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Factors Associated with Length of Stay in a Swiss Mental Hospital

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Abstract The aim of this study was to identify factors which are associated with the length of stay in a Swiss mental hospital. Demographical and clinical data of all patients who were admitted to the adult inpatient psychiatric service of the Federal State of Aargau in 2016 were examined regarding their association with the length of stay. The study sample included $N = 1479$ patients. Mean length of stay was 33 days and the median equalled 26 days. Higher age and a primary diagnosis of psychotic or affective disorder were associated with increased length of stay. In contrast, foreign nationality and compulsory admission were associated with reduced length of stay. While some of our findings were in line with recent findings from Italy and the United Kingdom, others could not be replicated.

Keywords Length of stay · Psychiatric inpatient treatment · Health care expenditures

Introduction

In the wake of the global economic and financial crisis in 2009 the average health spending growth of the Organization for Economic Cooperation and Development (OECD) countries per year diminished from 3.6% to 1.4% [1]. The percentage of the gross domestic product (GPD) spent on healthcare reflects the respective countries promotion of health and health-related quality of life. Therefore, any reduction has to be settled by efforts to improve the productivity, efficiency and affordability of the health care system in order to maintain the quality and availability of care. From the public health point of view, a better understanding of the factors contributing to the cost of health care thus is crucial.

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Switzerland has the second highest health care expenditures of all OECD countries, which are only exceeded by the health care costs in the United States of America [2]. In 2016, Swiss health care expenditures equalled 12.4% of the nation's GDP. About 65% of these costs (USD 5000 per inhabitant and year) are defrayed by the public sector, while private health care providers contribute 35%. According to the OECD, Switzerland has a relatively high number of hospital beds (4.6 per 1000 inhabitants) [3]. In 2015, about 32 billion Swiss Francs were spent for inpatient care, and psychiatric inpatient care was responsible for 10% of the country's hospital costs [4]. Due to increasing economic pressure financial incentives to control inpatient service utilization increasingly became a matter of debate in the last years. One key variable to reduce the high costs of inpatient care would obviously be a reduction of length of stay (LOS). The average LOS in Swiss mental hospitals had continuously decreased over the past years and corresponded to 33.1 days in 2015 [4].

Until now, hospitals in Switzerland received reimbursement through a per diem system, i.e., a fixed amount was set for each inpatient day. In contrast to the Swiss system case-based payment systems are on the rise in western Europe these days [5]. A pilot study in the Federal State of Zurich tested the effect of a case-based reimbursement model using a lump sum with degressive rates. Interestingly, a reduction of the mean LOS to 28 days was not only observed in the intervention hospital but also in the comparison hospitals of the Federal State of Zurich [6]. The effect of the lump sum measure was low, however [6]. Maybe this effect would have been increased if the reduction of revenue would have been greater [7].

These findings underline that LOS is at least not only triggered by financial incentives; other factors such as psychopathology might likewise be relevant. In a comprehensive review on LOS in psychiatric inpatient settings, Gopalakrishna et al. [8] identified demographic, treatment-related and diagnostic factors contributing to the LOS. These factors accounted for 10–37% of the variance of LOS. In contrast to this findings, Herwig et al. [9] could explain only 10% of the variance of LOS with psychopathology at admission in a Swiss sample. Warnke et al. [10] showed in another Swiss sample that - except for hostility and mania - all psychopathological syndromes were significantly associated with a longer LOS, but these factors explained only 5% of LOS variance. Recent research in Italy found that 18% of the variance in LOS could be explained by the following predictors which were associated with increased LOS: compulsory admission, thought disorders, absence of substance use disorder, previous hospitalization, and being discharged to a community residential facility [11]. The authors concluded that knowledge of these factors will be increasingly important for health services striving to reduce LOS. A recent study from the United Kingdom confirmed that psychotic disorders are associated with longer LOS. Further predictors of LOS were demographic factors such as being male, being White/White British, being homeless or in accommodation with support as well as and having a higher number of care coordinators. Together, these factors explained 15% of LOS variance [12]. Both the Italian and the British study found that addiction disorders are associated with shorter LOS than other diagnostic categories such as depression or psychosis [11, 12].

As recent data regarding LOS in relation to the above-mentioned factors is missing for Switzerland, the aim of this study was to examine factors predicting LOS in psychiatric inpatient services.

