Tore Hofstad

Geographical Variation In Compulsory Hospitalisation In Norway 2014-2018

Faculty of Medicine
University of Oslo
2022

In health care, geography is destiny

—John Wennberg, “Tracking Medicine”

Abstract

This dissertation provides a comprehensive description and analysis of geographical variation in compulsory hospitalisation in mental health care. It contains important new knowledge that can help reduce both unwarranted geographical variation and compulsion in mental health care.

Compulsory hospitalisation is a coercive practice that should only be used as a last resort and in the patient's best interest. By using registry data, spanning the whole population who were compulsorily hospitalised in Norway during 2014-2018, the extent and magnitude of variation between areas is quantified. Compulsory hospitalisation is measured by counts of events, individuals, and duration, resulting in different patterns of geographical variation. The average rate of compulsory hospitalisation during the study period was 5.6 times higher in the highest ranked area compared to the lowest. The inpatient rate showed a difference of 3.2, while an eight-fold variation was seen for number of days of compulsory hospitalisation.

Considerable variation within homogenous areas, beyond that expected due to warranting factors, suggests that some areas might use more compulsion than necessary. But it also raises the question whether some areas manage with less compulsion than expected because they provide services that help prevent the need for compulsory hospitalisation. The dissertation therefore explores how different characteristics of municipal mental health and addiction services are related to variation in compulsory hospitalisation. By applying hierarchical models to panel data, specifically Random Effects Within-Between models, the geographical variation can be differentiated. The level of compulsory hospitalisation was shown to be associated with various characteristics of the municipal services, both when comparing municipalities to each other and when comparing each municipality to itself at different times. Fewer compulsory hospitalisations were seen when the number of labour-years in municipal mental health and addiction services, number of general practitioners, and mental health nurses was higher compared to the area's average. Areas that on average had more general practitioners and public housing per population also had lower levels of compulsory hospitalisation. These findings indicate that the use of compulsory hospitalisation can be reduced and

that situations where compulsory hospitalisation is considered necessary can be contingent on the supply of local services.

To help make implicit normative evaluations explicit, the dissertation includes an ethical inquiry of how geographical variation in compulsory hospitalisation can challenge four core principles of medical ethics. Supply-driven use of compulsory hospitalisation, due to lack of less restrictive alternatives, infringes on the principle of justice and can be difficult to justify at a societal level. Geographical variation in compulsory hospitalisation can also infringe on the ethical principles of respect for autonomy and non-maleficence as the principles are challenged differently depending on the area. The lack of evidence for beneficial outcomes makes it difficult to identify overuse and underuse, but the right level of compulsory hospitalisation would never be higher than that which is minimally necessary within a service system with good practices that promotes voluntariness.

Sammendrag [Norwegian abstract]

Denne avhandlingen gir en omfattende beskrivelse og analyse av geografisk variasjon i tvangsinnleggelser i psykisk helsevern. Den inneholder viktig ny kunnskap som kan bidra til å redusere uønsket geografisk variasjon, samt bruk av tvangsinnleggelser.

Tvangsinnleggelse innebærer frihetsinnskrenkning og skal kun brukes som siste utvei, og i pasientens beste interesse. Ved å analysere registerdata fra alle som var tvangsinnlagt i Norge mellom 2014 og 2018 tallfestes omfanget av geografisk variasjon. Forskjeller i tvangsinnleggelser kan måles på ulike måter basert på hendelser, personer eller varighet. Dette resulterer i ulike mønstre av geografisk variasjon. Gjennomsnittlig tvangsinnleggelsesrate i studieperioden var seks ganger høyere i det høyest rangerte området, sammenlignet med det laveste. Pasientratene varierte med 3.2, mens variasjonen var åtte ganger større for døgn med tvangsinnleggelse.

Variasjon innenfor ensartede områder, utover det man kan forvente på bakgrunn av berettigede faktorer, kan antyde at tvang brukes mer enn nødvendig i noen områder. Men det reiser også spørsmål om noen områder greier seg med mindre tvang enn forventet fordi helsetjenestene bidrar til å redusere behovet for tvangsinnleggelse. I avhandlingen utforskes det derfor hvordan kommunale tjenester for psykisk helse og avhengighet kan bidra til å forklare variasjonen. Ved hjelp av flernivåanalyse av panel data påvises det sammenhenger mellom tvangsinnleggelsesratene og ulike trekk ved de kommunale tjenestene, både når kommunene sammenlignes med hverandre, og når de sammenlignes med seg selv over tid. Færre tvangsinnleggelser var forbundet med økt bemanning innen psykisk helse og avhengighet, samt flere fastleger og psykiatriske sykepleiere sammenlignet med gjennomsnittsverdien i kommunene. Områder med flere fastleger og kommunale boliger per innbygger hadde i snitt færre tvangsinnleggelser. Disse funnene støtter tanken at bruk av tvangsinnleggelser kan reduseres. Men de antyder også at tilfanget av lokale tjenester er forbundet med hvorvidt en tvangsinnleggelse oppfattes som nødvendig

For å klargjøre uutalte normative vurderinger inneholder avhandlingen en etisk undersøkelse av hvordan geografisk variasjon i tvangsinnleggelse kan utfordre fire medisinsk-etiske kjerneprinsipper. Ressursavhengig bruk av tvangsinnleggelse, som følger av mangel på mindre inngripende alternativer, utfordrer rettferdighetsprinsippet og lar seg vanskelig rettferdiggjøre på samfunnsnivå. Geografisk variasjon i tvangsinnleggelse kan også utfordre prinsippene om respekt for autonomi og ikke-skade, ettersom disse prinsippene vil utfordres ulikt i ulike områder. Manglende dokumentasjon på nytte som følge av tvangs-innleggelse gjør det vanskelig å identifisere overforbruk og underforbruk. Men riktig nivå av tvangsinnleggelse vil ikke være høyere enn det lavest nødvendige i et system av helsetjenester som utøver god praksis og legger til rette for frivillighet.

Preface

For sixteen years I have worked as a mental health care worker at acute and geriatric mental health wards in Oslo. I met many people who were in crises or in dire need of help. Thankfully, we could provide care for most of them, so their situation improved and they could return to their lives. For some, this process was very painful and went on for a long time. Some persons who we were unable to help died by their own hand during or after hospitalisation.

I have taken part in coercion in various forms, including forced medication, use of restraints, shielding, forced feeding, forced showering, and the use of electroconvulsive therapy without consent. I believe that some patients would have died if the coercive measures had not been undertaken. Consequently, I believe that, in certain cases coercion can be beneficial. I am acutely aware that several patients suffered greatly from the coercive practices I was part of. At times it seemed coercion was used because we simply did not know what else to do.

I encountered people who seriously harmed my colleagues and I have been in situations involving a high risk of harm. It is unclear how much fear and anger were direct consequences of the coercive context within which the violence occurred, or how much violence and ensuing coercion could have been averted if mental health services had been organised differently. We do not yet know what a mental health service free of coercive practice could look like, and how such a shift might change outcomes for patients, personnel, relatives, and society at large. However, as I have come to learn during the work on this dissertation, most efforts at reducing coercion seem to succeed, which indicates ample room for reduction.

Variation and comparison grabbed my attention while pursuing a Master's degree in political science at the University of Oslo. Comparative politics involves the systematic study of institutions and people across areas and time, often involving innovative and rigorous statistical analysis. When the position as PhD-fellow on the ReCoN – Reducing Coercion in Norway – project was announced, this felt like a brilliant match for me, as it provided the opportunity to apply the skills and perspective I developed during my studies to a topic which interested me greatly in the clinic. It is my hope that the knowledge produced in the following pages can help improve the situation of some of the more vulnerable persons in our society and add to our understanding of a complex and contested practice within contemporary health services: the detention of persons against their will.

Acknowledgments

I want to extend a special thanks to my main supervisor, Tonje Lossius Husum, for believing in me. Tonje cares strongly about the issue of coercion and human rights and her passion for the topic has influenced me greatly. She has been available and supportive throughout the whole process, for which I am grateful. A sincere thank you to my co-supervisor and principal investigator on the ReCoN-project Jorun Rugkåsa. Jorun gives in depth feedback, continuously challenging me to improve on precision and clarity. Thanks to my co-supervisor Solveig Osborg Ose for methodological guidance and for sharing her extensive knowledge on municipal mental health services.

Thanks to The Research Council of Norway for funding ReCoN – Reducing Coercion in Norway (NFR 273546), and to my fellow researchers in the project. Olav Nyttingnes was co-author on Paper I and II and has shared many insights from his knowledge on mental health care. Olav has been available for enquiries on a variety of topics, and I look forward to our continued collaboration. Thanks to Solveig Helene Høymork Kjus who was co-author on Paper II. Solveig's perspectives from lived experience with compulsion, as well as background as a researcher, have been very valuable. Solveig brings warmth and a good mood, the importance of which should not be underestimated. Thanks to Eric Noorthoorn for sharing experiences with working on coercion data.

I have learnt a lot from my colleagues at the Centre for Medical Ethics at the University of Oslo, which is a stimulating and supportive work environment. I am particularly grateful to Bjørn Morten Hofmann, whose passion for science and broad range of interests is highly inspiring. While waiting for the data from NPR, Bjørn and I had a series of exchanges on the concept of disease, which resulted in an article co-authored with James Hampton. The process was both instructive and rewarding. Given Bjørn's extensive work on ethics and geographical variation, it was reassuring to have him as co-author on Paper III. Thanks to Jan Helge Solbakk for sharing insights from a long academic career. Jan Helge has responded to every request and provided abundant advice. Reidar Pedersen, Carl Tollef Solberg, Morten Magelssen, Jørgen Dahlberg, and Søren Holm deserve thanks for sharing their perspectives on topics related to my research and providing feedback. I have at various times shared offices with Henrik Vogt, Trygve Johannes Lereim Sævareid, and Lars Hestmark, and I am grateful for interesting discussions and good laughs. I also want to thank Magne Thoresen, Jon Michael Gran, and Tron Anders Moger at the University of Oslo for statistical advice.

Thanks to Ragnild Bremnes at the Norwegian Directorate of Health. Ragnild was responsible for the official national statistics on coercion for more than ten years. She willingly shared both experiences and code with me which was crucial in understanding and handling the large and complex data sets. Furthermore, I could compare the results of my counts with hers, which was reassuring.

Arnstein Mykletun is primary investigator on the research project Controversies in Psychiatry: Coercive measures and medication, which I will work on after finishing this dissertation. I am very grateful to Arnstein for allowing me to continue working within this field and for valuable feedback on drafts.

I am grateful to the EPINOR PhD School and Research Network for opportunities for networking among junior epidemiologists in Norway. I have become part of The European Violence in Psychiatry Research Group – EViPRG, and FOSTREN: Fostering and Strengthening Approaches to Reducing Coercion in European Mental Health Services, who collaborated on arranging a training school in Middelfart, Denmark in 2021. I am grateful for the opportunity to present my research and learn from colleagues in these contexts.

Thanks to my band colleagues in Ping. Although the Covid-pandemic prevented us from playing concerts, we did manage to release another album - The Zigzag Manoeuvre - which I am very proud of. Thanks to family and friends for support. My best man Martin Kinn Sivertsen helped with a crucial piece of code for counting compulsory hospitalisations, as well as providing feedback on a manuscript, for which I owe my thanks. Thanks to my parents Anne and Torstein for your everlasting support. Thanks to Benjamin for interesting discussions and patience with me in stressful times. Most importantly, thanks to my beloved wife Mona for thoughtful discussions and for patiently supporting me. You are the best!

List of Papers

The dissertation is based on these papers which will be referred to by their roman numerals.

Paper I: Hofstad, T., Rugkåsa, J., Ose, S. O., Nyttingnes, O., & Husum, T. L.(2021). Measuring the level of compulsory hospitalisation in mental health care: The performance of different measures across areas and over time. *International Journal of Methods in Psychiatric Research*, e1881. doi:10.1002/mpr.1881

Paper II: Hofstad, T., Rugkåsa, J., Ose, S. O., Nyttingnes, O., Kjus, S. H. H., & Husum, T. L.(2021). Service characteristics and geographical variation in compulsory hospitalisation: an exploratory random effects within–between analysis of Norwegian municipalities, 2015–2018. *Frontiers in psychiatry*, 12. doi:10.3389/fpsyt.2021.737698

Paper III: Hofstad, T., Husum, T. L., Rugkåsa, J., Hofmann, B. M. Geographical variation in compulsory hospitalisation – ethical challenges. *(Submitted).*

List of Tables and Figures

Clarification of Terms and Abbreviations

Coercion/ Compulsion	The term **Compulsion** is used in this dissertation to cover formal coercion through mental health legislation. The term **Coercion** covers compulsion, as well as informal coercion such as treatment pressures and threats.
CMHC	**Community Mental Health Centres** deliver decentralised specialist mental health services for adults in Norway. They provide diagnoses and care for inpatients and outpatients, including compulsory mental health care.
CRPD	The **Convention on the Rights of Persons with Disabilities** is a human rights instrument by the United Nations intended to change attitudes to persons with disabilities.
CV	**Coefficient of Variation**, standard deviation divided by the mean of a distribution, is a standardised measure of dispersion, which can be used to quantify geographical variation.
DAG	**Directed Acyclic Graphs** are path diagrams that display assumptions about causal relationships and can help identify good and bad control variables.
EQ	The **Extremal Quotient** is the ratio of the highest value divided by the lowest.
$\mathrm{EQ}_{90/10}$	The **Extremal Quotient**$_{90/10}$ is calculated by dividing the 90th percentile by the 10th percentile and is therefore more robust to outliers than EQ.
GP	**General Practitioners** are medical doctors in primary care that treat acute and chronic illnesses, including mental health disabilities.
IRR	**Incidence Rate Ratio** is a measure of relative differences that allows comparison of incidence rates between two groups.

LoS	**Length of Stay** is a measure of duration of hospitalisation. In this dissertation, only days with a legal status of compulsory hospitalisation were counted.
NPR	The **Norwegian Patient Registry** is a mandatory central health registry operated by the Norwegian Directorate of Health. NPR collects personally identifiable information on all patients in contact with specialist services.
ρ	**Spearman's Rank Order Coefficient** is a standardised non-parametric measure of rank correlation that quantifies degree of monotonic relationship.
R^2	The **Coefficient of Determination** is the proportion of variation in the dependent variable that can be predicted from the independent variable(s).
RCT	**Randomised Controlled Trials** are experiments suitable for evaluating effectiveness of interventions, since randomisation minimises risk of bias due to group differences.
SCV	The **Systematic Component of Variation** is a measure of geographical variation designed to remove the random component from the observed variation. $\text{SCV} = \left[\frac{\sum_i \frac{(OR_i - ER_i)^2}{ER_i^2} - \sum_i \frac{1}{ER_i}}{n-1}\right] \times 100$ Where *OR* is the observed number of cases in area *i*, *ER* is the expected number, given the age and gender distribution, and *n* is number of areas compared.
SMI	**Severe Mental Illness** is a subset of mental illnesses including psychotic disorders (psychosis, schizophrenia, schizophreniform disorders, manic episodes) and major depression. The subset used in Paper 2 corresponds to diagnose codes F20-31 in the International Classification of Diseases 10th revision.

Contents

1 Introduction and Summary of Papers

In this dissertation, two topics of societal importance and professional debate are combined: geographical variation in health services and compulsory hospitalisation. Research from a growing number of medical fields has documented geographical differences in clinical practice and health service delivery within similar populations (OECD, 2014). These variations are often beyond what one would expect based on differences in demographics, morbidity, or patient preferences. Concurrently, the use of compulsory hospitalisation in mental health services is a controversial practice (Ending Coercion in Mental Health: The Need for a Human Rights-Based Approach, 2019; Gooding, 2021). Compulsory hospitalisation is distinct from most other health services as it is not based on informed consent and involves depriving patients of their liberty, while the evidence for long-term beneficial outcomes is sparse (Katsakou & Priebe, 2006). Legislations tend to limit the use of compulsory hospitalisation to situations where voluntary options have been exhausted or are considered clearly futile (Saya et al., 2019). Importantly, geographical variation in compulsory hospitalisation has been reported within several countries (Bremnes & Skui, 2020; Brieger et al., 2014; Broer et al., 2020; Daly & Craig, 2021; Di Cesare et al., 2017; Engberg, 1991; Gandré et al., 2018; *Gedwongen Verblijven in PZ En PAAZ*, 2021; Hwang et al., 2020; Keown et al., 2016; Kjellin, 1997; Lee & Cohen, 2020; O'Brien et al., 2012; Schuler et al., 2018), where the delivery of health care is expected to be of the same quality, regardless of the patients' residence.

Compulsory hospitalisation should be used as a last resort for ethical, as well as legal, reasons. If unwarranted geographical variation exists, beyond that which can be expected based on warranted or "acceptable" risk-factors, it can suggest that certain areas use compulsory hospitalisation to a greater extent than may be necessary and thus could reduce its use. At the same time, lower levels of compulsory hospitalisation than expected could indicate that some areas are able to provide alternative services that the users want to receive, even in states of poor mental health. These services could potentially prevent the need for compulsory hospitalisation to develop at all. However, variations can also indicate that patients in some areas can choose to decline health services that they could have benefitted from (Gooding, 2021).

This dissertation is part of the research project ReCoN - Reducing Coercion in Norway - which was designed to identify ways in which we can reduce the use of coercion towards people with severe mental illness (SMI). The project directs focus to the role of primary mental health services as an arena in which compulsory hospitalisation might be prevented prior to the patient arriving at hospital, at which point a crisis may already have developed. It is our expectation that community-based health services, at primary or secondary level, have a central role in preventing the need for compulsory hospitalisation by providing care welcomed by, and acceptable to, patients outside of hospitals.

Despite long-standing efforts by health authorities to reduce the use of compulsory hospitalisation (Gooding et al., 2020), incidence rates remain high in many countries (Sheridan Rains et al., 2019). Norwegian authorities have expressed concern that there is too much use of coercion in mental health care and that use differs between regions (Helse- og omsorgsdepartementet, 2012). Raising awareness of the disparity in usage rates within homogenous populations can trigger reductive efforts in the higher ranked areas and it can encourage investigations into how services are organised and delivered in the lower ranked areas. The first aim of the dissertation is therefore primarily of a descriptive nature: how large was the geographical variation in compulsory hospitalisations in Norway between 2014 and 2018? However, there is little agreement on how levels of compulsory hospitalisation should be measured or available knowledge on how the variation is impacted by choice of measure.

In Paper I we therefore illuminate different ways of measuring and describing compulsory hospitalisation and on how the geographical variations appear differently depending on method of measurement. We obtained individual level registry data from the Norwegian Patient Registry (NPR), that allowed us to calculate and compare population-based rates. The results show that the geographical variations appear largest when we compare measures of duration, smaller when we compare measures of events, and smallest for measures of individuals.

The existence of considerable geographical variation in compulsory hospitalisation motivates research to explain this variation. If it is possible to identify characteristics of areas with higher or lower levels of compulsory hospitalisation, then knowledge of these characteristics might contribute to improve services and reduce the apparent need for compulsion. In Paper II we make such a contribution by focusing on characteristics of primary health care services, which are the services that those affected encounter most frequently in their daily lives. Our findings suggest that rates of compulsory hospitalisation in an area can be expected to decrease when the labour-years in municipal mental health and addiction services; number of general practitioners (GPs); or mental health nurses in that area are increased.

Finally, when considering why it is important to understand service variation in compulsion (Rugkåsa, 2017), normative claims are made on the basis of ethics that are often implicit. While the ethics of compulsory hospitalisation continue to be hotly debated, the ethical challenges pertaining to geographical variations have not been explicitly dealt with. Building on the findings of the two first papers, the ethical enquiry in Paper III shows how four core principles of health care ethics can be challenged by geographical variation. Furthermore, by considering a possible “right” level of compulsory hospitalisation it is argued that the optimal level of compulsory hospitalisation would not be higher than the required minimum over time in an area with good, less restrictive services that promote voluntariness. The paper concludes that compulsory hospitalisations that result from a lack of such alternatives are not ethically justifiable at the societal level. If Wennberg’s statement on page III is true – that in health care, geography is destiny (Wennberg, 2010) – this can provide particular concern regarding situations where care is enforced against the patients’ will, such as compulsory hospitalisation.

The insights garnered in this dissertation can help raise awareness of unwarranted geographical variation and contribute to improve mental health service provision by helping to reduce unwarranted variation and use of compulsory hospitalisation.

2 Background

The theoretical foundation of the dissertation is presented in this chapter. The literature review is a result of repeated searches in Google Scholar and PubMed, and extensive use of *snowballing,* or citation tracking, which involves following the bibliography of relevant books and articles. Where available, I have relied on systematic reviews or meta-analyses.

2.1 Geographical Variation in Health Services

The literature on geographical variation in health services is extensive. This section focuses on the most used analytic framework associated with John Wennberg and background information that serves as context for the investigations in the dissertation.

Small-area analysis of health care delivery is a framework used in research on health services to investigate and compare how populations use health care resources (Paul-Shaheen et al., 1987). Explicitly, or implicitly, the goal of such research is to contribute to improve equity and quality of care in health services (*The Fourth Australian Atlas of Healthcare Variation*, 2021). The studies are population-based, which means that they examine what occurs to groups of patients rather than individuals. Counts of health-related incidents within an area in a given time frame are usually divided by its population-at-risk of an event. This results in rates per population, which make it possible to compare areas with different population sizes. Geographical areas can be defined at different levels, but for the units to be sensibly comparable, areas within the same legislation or organisational administration are often favoured.

For the last fifty years, small-area analysis has been associated with the work of John Wennberg, founder of The Dartmouth Institute for Health Policy and Clinical Practice. Tracing back to research by James Glover in 1938, their research documented great variability in rates of tonsillectomy between school districts. The expectations of Wennberg and colleagues were that health service provision would primarily be based on medical need and evidence-based science. But their surprising findings showed that large variations resulted from differences in physician-opinion and non-medical factors such as availability of resources (Wennberg, 2010). These pioneering efforts sparked considerable interest in the public, and health atlases documenting geographical variations in the provision of various health related services are now found in multiple countries – Australia (*The Fourth Australian Atlas of Healthcare Variation*, 2021), England (DaSilva & Gray, 2016), Norway (Bale et al., 2021), Spain (Bernal-Delgado et al., 2014), and the USA (Wennberg et al., 2008). A search in Google Scholar[1] revealed an increasing use of small-area analysis, with no articles using the term in the early 1960s, to 270 publications including the term in 2020. A search on PubMed[2] on "geographical variation" peaked at 173 publications in 2020. Studies on geographical variation within mental health care include: diagnosing or prevalence of mental illness (Madsen et al., 2015; Perälä et al., 2008; Scully et al., 2004); prescription or use of medication (Jensen-Dahm et al., 2019; Verdoux et al., 2016); hospital admissions or discharges (Almog et al., 2004; Madianos et al., 1999; White et al., 2014), and use of outpatient commitment (Light et al., 2012; O'Brien, 2014).

Not all geographical variation in health services is considered problematic. If due to regional differences in patient preferences, medical evidence, morbidity or illness prevalence, variations are usually considered appropriate (Wennberg et al., 2008).[3] Non-random geographical variations due to other reasons are considered *unwarranted* or *unwanted* in the framework of Wennberg and the Dartmouth Atlas. This distinction is related to their description of three categories of health services: effective, preference-sensitive and supply-sensitive care.

---

[1] Search performed 28.10.2021 on Google Scholar using the search string "small area analysis" for each year from 1960 to 2020.

[2] Search performed 04.11.2021 on PubMed using the search string "geographical variation". The first health related articles appeared in 1960 but geographical variation has been a long-time staple in biology.

[3] Patterns of variation that follow known differences in morbidity can still signal the need to improve prevention of serious illness. For instance, in cases of increased risk resulting from socioeconomic disadvantage (*The Fourth Australian Atlas of Healthcare Variation*, 2021).

Effective care describes services where the benefits clearly outweigh the potential harm. These services are recommended in guidelines for best practice. Unwarranted variation of this type would represent a failure to supply appropriate care, which is related to *underuse*. Underuse involves situations where a patient could be expected to benefit from an affordable health service but does not receive such treatment (Glasziou et al., 2017).

Preference-sensitive care describes health care interventions where two or more treatments are available with different risks and benefits. If choice of treatment, by professionals or patients, is not evidence-based, this can be related to *misuse* of health services or preventable medical errors.

Supply-driven care concerns services that are contingent on local capacity and not on the patient's needs or preferences. This can result in *overuse* of low-value care. Overuse is defined as provision of medical services that are likely to result in more harm than good (Brownlee et al., 2017). Professionals can be biased by the idea that more implies better (Hofmann, 2020), however more health care can both be more costly and result in more harm (Wennberg et al., 2015). Overuse signals poor use of resources since patients with greater need might have been deprioritised.

An alternative framework has been developed within the European Collaboration for Healthcare Optimization, which emanated from the Atlas of Variations in Medical Practice in Spain (Bernal-Delgado et al., 2014). They distinguish between effective care, effective care with uncertain marginal benefit, and lower-value care. The first and third categories within this framework are used to judge appropriateness of care, based on benefits to the patient (OECD, 2014). Neither of these two frameworks have, to my knowledge, been applied to services provided without the patients' consent. It is therefore a matter of debate whether these categories are appropriate for involuntary care or if treatment without consent involves other and different factors.

Each framework indicates that geographical variations are likely to be impacted by available evidence of treatment effectiveness and risks of harm involved, both through professionals' views on appropriateness of care and patient preferences.

As new and potentially less harmful interventions become available, practice styles may need to change in accordance with revised evidence (OECD, 2014).

The *professional uncertainty hypothesis* by Wennberg and Gittelsohn postulates that geographical variations in medical procedures are the result of differences in physicians' diagnostic practice, or differences in how physicians evaluate the effectiveness of a treatment (Wennberg et al., 1982). With larger professional uncertainty there is more room for individual interpretations of what is in the patient's presumed best interest, which will lead to more practice variation. This hypothesis is supported by observations that the more controversy or professional disagreement on right care for a specific condition, the more geographical variation is observed (Wennberg et al., 2015). This can be due to differential diagnoses, a debatable evidence-base, or disagreement between physicians about indications for treatment. Examples of high-variation procedures include tonsillectomy and prostatectomy.

Conversely, medical procedures for conditions with relatively little dispute about best treatment or alternate diagnoses tend to display little geographical variation, both over time and in different settings. Examples include heart attack, stroke, and hip fraction repair, which constitute less than 20% of all hospitalisations (Wennberg et al., 2015). Hospitalisation rates following these conditions can be considered benchmarks for health care where variation is primarily driven by illness prevalence. As different conditions tend to display different patterns of geographical variation, these benchmarks, or appropriate levels, can be used as part of strategies for "reducing waste" in healthcare, i.e. decrease overuse of low-value care.

After quantifying the extent and magnitude of variations, researchers sometimes make qualitative judgements as to what constitutes large variation. The Office of the Auditor General in Norway published an audit in 2019 which investigated reasons for unwarranted variation in health services (*Riksrevisjonens kontroll med forvaltningen av statlige selskaper – 2018*, 2019). In this audit, procedures were considered to have large geographical variation if the highest rate was at least twice the size of the lowest. This was based on the reasoning that if one area had double the use of a procedure compared to another, after accounting for age and gender differences, this variation was most likely systematic, unwanted, and not the result of chance. If usage rates were more than four times higher in one area than another, variations were considered as very large or extreme.[4]

The term *right care* has seen increasing use over the last twenty-five years and has been defined as “care that weighs up benefits and harms, is patient-centred (taking individual circumstances, values, and wishes into account), and is informed by evidence, including cost-effectiveness” (Kleinert & Horton, 2017, p. 101). There have been a series of international initiatives to reduce overuse, underuse, and geographical variation in health care delivery, such as the NICE Do not Do prompts (*NICE Do Not Do Prompts*, 2013), and the Choosing Wisely campaign (Cassel & Guest, 2012), which have been adopted in multiple countries.

