis	218 (10.8%)	535 (16.1%)	0.000
Affective	400 (19.8%)	759 (22.9%)	0.008
Anxiety	444 (22.0%)	695 (21.0%)	0.389
Anorexia nervosa	66 (3.3%)	56 (1.7%)	0.000
Personality disorders	137 (6.8%)	121 (3.6%)	0.000
Others	163 (8.1%)	98 (3.0%)	0.000
Level of care			
Inpatient	758 (37.5%)	1174 (35.4%)	0.127
Outpatient	1264 (62.5%)	2142 (64.6%)	
Coercion			
No	1909 (94.4%)	3185 (96.0%)	0.007
Yes	113 (5.6%)	131 (4.0%)	

A 4-year registered prevalence sample (2003–2006), N = 5338.

Modified version of Table 3 in Myklebust et al.<sup>18</sup> (Myklebust LH, Sørgaard K and Wynn R. Local psychiatric beds appear to decrease the use of involuntary admission: a case-registry study. *BMC Health Serv Res* 2014; 14: 64. CC BY 2.0. © Myklebust et al.; licensee BioMed Central Ltd (2014); URL to original table: <https://bmchealthservres.biomedcentral.com/articles/10.1186/1472-6963-14-64#Tab3>).

**Table 2.** Patient- and treatment characteristics of only acute admissions to specialized services in a deinstitutionalized versus a locally institutionalized model of mental health services.

	Coerced	Voluntary	p-value (two-sided)
N	227 (14.9%)	1293 (85.1%)	
Age	39.7 (SD = 13.4)	40.5 (SD = 13.5)	0.419
Gender			
Male	118 (7.8%)	574 (37.8%)	0.36
Female	109 (7.2%)	719 (47.8%)	
Diagnosis			
Observation	7 (0.5%)	84 (5.5%)	0.048
Substance abuse	20 (1.3%)	189 (12.4%)	0.021
Psychosis	106 (7.0%)	316 (20.8%)	0.000
Affective	41 (2.7%)	332 (21.8%)	0.015
Anxiety	15 (1.0%)	221 (14.5%)	0.000
Anorexia nervosa	1 (0.1%)	33 (2.2%)	0.049
Personality disorders	23 (1.5%)	83 (5.5%)	0.048
Others	14 (0.9%)	35 (2.3%)	0.013
Service system			
Deinstitutionalized	109 (7.8%)	598 (39.3%)	0.665
Locally institutionalized	118 (7.2%)	695 (45.7%)	

A 4-year registered prevalence sample (2003–2006), N = 1520.

The results are displayed in Table 3. Variables that did not reach level of significance were omitted in the table, except for “*Gender*” and “*Age*.”

The model containing all variables was significant (N = 5338, chi-square = 3693.095, df = 12, p < 0.000), demonstrating that it could differentiate between type of admission

**Table 3.** Logistic regression model of acute admissions (n/y) to a locally institutionalized versus a deinstitutionalized system of mental health services.

Variable	B	Sig.	OR	95% CI for OR	
Gender (F=0, M= 1)	0.227	0.035	1.254	1.016	1.548
Age	0.002	0.614	1.002	0.994	1.010
Coercion	1.998	0.000	7.377	4.131	13.174
Substance abuse	0.756	0.016	2.130	1.154	3.931
Psychosis	0.554	0.046	1.740	1.010	2.998
Affective disorders	0.536	0.052	1.709	0.996	2.933
Service system (locally institutionalized = 0, deinstitutionalized = 1)	1.178	0.000	3.247	2.582	4.083

County of Nordland, Norway. A 4-year registered prevalence sample, N=5338.

(acute or elective). Log-likelihood was at 2684.582, and the model explained between 49.9% (Cox & Snell R<sup>2</sup>) and 71.6% (Nagelkerke R<sup>2</sup>) of the variance in type of admission.