Method

Setting and Sample

The mental hospital of the Psychiatric Services Aargau AG (PDAG) provides inpatient services for the approximately 650.000 inhabitants of the Federal State of Aargau in Switzerland. The Federal State of Aargau is located between the metropolitan areas of Zurich, Bern, and Basel, and it consists of urbanized and of some more rural parts. The hospital of the PDAG is the only facility providing acute inpatient services in the Federal State of Aargau (for more information on the catchment area, see [13]). We examined all admissions to the hospital's departments of general psychiatry and addictive disorders in the year 2016.

Data Collection

Information on patients' socio-demographics, routine clinical diagnoses (according to ICD-10) and LOS were drawn from the medical database of the PDAG.

Data Analysis

Data on LOS were right skewed with heavy right tails. We therefore used a generalized linear model (GLM) using the gamma error distribution and a log-link function to examine predictors of LOS [14]. Cases with missing information on predictors were excluded from analyses. Confidence intervals for the parameter estimates were calculated using bootstrapping with k = 5000 samples. All analyses were performed with IBM SPSS, version 23.

The study was approved by the responsible regional ethics committee (BASEC 2017–01533).

Results

In 2016, $N = 1607$ patients were admitted to the mental hospital of the PDAG for $N = 2108$ treatment episodes. If there were multiple admissions per patient, we analysed the first treatment case for each patient only in order to avoid interdependencies in data structures. Of the $N = 1607$ patients, one case had to be excluded because the inpatient treatment was still ongoing when performing our analyses and calculation of the LOS thus was not yet possible. Another 127 (7.9%) patients were excluded due to missing data in potential predictors of the LOS. The average LOS among the remaining $N = 1479$ patients was M = 33.4 days (SD = 28.4 days), with a median LOS of 26 days. Table 1 shows the socio-demographic and clinical characteristics of the patients. Table 2 shows the LOS for these characteristics.

The GLM to examine predictors of LOS fitted data well ($\chi^2 = 986.959$, df = 1465, $p = 0.999$; Omnibus Likelihood ratio Test: $\chi^2 = 126.073$, df = 13, $p < 0.001$). Higher age was associated with extended LOS (b = 0.005, $p = 0.001$), while foreign nationality (b = −0.237, p < 0.001) and compulsory admission of the patient (b = −0.286, $p < 0.001$) both were associated with shorter hospital stays (Table 3). For instance, LOS was reduced by the factor $e^{-0.286} = 0.752$ in the case of compulsory admission. Schizophrenia (F2; b = 0.498, p < 0.001) and affective disorders (F3; b = 0.318, p < 0.001) both were associated with increased LOS when compared to substance use disorders (F1 was the reference category of the dummy-coded primary diagnosis).

Table 1 Sample characteristics
(*n* = 1479 patients)

Patient characteristic	Distribution
Age (years), M (SD)	41.5 (13.9)
Male sex, n (%)	840 (56.8)
Foreign nationality, n (%)	279 (18.9)
Married, n (%)	404 (27.3)
Homeless, n (%)	28 (1.9)
Employed or ongoing education, n (%)	455 (30.8)
Primary diagnosis (ICD-10), n (%)	
F1 (substance use disorders)	466 (31.5)
F2 (schizophrenia)	331 (22.4)
F3 (affective disorders)	342 (23.1)
F4 (anxiety and stress-related disorders)	169 (11.4)
F6 (personality disorders)	110 (7.4)
Other	61 (4.1)
Co-morbid substance use disorder (F1), n (%)	390 (26.4)
Compulsory admission, n (%)	460 (31.1)

Discussion

Our study in a Swiss mental hospital confirmed previous findings from other Swiss [9] and European [11] samples showing that certain demographical and clinical factors are associated with the LOS in mental hospitals. However, other predictors of LOS which were identified in previous studies could not be confirmed by our findings.