Variations in health services can also be understood in terms of prioritisation and whether resources are allocated appropriately to provide right care. Geographical variations described in health atlases can help identify potential overuse and underuse of health services. Atlases can be used as a starting point for exploring why the variations exist and how they can be handled. For services where overuse is a problem, setting targets for levels of health service provision can contribute to reduce rates in highly ranked areas (OECD, 2014). The Norwegian Act relating to Specialist Health Services aims to ensure quality and equity of health services and that resources are used in the best possible way (Spesialisthelsetjenesteloven, 1999). The Norwegian Ministry of Health and Care Services have stated that too much variation in quality between hospitals, municipalities and services signals potential for improvement (Proposition to the Storting (draft resolution), 2016). Meanwhile, the Regulation on Priority Setting states that patients have a right to necessary health care from specialist services when benefit from treatment can be expected and associated costs are in a reasonable relation to expected outcomes (Prioriteringsforskriften, 2000). Furthermore, the regulation states that expected

---

[4] Simulation studies have shown that dividing the highest rate by the lowest rate can be susceptible to various types of bias (Diehr et al., 1990). Other measures of geographical variation are therefore preferred (Diehr et al., 1993; Ibáñez et al., 2009).

benefits should build on evidence-based practice. From this perspective, knowledge of the extent of unwarranted variation in health services is important.

Terms like unwarranted, unwanted, priority, equity, quality of care, and benefit, which are often used by researchers and health officials, all contain elements of normativity. It appears that ethical and normative evaluations are implicit drivers of both current practice as well as the will to change the status quo. However, to my knowledge, there has been no explicit ethical analysis of geographical variation in health services in general, nor of geographical variation in compulsory hospitalisation. The latter is therefore the topic of Paper III.

2.2 Coercion in Mental Health Care

Voluntariness is a corner stone of health care. Only a small subset of services is provided without consent and against the immediate wishes of the patients involved. Examples include the use of coercive interventions towards pregnant women with addiction issues, and towards persons with organic mental disorders, such as dementia and mental retardation, who lack the capacity to consent to treatment. In Norway, coercive interventions are occasionally used towards children in child welfare services, primarily involuntary drug testing, or for reasons regarding danger (*Tvangsbruk i Barneverninstitusjoner*, 2021). During the Covid-pandemic, the coercive practice of mandatory vaccination has been debated internationally, and by the time of writing, mandatory vaccination has been implemented for all adults in Austria. A considerable share of coercive practices fall within the category which is the focus of this dissertation: compulsory hospitalisation in mental health care.

Szmukler and Appelbaum described a hierarchy of treatment pressures used in mental health services, ascending from persuasion, to interpersonal leverage, to offers, then threats, with compulsion - within hospital or community settings - situated at the top (2008). They argued that the justification for intervention increases along the hierarchy. While threats are understood as coercive by narrowing available options, offers are not (Hawkins & Emanuel, 2005). In this dissertation I use the term *compulsion* to indicate formal coercion through mental health legislation, where the legal status of a hospitalisation is used to identify episodes of compulsion. The terms *coercion* and *coercive practice* also include informal coercion such as treatment pressures (Szmukler & Appelbaum, 2008). Informal coercion can be related to the inherent power asymmetry embedded in the institutions of mental health care which can contribute to patients' experiences of being coerced, even though they formally might be admitted voluntarily (K. I. Iversen et al., 2002). Interesting studies have been done on *perceived coercion*, focusing on the subjective experiences of the compelled individuals (Akther et al., 2019; Katsakou & Priebe, 2007; Newton-Howes & Mullen, 2011; Nyttingnes, 2018; Seed et al., 2016). Informal and perceived coercion are beyond the scope of this dissertation and are not well-suited for registry-based studies.[5]

Compulsory hospitalisation, also known as involuntary admission or civil commitment, usually involves admitting individuals to a psychiatric hospital against their will, based on the assumed presence of SMI. Further criteria specifying additional requirements differ between jurisdictions (Saya et al., 2019), but typically involve danger to self or others, or the need for treatment lest the individual's condition deteriorates. The practice has a long history of controversy, in part due to the historical use of treatment procedures that can do more harm than good. Examples include lobotomy, isolation, and electroconvulsive therapy. Today, compulsion and coercion in mental health care include a range of restricting practices such as seclusion or isolation (Chieze et al., 2019), mechanical fixation or restraints (Beghi et al., 2013), and forced medication (Jarrett et al., 2008). There is considerable literature on in-hospital coercion, such as seclusion and mechanical fixation (Aguilera-Serrano et al., 2018; Luciano et al., 2014), including geographical variation in the use (Bak & Aggernæs, 2012; Flammer et al., 2022; Husum et al., 2010; Raboch et al., 2010; Steinert et al., 2007; Välimäki et al., 2019).

In Norway, mechanical restraints are permissible towards voluntarily admitted patients to prevent immediate danger of harm. The regulation of seclusion does not

---

[5] It would however be very interesting to see more studies on geographical variation in perceived coercion (Kjellin et al., 2006).

differ with legal status of admission, but seclusion cannot be used to prevent voluntarily admitted patients from leaving the hospital. In contrast, a legal status of compulsory care is a necessary condition for forced medication (*Circular from the Directorate of Health*, 2020). Compulsion, in the form of compulsory hospitalisation, is therefore an interesting unit of analysis, as it constitutes a high degree of restriction while providing the context within which a range of other coercive practices can be performed.

2.2.1 Developments in Mental Health Services

Several developments within the field of mental health services deserve mentioning as they are likely to be related to variations in the use of compulsory hospitalisation. Of considerable importance is *deinstitutionalisation*, which describes the trend of downsizing long-term hospital beds in traditional asylums, coupled with a move towards *community mental health care* (Thornicroft et al., 2016). This development enables people with SMI to live at home and receive treatment in environments that are considered less restrictive, such as Community Mental Health Centres, instead of remaining isolated from society for extended periods of time. Some have argued that this move has improved quality of care (Taylor et al., 2009). However, there have been concerns that the transition was too swift and that community services have not been adequately developed in all areas (Novella, 2010). Multiple concerns have been voiced that deinstitutionalisation has gone too far (Munk-Jørgensen, 1999; O'Reilly et al., 2019; Thornicroft et al., 2016), with the large-scale closure of beds resulting in overburdening of the hospital system and poorer patient outcomes. Associations between reduced mental health bed numbers and increased use of compulsory hospitalisation have been observed in the United Kingdom (Keown et al., 2011). Furthermore, the shift towards community mental health care involves the move of compulsory interventions into people's homes, under names such as *Community Treatment Orders* or *Outpatient Commitment* (Rugkåsa & Burns, 2017). According to a Cochrane review, evidence is limited but shows little support for beneficial outcomes for patients on outpatient commitment (Kisely et al., 2017). Similarly, a systematic review and meta-analysis found no support for reduced readmission or length of hospitalisations following outpatient commitment (Barnett et al., 2018).

Secondly, following the universal declaration of human rights by the United Nations' General Assembly (Universal Declaration of Human Rights, 1948), there has been increased focus on individual rights. Paternalistic justifications for compulsory hospitalisation have been challenged, while the wills and preferences of patients are given increased value (Puras & Gooding, 2019; Szmukler, 2019). Correspondingly, there have been attempts at moving away from *substitute decision-making*, where the clinician decides on behalf of the patient what is in their assumed best interest, towards *supported decision-making*. The idea is that people ought to be supported in choosing their own care regardless of ability.[6] These developments have been spurred by the *Convention on the Rights of Persons with Disabilities* (CRPD, 2007), which is a United Nations human rights treaty currently ratified by 184 parties. The convention, and the comment by the Committee on the Rights of Persons with Disabilities (2014) regarding article 12, shows the injustice and possible stigmatisation involved in discriminating on the basis of diagnoses. In the case of somatic disease, people are generally allowed to abstain from even life-saving treatment known to be effective, if they wish. In contrast, persons with SMI can under many legislations be committed and forcibly medicated against their will, despite uncertain treatment outcomes (Katsakou & Priebe, 2006). The convention shows how health legislations often have been, or remain, in conflict with fundamental human rights.

There is considerable uncertainty about how legislations can be designed to conform with human rights while securing patients' right to treatment and society's right to protection (Appelbaum, 2016; Dawson, 2015; M. C. Freeman et al., 2015; Kumar, 2018; Mahdanian et al., 2022). Article 12 of the CRPD concerns equal recognition before the law, including the right to legal capacity, which should hold

---

[6] A review suggested that human rights-based approaches to mental health care can, at a low cost, result in clinical improvement (Porsdam Mann et al., 2016).

regardless of perceived or actual impairment of capacity for decision-making (Sashidharan et al., 2019).

It can be argued that persons who lack capacity to consent belong to patient groups that are particularly vulnerable and therefore deserve additional protection against harms and wrongs beyond those covered by human rights (Solbakk, 2011). Some have argued that the Committee's interpretation of the CRPD is in conflict with the duty to protect the vulnerable (Newton-Howes et al., 2020).

Correspondingly with these developments, there has been a drive towards reduced use of coercion in mental health care[7], including the need to develop and strengthen good practices that promote voluntariness and that might help reduce the need for coercive interventions (Gooding, 2021; Gooding et al., 2018). This development has been supported by users of mental health services, former patients, professionals working within services, as well as governments. The increased demand for evidence-based medicine also questions the effectiveness of coercive practices (Sashidharan et al., 2019). Despite these intentions and political initiatives, annual rates of compulsory hospitalisation appear to be rising in some countries (Sheridan Rains et al., 2019).

In this context, studies on geographical variation in compulsory hospitalisation play an important role by showing that some areas use considerably more compulsion than comparable areas and thus are likely to have potential for reduction. Studies also reveal the existence of areas that use comparatively little compulsion

---

[7] The anti-psychiatry movement is occasionally described as originating in the 1960-70s but concerns over coercive practices have been part of psychiatry's history since the early asylum-era. Historical data show that the use of in-hospital compulsion and use of restraints varied greatly throughout the 1900s and do not support an idea of a linear development of moral standards within psychiatry, from previously low standards, to higher, modern standards (Rabben & Thomassen, 2019).

which might contribute to our understanding of how the use of compulsory hospitalisation can be reduced.

2.2.2 Mental Health Legislations

Current mental health legislations regulating compulsory hospitalisation tend to require the presence of mental illness, but additionally a need for treatment, dangerousness of the patient[8], or both, according to a recent review (Saya et al., 2019). Some countries require the involvement of a representative from the legal system which has been suggested to reduce practice variation (Lin et al., 2016).

2.2.2.1 The Norwegian Mental Health Act

In Norway, compulsory mental health care is regulated through the Mental Health Care Act which states that voluntariness must have been tried without success or considered clearly futile (*Mental Health Care Act*, 1999). §3.2 regulates compulsory observation in situations where it is uncertain whether criteria for compulsory care are fulfilled. The observation period is limited to ten days but can be extended by an additional ten days. §3.3 regulates compulsory mental health care, both for inpatients and outpatients. In addition to the presence of SMI, at least one of two additional criteria must be fulfilled. The *treatment criterion* requires that improvement of the patient's health will be considerably reduced, or that it is highly likely that their condition will deteriorate significantly in a short time-period without compulsory care. The *danger criterion* requires that the patient poses an immediate and serious threat to own or others' lives or health. Following a legislative change in 2017, an additional requirement is that the patient must lack the capacity to consent, unless the danger criterion is fulfilled. Finally, in an overall assessment, the involuntary care must clearly be in the patient's best interest, except if there is potentially imminent and high-risk danger to others.

Coercive practice is overseen by control commissions appointed by the Department of Health to ensure that rule of law is followed. This includes a control of formal

---

[8] The danger criterion is notably absent in Italy and Spain (Saya et al., 2019).

demands and whether the legal decision is based on correct interpretations of the material conditions of the law (*Circular from the Directorate of Health*, 2020).

2.2.3 Compulsory Hospitalisation: Risk Factors and Outcomes

Compulsory hospitalisation is associated with the male gender, single marital status, unemployment, and those receiving welfare benefits, according to a systematic review of 77 studies from 22 countries (Walker et al., 2019). Additionally, the presence of SMI and previous compulsory hospitalisations are strong predictors, or risk factors, for involuntary admission. Many persons with SMI struggle with addiction challenges, and so called "dual diagnoses" are associated with poorer outcomes (Carrà et al., 2015). According to a systematic review, ethnicity is another risk factor for compulsory hospitalisation, with minority ethnic and migrant groups being significantly more at risk compared to host nation populations (Barnett et al., 2019).

There are currently no Cochrane reviews of the effectiveness of compulsory hospitalisation and other types of reviews find limited support for beneficial outcomes (Luciano et al., 2014). For ethical, legal, and practical reasons it is usually considered unfeasible to perform Randomised Controlled Trials (RCT) investigating the effectiveness of coercive interventions. Available evidence for the effectiveness of compulsory hospitalisation has been criticised for a lack of standardisation and the overall quality of studies were considered low, with small sample sizes (Kallert et al., 2008; Katsakou & Priebe, 2006).

Since people can be involuntarily committed for a variety of reasons there are differences in service providers' expected outcomes. Broadly, people are detained to protect their own best interest or to protect the interests of others (Høyer, 2000; Saya et al., 2019).

The first reason includes hospitalisations to reduce the risk of self-harm, hospitalisations to improve the person's health or to avoid serious deterioration. In case of danger to the self, the expected outcome is to prevent suicide or serious self-harm. It is difficult to predict who is likely to commit suicide and the evidence is conflicting as to whether compulsory hospitalisations on the grounds of danger of harm to the self result in fewer suicides long-term (Borecky et al., 2019). A pooled analysis from eleven European countries found a significant reduction of suicidality three months after involuntary admission (Giacco & Priebe, 2016), however there are several limitations with the methodology employed, including non-randomised treatment assignment and selection bias. In situations where danger to the self is not an issue, the expected benefits can include improving the patient's functioning and long-term prognosis, stabilising a crisis, and restoring autonomy. Some studies have observed improved functioning or insight and reduction of symptoms following compulsory hospitalisation (Kallert et al., 2011; Kjellin et al., 1993, 1997; McEvoy et al., 1989; Opjordsmoen et al., 2010). Other studies found little or no patient improvement from compulsory hospitalisation (Jaeger et al., 2013; Priebe et al., 2011; Seo et al., 2013; Svindseth et al., 2010; Wallsten et al., 2006).

The second reason involves the involuntary detention of persons with SMI who are considered to represent a high risk of danger to others. Again, available evidence is limited. The pooled analysis from eleven European countries also found a significant reduction in hostility following compulsory hospitalisation (Giacco & Priebe, 2016), but the same limitations apply in this case. There is a lack of studies that assess to what extent compulsory hospitalisation was necessary to prevent worsening harm had it not been initiated.

Compulsory hospitalisation can also be initiated for forced medication to take place. Despite controversy over the long-term effectiveness of anti-psychotic medication and considerable side effects (Kishimoto et al., 2019), the short-term effect on stabilising psychotic breakthrough and preventing relapse is well documented (Ceraso et al., 2020; Haddad & Correll, 2018). At the same time, the practice of forced medication is often perceived as a violation of integrity and patient organisations are often strongly opposed to it (Nyttingnes & Rugkåsa, 2021). According to a recent systematic review, available evidence cannot answer whether involuntary medication provides better, worse, or identical outcomes compared to voluntary treatment (Jardim, 2021).

Meanwhile, there is a growing body of studies documenting negative consequences of compulsory hospitalisation, primarily on the basis of patient experiences (Kallert et al., 2008; Katsakou & Priebe, 2006; Kjellin et al., 2006; Norvoll, 2011; Svindseth et al., 2007). Examples include negative emotions, negative expectations towards treatment outcome, and reduced confidence in staff, which made some patients less inclined to engage with mental health services in the future (Luciano et al., 2014; Norvoll, 2011).

2.3 Geographical Variation in Compulsory Hospitalisation: Previous Studies

During the last thirty years, the existence and importance of geographical variation in compulsory hospitalisation has increasingly been recognised. Registry data have made investigations easier, but are not available in all countries, and there has been concern about the quality of reported data (K. I. Iversen et al., 2009). In contrast to the preceding two sections, the literature dealing explicitly or implicitly with geographical variation in compulsory hospitalisation is still fairly limited. The following review is therefore expected to cover most of the relevant literature.

Several studies have compared compulsory hospitalisation rates between different countries, though almost exclusively within Europe, revealing surprisingly large variations.

- Riecher-Rössler and Rössler (1993) compared quotas and rates from 22 countries They were concerned by the lack of comparability due to differences in definitions, as well as the reliability of the numbers.
- Hansson and colleagues (1999) compared rates and shares of both compulsory admissions and compulsorily admitted patients between seven catchment areas in Denmark, Finland, Norway and Sweden. They observed large variations with no regular rural-urban pattern.
- Zinkler and Priebe (2002) compared rates from 14 European regions and observed a twenty-fold difference. Due to limitations in data availability, the selection was limited to five European countries.

- Salize and Dressing (2004) provided an overview of data from 13 countries in the European Union. They strongly urged more research into the topic and increased standardisation of reporting.
- de Stefano and Ducci (2008) compared compulsory admission data from the 15 members of the European Union. In contrast with Salize and Dressing, they argued that higher rates were associated with the danger criterion, while the need-for-treatment criterion was associated with lower levels of compulsory admission.
- The latest comparison was completed in 2019 in a comprehensive study of 22 countries (Sheridan Rains et al., 2019). Rates of involuntarily hospitalised patients ranged from 15 per 100 000 in Italy, to 282 per 100 000 in Austria, with a median rate of 106. They found higher rates in countries with more hospital beds, higher Gross Domestic Product, higher health-care spending, more foreign-born individuals, and lower absolute poverty.

The comparative studies are important for context and to understand developments in levels of compulsory hospitalisation. Many questions remain unanswered concerning reasons for the large variations between countries. Since the legal foundation for compulsory hospitalisation (Wasserman et al., 2020) and the organisation of health care delivery differs between countries, these studies represent a different type of comparison than the one found in this dissertation, where similar units within the same jurisdiction are compared.

There is a small body of literature that examines variation across areas within a jurisdiction. The rates compared in these studies are sometimes based on counts of hospitalisations, including readmissions, while in some studies they are restricted to counts of individuals or first admissions.

- An early comparison of rates can be found in Engberg (1991) who studied rates of compulsory hospitalisation in Denmark and Danish territories with common legislation between 1984-1988. Rates were higher in Greenland with 36 per 100 000 and lower in the Faroe Islands with 21, compared to 24 per 100 000 in mainland Denmark.

- In Sweden, Kjellin (1997) compared rates from 21-26 counties between 1988 and 1993 and found that the number of involuntarily hospitalised patients ranged from 4 to 21 per 100 000.
- Brieger et al. (2014) found compulsory hospitalisation rates ranging from 17 to 98 per 100 000 in five clinics in Germany in 2008-2009.
- Donisi et al. (2016) compared the average rate of compulsory hospitalisations of 21 mental health departments in the Veneto region of Italy between 2000 and 2007, with results ranging from 2 to 28 per 100 000.
- In England in 2010/2011, the rates of compulsorily hospitalised patients in 138 primary care trusts ranged from 81 to 231 per 100 000 population (Keown et al., 2016).
- In New Zealand between 2005-2008, the average monthly rate of committal to compulsory acute care ranged from 5 to 15 per 100 000 (O'Brien et al., 2012).
- A study by Gandré et al. (2018) found that the rate of involuntary hospitalised patients was 10 times higher in the 90th ranked percentile compared to the 10th percentile. This study covered 66% of all catchment areas to the psychiatric sector in France in 2012.
- In the United States of America, comparing emergency detentions per 100 000 in 25 states from 2011 to 2018, Lee and Cohen (2020) observed rates ranging from 29 to 966.[9]
- Comparing rates of compulsory admission in 17 cities and provinces of South Korea in 2017, Hwang et al. (2020) observed rates ranging from 5 to 105 per 100 000.
- In the Netherlands, the number of compulsorily hospitalised patients in 2017 ranged from 122 to 265 per 100 000 between 11 districts (Broer et al., 2020).

Explicit or implicit displays of geographical variation in compulsory hospitalisation can also be found in official statistics and governmental reports.

---

[9] Legislations differ somewhat between states (Testa & West, 2010), so this comparison is an exception.

- According to a report by the Swiss Health Observatory on compulsorily hospitalised patients in all 26 cantons in Switzerland in 2016, rates ranged from 38 to 331 per 100 000 (Schuler et al., 2018).
- In 21 Italian regions in 2016, rates of compulsory hospitalisation ranged from 4 to 29 per 100 000 (Di Cesare et al., 2017).
- The Belgian Federal Public Service reported rates of compulsory hospitalisations ranging from 42 to 130 per 100 000 between 11 provinces in 2018 (*Gedwongen Verblijven in PZ En PAAZ,* 2021).
- In Finland in 2018, admissions to involuntary care ranged from 30 to 290 per 100 000 between 21 hospital districts (The Finnish Institute for Health and Welfare, 2022).
- In Ireland in 2020, rates of compulsorily hospitalised patients per 100 000 ranged from 13.5 to 27 between nine community healthcare organisations (Daly & Craig, 2021).
- In Sweden in 2020, rates of compulsorily hospitalised patients aged 18 to 64 ranged from 55 to 227 per 100 000 between 21 regions, while rates of compulsory hospitalisation ranged from 76 to 393 (*Statistikdatabaser - Psykiatrisk Tvångsvård*, 2021).

Where rates have been available in the literature just described, I have summarised them in Table 1. In some of the literature counts are based on individuals, while other counts are based on hospitalisations, so these are summarised separately. I have calculated the Extremal Quotient (EQ), which is the highest rate divided by the lowest. A higher EQ indicates more geographical variation, and the numbers suggest that large variations are common. These estimates should be interpreted with caution, as they differ in ways that impact the magnitude of variation, such as the number of units compared, the population size of the units - which were most often not reported, the length of the study period, and the frequency of the procedure (Diehr, 1984; Diehr et al., 1990; Ibáñez et al., 2009).

Additionally, country size can play a role in the equation since smaller countries are more likely to be homogenous than larger countries.

A few studies and reports have considered geographical variation in compulsory hospitalisation in Norway.

- Hatling et al. (2002) found that shares of compulsory hospitalisation ranged from 33% to 60% between Norwegian counties in 1996, and they related this to differences in prevalence of SMI.
- Iversen et al. (2009) compared data from four Norwegian psychiatric hospitals in 1996-97, with rates of involuntary referrals ranging from 198 to 356 per 100 000. They were concerned that official statistics, for methodological reasons, underestimated the use of compulsory hospitalisation.

Table 1: Geographical variation in compulsory hospitalisation within different countries.

Unit	Country	Min	Max	N	Years	EQ
Hospitalisations	U.S.A. (Lee & Cohen, 2020)	29	966	25	8	33.3
	South Korea (Hwang et al., 2020)	5	105	17	1	21
	Finland (The Finnish Institute for Health and Welfare, 2022)	30	290	21	1	9.7
	Italy (Di Cesare et al., 2017)	4	29	21	1	7.3
	Germany (Brieger et al., 2014)	17	98	5	2	5.8
	Sweden (*Statistikdatabaser - Psykiatrisk Tvångsvård,* 2021)	76	393	21	1	5.2
	Belgium (*Gedwongen Verblijven in PZ En PAAZ*, 2021)	42	130	11	1	3.1
	New Zealand (O'Brien et al., 2012)	5	15	21	4	3
	Denmark, Greenland, Faroe Islands (Engberg, 1991)	21	36	3	5	1.7
Inpatients	France (Gandré et al., 2018)	-	-	541	1	10.2*
	Switzerland (Schuler et al., 2018)	38	331	26	1	8.7
	Sweden (*Statistikdatabaser - Psykiatrisk Tvångsvård,* 2021)	55	227	21	1	4.1
	England (Keown et al., 2016)	81	231	138	2	2.9
	The Netherlands (Broer et al., 2020)	122	265	11	1	2.2
	Ireland (Daly & Craig, 2021)	13.5	27	9	1	2

N = Number of areas compared. * Ratio of the 90th to the 10th decile.

- Norum et al. (2013) compared rates from two hospitals in Northern Norway in 2009-2010, ranging from 10 to 31 per 100 000. The authors acknowledged that concerns had been voiced about the data quality in this study, which could be related to differences in reporting.

- The Norwegian Directorate of Health has, for some time, published statistics on use of compulsion, including geographical variation in compulsory hospitalisation at the level of health trusts (Bremnes & Skui, 2020).

In summary, this review shows that the scientific literature on geographical variation in compulsory hospitalisation is growing but remains quite limited in scope. Few studies have been able to include data from the whole country and data is limited to one year for most studies. There is a discrepancy regarding how compulsory hospitalisation is measured and described, with counts being based on both events and individuals. The magnitude of geographical variation can in many countries be considered large or very large. The population size of the areas impacts the magnitude of geographical variation but is often not stated.

Comprehensive, descriptive studies that show the extent and quantify the magnitude of geographical variation in compulsory hospitalisation are therefore required. Preferably, such studies should be done using data that covers the whole population over several years, with a standardised methodology that allows comparison between studies. Paper I is intended to be such a contribution, by providing a thorough description of geographical variation in compulsory hospitalisation in Norway during 2014-2018.

2.4 Study Context: Norwegian Health Services

Norway is a long-stretched country populated by 5.3 million inhabitants. With a high standard of living, life expectancy, and education level, Norway ranks at the top of the United Nations' Human Development Index (*Human Development Index*, 2021). Health care is covered through the tax bill and a modest co-payment for services received. The evolution of mental health services in Norway has followed the same pattern observed internationally, with the rise and decline of asylums and reform of mental health services. In this third phase, care is provided closer to home by community-based services supported by acute inpatient care (Jones et al., 2018). Municipalities are now expected to assume more responsibility for treatment and follow-up of patients with mental disabilities (Løvsletten et al., 2020).

Most health service delivery is provided by primary care, which in Norway is synonymous to municipal health services. These services are regulated through the Health and Care Services Act (Helse- Og Omsorgstjenesteloven, 2011). The municipalities are responsible for providing primary health and social services for residents as well as visitors. Primary health services are expected to provide preventive healthcare, diagnosing, treatment, medical rehabilitation, and emergency care. They are comprised of general medical services, which include GPs, emergency departments, home nursing, and nursing homes. Since 2020, municipalities are also required to have access to psychologists (Helse- Og Omsorgstjenesteloven, 2011). The number of municipalities changed during and after the study period, from 428 to 356.

The dimensioning of primary health services differs between municipalities, with the higher rates of labour-years per population primarily found in smaller municipalities. According to the Social Services Act (Sosialtjenesteloven, 2009), municipalities are expected to cover basic needs for disadvantaged persons, which includes a requirement to provide shelter for those unable to obtain this on their own.