The variable “*Involuntary admission*” was the most important predictor, with a confidence interval (CI) for odds ratio (OR) between 4.131 and 13.174 ( $p=0.000$ ) when other factors in the model were controlled for. It indicates that if the condition of a patient was so serious that coercion was used, it would probably result in an acute admission to the specialized services. “*Service system*” emerged as the second most important predictor with a 95% CI for OR between 2.582 and 4.083, indicating that patients in the deinstitutionalized system of Lofoten were more likely to be acutely admitted to psychiatric specialist services than patients from the local institution-based system of Vesterålen. The diagnoses of “*Substance abuse*” (95% CI for OR between 1.154 and 3.931), “*Psychosis*” (95% CI for OR between 1.010 and 2.998), and “*Affective disorders*” (95% CI for OR between 0.996 and 2.933) also emerged as predictors, indicating that these often serious and potentially self-harming conditions are more often subjected to acute care than other diagnostic categories. Also being male (95% CI for OR between 1.016 and 1.548) predicted acute admission.

## Discussion

In our natural semi-experiment, we compared a “deinstitutionalized” and a “locally institutionalized” model of mental health services. We aimed to study the effect of several variables of the service models and of patients on the rate of acute psychiatric admissions to the specialized services.

This study lends support to earlier studies that have found that male patients and patients suffering from affective or psychotic disorders have an increased risk of being acutely admitted to psychiatric care. We also found that substance abuse was a significant predictor of acute admission.<sup>17,23</sup>

The strongest predictor of acute admission to care was coercion. Patients that are involuntarily admitted are usually admitted acutely, and the use of coercion, which also may be partly contingent on how services are organized, is consequently a strong predictor of acute admission. Put in other

words, if the condition of the patient was so serious that coercive measures were undertaken, the admission was likely to be acute.

Nevertheless, the majority of the acute admissions were voluntary. While this applied to all the diagnostic categories, especially acute patients suffering from anorexia, anxiety disorders, mood disorders, and substance abuse disorders, were more likely to be voluntary. Among the acute patients, those suffering from psychosis, personality disorders, and “others,” were relatively more often involuntary. While we lack data explaining these differences, we might speculate that whether the patients were believed to be of danger to themselves or others was an important factor in the considerations of the referring doctors, and that patients suffering from psychoses relatively more often might have been considered dangerous than for instance patients suffering from anxiety disorders.<sup>17,24</sup>

However, also the organization of services may have an impact on the rate of acute admissions to specialized services. Having psychiatric beds available at small local institutions rather than beds at a CMH appeared to decrease the rate of acute admissions to specialist care, supporting findings in a prior study.<sup>11</sup> A possible explanation for the effect of service organization on the rate of acute admissions may be that the proximity and local control of psychiatric beds lower the threshold for care and treatment before the condition becomes too grave. This may work through several mechanisms. In an earlier study, we found that local bed-units had a more system- and outward-oriented approach compared to more traditional hospital units.<sup>4</sup> It may be that our locally institutionalized system of services is more alert to local patients’ shifting needs of care.

This issue may parallel recent findings on *self-referral*, where patients are allowed to show up for inpatient care without being formally referred by GPs or other health personnel. The preliminary findings suggest that this could make patients seek help at an early stage and reduce the rate of acute or involuntary admission to specialized care.<sup>25</sup>

Our results also relate to the importance of *continuity of care* for severely ill patients, and its dependence on high levels of integration of the various services inherent in an

efficient mental health system.<sup>18,26,27</sup> Here, a growing body of research highlights care systems' ability to facilitate continuous clinical alliances between health personnel and patients.<sup>19,28</sup> A close and positive relationship between patients and providers is held by the patients themselves as central for efficient recovery.<sup>29–36</sup> This may certainly be easier in a model with high levels of integration, where patients often can relate to the same clinician regardless whether they are temporarily treated in an inpatient ward or at an outpatient clinic. In the decentralized system, however, patients often have to relate to different personnel due to the geographical and organizational barriers between inpatient and outpatient units. To repeatedly have to establish new clinical relationships in different units may be a particularly negative factor for mental health patients, and lead to high dropout rates from treatment.<sup>19,37</sup>

The results may also be in agreement with findings that point to the relationship between organization of services and clinical practice.<sup>4,7</sup> Available treatment resources may affect the clinical decisions by health personnel more than only strict and sober assessments of the clinical condition of patients.<sup>6</sup> An implication for this study may be that high levels of acute admissions to the decentralized system reflect strategic considerations in the referrals from primary care because of perceived barriers or shortage of inpatient resources rather than an actual graver clinical condition of patients. We have not found any distinct literature on this topic, but it may be relevant for future studies.