Table 2 Length of Stay (LOS) according to characteristics

Patient characteristic	LOS	
	M (SD)	Median
Male	32.3 (26.6)	26
Female	34.8 (30.6)	27
Foreign nationality	27.5 (21.9)	22
Swiss nationality	34.7 (29.5)	28
Married	32.0 (26.3)	25.5
Not married	33.9 (29.1)	27
Homeless	31.1 (29.8)	24.5
Not homeless	33.4 (28.4)	27
Employed or ongoing education	31.6 (27)	26
Unemployed	34.1 (29)	27
Primary diagnosis (ICD-10), n (%)		
F1 (substance use disorders)	27.3 (20.7)	23
F2 (schizophrenia)	41.5 (33.7)	33
F3 (affective disorders)	37.2 (28)	32
F4 (anxiety and stress-related disorders)	28.6 (30)	17
F6 (personality disorders)	31.9 (33.2)	21.5
Other	29.4 (21.9)	24
Co-morbid substance use disorder (F1)	29 (22.9)	23.5
No Co-morbid substance use disorder	34.9 (30)	28
Compulsory admission	30 (30.1)	21
No compulsory admission	34.9 (27.5)	29

Table 3 Predictors of length of stay (n = 1479 patients)

Patient characteristic (predictor)	b (95% CI)	e^b	p
Age (years), M (SD)	0.005 (0.002 … 0.009)	1.005	0.001
Male sex, n (%)	−0.034 (−0.121 … 0.059)	0.967	0.463
Foreign nationality, n (%)	−0.237 (−0.343 … -0.131)	0.789	<0.001
Married, n (%)	−0.087 (−0.190 … 0.015)	0.917	0.096
Homeless, n (%)	0.070 (−0.285 … 0.355)	1.072	0.662
Employed or ongoing education, n (%)	−0.074 (−0.166 … 0.019)	0.929	0.119
Primary diagnosis (ICD-10), n (%)			
F1 (substance use disorders)	-[a]		-[a]
F2 (schizophrenia)	0.498 (0.369 … 0.624)	1.645	<0.001
F3 (affective disorders)	0.318 (0.205 … 0.430)	1.374	<0.001
F4 (anxiety and stress-related disorders)	0.075 (−0.105 … 0.237)	1.078	0.396
F6 (personality disorders)	0.154 (−0.052 … 0.345)	1.167	0.124
Other	0.103 (−0.120 … 0.307)	1.109	0.330
Co-morbid substance use disorder (F1), n (%)	−0.096 (−0.195 … 0.001)	0.908	0.052
Compulsory admission, n (%)	−0.286 (−0.393 … -0.186)	0.752	<0.001

Constant = 3.269

[a] Reference category of the dummy-coded variable primary diagnosis

Demographic Factors

Corroborating previous finding [15], higher age was associated with longer LOS. This finding might be explained by poorer health and lower social support in the elderly [16]. It is important to note that our sample did not include patients older than 65 years, the effects of age thus might have been underestimated in our sample.

The role of gender regarding LOS seems to be ambiguous. Tulloch et al. [17] reported longer LOS for females. However, more recent studies either found no association between gender and LOS [11], or they reported even longer LOS for male inpatients [12]. In our sample, there was no significant association between gender and LOS.

Previous studies furthermore suggested that ethnicity might contribute to LOS [12]. In the US, LOS for African Americans has been shown to be longer than for other ethnicities [18]. The authors hypothesized that African-Americans might seek help later than other ethnicities, and as a consequence are hospitalized with more severe mental health problems. Longer LOS in certain ethnic minorities has also been reported by Newman et al. [12] for Asian, Asian British, Black or Black British patients when compared to White or White British ethnicities. In Swiss medical statistics ethnicity is not systematically recorded. However, foreign nationality was associated with shorter LOS in our sample. This could indicate that foreigners do not enter treatment later and hence are not more severely ill than Swiss patients, but it might also be an expression of a failed attachment to the treatment, for example due to the lack of therapies in their native language.

Marital status was not associated with LOS in our sample. This finding contrasts with older studies which reported shorter LOS for married patients [19]. However, more recent studies [12] likewise found no significance for marital status for LOS.

Housing status was often found to be a predictor for LOS [17]. Specifically, in homeless people LOS appeared to be longer than in patients with stable housing situation. In our sample, being homeless was not associated with LOS. There might simply not have been sufficient statistical power to detect effects of homelessness on LOS as the rate of homeless patients was low in our

sample (1.9%). While a recent study showed a high rate of psychiatric disorders among homeless persons in Switzerland [20], the rate of homelessness is generally very low in Switzerland (approximately 300–500 per 8 million inhabitants) when compared to other countries.