From the end of the 1990s to 2008 health authorities developed a large reform known as the “escalation plan for mental health” (Ose et al., 2018). Furthermore, the “coordination reform” of 2012 introduced a legal requirement for coordination agreements between Norwegian Health Enterprises and municipalities (Rommetvedt & Nødland, 2020). An aim of these reforms was to transfer parts of the services from the specialist level to the primary care level and strengthen the dimensioning of primary services, including staffing and public housing.

Specialist services are owned by the state and run by four Regional Health Authorities. They consist of 19 health trusts that run hospitals and 65 Community Mental Health Centres (CMHC). Specialist mental health services are divided into: acute mental health services, which are available at all major hospitals; specialised mental health services that provide longer rehabilitative treatment, including outpatient unit and ambulatory teams; child and adolescent mental health services for persons under eighteen years; geriatric mental health for persons over sixty-five years; forensic psychiatry for persons with SMI and violent and aggressive behaviour, and contract specialists, who are psychologists and psychiatrists who treat conditions that do not require hospitalisation. The CMHCs have the primary responsibility for diagnosing and treating SMI among adults and providing both outpatient and inpatient treatment. The specialist services are also responsible for the use of compulsory mental health care.[10] Geographical variations in provision of specialist mental health services have been documented (The Norwegian Directorate of Health, 2019). Variations were not considered to be large but were larger for mental than somatic health care.

Following authorities' guidelines to increase decentralised care there was a reduction of bed capacity in mental health care institutions for adults. In 2011, the availability of mental health care beds in Norway still ranked towards the higher end compared to other OECD countries (Lin et al., 2016). The number of beds available in adult mental health care reduced from 17.6 per 100 000 in 1998 to 8.1 in 2018 (Lilleeng et al., 2019). This is equivalent to a 54% reduction of beds after correcting for population growth. There was a reduction in average length of stay and in 2018, two thirds of admissions were acute, rather than planned.

The number of persons in court-ordered compulsory psychiatric care increased 27% from 169 in 2015 to 215 in 2018 (*Årlig melding 2018: Nasjonal koordineringsenhet for dom til tvungent psykisk helsevern*, 2018). More than half of these were treated in hospital. This means that an increasing share of mental

---

[10] See Wynn (2018) for a systematic review on compulsory hospitalisation in Norway.

health care beds are occupied by forensic psychiatry which leaves less available capacity for other patients (Totland, 2021).

The public is expected to have equal access to mental health services at both the municipal and specialist levels, regardless of area of residence.[11] The principle of municipal self-governance gives opportunities for locally tailored service organisation according to needs and priorities, providing that the governmental expectations for quality and accessibility are met (*Riksrevisjonens undersøkelse av psykiske helsetjenester*, 2021). Considerable variation in provision has been documented with violations of the law observed in two thirds of municipalities (*Riksrevisjonens undersøkelse av psykiske helsetjenester*, 2021). This variation has consequences for whether persons with mental disabilities receive health care when in need. Services are required to have a satisfactory standard, be provided within reasonable time and in sufficient supply (*Riksrevisjonens undersøkelse av psykiske helsetjenester*, 2021). Furthermore, municipalities are required by law to provide necessary health and care services.

Norwegian health authorities launched action-plans in 2006 (Sosial- og Helsedirektoratet, 2006) and 2012 (Helse- og omsorgsdepartementet, 2012) to reduce the use of compulsion in mental health care. Services are instructed to ensure appropriate and reduced use of compulsion. In March 2022, the Norwegian Directorate of Health published national professional advice for prevention of coercion in mental health care (The Norwegian Directorate of Health, 2022). The advice was developed to reduce the use of coercion, including compulsory hospitalisation, as well as unwarranted variation. The first section of the advice focussed specifically on the preventative role of municipalities and how services were organised. Advice included: ensuring stable living conditions and work or education for persons at risk of compulsory hospitalisation; the importance of GPs in evaluating need for compulsory hospitalisation, and cooperation between services levels. The

---

[11] For an overview of community-based mental health services in Norway, see Ruud & Friis (2021).

publication of this advice illustrates that the topic of this dissertation is both timely and important.

2.5 Municipal Services and Compulsory Hospitalisation

A guiding expectation underlying this dissertation is that primary health care, including municipal mental health and addiction services, are organised in ways that have consequences for the use of compulsory hospitalisation in that area. If people with SMI have access to services that satisfy their needs, the likelihood of crisis development might be reduced, thereby preventing the need for extraordinary interventions such as compulsory hospitalisation (Wormdahl et al., 2020).

A U.S. study suggested that increased availability of community mental health services and support could reduce involuntary commitment (McGarvey et al., 2013). Similarly, a French cross-sectional study observed fewer involuntary admissions in areas where alternatives to full-time hospitalisation were better developed (Gandré et al., 2017). Other available evidence points to the importance of resource availability and service organisation (Gooding et al., 2020; Quirk et al., 2003). In Paper II we investigate associations between characteristics of primary health services and levels of compulsory hospitalisation. The following section contains an extended summary of previous research on the service characteristics included in Paper II, as well as theoretical reflections on why such associations were expected.

2.5.1 Dimensioning of Services: Labour-years

Municipal services have been scaled up with the closing of long-term beds in mental health care but services are not staffed equivalently in all areas. There is reason to believe that increasing the number of staff working in primary mental health care can help prevent the perceived need for, and use of, compulsory hospitalisation. More personnel per population is likely to coincide with more time available for patient contact. In turn, adequate resources to establish and maintain trusting relationships between providers and service users can be expected to increase chances of care being received voluntarily, as well as the possibility of noticing early signs of relapse. Adequate staffing levels in mental health care has been recognised as a challenge by the World Health Organisation (World Health Organization. Regional Office for Europe, 2008, p. 93).

Fewer referrals and admissions to compulsory hospitalisation were observed in Norwegian catchment areas with more labour-years per population in primary mental health services (Bremnes et al., 2008). Similarly, in Finland more staffing for outpatient treatment was associated with lower levels of compulsory hospitalisation (Kokkonen, 1993).

On the other hand, more staff can increase the chances of detecting crises, as suggested by an Italian study where compulsory admissions were more frequent in areas with more social workers (Donisi et al., 2016). Likewise, in the United Kingdom, higher rates of compulsory hospitalisation have been suggested to coincide with an increase in the perceived need for detention (Rains et al., 2020; Weich et al., 2017). Further, a cross-sectional study from France argued that they observed more compulsorily hospitalised patients in areas with more GPs (Gandré et al., 2018). There are, however, reasons to question the validity of that finding. Firstly, the multivariable regression analysis contained a wide range of variables, including a number of potential *bad controls* (Cinelli et al., 2020), which can bias the coefficients. Secondly, since the coefficients are conditional on all included variables, they can be difficult to interpret. Thirdly, the *p*-value for the coefficient was 0.0499, but the 95% confidence interval included 0, which suggests a discrepancy.

Municipalities in the districts have had difficulties in recruiting highly qualified personnel (Ose et al., 2018). An uneven distribution of general staff levels, as well as specialised personnel such as GPs and mental health nurses (World Health Organization. Regional Office for Europe, 2008, p. 96), might be part of the explanation for geographical variation in compulsory hospitalisation.

2.5.2 Public Housing

Shelter is a basic human need; uncertainty regarding housing conditions impacts other areas of life, potentially aggravating additional challenges, including basic health, substance abuse and risk of unemployment (Baxter et al., 2019). According to a recent meta-analysis, three of four homeless people in high-income countries were diagnosed with a mental disorder (Gutwinski et al., 2021). It is likely that homelessness can both be a risk factor for, and a consequence of, mental health conditions. If stability can be provided through public housing this might help maintain good mental health and avert need for compulsory hospitalisation.

Although homelessness is a limited problem in Norway, with 75 homeless persons per 100 000 inhabitants in 2016 (Dyb & Lid, 2017), the consequences are substantial for those affected. At an individual level, homelessness has been associated with compulsory hospitalisation in studies from the Netherlands (de Jong et al., 2021), India (Indu et al., 2018), Switzerland (Lauber et al., 2005), and Germany (Haussleiter et al., 2022). An American study observed that availability of temporary housing was associated with lower levels of involuntary commitment (McGarvey et al., 2013). As noted, Norwegian municipalities have a duty to provide shelter to those unable to obtain this on their own, but public housing is a service sector that municipalities have reported considerable difficulties in handling (Huseby et al., 2015). Persons with mental disabilities and addiction challenges are some of the larger groups who use public housing. Provision of public housing can therefore be expected to result in less need for compulsory hospitalisation.

A special initiative, aimed at providing housing for persons with extensive need for services due to substance use and/or mental illness, is Housing First (Baxter et al., 2019). In contrast to similar initiatives, Housing First does not require substance abstinence. In 2015, 29 Norwegian municipalities reported that they offered Housing First (Ose et al., 2018). While Housing First has been shown to reduce homelessness and increase residential stability (Woodhall-Melnik & Dunn, 2016), there is a lack of research on the relationship between such housing initiatives and the use of compulsory hospitalisation (Bone et al., 2019).

2.5.3 Supported Employment

Similarly to housing problems, lack of employment can be conducive to, and the result of, mental health challenges. Being employed can provide meaning, a sense of achievement and belonging, as well as valuable social interactions. According to a meta-analysis of 20 studies, including seven of high quality, unemployment was associated with compulsory hospitalisation at the individual level (Walker et al., 2019). Coordinated initiatives of employment support, such as Individual Placement and Support, aim to facilitate employment for individuals with SMI (Frederick & VanderWeele, 2019; Reme et al., 2019; Slade et al., 2014; Wallstroem et al., 2021). Enabling this group of individuals, who have a higher risk of compulsory hospitalisation, to be part of the work force could theoretically contribute to prevent deterioration and the need for compulsory hospitalisation, but there is a lack of studies investigating these relationships (Bone et al., 2019). The number of Norwegian municipalities that reported providing some type of employment support increased from 51 in 2015 to 95 in 2018 (Ose et al., 2018).

2.5.4 Quality of Cooperation between Municipal and Specialist Levels

Professionals in municipal services believe that the quality of cooperation between service levels is one of the factors that impacts the use of compulsory hospitalisation (Wormdahl et al., 2020), but this has, to my knowledge, not been previously investigated empirically. Specialist services in Norway are expected to supervise and guide their colleagues in municipal services, and with regards to mental health services, this collaboration is expected to prevent some use of compulsion (The Norwegian Directorate of Health, 2018). The quality of cooperation might be related to continuity of care for people with SMI, defined as long-term delivery of coordinated care. Specialist services can contribute in the development of Individual Care Plans, to which all patients with the need for long-term coordinated services in Norway are entitled (Holum, 2012). High-quality cooperation can also be expected to reduce the risk of compulsory readmission, by ensuring that patients do not lose contact with services after discharge (G. Freeman & Crawford, 2002).

2.5.5 Recovery-oriented Practice

Recovery-oriented practice is considered a paradigm shift in mental health care, with a de-emphasis on pathology and an aim of rehabilitation (Anthony, 1993). A systematic review identified five recovery processes of particular relevance to clinical research and practice, summarised by the acronym CHIME: “connectedness; hope and optimism about the future; identity; meaning in life; and empowerment” (Leamy et al., 2011, p. 449). The inclusion of recovery perspectives was suggested by the European Community Mental Health Services Provider Network as one of six principles that ought to underlie high-quality mental health care in the community (Keet et al., 2019). A review for the Council of Europe described several recovery-oriented practices that have succeeded in reducing coercion in mental health care (Gooding, 2021).

2.5.6 Service Users’ Perspectives

One conceptualisation of recovery emphasises the role of peer support, and the collaboration between users of services and carers (Slade et al., 2012). The inclusion of perspectives from service users might influence how local mental health services are arranged. This can result in services that are more attuned to the needs of the users (Jacobson & Curtis, 2000). In Norway, every service user has the right to be involved in their care, but 65% of municipalities report that they do not collect information from patients and service users as a basis for improving services (*Riksrevisjonens undersøkelse av psykiske helsetjenester*, 2021, p. 97). According to a recent review of studies on users of mental health services, service users tend to emphasise the importance of autonomy in treatment and the development of good relationships with professionals over time (Pettersen & Lofthus, 2018). The involvement of service users with peer expertise in designing and delivering services might make services more likely to be received voluntarily, thereby reducing the need for compulsory hospitalisation.

2.5.7 Early Intervention

Services designed to identify and treat early phases of psychosis are hoped to improve recovery rates from schizophrenia by reducing the duration of untreated psychosis. They have been associated with superior outcomes than treatment-as-usual (Correll et al., 2018). These services are increasingly recommended internationally in mental health care (Lin et al., 2016), but availability of community-based early intervention differs within and between countries (World Health Organization. Regional Office for Europe, 2008). A Dutch study suggested that early identification of persons with mental health problems could prevent them from escalating, thereby avoiding the need for compulsory hospitalisation to develop (Wierdsma et al., 2007). Evidence from RCTs, however, is mixed as to whether early intervention services reduce the use of compulsory hospitalisation for persons in early phases of psychosis (Bone et al., 2019). Concern has also been voiced that early intervention in mental health can result in problematic use of coercion in the name of public health (McKeown et al., 2019).

2.6 The Ethics of Compulsory Hospitalisation

Coercion and compulsion in health care are controversial topics that have been extensively discussed, particularly with reference to the principle of autonomy (Matthews, 2000) and paternalism (Burns, 2011). The breadth of the topic is quite beyond the scope of this dissertation and a quick summary cannot cover the many nuanced discussions. However, since we only allude to this literature in Paper III, it is necessary to provide some contextual background. To limit the summary, the following section draws on a recent literature review of ethical arguments used to justify or reject the use of coercive interventions, by Chieze et al. (Chieze et al., 2021).

The ethical principles of autonomy, bodily integrity, and the freedom of movement and will are the basis of fundamental rights. Attempts at justifying coercion in mental health care tend to involve prioritisation of some ethical principles at the cost of rights or the infringement of other principles. However, there is no consensus on which moral theory ought to be preferred, while competing theories place different value on conflicting perspectives, such as individual rights versus community rights and duties unto others (Szmukler & Appelbaum, 2008).

Recently, an emphasis on autonomy (Hoff, 2019) has challenged the once prominent paternalism of medical care (Dworkin, 1972). Paternalism is now considered more authoritarian, involving risk of abuse of power (O'Brien & Golding, 2003). Coercion can be seen as a practice of care through the concept of *relational autonomy* (Series, 2015). Short-term coercion might facilitate long-term recovery of autonomy (Hem et al., 2018), in which case coercion can be understood as *soft paternalism* (Sjöstrand & Helgesson, 2008). *Decision-making capacity* is important in this context, but the relationship between autonomy and decision-making capacity is complex. The principles of evidence-based medicine require that the effectiveness of coercion is documented. However, a lack of scientific evidence does not automatically render an intervention illegitimate (Gupta, 2009). Therapeutic or diagnostic interventions differ from interventions for the protection of patients or others and protective goals alone do not justify compulsion.

A minority of authors argue for a “non-negotiable rejection” of coercion because it violates fundamental rights and principles of medical ethics. Most authors argue that coercion can occasionally be justified. Some claim that autonomy, dignity and integrity are not necessarily infringed by coercion (Hem et al., 2018) if benevolent attention is provided and coercion is used according to the long-term wishes of the patient. Other principles, such as beneficence, non-maleficence, and justice, can be accorded more weight than autonomy. Some argue that the safety of patients or others can justify coercion (Ewuoso, 2018) and that the prevention of violence was often the main reason for such interventions. Some perceive coercion, understood as self-limitation, to be integral to, and essential for, peaceful communal life (Wertheimer, 1993). While the law only regulates formal coercion, informal coercion can also violate rights and needs ethical justification. Some claim the therapeutic relationship can be improved through coercion, for instance based on advance care planning (Widdershoven & Berghmans, 2007).

The review of Chieze et al. found many ethically relevant reasons against the use of coercion, most often the violation of rights such as freedom, autonomy, dignity, and integrity, but also the risk of harm. There are therefore good reasons to seek alternatives to, and prevent the need for, coercion. Coercion as punishment or for reasons of others’ comfort can rarely be justified (Hem et al., 2018). Negative side-effects of coercion suggest it ought to be avoided (O’Brien & Golding, 2003). Absence of decision-making capacity was often seen as necessary but not sufficient for coercive action. Informal coercion can be experienced as more negative than formal coercion. The existence of alternatives in line with human rights is another reason for avoiding coercion. Since coercion can result in more harm than good it is highly controversial (Høyer et al., 2002).

Authors emphasise the importance of weighting elements that are relevant to each situation, therefore the principles of proportionality, necessity, and subsidiarity are underlined in this context. If elements are ignored in the weighting, strong moral disagreement can be expected among stakeholders (Widdershoven & Berghmans, 2007). According to the review, there was strong agreement that coercion should only be used as an exception, with a need for ethical justification of each case.

2.7 Principles of Biomedical Ethics

In Paper III we apply an ethical framework developed by Tom Beauchamp and James Childress, first presented in their influential book "Principles of Biomedical Ethics" in 1979, with the eighth edition released forty years later (Beauchamp & Childress, 2019). According to the authors, four principles can be derived from a *common morality* that is shared by all individuals who want to act morally: respect for self-determination, to do good, avoid harm, and justice.[12] In combination, these principles make up a framework of general norms that are particularly relevant to health care ethics.

2.7.1 Respect for Autonomy

Autonomy literally means 'self-governing', from Greek *autos* (self) and *nomos* (law). The core of the principle is the norm that autonomous choices should be respected and supported. Coercive interventions can infringe on the principle of autonomy, and variations in compulsory hospitalisation can therefore indicate variations in infringement of the principle of autonomy. There are, however, three necessary conditions for an individual to be considered autonomous: intentionality, understanding and voluntariness. *Intentionality* involves the ability to plan one's actions; *understanding*, as the word suggests, entails the capacity to comprehend, while *voluntariness* is the state of being free from internal or external controlling influences.

Within health services and clinical ethics the capacity to consent is increasingly emphasised and can be understood as operationalising the ideal of autonomy, since "…the criteria of the autonomous person and of the competent person are strikingly similar" (Beauchamp & Childress, 2019, p. 114).

---

[12] For critiques and defences of the common morality see (Beauchamp, 2003; Holm, 1995, 2022; Macklin, 2022; Rhodes, 2022).

2.7.2 Beneficence

The principle of beneficence implies two norms: that we should *prevent and reduce harm*, and that we should *promote good*. These norms are foundational to the provision of health services and serve as basis for paternalistic interventions, such as compulsory hospitalisation. Paternalism assumes that a substitute decision-maker, such as a health professional, can know what is in a patient's best interest. Following Feinberg (Feinberg, 1971), Beauchamp and Childress make a distinction between soft paternalism and hard paternalism. *Soft paternalism* implies coercion towards a person who lacks the capacity for consent. *Hard paternalism* is the use of coercive interventions towards individuals who have capacity to consent, and coercion of this type is more difficult to justify.

2.7.3 Non-maleficence

Primum non nocere, from the Latin "above all, do no harm", has been a long standing guide to the ethical practice of medicine and health care. The norm of avoiding harm implies that it can be better to do nothing at all than to provide interventions that have a risk of harm to the patient. What separates the norm of "avoiding harm" from "prevent and reduce harm" is that the former involves *intentional avoidance* of harmful actions, while the norm of beneficence requires action through *helping*. The pervasive documentation of people who have been harmed from compulsory hospitalisation indicates that the principle of non-maleficence is regularly infringed by this practice (Norvoll, 2011).

2.7.4 Justice

The principle of justice involves the fair distribution of benefits, disadvantages, and costs. This can be related to the use of resources and priority-setting, since providing health care for some involves the use of limited resources that could theoretically have been spent on other patients or treatments. Furthermore, the principle concerns equality, which entails that patients should be provided the same health care regardless of their socioeconomic, religious, or ethnic status.

2.7.5 Weighting of Principles through Ethical Reflection

It may appear that these principles ought never to be violated. The principles are not inherently ranked, however, and dilemmas can emerge when one or more principles are threatened or infringed. Through ethical reflection, involving weighting of principles and attempting to evaluate the totality of the situation in consideration, solutions can emerge that suggest when one or more principles ought to be deprioritised in favour of honouring the other principles. By specifying the principles to concrete norms and providing reasons for why one or more norms should be accorded special weight then a preferred course of action can emerge. In Beauchamp and Childress' terminology, this is called *balancing* the moral norms, by giving morally *relevant* and *sufficient* reasons for why one or more norms should be considered most important in each case.

The following six conditions are listed as requirements for justifying why one norm can be infringed to adhere to another norm:

1. "Good reasons are offered to act on the overriding norm rather than the infringed norm.
2. The moral objective justifying the infringement has a realistic prospect of achievement.
3. No morally preferable alternative actions are available.
4. The lowest level of infringement, commensurate with achieving the primary goal of the action, has been selected.
5. All negative effects of the action have been minimized.
6. All affected parties have been treated impartially." (Beauchamp & Childress, 2019, p. 23)

3 Study Aims

The overarching aim of this dissertation is to provide a comprehensive description and analysis of geographical variation in compulsory hospitalisation in mental health care. To pursue this aim it is important to assess ways of measuring compulsory hospitalisation and corresponding geographical variation; explore factors that contribute to explaining the variation, and to analyse the phenomenon in light of principles of medical ethics. The knowledge produced is expected to contribute to prevent compulsion and help reduce unwarranted geographical variation.

The first subgoal is to quantify the extent and magnitude of geographical variation between catchment areas to CMHCs in Norway in 2014-2018, with an emphasis on how compulsory hospitalisation is measured. In Paper I we specifically examine these research questions:

1.1 How does the extent of geographical variation in the level of compulsory hospitalisation vary when captured by different measures and over time?

1.2 How do different measures applied to one population correlate?

1.3 How well can the different measures predict future ranked levels of compulsory hospitalisation in different areas?

Considerable geographical variation, beyond what could be expected based on risk-factors considered warranted, makes us wonder whether some areas admit patients against their will more frequently than strictly necessary. To reduce the use of compulsory hospitalisation it seems likely that initiatives can effectively be undertaken at the primary care level, amidst people's everyday lives. The second subgoal is therefore to identify characteristics of primary health services that could contribute to explain why variation exists. Knowledge of such characteristics might inform health services and potentially reduce the use of compulsory hospitalisation.

In Paper II we answer these research questions:

2.1 What is the direction and the strength of association between selected characteristics of primary mental health services and the area level of compulsory hospitalisation?

2.2 How much of the variation in compulsory hospitalisation is accounted for by the area's age distribution, deprivation level, SMI prevalence, and municipal mental health services?

Some, but not all, variations in health services are unwanted. In the case of compulsory hospitalisation, there appears to be an agreement that its use ought to be reduced. Even though normative claims abound, a normative ethical analysis of geographical variation in compulsory hospitalisation has been missing. This is therefore the focus of Paper III. Such analysis can shed light on ethical challenges with current practice and make implicit normative evaluations explicit. Paper III is divided into three sections where specifically we:

3.1 Perform a normative ethical analysis structured according to four core principles of health care ethics to identify how they may be challenged by geographical variation in compulsory hospitalisation.

3.2 Consider the theoretical possibility of a “right” level of compulsory hospitalisation, to facilitate reflections on overuse and underuse.

3.3 Discuss implications of our analysis and how they can inform mental health services.

The arguments provided in this dissertation, based on findings from the three papers, should convey why geographical variation in compulsory hospitalisation is an important topic of public interest. This knowledge can contribute to improve service delivery.

4 Methods and Design

In this chapter the materials and methods used to answer the research questions are presented.

4.1 Materials

4.1.1 Paper I & II: The Norwegian Patient Registry

The Norwegian Patient Registry (NPR) is a population-based registry owned by the Norwegian Directorate of Health (Bakken et al., 2020). It is mandatory for health trusts to submit detailed medical information on all patient contacts with specialist health services to the NPR annually. By using encrypted personal identifiers persons can be followed across institutions and over time. The registry provided us with information on all hospitalisations in mental health care in Norway between 2014 and 2018, with a legal status of compulsory care according to the Mental Health Care Act - §3.2 compulsory observation or §3.3 compulsory hospitalisation (*Mental Health Care Act*, 1999). Additionally, all voluntary, inpatient and outpatient contacts with specialist services for persons diagnosed with SMI were provided. Information included the patients' age, gender, diagnoses of mental disorder, municipality/city district of residency, the legal status of the episode, time of admission/discharge, and institution.

4.1.2 Paper I & II: Statistics Norway

Data from Statistics Norway is freely available for download, and we collected age and gender stratified population counts for each municipality and city-district (Statistics Norway, 2022b); the labour-years for physicians in the municipal health and care services (Statistics Norway, 2022f); labour years of mental health nurses (Statistics Norway, 2022e); public housing (Statistics Norway, 2022g), and share of population living in crowded dwelling (Statistics Norway, 2022d).

4.1.3 Paper II: Municipal Mental Health and Addiction Services

Resources and Competence in Municipal Mental Health and Addiction Services (IS 24/8) is a research project that has surveyed developments in municipal mental health and addiction services since 2007. The data were collected and provided to us by SINTEF, on behalf of the Norwegian Directorate of Health (Ose et al., 2018). The data were collected through electronic forms that contained 288 quantitative and qualitative variables in the report from 2018 (Ose et al., 2018). According to the authors, no other country is known to provide similarly extensive data on local mental health and addiction services.

Variables included from this dataset were: the total number of labour-years in municipal mental health and addiction services; whether the municipality offered employment support for individuals with SMI; whether the municipality systematically included the perspectives of service users; whether recovery perspectives were part of municipal mental health services; an evaluation of the quality of cooperation between municipal and specialist services; whether the municipality had efforts for uncovering mental health and addiction problems as early as possible, and whether the municipality offered Housing First.

4.1.4 Paper II: Norwegian Labour and Welfare Administration

Counts of each area's number of unemployed persons were collected from the website of the Norwegian Labour and Welfare Administration (Norwegian Labour and Welfare Administration, 2022). Data from city districts were provided by email.

4.2 Completeness and Validity of the Data

Data quality tends to be measured by completeness and validity (Schmidt et al., 2019).

4.2.1 Norwegian Patient Registry

One advantage of focusing on the legal status of the hospitalisations, relative to other types of coercion in mental health care, is the *completeness* of the variable, which ranged from 91% (2014) to 97.4% (2018). Missing values on legal status of hospitalisations originated predominantly in institutions that only offer voluntary care, and the NPR considers the variable complete for compulsory hospitalisations since 2015, meaning that the entire population of compelled individuals is covered by the registry.

In 2014 there was under-reporting in the health region Central Norway, while numbers from the other three health regions were considered complete. The solution used by the Norwegian Directorate of Health was to impute the national mean for that region, however mean imputation is known to bias results and deflate standard errors (Donders et al., 2006). Although more sophisticated imputation techniques were readily available, this did not appear necessary nor reasonable given our aim of quantifying the extent of geographical variation. Numbers from Central Norway in 2014 were therefore omitted from the analysis in Paper I. Consequently, the national averages are likely to be slightly biased upwards for that year, but this omission is not assumed to have made noteworthy impact on other results.

Validity of register data describes whether a variable actually measures what it is intended to (Schmidt et al., 2019). The data on compulsory hospitalisation from NPR are considered to have high validity and data quality is routinely analysed by the National Service for Validation and Completeness Analyses (Bakken et al., 2020).