### Limitations

A number of considerations imply a cautious interpretation of the results. One limitation is that the data in this study are related to admissions to mental health specialist services and not to individual patients. This could cause a bias because some patients may have been using various services and type of wards without necessarily being readmitted or recategorized in the records.

We did not have any variables that directly measured the seriousness of the patients' condition, that is, level of symptoms and level of functioning. However, several of the other variables, including some of the diagnoses and the use of coercion, may give a rough indication of level of the patients' symptoms and functioning.

Moreover, we do not have data on certain variables that might be important for the findings, including level of education, disability level, ethnicity, financial situation, employment status, doctors' attitudes to mental health care and coercion, diagnostic practices, and so forth. These variables have, in other studies, been suggested to influence the rate of voluntary and/or involuntary psychiatric admissions or other types of coercion.<sup>38–40</sup> However, the multivariate model explains a great deal of the variance in risk of acute admission, and may therefore be considered quite stable. Correspondingly, it is not very likely that adding new

variables will reduce the significance of the variables in this study.

Data relating to primary care mental health services were unavailable to us. There is a growing literature and recognition for the role of GPs in the care and treatment of psychiatric patients.<sup>41</sup> If there are large differences in primary care services between the two systems in the study, this could have implications for the rate of acute admissions to psychiatric services. However, due to the similar rate of GPs and the national guidelines for the standards of primary mental health care, such a difference may be unlikely.

An advantage of this study is that the patient-population is quite controlled. The approvals from Norwegian health authorities made it possible to link treatment episodes to individual patients across different units of services before the data were anonymized. Moreover, in the catchment areas, there are no private or non-governmental organizations that provide mental health services, and the travel distances make it cumbersome for patients to access services elsewhere. As a consequence, the case registries sample all the psychiatric patients who have accessed services in the systems.<sup>19</sup>

The difference in size of the diagnostic categories calls for a cautious interpretation of the results. There may be a selection bias of patients in the two service systems, or from different clinical assessment procedures or registration procedures. Unfortunately, the case register used in this study cannot clarify these questions.

The issues concerning accuracy seems to be inherent in the use of case registries for psychiatric research and represents a methodological challenge that should be addressed in the future. Despite such limitations, case registries' size and information on treatment courses render them a long-standing tradition in mental health services research.<sup>42</sup>

This study has a quantitative case registry-based design and has as such some inherent limitations. We are unable to address important issues such as patients' and providers' experiences of and attitudes to acute admissions or how individual decisions regarding acute admissions are made in the local context. These issues may be better addressed by means of qualitative in-depth interviews or ethnographic studies.<sup>43,44</sup>

Although we will be cautious in generalizing the results of this study, we believe that this study helps to improve our understanding of the psychiatric services. Studies examining the importance of service organization are highly relevant to stakeholders involved in policy planning.<sup>28,45–47</sup>

### Conclusion

While it is likely that the seriousness of the patients' condition is the most important factor for decisions to refer patients acutely to psychiatric care, this study suggests that also the organization of mental health services is of importance. Locally integrated services with the availability of local psychiatric beds may be more flexible and responsive to patients' needs than other types of organization, and thereby reduce

the need for acute admissions to the services. Patient characteristics, including diagnoses and the use of coercion, are also important predictors of acute admission to the specialized psychiatric services.

### Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Ethical approval

The Regional Committee for Medical and Health Research Ethics North (REK Nord) approved the VeLo 1 project (2006/49).

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### Informed consent

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