Unlike in previous studies [16, 17], being in vocational training or having a job was not associated with shorter LOS in our sample. Newman et al. concluded that unemployment might be a proxy for current functional impairment [12]. A recent study [21] highlights the impact of functional impairment, as measured by the Mini-ICF-APP [22], in patients which were not "fit to work". Unemployment rates in Switzerland are rather low when compared to other European countries. The rate of unemployment in the Federal State of Aargau was 3.2%, while the respective figure for the country was 3.3% [23]. However, in our sample the rate of unemployed patients was rather high (70%).

Clinical Factors

In line with previous findings from Swiss [9] and international studies [8], psychotic disorders and affective disorders were related to longer LOS when compared to other mental disorders such as substance use disorders. Addictive disorders are the only diagnosis which has been constantly found to have shorter LOS [8, 11, 12]. While health care politics strive for a reduction of LOS, a shorter LOS might also be considered as a manifestation of one of the core problems of substance use disorders. The lack of a sustained motivation to stay abstinent often leads to premature discharge and relapse or ongoing substance abuse. The German guidelines for the treatment of alcohol use disorder [24] therefore recommend 21–42 days of inpatient treatment. Many patients with substance disorders are admitted due to intoxications. In the Federal State of Aargau, intoxicated patients are often admitted to our mental hospital and not to emergency rooms of general hospitals. This routine procedure might contribute to shorter LOS in our sample because patients often ask to be discharged when they are detoxicated.

In contrast to Gopalakrishna's [8] findings, we found that compulsory admission did contribute to shorter LOS in our Swiss sample. The legal and practical preconditions for compulsory admission vary within Switzerland and more so between different countries, making a comparison on the local and international level difficult. In the Federal State of Aargau all physicians, regardless of specialization, can initiate compulsory admission. This policy contributes to more compulsory admission as compared to regions in which only specialized doctors are allowed to initiate such admissions. If the psychiatric intake assessment at the hospital then does not confirm the need for involuntary treatment, a timely discharge might lead to shorter LOS in that subgroup.

Limitations of the Study

Our study examined all available demographical and clinical factors for their relation with LOS. The design of the study neither allowed for causal inferences nor can we exclude that other characteristics for which no data was available also contributed to LOS.

Conclusion

While our study contributes to the knowledge on factors related to LOS in inpatient settings, some critical questions remain open. The shorter LOS in addiction is a very constant finding in

studies on LOS. Interestingly, research on the reasons for this finding is rare. As already addressed above, shorter LOS in substance use disorders might be considered as a complication of treatment. However, health authorities might be prone to conclude that shorter LOS in substance use disorders might justify lower reimbursements for these disorders. This would be a critical misinterpretation. Furthermore, the relation between shorter LOS and foreign nationality in our sample should be examined in more details. We therefore strongly encourage more detailed analysis on the underpinnings of shorter LOS in substance disorders and in foreign nationality.

Compliance with Ethical Standards

Conflict of Interest Benedikt Habermeyer, Hristijana De Gennaro, Rene Channa Frizi, Patrik Roser and Niklaus Stulz all declare that they do not have any conflict of interest.

Ethical Approval The study was approved by the responsible regional ethics committee (BASEC 2017–01533). No human participants were involved and all procedures performed in the study were in accordance with the ethical standards of the responsible research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