4.2.2 Data on Population and Municipal Services

The population data from the Central Population Register are considered to have very good quality for statistical purposes, and Statistics Norway considers errors from coding and data processing to be relatively insignificant (Statistics Norway, 2022b). In general, the completeness of the data on service characteristics from Statistics Norway and IS 24/8 was considered good. In the case of non-response for the variables on labour-years, Statistics Norway used the number from the previous year, or “other methods of estimation” (Statistics Norway, 2022f, 2022e).

The variable measuring mental health nurses contained 12% missing values. These missing values could have been imputed using multiple imputation with chained equations. However, ordinary cross-sectional multiple imputation, that does not account for the clustered and longitudinal nature of the data, may well have produced biased results (Huque et al., 2020). Although methods that can handle such situations do exist, they are complicated to use in practice. Given the large number of variables we intended to investigate, we decided to forgo this option and use listwise deletion for the models where this variable was included, which means that municipality-years with missing values were omitted from the analyses. If the values were missing at random, listwise deletion would not introduce any bias. For two variables, Housing First and Early Intervention, there was only data available for one year. For these variables, multiple imputation with chained equations was performed (Buuren & Groothuis-Oudshoorn, 2010) with negligible impact on results.

Answers to the survey on municipal services were provided by one or more persons responsible for mental health and addiction services in each municipality and they were encouraged to obtain input from relevant professionals. In 2018, 95% of the municipalities reported that more than one person had been involved in responding (Ose et al., 2018). Still, evaluations were based on discretionary assessment, and interpretations are likely to differ somewhat between municipalities, so the reliability of some of these measures can be questioned. The variable measuring quality of cooperation between service levels might be impacted by subjective evaluations and it is not evident if these evaluations would be identical if performed by someone else. The variable measuring recovery-orientation does not explicitly state what is meant by the term, so it is possible for respondents to interpret this question differently. This might impact both reliability and validity. Similarly, the question of whether the municipalities made efforts to uncover mental health or addiction problems as early as possible did not specify what these efforts entailed. These limitations ought to be considered when interpreting the results. The survey is revised annually by SINTEF, in collaboration with The Norwegian Directorate of Health, to ensure that the survey is updated and useful.

4.3 Population at Risk of Compulsory Hospitalisation

For Paper I and II, the population at risk of compulsory hospitalisation was restricted to individuals between 18 and 65 living in a Norwegian municipality during the time of the study. Although the age range of populations used to calculate rates is not always presented alongside statistics on compulsion (Høyer, 2008), this appears to be a commonly used range in the existing literature. Furthermore, services are organised differently for both the younger and older age groups, and additional mental health issues such as dementia and cognitive impairment are more prevalent within the older age group. Investigations of geographical variation for these other age groups therefore require separate analyses.

4.4 Paper I: Measuring Geographical Variation in Compulsory Hospitalisation

Paper I is a retrospective, observational study, with a descriptive study design. The methods used to quantify the extent and magnitude of geographical variation in compulsory hospitalisation are described in this section.

4.4.1 Standardisation of Population Based Rates

The risk of an event can differ between population groups and investigations of geographical variation are conventionally performed on risk-adjusted rates (Ash et al., 2003). In the case of compulsory hospitalisation, age and gender serve as proxy variables for other unobserved socio-economic and behavioural predictors - such as differences in vulnerability and risk-taking behaviour, like drug use - which could trigger psychotic breakthrough. These factors are usually beyond the control of local health services and they are unevenly divided between areas. Consequently, a lower use of compulsory hospitalisation can be expected in areas with an older population, while areas inhabited more so by younger men are expected to use compulsion more frequently.

Figure 1 shows age and gender specific rates of compulsory hospitalisations in Norway 2014-2018.

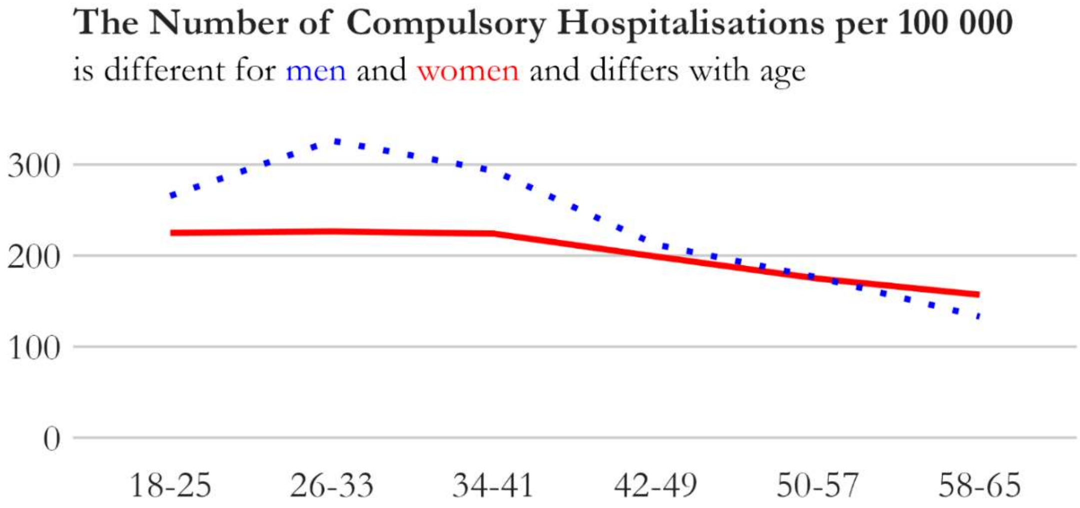


Figure 1: Compulsory hospitalisations by age categories.

Age was divided into eight-year categories, as seen along the x-axis of Figure 1, which made it possible to account for non-linearity in the distribution of risk of compulsory hospitalisation.The figure was created from the individual level data that underlie the analyses in Papers I & II and illustrates how the risk of compulsory hospitalisation differs with age and gender. Direct standardisation was used, with the national population for each gender and age group for each year as reference population. The resulting rates can be interpreted as the expected rates had the area's population been similar to that of the whole country.

4.4.2 Outcome Variables

Five different measures were employed to quantify the level of compulsory hospitalisation. These were based on three basic quantities of epidemiology: events, individuals, and duration.

1) The compulsory hospitalisation rate was created by counting all compulsory hospitalisations that were initiated in an area during a calendar year in each CMHC catchment area, including compulsory readmissions.
2) The compulsory inpatient rate measured the number of persons who were admitted involuntarily at least once during each year. This is equivalent to only counting their first event each year.

3) The compulsory Length-of-Stay rate (LoS-rate) counted the annual number of days of compulsory hospitalisation in an area, including hospitalisations that were initiated in previous years.

To create annual population-based rates, these three counts were each divided by the area's population at risk and multiplied by 100 000.

The final two duration measures were 4) the average, and 5) the median number of days of compulsory hospitalisation. These were based on hospitalisations that ended during the year under study. All duration measures excluded days of voluntary stay. To reduce the impact of random variations, each area's average value over the five-year period was calculated to answer research question one and two.

4.4.3 Measures of Geographical Variation

To answer the first research question on the extent and magnitude of geographical variation, four different measures were calculated. The *Extremal Quotient* (EQ) is the ratio of the highest divided by the lowest rate. This is an intuitive measure which is often reported but it is affected by the number and size of the areas compared. To reduce the impact of outliers, the highest and lowest 10% were removed, and the ratio of the highest and lowest rates were once again calculated, resulting in the $EQ_{90/10}$ (OECD, 2014). Thirdly, the *Coefficient of Variation* (CV) was calculated, which is the standard deviation divided by the mean. This is a relative measure of variability which is unitless and standardised and can thus be used to compare variability between differing measures. Finally, the *Systematic Component of Variation* (SCV) is a measure that was specifically developed to quantify geographical variation (McPherson et al., 1982). In contrast to the former three measures, the SCV adjusts for random variation and incorporates each area's demographic composition. Furthermore, the SCV can give a suggestion whether the variation is higher than expected due to chance (OECD, 2014). For the rates based on hospitalisations and days of compulsory hospitalisation an adjusted formula accounting for extra Poisson variation due to readmitted persons was employed (Cain & Diehr, 1992; Diehr et al., 1993). To calculate the SCV, indirect standardisation was used. In this procedure, the age and gender specific rates of compulsory hospitalisation for the whole country were used to calculate expected counts. The SCV was used to compare the magnitude of geographical variation in compulsory hospitalisation to other health related procedures or services. Previous studies have considered SCV < 3 to be low variation; SCV between 3 and 5.4 moderate variation; values between 5.4 and 10 to be high variation, and SCV $>$ 10 very high variation (Murphy et al., 2017).

To answer the latter part of the first research question, concerning how the geographical variation changed over time, the four measures of geographical variation were calculated separately for each year.

4.4.4 Correlation between Measures

To explore how the different measures of compulsory hospitalisation correlated, the second research question, we used *Spearman's rank order coefficient* (ρ). The rank order coefficient is a standardised measure ranging from -1 to 1 and quantifies the magnitude and direction of monotonic association between two variables. A value of zero indicates no association, while positive values means that a higher rank on one variable is associated with a higher rank on the other value.

4.4.5 Predicting Future Ranked Levels

To answer the third research question, how well could future levels of compulsory hospitalisation potentially be predicted, each CMHC area was ranked according to each compulsion measure for each year. Linear regression by Ordinary Least Squares was performed, using each area's ranking the following year as a dependent variable and the area's rank the preceding year as predictor. The coefficient of determination, R^2, was calculated to measure the amount of variance explained. Furthermore, the rank from 2014, as well as the area's average from 2014 to 2017, were used to predict ranks in 2018.

4.5 Paper II: Municipal Services and Compulsory Hospitalisation

The overarching aim of this paper was to estimate associations between compulsory hospitalisation and characteristics of municipal health services. The associations were explored retrospectively through the use of hierarchical modelling of panel data (Gelman & Hill, 2006). Specifically, random intercept Poisson models were used to account for clustering at different levels using annual observations from municipalities nested within CMHC catchment areas.

4.5.1 Outcome Variables: Count Data

Following findings from Paper I, both the number of compulsory hospitalised patients and the number of compulsory hospitalisations were used as outcomes. These were count variables, by definition, non-negative integers. Poisson regression was used to estimate expected differences in the log count, given a one-unit change in the individual variables of interest. To account for differences in population size, the log of the population aged 18-65 was used as an offset, which changed the outcomes to annual rates per population. Regression coefficients were exponentiated and could be interpreted as rate ratios.

4.5.2 Random Effects Within-Between Models

Panel data contain observations from multiple units at several points in time, in this case annual observations at the municipal level. Consequently, the variation in the panel data stems from differences between municipalities as well as variation within each municipality over time. The *Random Effects Within-Between* approach is suited for differentiating these sources of variation (Bell et al., 2019). Originally developed by economist Yair Mundlak (1978), the model has gained traction in later years (Bell et al., 2018, 2019; Bell & Jones, 2015; Certo et al., 2017; Curran & Bauer, 2011; Dieleman & Templin, 2014; Fairbrother, 2014; Gelman, 2006; Hamaker & Muthén, 2020; Howard, 2015; Neuhaus & Kalbfleisch, 1998; Neuhaus & McCulloch, 2006; Rohrer & Murayama, 2021; Schunck, 2013; Schunck & Perales, 2017). Each area's average value during the study period was used for cross-sectional comparison, also described as the between-effect. Meanwhile, the annual deviation from the area average was used to compare each area with itself at different time points, providing the within-effect. This latter estimate is very similar to the estimate found when using area fixed effects. The within-effect will not be biased by unmeasured variables at the municipality level and it is therefore particularly informative of how compulsory hospitalisation varies with changes in service characteristics.

To account for clustering of municipality-years within municipalities, intercepts were allowed to vary for each municipality. Furthermore, municipalities were clustered within CMHC catchment areas and, as observed in Paper I, there were differences in the use of compulsory hospitalisation between CMHCs. To account for this second level of clustering in the statistical models the municipalities were modelled to be nested within CMHCs. Likelihood ratio tests of models with only municipality or CMHC as random intercept showed that the nested models performed better. In contrast, models with a third level of nesting within a regional health authority did not perform better.

4.5.3 Cross-sectional Models

For two of the explanatory variables, Housing First and Early Intervention, data were only available for one year. Poisson regression with CMHC catchment area as fixed effect and area population as offset were used for these two variables.

4.5.4 Control Variables

To adjust for confounding variables, that could theoretically be expected to have an impact both on compulsory hospitalisation and the service characteristics in question, a set of control variables was added to the models. Firstly, the area's age demographics, or composition, was modelled by the share of population aged 20-39 and the share of population over 65 years. This was done to account for risk differences, since younger people have a higher risk of compulsory hospitalisation, while older people have a lower risk (see 4.4.1 Standardisation of Population Based Rates). Secondly, as SMI is one of the strongest predictors of compulsory hospitalisation (Walker et al., 2019) and is a legal requirement for compulsion in Norway, the prevalence of SMI was indirectly measured through the number of individuals with such a diagnosis who were in contact with specialist services during the year. SMI was defined as diagnoses F20-F31 in The International Classification of Diseases 10th revision (World Health Organization, 1992), which includes schizophrenia and other psychotic illnesses, manic episodes, and bipolar affective disorder. Third, to account for area deprivation level (Bindman et al., 2002; Emons et al., 2014; Keown et al., 2016; Weich et al., 2017), the share of inhabitants living in crowded dwelling (Braam et al., 2016) as well as unemployment rate were included (Karasch et al., 2020).

Finally, time fixed effects were added by creating dummy variables for each year to control for unobserved confounding that changes over time but is constant across units.

4.5.5 Effect Sizes

The estimates from the main analyses can be described as (incidence) rate ratios. Rate ratios are context specific, which means that they depend on the base rate of an outcome, in this case, compulsory hospitalisation. By relying on relative measures there is a danger of “risk relativism” or “base-rate fallacy”, which involves overestimating the effect of an exposure (Stegenga, 2015).

To improve interpretation and get a sense of the magnitude, conditional effects were calculated. A conditional effect describes the predicted change in probability of an outcome during a specific time-period, given incremental increases in the exposure of interest, holding other control variables constant. For Paper II, conditional effect plots were made for the four continuous measures - total labour-years in municipal mental health; number of GPs; mental health nurses, and public housing - to predict how the number of compulsory hospitalisations is expected to change when these variables increase.[13]

---

[13] These were moved to the appendix during the review but can provide additional understanding of effect sizes.

Calculating predicted probabilities for generalised linear models is more complicated than for models estimated by Ordinary Least Squares, since the effect sizes will depend on the value of the other independent variables. The within-effects were therefore calculated separately for municipalities with low, medium, and high average numbers of the treatment variable. The control variables were set to their average values.

4.5.6 Variance Explained

To answer the second research question about the amount of variance explained by the different groups of predictors, the marginal R^2 suggested by Nakagawa and Schielzeth (2013) was estimated. This procedure accounts for variance in modelled variables, such as the between- and within-effects, but does not account for the random-intercept variance.

4.6 Ethics Approvals

The Norwegian Health Research Act (*Lov Om Medisinsk Og Helsefaglig Forskning (Helseforskningsloven)*, 2009) regulates research that aims to provide new knowledge about health and disease. The Regional Ethics Committee of South-Eastern Norway considered the research project that this dissertation is part of to fall outside their remit [Reference number 2018/795 REK sør-øst B]. Nevertheless, they considered the project to be of considerable societal interest and the registry data relevant for answering the research questions. Therefore, they gave dispensation from the duty of confidentiality so that we could obtain data from the NPR without individual consent from each patient

Following a detailed Data Protection Impact Assessment (DPIA), the data protection official at Akershus University Hospital, the project owner, recommended that the project be implemented [reference number 2018-090] as the efforts to reduce the possibility of reverse identification, and the procedures for handling the data, were deemed satisfactory. Disadvantages for individual patients were considered small, while the considerations of welfare and integrity were handled. In the case of the data used in this dissertation, the personal identification number was encrypted and the key remains within the Norwegian Patient Registry, so the data are considered indirectly identifiable. All data were stored at the hospital's domain within the University of Oslo's services for sensitive data (TSD), which ensured password protected secure storage of the data.

4.7 Reflexivity

My interpretations of findings can be coloured by both conscious and unconscious values and acknowledging the preconceptions I bring to the research can improve transparency. While the first two papers are based on data of a quantitative nature, normative evaluations are integral to the ethics paper. The methodological choices in Paper I and II were likely influenced by my background within the discipline of political science. Researchers with a different academic background might have adopted alternative strategies for answering the research questions or emphasised other findings.

My background in the field of practice and experience with challenging situations in acute mental health care are likely to impact my preconceptions about possible harms and benefits from compulsory hospitalisation. When facing suggestions that compulsion in mental health care should be eradicated (Ending Coercion in Mental Health: The Need for a Human Rights-Based Approach, 2019; Zinkler & von Peter, 2019), I become hesitant. Based on sixteen years of experience in working as an untrained health worker in acute mental health care, this suggestion appears unrealistic to me, because I believe that some use of compulsion is unavoidable to prevent serious harm. However, these experiences were all gathered within a system that, to some extent, relies on coercion. It can therefore be difficult for me to envision a service system that is entirely based on voluntary participation, where the purported need for compulsory hospitalisation may decline or disappear entirely. Although I do admit that such systems appear utopian to me, I cannot rule out the possibility that this conception is the result of conditioning from working within a coercive system for many years. Furthermore, a limitation of my clinical experience is that I most often did not get to meet the patients after they were discharged and so I know little of their long-term outcomes.

Meanwhile, the project within which this dissertation is written has the name ReCoN – Reducing Coercion in Norway, where the explicit aim for which the project is funded is to contribute knowledge on ways to reduce the use of compulsory hospitalisation. Consequently, the normative idea that we ought to reduce the use of compulsion, supported by the Norwegian Health Directorate, has, explicitly or implicitly, been central to this entire endeavour.

Both these elements are likely to have impacted the ethical considerations I have made and they can be traced in the choice of wording in the dissertation, as well as in the articles that form its basis. I have strived towards ideals of impartiality, but I believe that some of our values and limiting perspectives are nevertheless inescapable and that transparently stating them can aid the reader in evaluating the tenability of my arguments and conclusions. My experiences and attitudes probably had limited impact on data collection but they may have impacted on how I have interpreted results and the ethical analysis.

I am in full accordance with the regulations from health authorities that we should strive for appropriate and reduced use of compulsion. As I interpret it, this aim implies that current compulsion levels are, on average, too high in Norway. My own experience, which is supported by research, is that the use of compulsion can be reduced without reducing the quality of health care.

While working on this dissertation, I have reflected on my views on compulsion and revised them considering my new understanding. I have tried to bear in mind how my experiences might influence interpretations during the research process. To limit the impact of my preconceptions, I have had ongoing discussions with my supervisors and co-authors, as well as my colleagues at the Centre for Medical Ethics. Furthermore, I have had continuing discussions about my work and interpretations with colleagues and co-authors, including a fellow researcher with lived experience of compulsion who is part of the ReCoN project and co-author on Paper II.

5 Summary of Results

This chapter contains a summary of the results from the three papers included in the dissertation. The table and figures are reproduced from each paper, but some of the captions are updated to better convey the “take-home message”.

5.1 Paper I

In this paper we quantified the extent of geographical variation in compulsory hospitalisation in Norway 2014-2018. Compulsory hospitalisation was measured in five different ways, with four different measures of geographical variation, the results of which can be seen in Table 2. The CMHC catchment area with the highest average level of compulsory hospitalisations had 5.6 times higher rate per population than the area with the lowest level. The area that on average admitted most people involuntarily had 3.2 times higher rate than the lowest ranked area, while eight times more days of compulsory hospitalisation was seen in the highest compared to the lowest ranked area.

Figure 2 shows how the geographical variation appears differently depending on choice of measure. Outliers can be seen for the hospitalisation rate in Northern Norway, while the most days of compulsory hospitalisation were seen in several CMHCs in Western Norway. Central Norway was below the national average for all measures.

Table 2: Variation in the level of compulsory hospitalisation among 74 CMHC areas in Norway 2014-2018.

		EQ	$EQ_{90/10}$	CV	SCV
Rates	Hospitalisations	5.6	2.4	35	10.9*
per 100 000	Inpatients	3.2	2.0	26	5.1
person per year	LoS	8.0	2.9	40	16.5*
	Median	8.4	2.6	40	-
	Average	4.9	2.9	36	-

Extremal Quotient (EQ) = max / min. $EQ_{90/10}$ = 90th decile/10th decile. Coefficient of Variation (CV) = standard deviation/mean x 100. Systematic Component of Variation (SCV) x 100.

* SCV adjusted for multiple admissions.

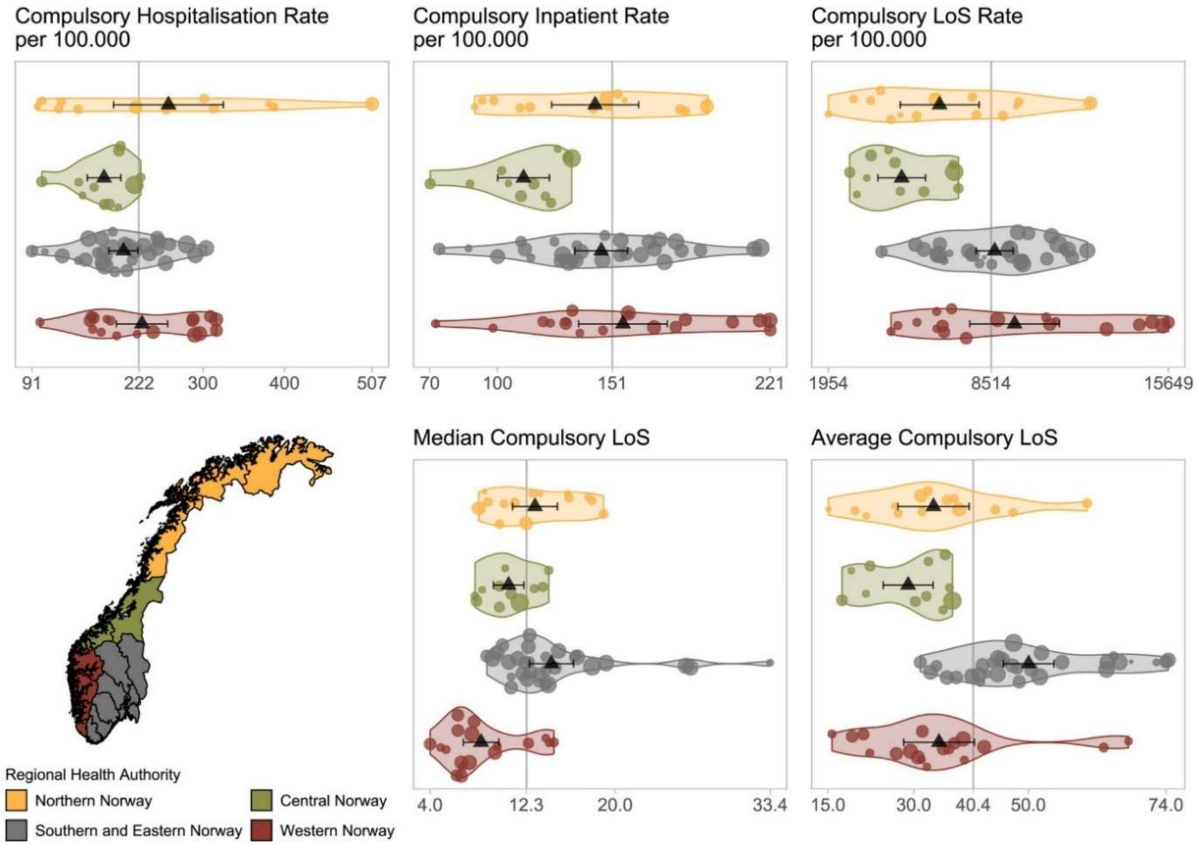


Figure 2: Measures of compulsory hospitalisation show different patterns of variation across health regions. Scatter points represent the average value for each CMHC in Norway 2014–2018, with point size reflecting population. Triangles show health region average with 95% confidence intervals. X-axes include minimum, maximum, and national average, which can also be seen in the vertical line. Map of Norway shows boundaries for Regional Health Authorities. CMHC: Community Mental Health Centre.

Figure 3 shows annual measures of geographical variation and how the extent of variation differed during the study period. Rates based on inpatient counts consistently displayed the least variation, and the EQ ranged from 3.3 to 5.9. The annual EQ for the compulsory hospitalisation rates ranged from 5.2 to 10.8, while the compulsory LoS-rate ranged from 6.1 to 12.9. There was a slight reduction in geographical variation during the study period, particularly for the hospitalisation rate.

The second research question concerned correlations between the different measures of compulsory hospitalisation. Results of the correlation analyses can be seen in Figure 4.

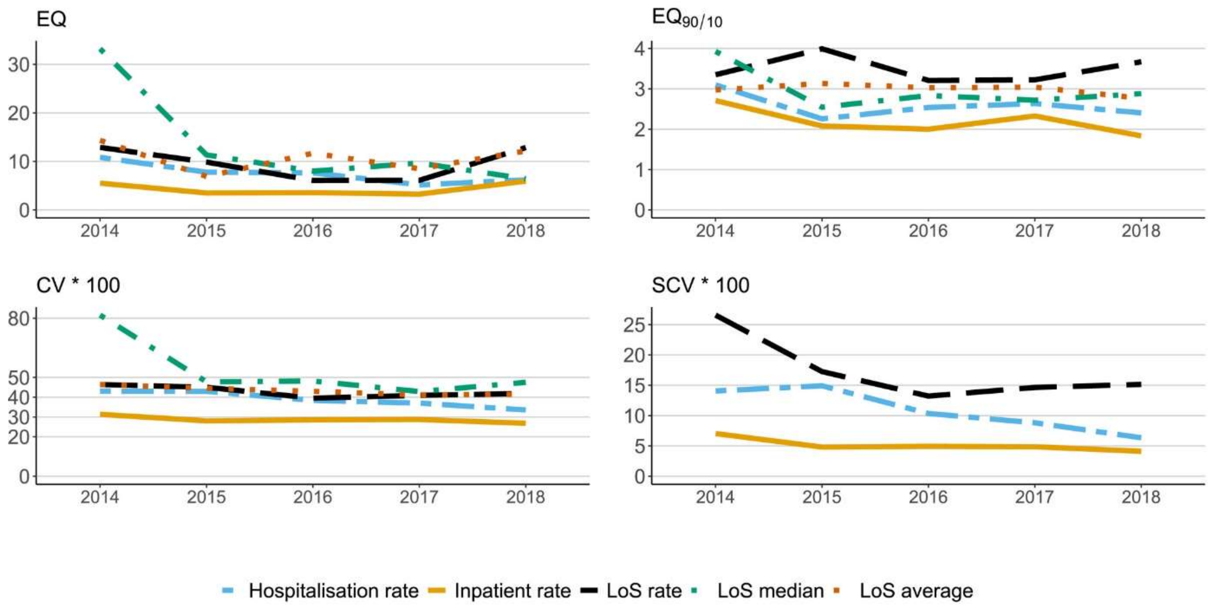


Figure 3: Annual measures of geographical variation in levels of compulsory hospitalisation among 74 CMHC areas in Norway 2014–2018. Extremal quotient (EQ) = max / min. EQ90/10 = 90th decile / 10th decile. Coefficient of Variation = standard deviation / mean × 100. SCV = Systematic Component of Variation × 100.

There was a very strong tendency for areas that were ranked higher on the patient rate to be ranked higher on the compulsory hospitalisation rate ($\rho = 0.88$), as well as the compulsory LoS-rate ($\rho = 0.78$). Areas that had more frequent compulsory hospitalisations tended to have shorter duration, as measured by median number of days of compulsory hospitalisation ($\rho =$ - 0.37).

The final research question involved predicting ranks of compulsory hospitalisation. Figure 5 shows explained variance from linear regression of ranked measures. Levels of compulsory hospitalisation showed great stability from one year to the next. Rates based on hospitalisations were consistently most successful in predicting future ranked levels and could alone account for 68-81% of the ranked variation the following year

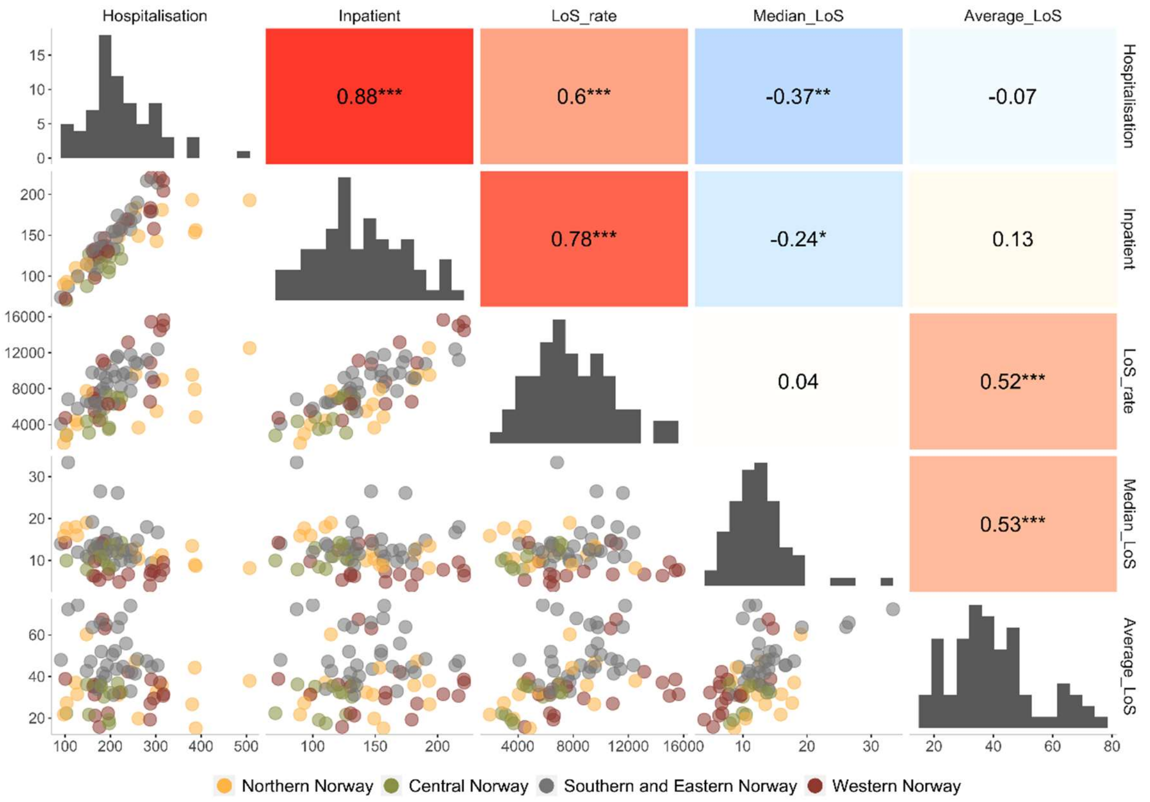


Figure 4: Inpatient rates correlate strongly with hospitalisation rates. Correlation plot shows measures of the level of compulsory mental health care in Norway 2014–2018. Upper half: heatmap with Spearman's rho. ***p < 0.001; **p < 0.01; *p < 0.05. Lower half: bivariate scatter plot. Diagonal: univariate distribution.

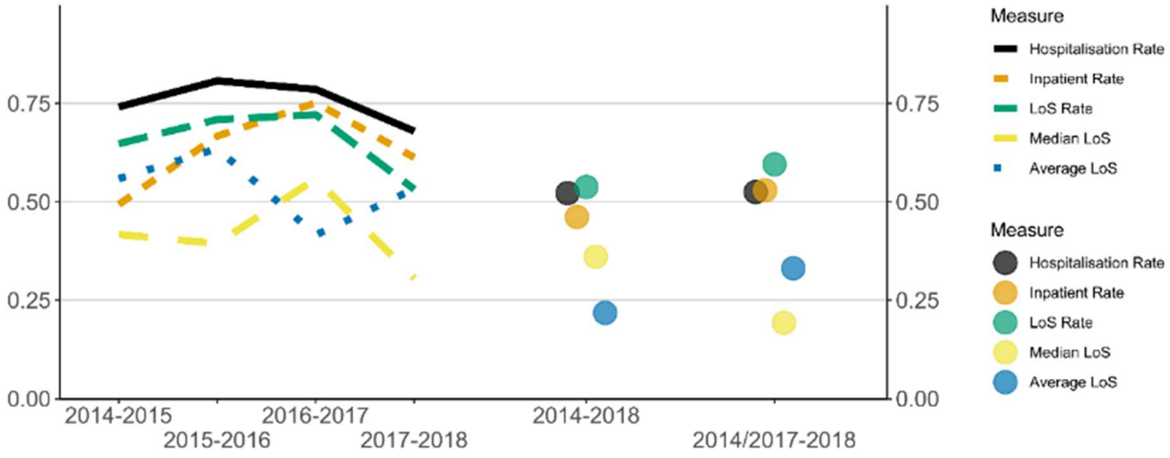


Figure 5: Ranked levels of compulsory hospitalisation can be predicted from previous years' ranks. The left section of the figure shows explained variance in ranked levels of compulsory hospitalisation as predicted from the previous year's levels. The right section shows explained variance for 2018 predicted by levels from 2014 and from the average levels during 2014–2017.

5.2 Paper II

In this paper we investigated relationships between the organisation and dimensioning of primary health care and the use of compulsory hospitalisation. Figure 6 shows results from eight models. Higher levels of staffing in municipal mental health services, general practitioners, and mental health nurses, were all associated with lower levels of compulsory hospitalisation within each area, as measured by both individuals and events, while accounting for control variables. Similarly, increased availability of public housing was related to lower levels of compulsory hospitalisation. Slightly higher levels of compulsory hospitalisation were associated with the inclusion of recovery perspectives.

Meanwhile, within-area changes in Supported Employment, cooperation between service levels, and inclusion of user perspectives showed no discernible effect on compulsory hospitalisation.

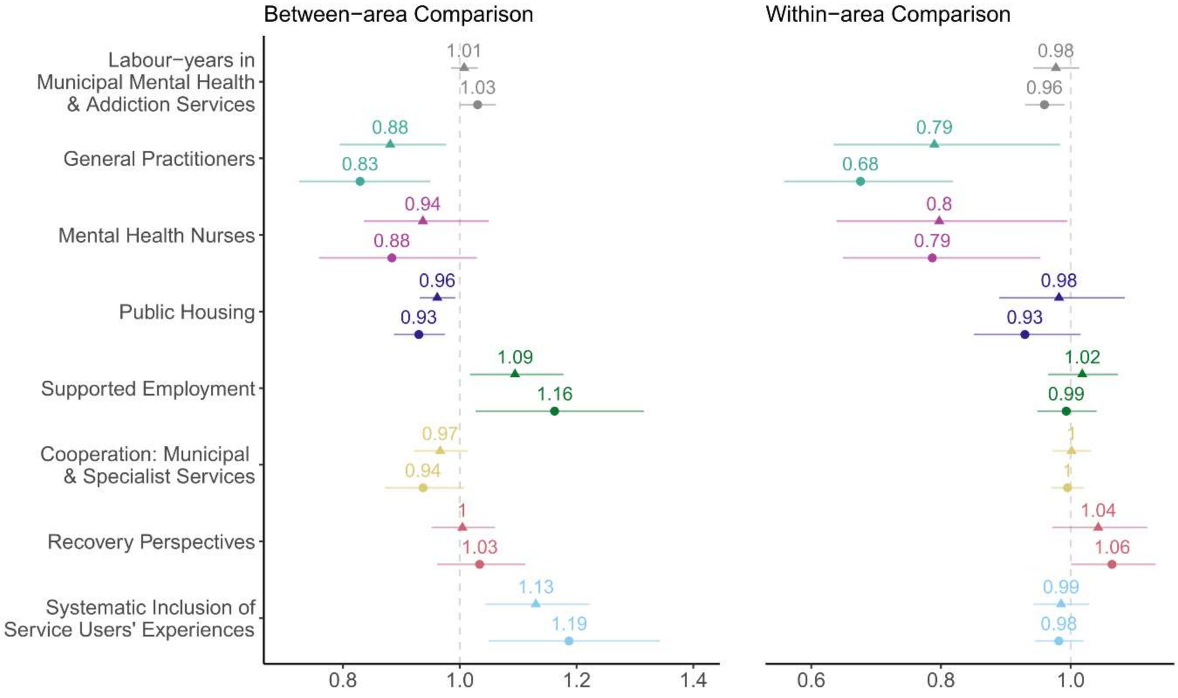


Figure 6: Between- and within-area associations of municipal mental health service and compulsory hospitalisation in Norway, 2015–2018. ▲ patients; ● hospitalisations. Rate ratios with 95% Wald confidence intervals. Adjusted for area demographics, deprivation, and prevalence of SMI.

The between-area comparisons showed that areas that on average had more GPs, mental health nurses, public housing, or good cooperation between service levels, also had lower levels of compulsory hospitalisation compared to other areas. Supported Employment and the systematic inclusion of service users' experiences were more often found in areas with higher average levels of compulsory hospitalisation.

For the within-area comparison of GPs the rate ratio was 0.68 [95%CI = 0.56 - 0.82]. This indicates that the risk of compulsory hospitalisation in an area is 32% [95%CI = 44% - 18%] lower for each one increase of GPs per 1 000 inhabitants. Figure 7 shows a modified excerpt of the conditional effect plot found in the appendix to Paper II. The left section of Figure 7 shows the within-area effect of change in GPs on compulsory hospitalisation. This is the expected change in compulsory hospitalisations and compulsory hospitalised patients within an area, associated with deviations from that area's average number of GPs per 1 000.

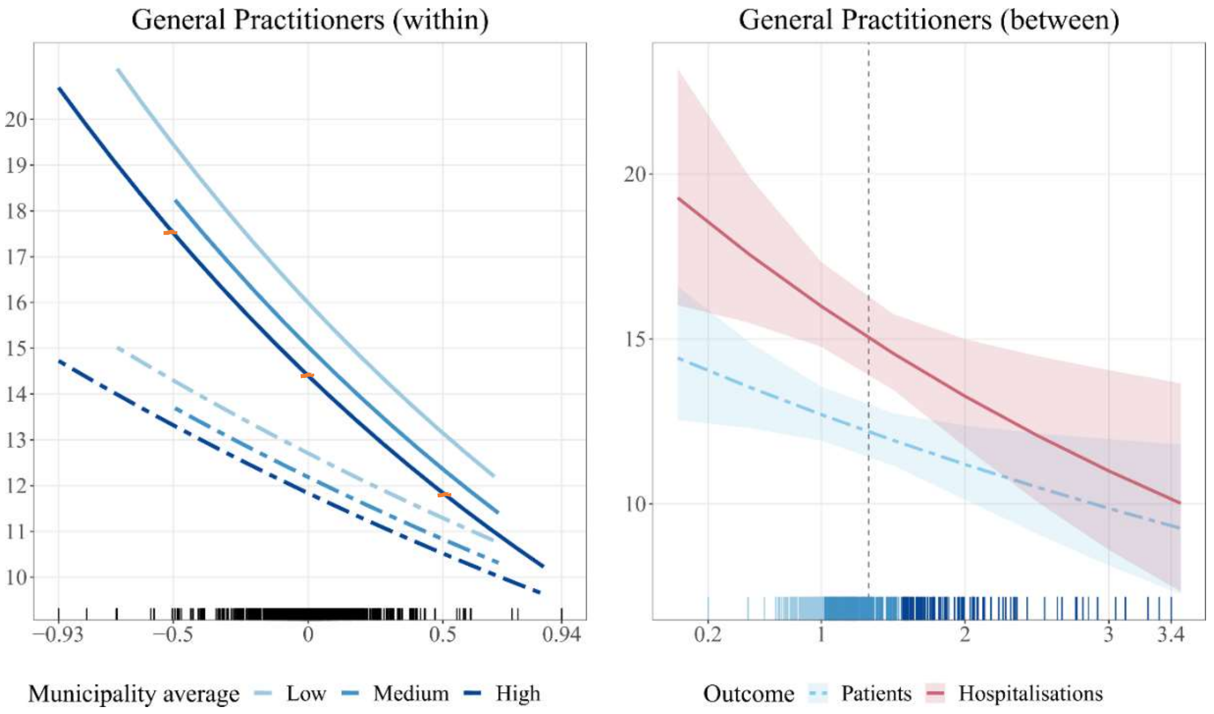


Figure 7: More GPs predicts fewer compulsory hospitalisations. The conditional effect plots show predicted average change in the number of compulsory hospitalisations and inpatients per 10 000 inhabitants within and between municipalities in Norway 2015-2018. Y-axis shows predicted numbers, keeping control variables at their mean. Areas in the first quartile were categorised as low, areas between the first and third quartile were considered medium, while areas above the third quartile were categorised as high.

In areas with a high average level of GPs, the predicted number of compulsory hospitalisations is roughly 14.5 per 10 000 as marked by the orange tick. If the number of GPs in those areas is reduced by 0.5 per 1 000, the predicted number of compulsory hospitalisations would be roughly 17.5 per 10 000. If the number of GPs increased by 0.5 per 1 000, the predicted number would be less than 12. The rug plot, which are the marks above the x-axis, shows the distribution of deviations from the area averages. Most deviations fall between -0.5 and 0.5, while the extreme values approach, but do not reach, 1.

The plot in the right section of Figure 7 shows the predicted level of compulsory hospitalisation when comparing areas cross-sectionally and shows how areas that have more GPs per population on average use less compulsory hospitalisation.

The rug plot on the right side shows the distribution of municipality averages, which ranges from 0.2 to 3.4 GPs per 1 000, with most averages falling somewhere between 0.7 and 2.

The cross-sectional analysis showed that the risk of compulsory hospitalisation was 19% higher [95%CI = 1.06 - 1.34] in municipalities with Early Intervention initiatives compared to municipalities in the same CMHC catchment area without such initiatives, controlling for area deprivation, age composition and SMI. Similarly, municipalities with Housing First initiatives had more compulsorily hospitalised patients compared to areas in the same catchment area without a Housing First policy (IRR = 1.14, 95%CI = 1.00 - 1.30).

In answer to the second research question concerning explained variance, the municipal health service characteristics could in combination account for 5% of the variation in compulsorily hospitalised patients, and 6% of the variation in compulsory hospitalisations. The areas' rates of patients with SMI that were in contact with specialist services could alone account for 29-33% of the variation. By combining all service characteristics and control variables, which included the areas' age distribution, deprivation, and SMI-rate, the models were able to account for 39-40% of the variation, as seen in Figure 8.

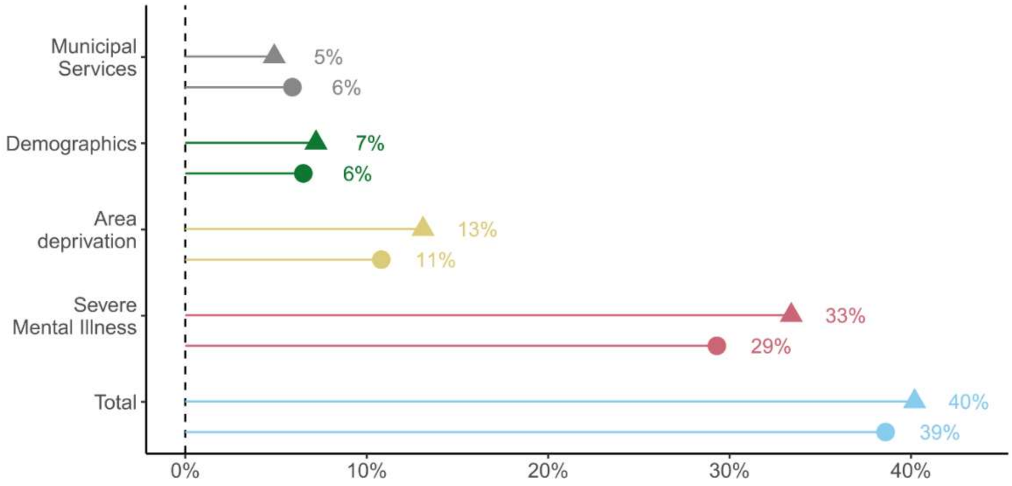


Figure 8: Most variation is explained by prevalence of SMI. Plot shows amount of total variance explained by groups of explanatory variables. ▲ patients; ● hospitalisations.

5.3 Paper III

Geographical variation in compulsory hospitalisation that is unaccounted for by factors considered to be warranted presents us with ethical challenges. The purpose of Paper III was to perform a normative ethical analysis of this topic.

Since compulsory hospitalisation occurs without the consent of the patient, geographical variation appears to conflict with the principle of respect for autonomy. However, autonomy requires three necessary conditions that are not always present among persons with SMI: intentionality, understanding, and voluntariness. In the cases where one or more of these capacities is not present, resulting geographical variation will not necessarily conflict with the principle of respect for autonomy as defined within this framework of four principles of health care ethics (Beauchamp & Childress, 2019).

Compulsory hospitalisation is often justified on the assumption that it benefits the patients – that they are in a better place because of the intervention than if it had not occurred. The evidence for beneficial outcomes is limited and it is unclear which patients are more likely to benefit. Simultaneously, there is considerable evidence of patients who have experienced harm resulting from compulsory hospitalisation. We argue that geographical variations, resulting from overuse or underuse of compulsory hospitalisation, can violate the principles of both beneficence and non-maleficence.

Geographical variations in compulsory hospitalisation that result from differences in physician-opinion, interpretation of legal or diagnostic criteria, or local experience-based practice, are likely to conflict with the principle of justice, which states that like cases should be treated like.

Reflections on which level of compulsory hospitalisation could be right or appropriate suggested that the optimal level of compulsory hospitalisation would never be higher than that which is minimally necessary within a mental health service system with adequate, less restrictive forms of care available. Consequently, supply-driven variation, which results from a lack of less restrictive interventions, is ethically challenging.

In conclusion to Paper III, we urge further research on the outcomes of compulsory hospitalisation, as well as increased standardisation of evaluations of competency to consent, diagnosing, and criteria for compulsory hospitalisation. Geographical variations in compulsory hospitalisation can be expected as long there is disagreement on what constitutes “right care” for the affected patient groups.

6 Discussion

In this section I begin by discussing aspects that are primarily related to methods before I move on to discuss the findings. Since the results are not independent of methodological choices some overlap between these two sub-sections should be expected.

6.1 Discussion of Methodological Approach

Countless major and minor decisions have been made while working on this dissertation. Openness regarding such decisions will increase transparency and improve the readers' prospect of evaluating the validity of the arguments presented. This section therefore contains reflections on some of the more influential choices I made during the process.

It is my overall contention that the materials and methods were well-suited to answer the research questions. As pointed out in Paper I, the existence of a national population-based registry such as the NPR, which provides individual level data, is a requirement for performing such extensive analyses of geographical variation in compulsory hospitalisation within one country.

6.1.1 Legal Status

The Norwegian Mental Health Care Act (*Mental Health Care Act*, 1999) makes a distinction between compulsory hospitalisation (§3.3) and compulsory observation (§3.2). The latter is intended to ascertain whether the criteria for §3.3 are present. It seems likely that patients who are admitted for observation but who are not converted to §3.3 constitute a somewhat different patient group than those who are admitted according to §3.3. By including these episodes in the counts, the measures of median and average number of days of compulsion were lowered, while all the rates increased. It could be relevant to analyse patients admitted according to different sections separately, but we decided that separate analyses would become too detailed and that episodes of compulsory observation also constitute formal compulsion.

6.1.2 Unit of Analysis

The research project which this dissertation is part of has a special focus on the role of municipal health services. The original plan for Paper I was to describe the extent of geographical variation between Norwegian municipalities but it became apparent that this unit of analysis was too small. Fifteen municipalities had less than 500 inhabitants aged 18-65, and 81 municipalities had less than 1 000. In 143 municipalities, no inhabitants were compulsorily hospitalised during one or more years of the study. Consequently, the use of the EQ to measure geographical variation would not be possible since dividing by zero is undefined. Furthermore, the rates would be unstable due to low incidence, which means that even small changes occurring randomly could have a considerable impact on measurements. As a result, we decided to refocus on catchment areas of CMHCs for Paper I.

For Paper II, the emphasis was on different characteristics of municipal mental health services, and it was therefore natural to use municipalities as a unit of analysis.[14] Additionally, the Poisson mixed models were well suited for handling such count data of rare events.

6.1.3 Analyses Based on Residency

Analyses were based on residency prior to each hospitalisation rather than where patients were treated. This reduced the impact of supply-side factors, such as the availability of hospital beds. Patients who moved and were compulsorily re-hospitalised the same year were counted in both areas.

One possible source of bias concerning the population rates are students. They are not obliged to report to the authorities if they move for the purpose of study. As a result, students who moved but did not report it would be wrongly allocated to their home municipality in our counts. This could introduce systematic bias, whereby municipalities with universities or colleges are estimated to have lower levels of compulsory hospitalisation since some of their residents will be reported

---

[14] Since we had access to data spanning several years, the unit of analysis can more precisely be termed municipality-years.

as living elsewhere. The number of students in Norway increased from roughly 255 000 to 280 000 during the study period (Statistics Norway, 2022a), and roughly 35% of the population aged 19-24 were students of higher education (Statistics Norway, 2022c). Less than 10% of students in Norway lived with their parents during 2016-2018 (Hauschildt et al., 2018), which suggests that this can make up a sizeable group. However, not all of them leave their home municipality to study and some do report moving. Twenty municipalities had increased population counts when based on actual residency in 2012 (Statistics Norway, 2012). The difference was less than 2% for more than 300 municipalities, while the difference was less than 4% for all municipalities. It is challenging to quantify the precise extent of this bias for our analyses. One possible sensitivity analysis could have been to assess the share of compulsory hospitalisations of patients who are not registered within each hospital's catchment area and compare the figures with similarly sized areas without institutions for higher education.

One technical reason for the high rates of compulsory hospitalisation observed in some CMHC areas in Northern Norway could be related to differences in how admissions during outpatient commitment were registered. Some areas apparently registered all such admissions as new episodes of compulsory hospitalisation, including admissions initiated by the patients.[15] Differences in reporting might therefore form part of the explanation for the reduced levels of compulsory hospitalisation seen in Northern Norway and might bias all outcomes in Paper I, though to a lesser extent the average measures and those based on inpatients.

6.1.4 Comparing Variations

In Paper I we commented briefly on the magnitude of geographical variation in compulsory hospitalisation compared to other health services, and we described the variation as high. There are however a variety of challenges when comparing measures of variation from different studies and countries (Diehr et al., 1990; Ibáñez et al., 2009; OECD, 2014, p. 76), such as unequal size of catchment areas, length of study period, and usage rate, that impact how large the geographical

---

[15] According to personal communication with Professor Anne Høye at the University of Tromsø.

variation appears. With larger areas, variations appear smaller since the area's rates will be nearer to the country average. Longer study periods will be less impacted by random fluctuations due to natural variation, which will decrease the extent of geographical variation. Conversely, if more areas are compared, they are more likely to include outliers, which will particularly impact the EQ but also the Coefficient of Variation, so resulting geographical variation will appear larger. As the name implies, the EQ relies on extreme values. This can exaggerate differences since the rates from all other areas fall somewhere within these extremes. For the reasons stated above, considerable care should be taken when comparing the extent of geographical variation between countries and procedures as factors other than practice variation are also likely to impact the figures.

The SCV has been shown to have good statistical properties and is robust to underlying differences in usage rates (Ibáñez et al., 2009). This measure is therefore better suited for comparisons between studies than the EQ. Unfortunately, this metric has, to my knowledge, not yet been reported in any other studies on geographical variation in compulsory hospitalisation.

6.1.5 Causality

In connection with Paper II we would ideally have liked to uncover the underlying causes of higher and lower levels of compulsory hospitalisation in an area to provide credible suggestions to policy developers on how to reduce rates in high-use areas. Some assume that causality cannot be investigated through observational data given the lack of proper randomisation in naturally occurring data, the usual caveats concerning selection bias, and omitted variables bias. During recent decades, however, statistical methods have been developed that allow causal inference from real world data, given a set of assumptions about counterfactuals and potential outcomes (Huntington-Klein, 2021; Morgan & Winship, 2015; Pearl, 2009). In theory, such methods could fruitfully have been applied to data similar to that we had access to for Paper II. The main reasons why we did not pursue such approaches further was, firstly, the initial uncertainty regarding directions of associations; secondly, the relatively large number of variables we wanted to investigate, and thirdly, that we did not have access to a sufficiently wide set of relevant control variables, which made us all favour an exploratory approach.

Nevertheless, the progress made within epidemiology, econometrics and statistics on these topics still informed our choice of modelling strategy. Directed acyclic graphs (DAGs) (Textor et al., 2016) can be understood as causal maps that formalise our expectations in structural equations (Rohlfing & Zuber, 2019). Figure 9 is an example of a DAG created for Paper II. Such visual models of the data-generating process can aid in choice of control variables by limiting the risk of including colliders or mediators.

Colliders are variables that are caused both by the exposure, which is the independent variable under study, and the outcome. Conditioning on a collider is known to introduce bias (Pearl, 2009). *Mediators* are variables that are on the causal path from the exposure to the outcome, and conditioning on them creates overcontrol bias. Colliders and mediators are known as bad controls (Cinelli et al., 2020).

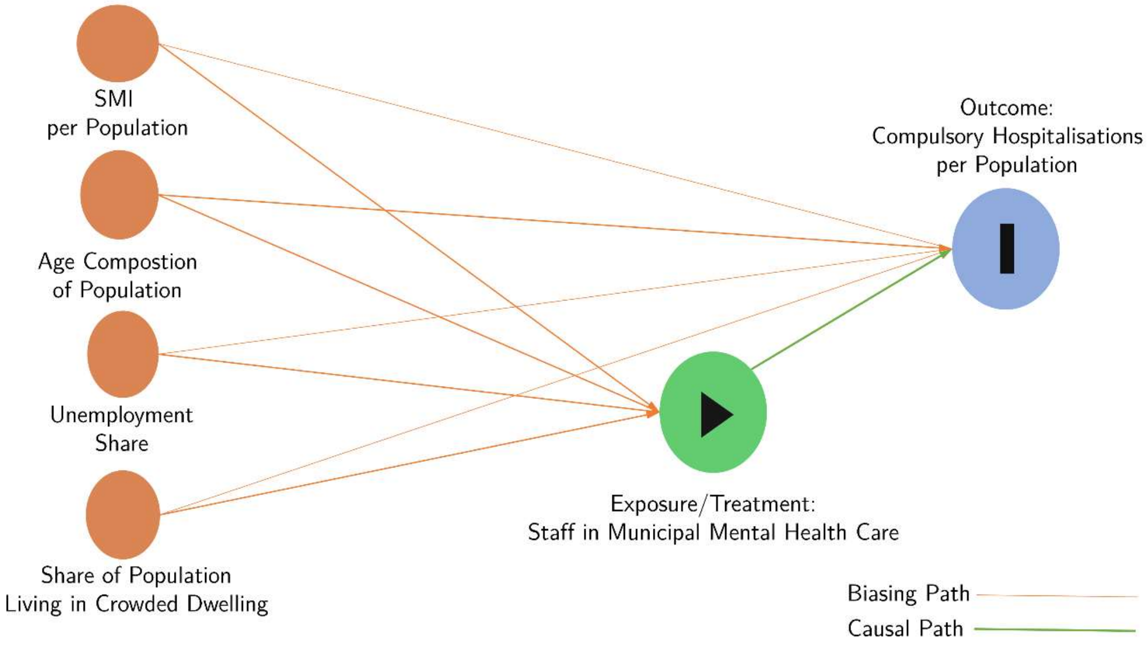


Figure 9: Directed acyclic graphs visualise causal assumptions.