References

1. Health at a Glance 2017 - OECD Indicators - en - OECD [Internet]. [cited 2017 Dec 5]. Available from: http://www.oecd.org/health/health-systems/health-at-a-glance-19991312.htm.
2. Health resources - Health spending - OECD Data [Internet]. [cited 2017 Sep 27]. Available from: https://data.oecd.org/healthres/health-spending.htm.
3. Health equipment - Hospital beds - OECD Data [Internet]. [cited 2017 Sep 27]. Available from: https://data.oecd.org/healtheqt/hospital-beds.htm.
4. Gesundheit [Internet]. [cited 2017 Sep 27]. Available from: https://www.bfs.admin.ch/bfs/de/home/statistiken/gesundheit.assetdetail.1380305.html.
5. Knapp M, McDaid D, Amaddeo F, Constantopoulos A, Oliveira MD, Salvador-Carulla L, et al. Financing mental health care in Europe. J Ment Health. 2007;16(2):167–80.
6. Warnke I, Rössler W, Nordt C, Herwig U. Assessing a financial incentive for reducing length of stay of psychiatric inpatients: implications for financing psychiatric services. Swiss Med Wkly. 2014;144:w13991.
7. Pletscher M. Marginal revenue and length of stay in inpatient psychiatry. Eur J Health Econ. 2016;17(7):897–910.
8. Gopalakrishna G, Ithman M, Malwitz K. Predictors of length of stay in a psychiatric hospital. Int J Psychiatry Clin Pract. 2015;19(4):238–44.
9. Herwig U, Warnke I, Rössler W. Psychopathologische Syndrome gemäß AMDP-System als Grundlage für Fallgruppierungen in der Psychiatrie. Psychiatr Prax. 2009;36(7):320–6.
10. Warnke I, Rössler W, Herwig U. Does psychopathology at admission predict the length of inpatient stay in psychiatry? Implications for financing psychiatric services. BMC Psychiatry. 2011;11:120.
11. Pauselli L, Verdolini N, Bernardini F, Compton MT, Quartesan R. Predictors of length of stay in an inpatient psychiatric unit of a general Hospital in Perugia, Italy. Psychiatry Q. 2017;88(1):129–40.
12. Newman L, Harris V, Evans LJ, Beck A. Factors associated with length of stay in psychiatric inpatient services in London, UK. Psychiatry Q. 2017. https://doi.org/10.1007/s11126-017-9498-7
13. Stulz N, Nevely A, Hilpert M, Bielinski D, Spisla C, Maeck L, et al. Referral to inpatient treatment does not necessarily imply a need for inpatient treatment. Admin Pol Ment Health. 2015;42(4):474–83.
14. Dodd S, Bassi A, Bodger K, Williamson P. A comparison of multivariable regression models to analyse cost data. J Eval Clin Pract. 2006;12(1):76–86.
15. Barnow S, Linden M, Schaub RT. The impact of psychosocial and clinical variables on duration of inpatient treatment for depression. Soc Psychiatry Psychiatr Epidemiol. 1997;32(6):312–6.
16. Pertile R, Donisi V, Grigoletti L, Angelozzi A, Zamengo G, Zulian G, et al. DRGs and other patient-, service- and area-level factors influencing length of stay in acute psychiatric wards: the Veneto region experience. Soc Psychiatry Psychiatr Epidemiol. 2011;46(7):651–60.

17. Tulloch AD, Fearon P, David AS. Length of stay of general psychiatric inpatients in the United States: systematic review. Adm Policy Ment Health Ment Health Serv Res. 2011;38(3):155–68.
18. Bolden L, Wicks MN. Length of stay, admission types, psychiatric diagnoses, and the implications of stigma in African Americans in the Nationwide inpatient sample. Issues Ment Health Nurs. 2005;26(10):1043–59.
19. Barnow S, Linden M, Schaub RT. The impact of psychosocial and clinical variables on duration of inpatient treatment for depression. Soc Psychiatry Psychiatr Epidemiol. 1997;32(6):312–6.
20. Briner D, Jäger M, Kawohl W, Baumgartner-Nietlisbach G. Psychische Krankheit und subjektive Gesundheit bei Wohnungslosen in Zürich. Psychiatr Prax. 2017;44(6):339–47.
21. Habermeyer B, Kaiser S, Kawohl W, Seifritz E. Rentenrelevante Arbeitsunfähigkeit und Mini-ICF-APP. Neuropsychiatrie. 2017;31(4):182–86.
22. Linden M, Baron S. Das „Mini-ICF-Rating für psychische Störungen (Mini-ICF-P)". Ein Kurzinstrument zur Beurteilung von Fähigkeitsstörungen bei psychischen Erkrankungen. Rehabil 2005;44(3):144–151.
23. Arbeitslosenzahlen [Internet]. [cited 2017 Oct 27]. Available from: https://www.seco.admin.ch/seco/de/home/Arbeit/Arbeitslosenversicherung/arbeitslosenzahlen.html.
24. Mann K, Hoch E, Batra A, Bonnet U, Günthner A, Reymann G, et al. Leitlinienorientierte Behandlung alkoholbezogener Störungen. Nervenarzt. 2016;87(1):13–25.