In contrast, the variables we want to control for are the *confounders* – variables that are assumed to impact both the exposure and the outcome. In Paper II we assumed that all included control variables were confounders and not colliders or mediators.

Panel data contains variation within areas over time and variation between each area. The Random Effects Within-Between approach allowed us to differentiate the sources of variation by using each area's average value to estimate the between-effect. Meanwhile, the deviation from each area's average was used to estimate the within-effect. The latter estimates are very similar to what we get when using unit specific fixed effects.[16] As noted, these within-effects are by construction not biased by time-invariant unmeasured confounding, and they are therefore occasionally given a causal interpretation (Antonakis et al., 2010). However, the within-effects are still susceptible to time-varying confounding (Bell et al., 2019). For the above-mentioned reasons, I have tended to avoid the use of wording that indicates causality regarding the findings from Paper II. The term *effect* is used on occasion, in line with conventional terminology, but does not imply causality. The within-area coefficients can more safely be interpreted as the expected differences in levels of compulsory hospitalisation within each area, given a one-unit change in each exposure.

6.1.6 Models without Control Variables

Concerning model selection for Paper II, all predictors and relevant covariates were selected based on previous findings or theoretical expectations. Our approach was exploratory and we had no explicitly stated hypotheses concerning the direction or magnitude of associations, since the demeaning of time-varying predictors

---

[16] The within-area coefficients are identical to those obtained using area fixed effects in the case of linear regression by Ordinary Least Squares, while for generalised linear mixed models they are usually similar but not identical (Schunck & Perales, 2017).

into within- and between effects had, to our knowledge, not previously been done within this research field.

Estimated treatment effects are sometimes strengthened by including control variables, known as suppression effects (Lenz & Sahn, 2021). Findings that rely on suppression effects to reach “statistical significance” are not robust to alternative model specifications and might be statistical artefacts. With the intention of being transparent about possible suppression effects we reported hierarchical models without control variables in the appendix to Paper II.

The between-effect of public housing on compulsorily hospitalised patients switched sign and increased strength when controls were included, which could be due to suppression effects. Similarly, the estimated within-effect of recovery perspectives on compulsory hospitalisation increased slightly.

6.1.7 Robustness and Potential Bias

To avoid undue impact of unstable rates in Paper I, we performed robustness tests by repeating all analyses for areas with more than 35 000 inhabitants (N= 35–40). These are reported in Appendix A1 and A2.

As part of the robustness testing for Paper II, separate models based on the Poisson estimator, using municipality and year fixed effect, were estimated and reported in the appendix. The results were very similar to the within-area associations reported in the main text, with some differences in standard errors. This strengthens the credibility of the main results.

One possible source of bias, which we did not fully account for, was spatial dependence, since neighbouring regions tend to have more similar rates in epidemiological studies (Lash et al., 2020). Such dependence could theoretically have been accounted for through Bayesian hierarchical modelling. While confounding by location might impact the between-effects, this will not impact the within-effects, since these, as noted, are unbiased by unmeasured time-invariant confounding. Furthermore, the nesting of municipalities in CMHC catchment areas can be expected to cover parts of such dependence.

Another challenge with some of the indicators is that they might both contribute to prevent deterioration and subsequent compulsory hospitalisation, while at the same time partly resulting from the local needs for services. This phenomenon can be described as simultaneity and it might bias some of the estimates. In theory, simultaneity could be remedied by including temporal lags of independent variables, however there are a range of potential problems associated with these methods as well (Leszczensky & Wolbring, 2019), and it is not evident how these problems are related to the within-between framework.

The models estimated in Paper II assumed that the within-effects were the same in all municipalities. If this assumption does not hold it could result in anti-conservative standard errors. Such heterogeneity could have been modelled by including random slopes which would allow the within-effects to vary between municipalities (Bell et al., 2019). Given the exploratory approach and the large number of variables we wanted to investigate, we favoured more parsimonious modelling by not including random slopes (Matuschek et al., 2017).

The panel analysis in Paper II was based on aggregated measures, and such ecological analyses are by some considered “incomplete” designs (Lash et al., 2020, p. 755). The topic under study in this paper was however ecological effects, rather than individual-level characteristics, since we attempted to understand differences in rates between populations. It is still worth emphasising that the estimated associations apply to the area level and not to the individual level.

6.1.8 From Is to Ought[17]

For Paper III, we decided to use the four principles framework of biomedical ethics developed by Beauchamp and Childress, because it is the most widely used framework within medical ethics. We attempted to avoid delving into the ethics of compulsory hospitalisation in itself and to focus on ethical challenges concerning the geographical variations of such hospitalisations. It can be argued that this was

---

[17] Some of these reflections were inspired by an unpublished manuscript on the ethics of geographical variation in health services, which was written and graciously shared with me by Bjørn Morten Hofmann at the Centre for Medical Ethics at the University of Oslo.

only partially successful as discussion of the ethics of compulsory care appeared almost unavoidable in some sections. However, it was crucial to stick to the ethical aspects of geographical variation, to delimit the paper from the vast and vivid debates on the ethics of coercion.

In this paper we considered the possible existence of a “right level” of compulsory hospitalisation. We made some qualitative statements about such a level that limited the theoretical range wherein the level exists. We qualified that the “right level” would never be higher than necessary. Secondly, what appears to be necessary is contingent on available alternatives. A normative leap was then made to claim that compulsory hospitalisations resulting from a lack of less restrictive alternatives ought not to be considered truly necessary. Consequently, they would not define “right care” and they would not be ethically justified.

It can be argued that the description of geographical variation is not a sufficient foundation to prescribe a “right level”. In Paper III we provided some reasons for why this is so, for instance we cannot know in which situations compulsory hospitalisation is truly necessary. Nevertheless, in both Paper III and the dissertation I make several normative statements related to practices I have found problematic, as well as suggestions on how these can be dealt with. Where relevant, such normative claims were performed with reference to the infringement of one or more ethical principles.

Ethical analysis can help inform right care by elucidating how ethical principles can be challenged by geographical variations in compulsory hospitalisation. Understanding the reasons why geographical variation can be ethically challenging might contribute to reduce its extent.

6.1.9 Considerations of Research Ethics[18]

Patient registries are treasured sources of information for health service researchers. They may provide answers to questions that for ethical, monetary, or practical

---

[18] This section draws on a presentation held by Jan Helge Solbakk and Heidi Beate Bentzen at the Centre for Medical Ethics at the University of Oslo.

reasons, would likely go unanswered without their existence, such as describing the geographical variation in compulsory hospitalisation within an entire population. By using registry data, it is possible to perform research on practices or patient groups that could otherwise be difficult to access.

There is a tension between the epistemological and the ethical ethos in the use of registry data. On the one hand, we have the possibility of developing knowledge that, over time, can contribute to reduce coercion in mental health care as well as unwarranted variation. This can be tied to ethical principles like justice and non-maleficence, as well as dignity, vulnerability, and solidarity. On the other hand, information on health status, such as diagnoses and status of hospitalisations, is highly personal, but none involved have given their explicit consent to partake in the research. This is particularly related to the principle of respect for autonomy.

Through the weighting of ethical principles, it can be argued that the potential benefits of describing and understanding differences in the use of compulsory hospitalisation ought to be accorded more weight than the marginal loss of autonomy that research on anonymised health data involves for individuals who have not provided explicit consent. In Paper III we argue that geographical variation in compulsory hospitalisation conflicts with several principles of health care ethics. Contributing to the awareness and reduction of the extent of geographical variation would therefore be desirable.

One of the strengths of registry-based research is that the information is gathered without any specific involvement of research participants (Thygesen & Ersbøll, 2014). There is thus no possibility of harm to research participants involved in the data gathering procedure. There is, however, potential for harm if study participants are identified (Ludvigsson et al., 2015). Such identification would be a breach of confidentiality and a violation of the law, and it has been argued that this potential problem is related to the existence of the registries in the first place rather than their use for research (Olsen, 2011). As noted in 4.6 Ethics Approvals, the registry data were anonymised and stored in secure servers. Still, the possibility remains that vulnerable groups can be unfairly stigmatised because of the research, as well as other possible unforeseen consequences.

According to the Helsinki declaration on research ethics (*Declaration of Helsinki – Ethical Principles for Medical Research Involving Human Subjects*, 2013), in situations where it is impossible or impractical to obtain consent, research can be performed following the consideration and approval of a research ethics committee. According to the Council for International Organizations of Medical Sciences (2017), a research ethics committee may approve a waiver of informed consent to research if: the research would not be feasible or practical to carry out without the approval; the research has important social value, and the research does not pose more than minimal risk to participants.

6.1.10 Lessons Learned

Regrettably, there is an erroneous claim in the discussion of Paper I, where we state that “measures based on inpatient counts never display more variation than measures based on hospitalisation counts when applied to the same dataset” (Hofstad, Rugkåsa, Ose, Nyttingnes, & Husum, 2021, p. 7). I have later come to find, in existing data material and subsequent simulations, that this is wrong as inpatient rates can indeed show more variation than hospitalisation counts. Prior to submission, I performed simulations and consulted with a statistician on the topic. However, I evidently did not thoroughly consider all the eventualities and with hindsight my process was not rigorous enough, so I take full responsibility for this honest mistake. I have notified the editor of the journal who has agreed to publish a corrigendum.

Something positive to be gained from this experience is the hard-earned lessons that confirmation bias can muddle one’s thinking and result in misunderstandings, and that categorical claims are susceptible to falsification.

6.2 Discussion of Results

In conjunction, the three papers that form the basis of this dissertation show us that there were considerable geographical variations in compulsory hospitalisation between catchment areas to Norwegian Community Mental Health Centres 2014-2018; that the variations can partly be attributed to differences in organisation and dimensioning of municipal health services, and that such variations challenge several ethical principles.

These contributions add new dimensions to the existing literature in multiple ways. By employing a wide range of measures, Paper I extensively describes the geographical variation in compulsory hospitalisation in Norway 2014-2018. It goes beyond mere description by showing how the extent and magnitude of variation can depend on choice of measure. To date, this is the most comprehensive description of geographical variation in compulsory hospitalisation within one country that is published, spanning an entire population over five years and using a range of measures based on counts of events, individuals, and days of compulsory hospitalisation. The paper was published in a methods-oriented journal and the results highlight the impact of choice of measures, as well as the importance of precision in wording and terms when reporting variations in compulsory hospitalisation.

Paper II was the first to analyse data on compulsory hospitalisation from the NPR in combination with data on municipal mental health services. Furthermore, this paper was the first study to use Random Effects Within-Between models of panel data in the context of compulsory hospitalisation. In contrast to many studies on compulsory hospitalisation that focus on characteristics of the admitted patients, this paper concentrates on the context within which the “need” for compulsory hospitalisations develops, or not. There is good reason to believe that changes in organisation and dimensioning of primary health services can impact levels of compulsory hospitalisation. The findings in this paper support this narrative.

Paper III is, as far as I have found, the first to present an analysis of ethical challenges which result from geographical variations in compulsory hospitalisation. The analysis builds upon the previous two papers by acknowledging the existence of geographical variation and asserting that the variation can partly be tied to the organisation of primary health services. In Paper III we urge more research on the outcomes of compulsory hospitalisation and that service providers ought to engage in practices that promote voluntariness and facilitate less restrictive forms of care that service users would like to receive. This might help prevent patients from deteriorating to an extent where they meet the criteria for compulsory hospitalisation and thereby contribute to reducing unwarranted geographical variation.

In the following sections, aspects from each separate paper are elaborated and discussed with reference to previous research before topics that are relevant to the dissertation as a whole are considered.

6.2.1 Paper I: Magnitude of Geographical Variation

> We classified the geographical variation in compulsory hospitalisation as high or very high, depending on choice of measure, based on comparisons with variation in other medical procedures within OECD-countries (OECD, 2014). The variation appeared particularly large when considering rates based on events and duration. Similar conclusions can be drawn by comparing the annual SCVs seen in Figure 3 with the benchmarks reported in 4.4.3 Measures of Geographical Variation. Notwithstanding the challenges of comparing EQs from different sources, as in Table 1, which displayed measures of geographical variation from fourteen different countries, the Norwegian results would be situated somewhere within the upper half of the table for both inpatient and hospitalisation rates.

We interpreted the annual measures of geographical variation as primarily indicating stability, although there was a slight reduction over time. The reduction was most clear from 2014 to 2015 for most measures, which might partly be due to the exclusion of Central Norway in 2014. The hospitalisation rate showed the most consistent reduction. This could be due to the change in legislation in 2017, which increased attention on admission procedures by requiring evaluations of capacity for consent. If admission procedures are more rigorously followed, patients can be expected to be treated more similarly from area to area, thereby reducing geographical variation. Compulsory hospitalisation rates initially declined following the legislative change but appear to be rising again after the study period (Bremnes & Skui, 2020).

Although we observed relatively large geographical variations, it can be argued that this variation appears less dramatic when considering absolute numbers. Comparing the population adjusted rates of individuals hospitalised compulsorily, the largest difference between CMHC areas was observed in 2018, with 42 versus 250 persons per 100 000. This is equivalent to saying that 0.04% vs 0.25% of the population aged 18 to 65 was hospitalised compulsorily at least one time that year. Such quantification might appear less dramatic than saying that six times more people were compulsorily hospitalised in one area compared to another. So, one can claim that the absolute variation is rather small, but the relative variation is high. For persons at «average risk of compulsory hospitalisation», the absolute difference might appear most relevant and would seem of little importance at 0.2 percentage points. However, individuals at increased risk of compulsory hospitalisation, such as people with SMI and previous compulsory hospitalisation, belong to sub-populations of a smaller denominator for whom the small numbers in the numerator will have a larger impact. If these patients move from a high-compulsion area to a low-compulsion area, then they might be received and treated differently by professionals in both municipal and specialist services. In Paper III, we argue that this would challenge the ethical principle of justice.

6.2.2 Paper I: Measures of Compulsory Hospitalisation

By employing five different measures of compulsory hospitalisation, we were able to capture more of the nuances in how usage rates vary between areas, as seen in Figure 2. Some CMHC areas had shorter median and average duration and more frequent involuntary rehospitalisation, while other areas had lower rates of compulsory hospitalisation with longer duration. Evidence is lacking to suggest whether one longer compulsory hospitalisation or several shorter admissions has the highest benefit-to-harm ratio. Several catchment areas in Western Norway drew attention due to many days of compulsory hospitalisation which can suggest that these areas may be too “protective”, or risk-averse, in their treatment philosophy. Some areas in Northern Norway had particularly high rates of compulsory hospitalisation, with frequent compulsory rehospitalisation, which could suggest that the duration of each hospitalisation might be too short in these areas. If compulsory rehospitalisation is common, this could be seen as an expression of unsuccessful health care. Further research is required to establish whether longer or shorter compulsory hospitalisations tend to be most conducive to beneficial outcomes and the least harm.

Norwegian health authorities have instructed services to ensure appropriate and reduced use of coercion, but they do not specify what that involves in practice. Should reduced use of compulsory hospitalisation be interpreted to mean *fewer* hospitalisations, *shorter* hospitalisation, or both? Following the legislative change in 2017, where lack of decision-making competence was added as a requirement for compulsory hospitalisation in cases that do not involve a risk of harm, it has been reported that this legislative change may have caused patients to be discharged earlier after regaining their decision-making capacity. Some argue that early discharge occasionally meant premature discharge, resulting in compulsory rehospitalisation (Totland, 2021). As our analysis showed, compulsory rehospitalisation is not uncommon, and in one CMHC area each compelled patient had on average 2.5 compulsory hospitalisations per year.

The inpatient rate appeared to be the most stable measure and it has previously been suggested that measures based on individuals are less sensitive to random variation than measures based on events (Bowers, 2000). By only counting one event per individual there is less risk of violating assumptions of independence in data, which apply to a wide range of commonly used statistical methods. In this light, inpatient rates are the safer choice when relying on a single measure. However, this measure provides a limited picture of the extent of compulsory hospitalisation and it might underestimate the magnitude of geographical variation. The compulsory hospitalisation rate comprises more coercive practice since it includes involuntary rehospitalisations.

As noted, an involuntary hospitalisation lasting an entire year will count the same as an episode lasting one day when measured by both the inpatient and hospitalisation rates. In contrast, the compulsory LoS-rate will correctly identify the 365-fold difference between these two kinds of episodes. This measure can be claimed to incorporate even more coercive practice, since it includes duration of all involuntary hospitalisations, regardless of whether patients have one or more hospitalisations during a year. The compulsory LoS-rate has been requested in the coercion literature (Høyer, 2008) but has seen little use. With high quality registry data becoming increasingly available we will hopefully see more use of this measure in future research.

6.2.3 Paper II: Service Characteristics

Several of the estimates in Paper II suggest that the use of compulsory hospitalisation covaries with differences in municipal health services. For roughly half of the indicators the data did not support this narrative. In this section I discuss the findings that I consider most noteworthy.

We found the negative association between compulsory hospitalisation and GPs to be of particular interest. The moderately strong association was robust to various model specifications, and the same relationship was observed both between and within municipalities. This finding aligns with those from a recent systematic-review of risk factors for compulsory hospitalisation in which four studies from Canada, the United Kingdom, and Norway documented significantly higher likelihood of voluntary over involuntary care if a GP or family doctor was involved in the referral or admission process (Walker et al., 2019).

General practitioners have a duty to serve as a hub for municipal health services to an individual and ensure continuity of care between different levels of health care. If GPs have more time available to maintain contact with vulnerable patients and unite separate service providers, they might help prevent relapse. General practitioners also prescribe medication that might prevent persons in early phases from developing more severe illness (Lin et al., 2016). A Norwegian study that followed persons with SMI over a seven-year period found that, out of the health services they received, they were most satisfied with GPs. This was suggested to be partly related to a continuity of personal relationships (Ruud et al., 2016). On the other hand, GPs can refer patients to compulsory hospitalisation (Røtvold & Wynn, 2015), so increasing the number of GPs could increase the potential for involuntary referrals. Our results suggest that the effect of such “supply-sensitivity” on referrals are counteracted by the preventive care provided by the GPs.

Higher rates of mental health nurses per population were associated with less compulsory hospitalisation, both within and between areas. A study from the UK also observed a reduction in mental health nurses per population correspondingly with an increase in compulsory hospitalisation, although they did not perform any statistical exploration of the association due to data limitations (Rains et al., 2020). Qualified personnel in the work force has been suggested to be related to compulsory hospitalisation (Wormdahl et al., 2020). In community services where few psychiatrists or specialist clinical psychologists are employed, mental health nurses might assume more responsibility. In Norway, three years of higher education are required to become a registered nurse, and specialisation in mental health requires an additional year of study. This could equip the staff with more adequate knowledge for providing high quality care and preventing compulsory hospitalisations. Compared to other OECD countries, the number of mental health nurses per population in Norway is high (Lin et al., 2016). Many countries require no specialisation and spend little time on mental health in the nursing curriculum, which caused the World Health Organisation to express concerns about quality of care, local practice, and workforce migration (World Health Organization. Regional Office for Europe, 2008, p. 111).

Our results showed that public housing was associated with lower levels of compulsory hospitalisation, both between and within-areas, although the 95% confidence intervals for the within-effect included 1. These findings support previous research that ties compulsory hospitalisation to housing (Gandré et al., 2018; Lebenbaum et al., 2018; McGarvey et al., 2013). Recent surveys from Norway show positive developments in this area, with annual reductions in the number of homeless people (Dyb & Zeiner, 2021). A considerable reduction in the number of homeless people from 2012 to 2016 resulted primarily from long term efforts by municipalities to prevent and reduce homelessness (Dyb & Zeiner, 2021). This result serves as another example of how providing basic services might help avert the development of crises and reduce perceived need for compulsory hospitalisation.

We observed somewhat lower levels of compulsory hospitalisation in municipalities that on average reported good cooperation with specialist services, compared to areas that rated the cooperation to be poorer. Health professionals in Norway have previously highlighted the importance of collaboration between service levels for preventing compulsory hospitalisation (Wormdahl et al., 2020). Similarly, a Dutch study suggested that close collaboration between community-care networks and emergency psychiatric services was important to prevent escalation of problems, thereby reducing “need” for compulsory hospitalisation (Wierdsma et al., 2007). In Greece, the mental health system was described as uncoordinated and fragmented, and this was assumed to be one explanation for high levels of compulsory hospitalisation (Stylianidis et al., 2017). Our within-area comparisons did not show any such association, which does not support the claim that better cooperation between service levels can be expected to prevent the use of compulsory hospitalisation. One explanation for the lack of within-effect could be that the quality of cooperation was relatively stable within each municipality during the study period. Another reason could be data quality since this variable seems more susceptible to measurement error than the variables on labour-years and public housing provided by Statistics Norway. Measurement error in independent variables is known to bias coefficients towards zero.

Higher levels of compulsory hospitalisation were seen in areas that had offered Supported Employment for longer time periods, which we suggested could mean that these initiatives were more likely to be prioritised and initiated in areas with more compulsory hospitalisation. These initiatives are still under development in municipalities, so it is possible that we will observe within-area reductions corresponding with Supported Employment once data from longer time periods becomes available. A recent systematic review found improved employment outcomes following Individual Placement and Support, which arguably is a more important outcome than compulsory hospitalisation for such initiatives (Killaspy et al., 2022).

Areas that reported having procedures for early detection of mental health problems more often had higher levels of compulsory hospitalisation. Data were only available for one year for this indicator, so it would be interesting to see how these associations develop over time. It is possible that early intervention initiatives uncover persons who are considered in need of treatment and that greater harm to the person can be avoided by temporarily committing them, thereby preventing development of severe illness, and preserving future freedom. This would be in line with Dworkin's conception of paternalism (Dworkin, 1972). However, this rests on the assumption of the efficacy of the coercive treatment which, as noted, is uncertain. Furthermore, this does not justify high levels of compulsory hospitalisation over time. On the contrary, if early intervention means coercive intervention, then this can hardly be justified if it does not result in reduced use of compulsion over time.

The combined explanatory power of municipal services was 5-6% variance explained which can be considered quite modest. More than half of the variation remained unexplained after all variables were included in the model. Examples of possible sources of variation considered in Paper III include differences in physician-opinion on diagnosing, legal criteria, capacity for consent, and danger. None of these sources of variation could be examined with the available data but they are likely to account for a substantial part of the variation.

6.2.4 Paper III: Ethical Challenges and Right Care

Ethical reflection can contribute to make implicit value evaluations explicit. By considering and weighting ethical principles, the analyses in Paper III increase our understanding of what makes unwarranted variations in compulsory hospitalisation ethically challenging. Overuse of compulsory hospitalisation describes situations where the intervention was not necessary. Underuse describes situations where compulsory hospitalisation was necessary but not initiated. Both sources of variation can challenge all four ethical principles, but the prevailing uncertainty surrounding outcomes of compulsory hospitalisation, and corresponding disagreement on “right care”, makes it difficult to identify if the principle of beneficence is infringed.

Comparisons of rates lead naturally to the question of which rate is “right”, “appropriate”, or “optimal”, which were dealt with in Paper III. In general health services there is a variety of ways that priority setting is impacted by bias that can contribute to overuse, underuse and misuse (Hofmann, 2020). According to the Norwegian Medical Association, the “culturally dominating perception among physicians, patients and population that more health care is usually for the better” is untrue, and “is considered one of the important factors that contributes to variation” (*Riksrevisjonens kontroll med forvaltningen av statlige selskaper – 2018*, 2019, p. 37). Among radiologists, this translates to the quip “scan because you can” (Maskell, 2018, p. 2). But, in the case of compulsory hospitalisation there are many reasons why more is not better. The main reason is the restriction of liberty inherent to the practice, but also the risk of harm and the uncertainty surrounding outcomes, so that the benefit often does not outvalue the harm. It might also be more costly since the use of compulsion can be resource-intensive and triggers additional legal rights for patients.

A limitation with the concept of the “right” rate (McPherson et al., 2013) is that it does not ensure that those who are likely to benefit from a compulsory hospitalisation are the ones who are admitted. Similarly, knowledge of the “right” rate does not prevent people who are not likely to benefit, or who are likely to become harmed, from becoming admitted involuntarily.

In Paper III we touch upon some of the tension inherent in the ethics of compulsory hospitalisation, where the interests of the patient occasionally diverge from the interests of relatives, neighbours, or society at large. This tension can be interpreted by considering the development of values in many modern societies where individual rights are often emphasised (Inglehart, 2006). Correspondingly, some argue that the principle of autonomy ought to be accorded exceptional weight (Gillon, 2003). In contrast, in more collectivistic or communitarian traditions, the principle of autonomy might be interpreted differently or given less weight. For instance, during the early 2000s in South-Korea, more than 90% of hospitalisations in mental health care were involuntary, and 66-73% referrals to compulsory hospitalisation were by the family (Bola et al., 2011). The important role of family in decision-making is highlighted in the literature on ethical challenges in mental health care from low- and middle-income countries (Hanlon et al., 2010). A related topic was considered by Kjellin et al. (1993) who argued that ethical benefits and costs ought to also be considered for the persons involved other than the patients, including relatives and staff. They argued that what are considered benefits and costs will differ between deontological libertarian and deontological communitarian perspectives. While libertarians primarily emphasise patient autonomy and communitarians focus on the rights of the community, in practice people tend to display a combination of such ethical views.

Similarly, there is a tension between the desire to reduce compulsory hospitalisation and a zero-vision of suicide, which is an ambition of authorities in both Sweden (Karlsson et al., 2018) and Norway (S. H. Berg & Walby, 2022). Professionals have described this as “damned if you do, damned if you don’t” (S. H. Berg & Walby, 2022, p. 35), where they are criticised for using too much coercion, but if something goes wrong there is a focus on finding out who did something wrong, and that they did not do a good enough job, often without considering the complexities of working with severe mental illness.

Likewise, the drive towards reduced use of compulsion, supported by authorities, user organisations, and many researchers, appears to be in conflict with views of other researchers, professionals, and politicians, who voice strong criticism towards mental health services for not being able to prevent serious violence by persons with SMI, following contact with the services (Thobroe, 2021). This is indicative of controversy, and shows some of the tension between different professions, values, and treatment aims that pull in opposing directions. This context highlights the need for improving the knowledge base surrounding use of compulsion.

6.3 Discussion of Overarching themes

In the following sections I reflect on topics related to the dissertation as a whole as well as issues of tension or ambiguity that have emerged from the papers.

6.3.1 Risk, Appropriateness, and Necessity

When we talk about the *risk* (Huitfeldt, 2016) of compulsory hospitalisation, which has epidemiological connotations, compulsory hospitalisation is considered something that ought to be avoided due to the possibility of harm and the inherent restriction of liberty. From a normative human rights perspective, this rings true: if the use of compulsion can be avoided, it ought to be avoided. This is reflected in legislations and political guidelines that state that compulsory hospitalisation should only be used as a last resort (Salize et al., 2002). From a health service perspective, compulsory hospitalisations that could have been avoided, due to voluntary-focused initiatives being provided, appear as a service of lower quality given the negative implications of compulsion. From a micro-perspective, within acute mental health care of the term risk may appear less suitable. In an acute crisis, a situation has developed where a coercive intervention might be deemed necessary. The situation was not desired by any party but once developed it becomes unavoidable. In such a situation, where compulsory hospitalisation appears to be truly required, the nature of the risk changes, since the risk would then be related to not receiving/delivering adequate health care rather than patient wellbeing. However, this dissertation primarily concerns the macro-level, where we expect that the provision of good mental health and social services can prevent the need for coercive interventions to develop in the first place. There is thus a tension between the micro- and macro-perspective, as well as between acute situations and long-term developments - a tension that runs through this entire dissertation and, potentially, through all the literature on coercion.

This deliberation can be linked to Paper III, where we state that there is disagreement over whether compulsory hospitalisation should be considered a good, a disservice, or both. Patients can experience aspects of an involuntary hospitalisation as positive, such as the provision of care and positive treatment outcomes, while other parts are experienced as intrusive, such as loss of autonomy and feeling devalued (Katsakou & Priebe, 2007). According to a recent review, patients reported in several studies that compulsory hospitalisation safeguarded them while they were unaware of the severity of their illness, however negative experiences were also often reported (Akther et al., 2019). This again highlights the complexity of the topic, where polarizing discussions are not likely to capture the nuances involved.

The term *necessary* is also ambiguous. When considering variation in health services in general, the term necessary describes high-value services considered effective, with variations in such services being related to underuse. These are services where there is agreement on “right care” so little variation is expected. Meanwhile, most mental health legislations also state that compulsory hospitalisation should only be used when necessary (*Mental Health Care Act*, 1999). If these two uses of “necessary” signify the same concept, we should expect variation patterns that show little to moderate geographical variation in compulsory hospitalisation. However, as Paper I illustrates, variations are large. Arguably, some health services are considered necessary even when there is controversy surrounding “right care” and where more variation is expected (*Riksrevisjonens kontroll med forvaltningen av statlige selskaper – 2018*, 2019). However, is an intervention necessary if there is little agreement on “right” care? These lines of reasoning suggest that compulsory hospitalisation to a considerable extent is used in situations where it is not really necessary.

For patients experiencing compulsory hospitalisation as harm, the term “health care” can appear misplaced. Correspondingly, the term “right care” and “right levels” of compulsory hospitalisation might not feel appropriate for persons who have had severely negative experiences of compulsion.

It has been argued that the concepts of necessity and appropriateness are fundamentally evaluative, and for the concepts to be meaningful it must be specified for whom and what something is appropriate and “necessary to achieve what and whose ends” (Sharpe, 1997, p. 337). Sharpe suggested that “[i]f appropriate and necessary mean something other than that which is necessary to benefit this patient, that should be made explicit…” (Sharpe, 1997, p. 342).

Several of the findings and discussions in this dissertation point towards a source that could account for a substantial share of variation: differing judgements among decision-makers regarding necessity. Evaluations on when it is necessary to use compulsion are likely to depend on history, culture, individual differences between decision-makers, and organisational differences. We argued in Paper III that compulsory hospitalisation would more easily appear requisite if few or no other alternative interventions were available. Note the similarity to the third condition described in 2.7.5 Weighting of Principles through Ethical Reflection for justifying when a norm can be infringed which states that, “[n]o morally preferable alternative actions are available” (Beauchamp & Childress, 2019, p. 23). Again, this illustrates how a compulsory hospitalisation can be ethically justifiable in a certain situation but still be ethically challenging in a societal, macro-perspective. This contradiction places a moral responsibility on authorities, service providers and legislative powers to ensure that alternatives of an adequate standard are made available.

6.3.2 Risk Factors: Warranted and Unwarranted Variation

Paper III concerns ethical challenges that arise from unwarranted geographical variation in compulsory hospitalisation. One topic that merits further discussion is the question of which factors should be considered warranted in this regard (Sutherland & Levesque, 2020). Demographic factors such as age and gender of the population are beyond the influence of health services, and the services should therefore not be accountable for having a population that is more at risk when comparing outcomes between areas.

The standardisation procedure applied in Paper I, which accounted for uneven distribution of age and gender between areas, was expected to remove some but not all variation resulting from differences in morbidity between regions (OECD, 2014). Consequently, the rates were partly, but not totally, adjusted for population needs.

Prevalence of SMI is one of the strongest predictors of compulsory hospitalisation (Walker et al., 2019). Since the presence of SMI is part of the legal requirements of §3.3 compulsory mental health care, this variable is likely to have considerable impact on the levels of compulsory hospitalisation. If the number of individuals with SMI increases in an area, the need for treatment is likely to increase, including involuntary treatment (Danleavy, 2017). It might therefore seem reasonable to consider an uneven distribution of SMI to be a warranted factor for geographical variation.[19] I have argued that the organisation of health services can impact the use of compulsory hospitalisation and one suggested mechanism is a higher degree of recovery in certain areas. If services are designed and delivered in ways that people also want to receive them in states of reduced capacity, this might contribute to improve functioning, avoid deterioration, reduce the need for compulsory hospitalisation, and potentially reduce the prevalence of SMI in an area. In this light, depending on the time frame, prevalence of SMI might not be warranted for maintaining high levels of compulsory hospitalisation over time.

Furthermore, previous research has shown that the prevalence of diagnoses hinges not only on the underlying illness in the population but also on the supply of physicians (Wennberg et al., 2015). Availability of physicians allows for more consultations, which result in more diagnoses. Consequently, by adjusting for SMI, the population in areas with higher physician capacity appear to have higher morbidity than if their physician capacity had been lower. In other words, the measures would be “falsely inflated by the supply of resources” (Wennberg et al., 2015, p. 23). Arguably, it is unclear whether such supply-sensitivity pertains to SMI the same way it does for somatic conditions. If a mental illness is considered severe it might be less likely to “go under the radar” of health service providers, even if the availability of physicians is relatively low in an area. Second, SMI diagnoses are primarily given by psychiatrists or psychologists within specialist services and not GPs in primary mental health care (World Health Organization. Regional Office for Europe, 2008). This does not alter the supply side element,

---

[19] See 6.1.5 Causality for reflections on where prevalence of SMI might belong in the causal ordering.

however. Additionally, there were issues related to data availability. Not all diagnoses are reported in the NPR for all episodes, and there is currently no available data on the prevalence of SMI in Norway at a sufficiently disaggregated level. In our data material we had information about each contact with specialist services for individuals diagnosed with SMI. This means that we had no information about individuals with SMI who were not in contact with specialist services, for instance due to good functioning or adequate follow-up from primary health care preventing the need for contact with them. Adjusting for SMI in this case would cause areas that were successful in preventing hospitalisations to appear «healthier» than they truly are and they would consequently appear to use more compulsory hospitalisation than expected.

The international literature suggests that Black, Asian and minority ethnic groups have increased risk of compulsory hospitalisation (Barnett et al., 2019) and there is some literature to suggest that this applies in Norway (J. E. Berg & Johnsen, 2004; Hustoft et al., 2013; V. C. Iversen & Morken, 2003). It is certainly questionable if differences in ethnicity ought to be considered a warranted reason for variation in compulsory hospitalisation. But it might be a risk factor which can contribute to explain differences in the use of compulsory hospitalisation, in which case the geographical variation would decrease if this factor was accounted for. Controlling for socio-economic status could also "explain variation" yet this is usually not considered a warranted factor. Accounting for socio-economic status, as part of standardisation, would thus create overcontrol bias, and the geographical variation would appear smaller than it truly is. Unless it can be shown that ethnicity is a direct cause of differences in morbidity it ought not be included in the adjustment procedure. Further, for inclusion it would need to be evident that it is not mediated by factors that are considered unwarranted, such as socio-economic status. In any case, risk-adjustment based on ethnicity was not possible because data on ethnicity is not included in the NPR (nor in other national registers).

Another factor that is occasionally mentioned in this regard is urbanicity (Braam et al., 2016; Gandré et al., 2018; Keown et al., 2016; Kjellin, 1997; Roelandt et al., 2017). On the one hand, higher density of persons with mental health challenges and addiction problems, coupled with access to illegal substances, could be understood as risk factors that are more prevalent in urban than in rural areas. Younger populations, as well as immigrants and refugees with potentially traumatic backgrounds, are often found in cities (Bansal et al., 2014; Barnett et al., 2019). Further, residents are more likely to be overlooked in cities and it might take a longer time before health care is offered. These factors combined create an environment for higher levels of SMI to potentially develop. Other urban factors include area deprivation and residents with low socio-economic status, which have been associated with compulsory hospitalisation both at the individual and area level (Braam et al., 2016; Indu et al., 2018; Keown et al., 2016; O'Brien et al., 2012; Weich et al., 2017). While these can form part of an explanation of higher levels of compulsory hospitalisation, it is far from evident if they should be considered warranted factors for variation. Also, such examples of a social gradient in access to health care seem to challenge the ethical principle of justice (Wilson, 2009).

At the same time, one can imagine protective factors that might alleviate the need to use compulsory hospitalisation in urban, compared to rural, areas. For example, the possibility of developing and maintaining a well-functioning community mental health service is larger in urban areas, compared to scarcely populated districts, where few professionals might serve a population that potentially lives hours away. On the other hand, long travel distances to mental hospitals are associated with lower usage rates, as observed more than 150 years ago by Edward Jarvis and has been frequently replicated since (Holley, 1998).

Due to the manifold interactions between urbanicity and compulsory hospitalisation, adjusting for urbanicity did not seem reasonable in Paper I. In any case, even if urbanicity effects can be "explained" by other factors, the variations still exist. For patient groups where there is disagreement on "right care", the risk of compulsory hospitalisation can be considerably higher in some urban areas compared to rural areas. For these persons it might not seem reasonable that such an increased risk should be considered a fair cost of living in an urban environment.

For Paper II, these considerations were different, since we attempted to estimate the strength of associations between mental health services and levels of compulsory hospitalisation. The control variables were in these cases expected to reduce the risk of confounding and increase the precision of estimates. It is possible that urbanicity ought to have been included as a control variable in Paper II although it is not evident how such a variable should have been operationalised. Regardless, controlling for urbanicity might have altered between-effects, but not within-effects.

The deliberations above illustrate that warranted variation is a normative concept and differs from explained variation which is a descriptive concept. Normative concepts include value judgements that need to be interpreted and weighted and might be more prone to disagreements than descriptive concepts, as the latter can be more impartially observed. In Paper II we were able to explain 39-40% of the variation, which implies that more than half remains unexplained. Arguably, it was not the ambition to maximise the amount of variance explained. Increased knowledge of factors that predict compulsory hospitalisation contribute to motivate discussions on what ought to be considered warranted factors and which geographical variations represent ethical challenges. Continued research is therefore needed to explain more of the remaining geographical variation in compulsory hospitalisation.

6.3.3 Categories of Care and Compulsory Hospitalisation

The categories of health care described by Wennberg and colleagues (2010) (efficient, preference-sensitive, and supply-driven), and the European Collaboration for Healthcare Optimization (Bernal-Delgado et al., 2014) (effective care, effective care with uncertain marginal benefit, and lower-value care), were developed in the context of health services received on a voluntary basis. It is unclear whether they are equally suitable for describing compulsory care which, by definition, are services provided without the patients' consent.

Compulsory hospitalisation to prevent risk of harm to others might not fit into either of these categories, and it has been argued that services where the intention is not primarily to benefit the patient ought not to be considered health care but rather safety measures (Storvik, 2017). Most patients receiving mental health care represent no danger to other persons and this includes most patients hospitalised involuntarily (Bjørngaard & Hatling, 2005). Media coverage following serious crime committed by persons with SMI can often result in unfair stigma, since coerced patients can wrongly be perceived as a homogenous group. According to a 2009 meta-analysis 6.5% of all homicide offenders had a schizophrenia diagnosis (Large et al., 2009). In comparison, a 2013 meta-analysis found that 48% of homicide offenders were under the influence of alcohol (Kuhns et al., 2014). The risk of homicidal attack by an intoxicated person is much higher than the risk by a person with schizophrenia, but there are no calls for pre-emptively incarcerating persons under the influence of alcohol. This is not intended to undermine the tragedy of violence committed by persons with SMI, nor to signify that efforts at reducing risk of violence are not important for this patient group, but when reporting risks of dangerous events comparison with other risks is crucial, lest we overestimate the danger involved (Rosling et al., 2018). Furthermore, there is no evidence to suggest dangerousness can more reliably be predicted among persons with mental illness as compared with the general public (Szmukler & Holloway, 1998).

The category of supply-sensitive or supply-driven services usually describes services where supply induces demand, in line with Roemer's law that a hospital bed built is a bed filled (Delamater et al., 2013). In case of low-value care, supply-driven services can result in overuse. In this dissertation the term is often used inversely, describing situations where a lack of available treatment options of a less restrictive nature results in the use of compulsory hospitalisation. The findings in this dissertation suggests a need for studies on geographical variation in less restrictive forms of care. If such good practices (Gooding, 2021) can be documented to not have poorer outcomes than coercive interventions they ought to be considered effective, at least for reducing compulsion. If so, this would indicate underuse of effective health services, which should motivate ongoing action for reducing compulsion in mental health care. This is in line with the World Psychiatry Association's Call for Action to consider the evidence base of alternatives to compulsion (Herrman et al., 2022).

Patients, professionals, and relatives have repeatedly voiced concerns that reduction of bed capacity in mental health care has had negative consequences for patients (O'Reilly et al., 2019; Salinsky & Loftis, 2007; Sigurjónsdóttir, 2021). A shortage of beds will increase pressure of early discharge. However, once a crisis has developed and the patient is considered in need of compulsory hospitalisation, this will often require more than a few hospitalisation days. Similar concerns have been voiced by persons with lived experience of being denied requests for voluntary admission due to lack of bed availability, which resulted in a subsequent deterioration of their mental health to the degree where a compulsory hospitalisation became necessary. Such hospitalisations would be considered supply-sensitive and can be described in economic terms as a market in disequilibrium, where supply pushes or limits demand or usage (Wennberg, 2010). In Paper III we argue that such variations are unwarranted and ethically challenging.

A source of variation that is commonly considered in small-area analysis is differences in physician-opinion, which is related to preference-sensitive care within the Dartmouth framework. This source of variation was discussed in different contexts in Paper III, relating to controversies over "right care", differences in interpretation of legal criteria, diagnosing, and judgements of competency to consent. Another example is the disagreement surrounding use of compulsory hospitalisation for patients with borderline personality disorder (Howe, 2013; Lundahl et al., 2021). According to a Swedish interview study (Lundahl et al., 2018), reasons for admitting patients with borderline personality disorder were more based on psychiatrists' values and judgement than on clinical or legal indication. The psychiatrists argued that the law was sufficiently vague to allow for interpretations that both justified and disallowed the use of compulsory hospitalisation for this patient group (Lundahl et al., 2018). It would therefore be interesting to estimate the extent of geographical variation in compulsory hospitalisation for subgroups of patients; whether the provision of health services impact the use of compulsory hospitalisation differently for different patient groups, and whether outcomes vary according to diagnoses.

6.4 Implications

This section contains reflections on how the findings of this dissertation might inform policy, clinical practice and future research.

6.4.1 Policy

While all three papers focus specifically on geographical variation within the same jurisdiction, it is prudent to step back and compare international levels of compulsory hospitalisation. As documented (Sheridan Rains et al., 2019), there are strikingly huge differences across Europe, with less than 20 per 100 000 persons hospitalised involuntarily in Italy and Portugal, and around 40 per 100 000 in Northern Ireland, to more than 280 persons per 100 000 in Austria.[20] Norway ranks towards the higher end of this list, with roughly 150 persons per 100 000 compulsorily hospitalised annually.

Compulsory hospitalisation is only one of several coercive practices in health services. In some countries this umbrella term includes involuntary detention of persons with dementia or neurodevelopmental disorder, while in many countries, including Norway, such detentions are regulated within different legislations. These patient groups might therefore not be part of the presented statistics, which is another reason why comparing cross-national rates is challenging.

In response to a report by the Office of the Auditor General that investigated reasons for unwarranted variation in health services overall, the Norwegian Health minister asked the regional health trusts to identify which of their catchment areas showed good or poor results in terms of efficacy, capacity utilisation, and usage rates (*Riksrevisjonens kontroll med forvaltningen av statlige selskaper – 2018*,

---

[20] About half of these were cancelled in court within four days for not fulfilling legal requirements, which suggests that overuse of compulsory hospitalisation is common in Austria (Sagerschnig et al., 2017).

2019). In areas with good results, factors that contributed to success were sought to identify how this could inform other areas. In areas that performed poorly, plans to improve performance were demanded, including evaluation of what could be learned from health trusts with better performances. The results from the analyses in this dissertation would support that a similar process to inform the use of compulsion in mental health care is also carried out. So far, no health atlas has been established to document geographical variation in compulsory hospitalisation.

In Paper I we investigated how well different measures could predict future ranked levels of compulsory hospitalisation, based on the previous years' rankings. If rankings fluctuate considerably from year to year, there would be less reason to expect that measurements remain valid by the time rankings are reported. In our material, the compulsory hospitalisation ranking could alone explain 68-81% in next year's ranking, suggesting considerable stability from year to year despite random fluctuations. This indicates that the variations are true and are not the result of random noise. If "geography is destiny", as suggested by Wennberg (2010), it can be in the public's interest to know whether they live in an area known to frequently admit people involuntarily. It could be relevant to report local levels of compulsory hospitalisations regularly, for instance through health atlases, which can continue to shine a light on coercive practices, encourage services to re-evaluate their practices, and to implement reductive strategies following available evidence (Gooding, 2021).

Differences in how physicians and psychologists interpret the law have been suggested as explanation for some of the observed variation (Feiring & Ugstad, 2014). It is therefore important to develop a legal framework that is more likely to result in standardised evaluations to ensure that patients are treated equally, regardless of where they live.

The question of the right rate of compulsory hospitalisation appears to be closely related to how highly society wants to prioritise the reduction of coercive practice. The violation of the ethical principle of justice resulting from supply-sensitive use of compulsory hospitalisation urges development and strengthening of local health services in ways that contribute to reducing compulsion.

6.4.2 Clinical Practice

The results from Paper II support the claim that primary health services play a role in reducing the use of compulsory hospitalisation and the compendium from the European Council on good practices for reducing coercion in mental health care has been frequently referenced in this dissertation (Gooding, 2021). This compendium reported over thirty practices and initiatives that have been successful in reducing or preventing various forms of coercion in mental health care, including eight community-based initiatives. This knowledge ought to be disseminated to decision-makers and staff in local health services to inform practice and improve quality of care.

Several initiatives have also been aimed at reducing unwarranted variation in general health services (OECD, 2014). As pointed out, one suggestion is the publication of health atlases, showing regional differences in the use of compulsory hospitalisation. Such official reporting will increase knowledge and transparency about current practice. It will allow comparison of each area's levels to the national average and over time. Furthermore, such monitoring of compulsion levels ought to be reported back to service providers and inform decision-makers at different levels, including the control commissions. In a small-scale project in a Norwegian municipal emergency unit, decision-makers were systematically informed of their individual use of referrals to compulsory hospitalisation, as compared to their colleagues. Such work on quality control proved effective in reducing referrals to compulsory hospitalisation (Ness et al., 2016).

One CMHC area in Western Norway, which was ranked highest in terms of quality according to GP ratings of local CMHCs (Bjertnæs et al., 2006), has worked systematically to reduce the use of compulsory hospitalisation. Their approach is to abstain from coercive interventions as long as possible and to only use coercion when it would be professionally indefensible *not* to do so, according to an interview with psychiatrist Trond Aarre (Strand, 2011). This is partly based on the assumption that waiting and attempting voluntary follow-up is conducive to a better long term alliance. The quality of the relationship between patients and professionals has often been reported as important for patients' feeling of safety and self-worth (Akther et al., 2019), so an emphasis on relationship, including the consequences of coercive practice on this relationship over time, may well be worth considering for other service providers.

According to interviews with professionals in one Norwegian Regional Health Trust, temporary staff in specialist services occasionally admit patients involuntarily, to err on the side of caution (Totland, 2021, p. 17), in situations where less permanent staff are present. If multiple decision-makers or representatives from multiple professions were involved it might improve consensus, the quality of decisions, and reduce randomness. When decision-makers are challenged in professional discussions with colleagues, and they are provided feedback about their preferences as providers of health care, new practices in line with evidence-based medicine are likely to spread more rapidly (Ness et al., 2016; *Riksrevisjonens kontroll med forvaltningen av statlige selskaper – 2018*, 2019).

As suggested in Paper III, standardised guidelines for interpreting legal criteria and diagnosing SMI are likely to contribute to reduce unwarranted variation. We argued that compulsory hospitalisation in cases where it was not necessary constitutes overuse and this might be interpreted as a problem of reliability of evaluations. By focussing on the process prior to the decision of referring or admitting to compulsory hospitalisation, admissions that are initiated on the wrong grounds might be reduced. This has been compared to procedural justice, where the outcome of a decision can vary between cases, but every case should be based on a process which is perceived as fair (Appleby et al., 2011). Similarly, evaluations of capacity to consent ought to be based on research and stringent criteria, with improved routines for decision-making involving multiple evaluators; simultaneously limiting the impact of idiosyncratic physician-opinion. This might contribute to reduce geographical variation in compulsory hospitalisation, while increasing the likelihood that only individuals who lack the ability to consent are admitted.

Quality of decision-making might also be improved through seminars aimed at decision-makers, including the guidance of young or inexperienced professionals. Finally, leadership has been considered important for reducing coercive measures, such as seclusion and restraint (Huckshorn, 2006), which suggests that efforts ought to be targeted higher in the hierarchy as well.

6.4.3 Future Research

The findings from Paper I encourage researchers in the field of coercion to be mindful of which measures they employ. The name of the measure ought to reflect the type of count it is based on. If measurements are based on counts of patients, or first hospitalisations only, then terms such as “compulsory hospitalisation rate” and “involuntary admission rate” are likely to be misleading. As demonstrated, the extent of compulsory hospitalisation, as well as the geographical variation in the practice, can appear considerably larger if counts are based on events. Similarly, most effect sizes in Paper II were larger when the outcome was hospitalisations compared to patients.

There are a variety of interesting research questions that are related but beyond the scope of this dissertation. In terms of describing geographical variation in compulsory hospitalisation it would be relevant to perform sub-group analysis. Are there regional differences in the use of short-term compulsory observation versus more long-term compulsory hospitalisation? How does the use of criteria for compulsory hospitalisation differ between areas? What about diagnostic differences, both in terms of prevalence and as basis for compulsory hospitalisation?

In Paper I we observed different patterns of compulsory hospitalisation, with shorter duration and more frequent compulsory rehospitalisation in some areas, while other areas had fewer but longer compulsory hospitalisations. It is not clear if either of these patterns of service delivery can be interpreted as superior in terms of quality of care. It would therefore be interesting to investigate if either approach is preferable in terms of benefits, harms, therapeutic relationships or economic costs.

Forensic admissions following a court verdict of transfer to compulsory hospitalisation were not considered in this dissertation. In Paper I we argue that these patients constitute a distinct population, and such admissions are regulated by a different legal framework. An additional argument is that there appears to be less drive from stakeholders to reduce the use of compulsory hospitalisation in cases where there is risk of harm (Mahomed et al., 2018). Compulsory hospitalisation due to risk of danger to others is intended to prevent the occurrence of serious crime by persons with SMI. This could suggest that underuse of compulsory hospitalisation in such cases would result in higher levels of crime within this patient group and higher rates of forensic admissions, in line with the Penrose hypothesis[21] (Wild et al., 2021). It might therefore be relevant to investigate levels of compulsory hospitalisation and forensic admissions in conjunction, and whether the data supports a hypothesis of increased levels of serious crime in areas with low levels of compulsory hospitalisation.

6.4.3.1 Temporal Variation

A related, though less studied topic is temporal variation in compulsory hospitalisation (Aguglia et al., 2016; Arnold et al., 2019; Karasch et al., 2020). When does it occur and how can we interpret this variation? Are there weekly differences? Seasonal, as in before/during/after holidays? How much of temporal variation is related to characteristics in the patients' situations, such as increased severity of symptoms, and how much can be traced to organisational or systemic aspects, such as the use of temporary staffing during vacations? While variation resulting from the former kind can be warranted, compulsory hospitalisations that are contingent on hospital capacity or staff competence would be ethically problematic.

6.4.3.2 Using Variation for Causal Inference

A strong suggestion for future research following discussions on variation and right care is related to outcomes of compulsory hospitalisation. We need to know whether the benefits from enforcing health services on people are actually delivered

---

[21] The Penrose hypothesis predicts that a reduction in mental health beds will be accompanied by an increase in prison population.

as expected. This knowledge is generally not obtainable using RCTs, since ethics committees are unlikely to accept the randomisation of patients to compulsion. Furthermore, this type of outcomes research would be relevant for prognosis over years, while RCTs tend to have a shorter time frame. Registry-based studies, using instrumental variables to isolate exogenous variation, can be one way to obtain such knowledge (Mykletun et al., 2021).

For patients where there is disagreement on “right care”, clinical treatment choice can vary considerably depending on which side of the municipal border they live. For these patients, the variation in decisions to use compulsion can appear random, as if they were participating in an experiment. Meanwhile, patients are likely unaware of this variation, so there is little risk of self-selection. Seen in this light, the geographical variation provides a quasi-experimental framework for causal inference. By using *provider preferences* for use of compulsion in each catchment area as an instrumental variable, it is possible to estimate causal effects (Widding-Havneraas et al., 2021). The service provider’s treatment preferences create “as-if” random variation, which makes it possible to assess whether preference for more or less restrictive practice of compulsion lead to superior patient prognoses. In addition to variation in use of compulsory hospitalisation, this approach also makes it possible to investigate whether forced medication is causally related to prognosis. Relevant outcomes could be short and long-term risk of self harm; employment; education; housing and family conditions; mortality; crime; and morbidity.

Furthermore, it is important to assess the ratio of persons harmed from compulsory hospitalisation to serious harm that would have occurred without the intervention. For example, how many persons are on average expected to be harmed from a compulsory hospitalisation to prevent one suicide? In other words, we need to consider the harm caused by compulsory hospitalisation, in comparison to the harm attributed to a lack of compulsory hospitalisation. Such research can inform public debate on the future of mental health services. Reducing uncertainty about outcomes can also contribute to reduce unwarranted variation.

6.5 Strengths and Limitations

A limitation with this dissertation is that I did not perform systematic literature searches due to the breadth of the topics under study. It is therefore possible that I have missed relevant research.

A considerable strength of both Paper I and II is that we had access to high-quality registry data on the entire population who were hospitalised involuntarily in Norway during the study period. As we had data from five years the results are less affected by random fluctuations. The quantification of variation is therefore probable to be representative of real-world practice and have high ecological validity. We employed a broad range of measures of both compulsory hospitalisation and geographical variation, resulting in a thorough description, which can inform future research.

Since this study was from a specific country with its form of service organisation and legislation, the results might not be generalisable to other countries. However they can be useful for comparing variations in other countries and health services.

Although we considered the registry data to have high quality and completeness, we cannot rule out that differences in reporting and coding practices between health trusts had appreciable impact on the results.

The analysis of how the geographical variation in compulsory hospitalisation has changed over time might have been slightly biased by missing data. Due to under reporting in Central Norway in 2014, data from this health region were omitted from all analyses. This health region was the region that showed the least geographical variation for the other years, regardless of measure. Meanwhile, the geographical variation was highest in 2014 for most measures. The omittance of data from Central Norway this year might partly have contributed to the high estimates of geographical variation. The impact is not clear-cut however, as both the EQ and the $EQ_{90/10}$ would increase if the lowest rated areas were found in this health region.

Outpatient commitment or community treatment orders are increasingly used within community mental health care, despite limited evidence for beneficial outcomes to patients (Rugkåsa, 2016). The results from Paper I showed that some areas consistently had lower rates of compulsory hospitalisation and fewer days deprived of liberty. However, the analysis did not show whether these areas substituted inpatient compulsion with outpatient commitment. Creating a measure that counted both inpatient and outpatient days under formal compulsion would arguably provide a superior measure of the extent of coercive practice in an area. The idea of combining days under outpatient commitment with days of compulsory hospitalisation has to my knowledge not been discussed in the literature, and Paper I would have been an appropriate place to investigate such a measure. Unfortunately, the data on outpatient commitment for the study period were of insufficient quality to validly estimate duration and incidence, primarily because the NPR does not register end date of such orders.

A strength of Paper II is that we employed a sophisticated statistical model that, to our knowledge, has not previously been used in research on compulsory hospitalisation. This model allowed us to estimate within-area effects, which are not biased by unmeasured time-invariant confounding, in addition to cross-sectional between-area comparisons. Furthermore, we explored a wide range of variables on municipal mental health and addiction services, several of which had not been previously analysed.

Some of the indicators may have been unsuited for an ecological analysis, such as Employment Support and Housing First. To establish whether these initiatives reduce the risk of compulsory hospitalisation, it would be preferable to have individual level data on these indicators.

Previous research suggests that both Assertive Community Treatment and Flexible Assertive Community Treatment teams can contribute to reduce the use of compulsory hospitalisation (Aagaard et al., 2017; Landheim & Odden, 2020). Unfortunately, it proved difficult to trace where and when such teams had been established in Norway during the study period.

The findings from Paper I indicate that the level of compulsory hospitalisation in an area is not independent of previous years' values. It would therefore be relevant to use dynamic models in Paper II by including lagged dependent variables (Keele & Kelly, 2006). However, four time points is insufficient for this type of model. Furthermore, the legislative change during the study period might have impacted estimates, so similar analyses of data from another time-period could yield different results.

I argue in this dissertation that compulsory hospitalisations can be supply-sensitive, and previous research has shown mixed results concerning associations between availability of hospital beds and levels of compulsory hospitalisation (Donisi et al., 2016; Keown et al., 2011; Salize et al., 2002; Sheridan Rains et al., 2019). Since hospital beds are part of specialist services they were considered outside the scope of Paper II. Still, it is possible that the effects of municipal services on compulsory hospitalisation are contextual and dependent on bed capacity in specialist services, which could have formed part of a statistical model. Furthermore, availability of local beds outside hospital has been suggested to reduce compulsory hospitalisation (Myklebust et al., 2014), but we were unable to obtain data of a satisfactory quality for this variable.

We only reported the point estimate for the proportion of variance explained, which could overstate the precision of the measure. In retrospect we could have quantified the uncertainty around the R^2, such as 95% confidence intervals, which could be obtained through parametric bootstrapping. Again, the findings from Paper II are not necessarily generalisable outside Norway, nor for different study periods.

A strength of Paper III is that it, to our knowledge, was the first to perform an explicit ethical analysis of geographical variation in compulsory hospitalisation. Principlism is a widely used framework for ethical analysis in medicine and health research, however, other ethical frameworks could have been fruitfully applied, such as deontology, virtue ethics, utilitarianism, or communitarian ethics. Furthermore, as noted in the paper, other principles could also have been relevant. Parts of the discussion in Paper III are framed within the Norwegian context and legislation and some considerations may be less relevant for other countries. A more detailed discussion of the limitations can be found in the article.

7 Conclusion

The aim of this dissertation was to give a comprehensive description and analysis of geographical variation in compulsory hospitalisation in mental health care. It was shown that there were considerable variations in compulsory hospitalisation between catchment areas to Norwegian Community Mental Health Centres 2014-2018, and that these variations can be described as large to very large, compared to variation in other health services. Different patterns of geographical variation emerged, depending on whether measurements were based on hospitalisations, patients, or duration of compulsory hospitalisation. The variations were shown to be partly attributed to differences in organisation and dimensioning of municipal health services, such as staff levels and availability of public housing. It was argued that such variations challenge several ethical principles. Variations in health services that are due to an unequal distribution of supply-side characteristics, as opposed to differences among the patient population, are not considered warranted. Continued efforts are needed to reduce unwarranted variation in health services. This is particularly relevant for services that are provided without the patients' consent, since they restrict the patient's liberty and are experienced by some patients as doing more harm than good. Further research on outcomes of compulsory hospitalisation is urgently required and might contribute to reduce unwarranted variation. Community based-services that promote voluntariness and strengthen patient autonomy can reduce both unwarranted variations as well as the use of compulsory hospitalisation. Such initiatives should become the standard, rather than the exception.

8 Bibliography

Aagaard, J., Tuszewski, B., & Kølbæk, P. (2017). Does assertive community treatment reduce the use of compulsory admissions? *Archives of Psychiatric Nursing*, *31*(6), 641–646. https://doi.org/10.1016/j.apnu.2017.07.008

Aguglia, A., Moncalvo, M., Solia, F., & Maina, G. (2016). Involuntary admissions in Italy: The impact of seasonality. *International Journal of Psychiatry in Clinical Practice*, *20*(4), 232–238. https://doi.org/10.1080/13651501.2016.1214736

Aguilera-Serrano, C., Guzman-Parra, J., Garcia-Sanchez, J. A., Moreno-Küstner, B., & Mayoral-Cleries, F. (2018). Variables Associated With the Subjective Experience of Coercive Measures in Psychiatric Inpatients: A Systematic Review. *The Canadian Journal of Psychiatry*, *63*(2), 129–144. https://doi.org/10.1177/0706743717738491

Akther, S. F., Molyneaux, E., Stuart, R., Johnson, S., Simpson, A., & Oram, S. (2019). Patients' experiences of assessment and detention under mental health legislation: Systematic review and qualitative meta-synthesis. *BJPsych Open*, *5*(3).

Almog, M., Curtis, S., Copeland, A., & Congdon, P. (2004). Geographical variation in acute psychiatric admissions within New York City 1990–2000: Growing inequalities in service use? *Social Science & Medicine*, *59*(2), 361–376.

Anthony, W. A. (1993). Recovery from mental illness: The guiding vision of the mental health service system in the 1990s. *Psychosocial Rehabilitation Journal*, *16*(4), 11–23. https://doi.org/10.1037/h0095655

Antonakis, J., Bendahan, S., Jacquart, P., & Lalive, R. (2010). On making causal claims: A review and recommendations. *The Leadership Quarterly*, *21*(6), 1086–1120. https://doi.org/10.1016/j.leaqua.2010.10.010

Appelbaum, P. S. (2016). Protecting the Rights of Persons With Disabilities: An International Convention and Its Problems. *Psychiatric Services*, *67*(4), 366–368. https://doi.org/10.1176/appi.ps.201600050

Appleby, J., Raleigh, V., Frosini, F., Bevan, G., Gao, H., & Lyscom, T. (2011). *Variations in health care: The good, the bad, and the inexplicable*. The King's Fund. https://www.kingsfund.org.uk/sites/default/files/field/field_publication_file/Variations-in-health-care-good-bad-inexplicable-report-The-Kings-Fund-April-2011.pdf

Årlig melding 2018: Nasjonal koordineringsenhet for dom til tvungent psykisk helsevern [Annual report 2018: National coordination unit for sentence to *compulsory mental health care]*. (2018). [Annual report]. Oslo University Hospital. https://oslo-universitetssykehus.no/avdelinger/klinikk-psykisk-helse-og-avhengighet/psykisk-helse-nasjonale-og-regionale-funksjoner/regional-sikkerhetsseksjon-rsa/nasjonal-koordineringsenhet-for-dom-til-tvungent-psykisk-helsevern

Arnold, B. D., Moeller, J., Hochstrasser, L., Schneeberger, A. R., Borgwardt, S., Lang, U. E., & Huber, C. G. (2019). Compulsory Admission to Psychiatric Wards–Who Is Admitted, and Who Appeals Against Admission? *Frontiers in Psychiatry*, *10*, 544. https://doi.org/10.3389/fpsyt.2019.00544

Ash, A. S., Shwartz, M., & Pekoz, E. A. (2003). Comparing outcomes across providers. In *Risk adjustment for measuring health care outcomes* (Vol. 3). Health Administration Press. Chicago, IL.

Bak, J., & Aggernæs, H. (2012). Coercion within Danish psychiatry compared with 10 other European countries. *Nordic Journal of Psychiatry*, *66*(5), 297–302. https://doi.org/10.3109/08039488.2011.632645

Bakken, I. J., Ariansen, A. M., Knudsen, G. P., Johansen, K. I., & Vollset, S. E. (2020). The Norwegian Patient Registry and the Norwegian Registry for Primary Health Care: Research potential of two nationwide health-care registries. *Scandinavian Journal of Public Health*, *48*(1), 49–55.

Bale, M., Holsen, M., Osvoll, K. I., Bedane, H. K., & Skrede, O. (2021). *Healthcare Atlas for Mental Healthcare and Substance Abuse Treatment. Overview and analysis of use of mental healthcare and interdisciplinary specialised addiction services in Norway for the years 2014-2018* (Helse Førde health trust report No. 1 2020; ISBN: 978-82-691504-5-2). Helse Førde HF. https://helseatlas.no/sites/default/files/mhc_report.pdf

Bansal, N., Bhopal, R., Netto, G., Lyons, D., Steiner, M. F. C., & Sashidharan, S. P. (2014). Disparate patterns of hospitalisation reflect unmet needs and persistent ethnic inequalities in mental health care: The Scottish health and ethnicity linkage study. *Ethnicity & Health*, *19*(2), 217–239. https://doi.org/10.1080/13557858.2013.814764

Barnett, P., Mackay, E., Matthews, H., Gate, R., Greenwood, H., Ariyo, K., Bhui, K., Halvorsrud, K., Pilling, S., & Smith, S. (2019). Ethnic variations in compulsory detention under the Mental Health Act: A systematic review and meta-analysis of international data. *The Lancet. Psychiatry*, *6*(4), 305–317. https://doi.org/10.1016/S2215-0366(19)30027-6

Barnett, P., Matthews, H., Lloyd-Evans, B., Mackay, E., Pilling, S., & Johnson, S. (2018). Compulsory community treatment to reduce readmission to hospital and increase engagement with community care in people with mental illness: A systematic review and meta-analysis. *The Lancet Psychiatry*, *5*(12), 1013–1022. https://doi.org/10.1016/S2215-0366(18)30382-1

Baxter, A. J., Tweed, E. J., Katikireddi, S. V., & Thomson, H. (2019). Effects of Housing First approaches on health and well-being of adults who are homeless or at risk of homelessness: Systematic review and meta-analysis of randomised controlled trials. *J Epidemiol Community Health*, *73*(5), 379–387. https://doi.org/10.1136/jech-2018-210981

Beauchamp, T. L. (2003). A Defense of the Common Morality. *Kennedy Institute of Ethics Journal*, *13*(3), 259–274. https://doi.org/10.1353/ken.2003.0019

Beauchamp, T. L., & Childress, J. F. (2019). *Principles of biomedical ethics*. Oxford University Press.

Beghi, M., Peroni, F., Gabola, P., Rossetti, A., & Cornaggia, C. M. (2013). Prevalence and risk factors for the use of restraint in psychiatry: A systematic review. *Rivista Di Psichiatria*, *48*(1), 10–22. https://doi.org/10.1708/1228.13611

Bell, A., Fairbrother, M., & Jones, K. (2019). Fixed and random effects models: Making an informed choice. *Quality & Quantity*, *53*(2), 1051–1074. https://doi.org/10.1007/s11135-018-0802-x

Bell, A., & Jones, K. (2015). Explaining Fixed Effects: Random Effects Modeling of Time-Series Cross-Sectional and Panel Data. *Political Science Research and Methods*, *3*(1), 133–153. https://doi.org/10.1017/psrm.2014.7

Bell, A., Jones, K., & Fairbrother, M. (2018). Understanding and misunderstanding group mean centering: A commentary on Kelley et al.'s dangerous practice. *Quality & Quantity*, *52*(5), 2031–2036. https://doi.org/10.1007/s11135-017-0593-5

Berg, J. E., & Johnsen, E. (2004). Innlegges innvandrere oftere enn etniske nordmenn i akuttpsykiatriske avdelinger? [Are admission rates to acute psychiatric care higher for immigrants from non-Western countries than for the traditional Norwegian population?]. *Tidsskrift for Den norske legeforening*. https://tidsskriftet.no/2004/03/aktuelt/innlegges-innvandrere-oftere-enn-etniske-nordmenn-i-akuttpsykiatriske-avdelinger

Berg, S. H., & Walby, F. (2022). Nullvisjon for selvmord [Zero-vision for suicide]. *Tidsskrift for Norsk psykologforening*, *59*, 30–35.

Bernal-Delgado, E., García-Armesto, S., & Peiró, S. (2014). Atlas of Variations in Medical Practice in Spain: The Spanish National Health Service under scrutiny. *Health Policy*, *114*, 15–30. https://doi.org/10.1016/j.healthpol.2013.07.013

Bindman, J., Tighe, J., Thornicroft, G., & Leese, M. (2002). Poverty, poor services, and compulsory psychiatric admission in England. *Social Psychiatry and Psychiatric Epidemiology*, *37*(7), 341–345. https://doi.org/10.1007/s00127-002-0558-3

Bjertnæs, Ø. A., Oltedal, S., Garratt, A., Helgeland, J., & Røttingen, J.-A. (2006). Fastlegenes vurdering av kvaliteten ved distriktspsykiatriske sentre [Assessment of community mental health centres by general practitioners]. *Tidsskrift for Den norske legeforening*. https://tidsskriftet.no/2006/11/originalartikkel/fastlegenes-vurdering-av-kvaliteten-ved-distriktspsykiatriske-sentre

Bjørngaard, J. H., & Hatling, T. (2005). *Tvungent psykisk helsevern med døgnopphold i perioden 2001-2003 [Compulsory inpatient mental health care during 2001-2003]*. Sintef. http://hdl.handle.net/11250/2475834

Bola, J. R., Park, E.-H., & Kim, S.-Y. (2011). Reassessing the High Proportion of Involuntary Psychiatric Hospital Admissions in South Korea. *Community Mental Health Journal*, *47*(5), 603. https://doi.org/10.1007/s10597-011-9396-7

Bone, J. K., McCloud, T., Scott, H. R., Machin, K., Markham, S., Persaud, K., Johnson, S., & Lloyd-Evans, B. (2019). Psychosocial Interventions to Reduce Compulsory Psychiatric Admissions: A Rapid Evidence Synthesis. *EClinicalMedicine*, *10*, 58–67. https://doi.org/10.1016/j.eclinm.2019.03.017

Borecky, A., Thomsen, C., & Dubov, A. (2019). Reweighing the Ethical Tradeoffs in the Involuntary Hospitalization of Suicidal Patients. *The American Journal of Bioethics*, *19*(10), 71–83. https://doi.org/10.1080/15265161.2019.1654557

Bowers, L. (2000). The expression and comparison of ward incidents rates. *Issues in Mental Health Nursing*, *21*(4), 365–374. https://doi.org/10.1080/016128400247988

Braam, A. W., van Ommeren, O. W. H. R., van Buuren, M. L., Laan, W., Smeets, H. M., & Engelhard, I. M. (2016). Local Geographical Distribution of Acute Involuntary Psychiatric Admissions in Subdistricts In and Around Utrecht, the Netherlands. *The Journal of Emergency Medicine*, *50*(3), 449–457. https://doi.org/10.1016/j.jemermed.2015.06.057

Bremnes, R., Hatling, T., & Bjørngaard, J. H. (2008). *Tvungent psykisk helsevern med døgnopphold i perioden 2001-2006. Sluttrapport [Compulsory inpatient mental health care during 2001-2006. Final report]* (No. A4319). Sintef. https://www.sintef.no/globalassets/upload/helse/psykisk-helse/pdf-filer/rapport_sintef_a4319_tvungent_psykiskhelsevern_med_dognopphold_2001_2006_sluttrapport.pdf

Bremnes, R., & Skui, H. (2020). *Tvang i psykisk helsevern: Status etter lovendringene i 2017 [Compulsion in mental health care: Status after the legislative changes in 2017]* (IS-2888). Helsedirektoratet. https://www.helsedirektoratet.no/rapporter/tvang-i-psykisk-helsevern--status-etter-lovendringene-i-2017

Brieger, P., Kling Lourenço, P., Steinert, T., Längle, G., Lemke, U., Herpertz, S. C., Croissant, D., Becker, T., & Kilian, R. (2014). [Involuntary psychiatric hospital admissions: A comparison between five hospitals in three German federal states]. *Der Nervenarzt*, *85*(5), 606–613. https://doi.org/10.1007/s00115-013-3865-x

Broer, J., Wierdsma, A. I., & Mulder, C. L. (2020). [Regional differences in compulsory treatment in mental health care in the Netherlands during 2013-2017]. *Tijdschrift Voor Psychiatrie*, *62*(2), 104–113.

Brownlee, S., Chalkidou, K., Doust, J., Elshaug, A. G., Glasziou, P., Heath, I., Nagpal, S., Saini, V., Srivastava, D., Chalmers, K., & Korenstein, D. (2017). Evidence for overuse of medical services around the world. *The Lancet*, *390*(10090), 156–168. https://doi.org/10.1016/S0140-6736(16)32585-5

Burns, T. (2011). Paternalism in Mental Health – When Boots are Superior to Pushkin. In *Coercive Treatment in Psychiatry: Clinical, Legal and Ethical Aspects*. https://onlinelibrary.wiley.com/doi/10.1002/9780470978573.ch11

Buuren, S. van, & Groothuis-Oudshoorn, K. (2010). mice: Multivariate imputation by chained equations in R. *Journal of Statistical Software*, 1–68. https://doi.org/10.18637/jss.v045.i03

Cain, K., & Diehr, P. (1992). The Multiple Admission Factor (MAF) in Small Area Variation Analysis. *UW Biostatistics Working Paper Series*, *Working Paper 116*. https://biostats.bepress.com/uwbiostat/paper116/

Carrà, G., Bartoli, F., Brambilla, G., Crocamo, C., & Clerici, M. (2015). Comorbid Addiction and Major Mental Illness in Europe: A Narrative Review. *Substance Abuse*, *36*(1), 75–81. https://doi.org/10.1080/08897077.2014.960551

Cassel, C. K., & Guest, J. A. (2012). Choosing wisely: Helping physicians and patients make smart decisions about their care. *Jama*, *307*(17), 1801–1802. https://doi.org/10.1001/jama.2012.476

Ceraso, A., Lin, J. J., Schneider-Thoma, J., Siafis, S., Tardy, M., Komossa, K., Heres, S., Kissling, W., Davis, J. M., & Leucht, S. (2020). Maintenance treatment with antipsychotic drugs for schizophrenia. *Cochrane Database of Systematic Reviews*, *8*. https://doi.org/10.1002/14651858.CD008016.pub3

Certo, S. T., Withers, M. C., & Semadeni, M. (2017). A tale of two effects: Using longitudinal data to compare within- and between-firm effects. *Strategic Management Journal*, *38*(7), 1536–1556. https://doi.org/10.1002/smj.2586

Chieze, M., Clavien, C., Kaiser, S., & Hurst, S. (2021). Coercive Measures in Psychiatry: A Review of Ethical Arguments. *Frontiers in Psychiatry*, *12*, 2338. https://doi.org/10.3389/fpsyt.2021.790886

Chieze, M., Hurst, S., Kaiser, S., & Sentissi, O. (2019). Effects of Seclusion and Restraint in Adult Psychiatry: A Systematic Review. *Frontiers in Psychiatry*, *10*, 491. https://doi.org/10.3389/fpsyt.2019.00491

Cinelli, C., Forney, A., & Pearl, J. (2020). *A Crash Course in Good and Bad Controls* (SSRN Scholarly Paper ID 3689437). Social Science Research Network. https://doi.org/10.2139/ssrn.3689437

Committee on the Rights of Persons with Disabilities. (2014). *General Comment No. 1—Article 12: Equal recognition before the law*. United Nations. https://tbinternet.ohchr.org/_layouts/15/treatybodyexternal/Download.aspx?symbolno=CRPD/C/GC/1

Correll, C. U., Galling, B., Pawar, A., Krivko, A., Bonetto, C., Ruggeri, M., Craig, T. J., Nordentoft, M., Srihari, V. H., Guloksuz, S., Hui, C. L. M., Chen, E. Y. H., Valencia, M., Juarez, F., Robinson, D. G., Schooler, N. R., Brunette, M. F., Mueser, K. T., Rosenheck, R. A., … Kane, J. M. (2018). Comparison of Early Intervention Services vs Treatment as Usual for Early-Phase Psychosis: A Systematic Review, Meta-analysis, and Meta-regression. *JAMA Psychiatry*, *75*(6), 555–565. https://doi.org/10.1001/jamapsychiatry.2018.0623

Council for International Organizations of Medical Sciences. (2017). *International ethical guidelines for health-related research involving humans.* (ISBN: 9290360887). World Health Organization. https://cioms.ch/

Ending coercion in mental health: The need for a human rights-based approach, no. Recommendation 2158, Council of Europe (2019). https://pace.coe.int/pdf/c16722d6137d2709fcacd22cfa7e55a2d95f5fb63326667a8259ffe25682ae848428feba12/resolution%202291.pdf

Curran, P. J., & Bauer, D. J. (2011). The Disaggregation of Within-Person and Between-Person Effects in Longitudinal Models of Change. *Annual Review* *of Psychology*, *62*(1), 583–619. https://doi.org/10.1146/annurev.psych.093008.100356

Daly, A., & Craig, S. (2021). *Activities of Irish Psychiatric Units and Hospitals 2020* (HRB StatLink Series ISSN 2737-7652). Health Research Board. https://www.hrb.ie/fileadmin/2._Plugin_related_files/Publications/2021_publications/NPIRS/Tables/NPIRS_Activities_2020_all_tables.pdf

Danleavy, D. J. (2017). Re: Is psychiatry becoming more coercive? Questions abound. *BMJ*. https://doi.org/10.1136/bmj.j2904

DaSilva, P., & Gray, J. M. (2016). English lessons: Can publishing an atlas of variation stimulate the discussion on appropriateness of care? *Medical Journal of Australia*, *205*(S10), S5–S7. https://doi.org/10.5694/mja15.00896

Dawson, J. (2015). A realistic approach to assessing mental health laws' compliance with the UNCRPD. *International Journal of Law and Psychiatry*, *40*, 70–79. https://doi.org/10.1016/j.ijlp.2015.04.003

de Jong, M. H., Wierdsma, A. I., Zoeteman, J., van Boeijen, C. A., Van Gool, A. R., & Mulder, C. L. (2021). Risk factors for repeated emergency compulsory psychiatric admissions. *BJPsych Open*, *7*(1), e19. https://doi.org/10.1192/bjo.2020.153

de Stefano, A., & Ducci, G. (2008). Involuntary admission and compulsory treatment in Europe: An overview. *International Journal of Mental Health*, *37*(3), 10–21.

Declaration of Helsinki – Ethical Principles for Medical Research Involving Human Subjects, The World Medical Association (2013). https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/

Delamater, P. L., Messina, J. P., Grady, S. C., WinklerPrins, V., & Shortridge, A. M. (2013). Do More Hospital Beds Lead to Higher Hospitalization Rates? A Spatial Examination of Roemer's Law. *PLOS ONE*, *8*(2), e54900. https://doi.org/10.1371/journal.pone.0054900

Di Cesare, M., Di Fiandra, T., Di Minco, L., La Sala, L., Magliocchetti, N., Romanelli, M., & Santori, E. (2017). *Rapporto salute mentale—Analisi dei dati del Sistema Informativo per la Salute Mentale (SISM)[Mental Health Report—Data analysis of the Mental Health Information System]*. Direzione generale della digitalizzazione, del sistema informativo sanitario e della statistica Direzione generale della prevenzione sanitaria. https://www.salute.gov.it/imgs/C_17_pubblicazioni_2731_allegato.pdf

Diehr, P. (1984). Small area statistics: Large statistical problems. *American Journal of Public Health*, *74*(4), 313–314. https://doi.org/10.2105/ajph.74.4.313

Diehr, P., Cain, K., Connell, F., & Volinn, E. (1990). What is too much variation? The null hypothesis in small-area analysis. *Health Services Research*, *24*(6), 741–771.

Diehr, P., Cain, K., Ye, Z., & Abdul-Salam, F. (1993). Small Area Variation Analysis: Methods for Comparing Several Diagnosis-Related Groups. *Medical Care*, *31*(5), YS45–YS53.

Dieleman, J. L., & Templin, T. (2014). Random-Effects, Fixed-Effects and the within-between Specification for Clustered Data in Observational Health Studies: A Simulation Study. *PLoS ONE*, *9*(10). https://doi.org/10.1371/journal.pone.0110257

Donders, A. R. T., van der Heijden, G. J. M. G., Stijnen, T., & Moons, K. G. M. (2006). Review: A gentle introduction to imputation of missing values. *Journal of Clinical Epidemiology*, *59*(10), 1087–1091. https://doi.org/10.1016/j.jclinepi.2006.01.014

Donisi, V., Tedeschi, F., Salazzari, D., & Amaddeo, F. (2016). Differences in the use of involuntary admission across the Veneto Region: Which role for individual and contextual variables? *Epidemiology and Psychiatric Sciences*, *25*(1), 49–57. https://doi.org/10.1017/S2045796014000663

Dworkin, G. (1972). Paternalism. *The Monist*, *56*(1), 64–84. https://doi.org/10.5840/monist197256119

Dyb, E., & Lid, S. (2017). *Homelessness in Norway 2016 – a survey*. NIBR. https://www.veiviseren.no/forstaa-helheten/forskning-og-utredninger/rapport/bostedslose-i-norge-2016---en-kartlegging

Dyb, E., & Zeiner, H. (2021). Bostedsløse i Norge 2020—En kartlegging [Homeless in Norway 2020—A mapping]. In *151* [Report]. By- og regionforskningsinstituttet NIBR, OsloMet – storbyuniversitetet. https://oda.oslomet.no/oda-xmlui/handle/11250/2758758

Emons, B., Haussleiter, I. S., Kalthoff, J., Schramm, A., Hoffmann, K., Jendreyschak, J., Schaub, M., Armgart, C., Juckel, G., & Illes, F. (2014). Impact of social-psychiatric services and psychiatric clinics on involuntary admissions. *International Journal of Social Psychiatry*, *60*(7), 672–680. https://doi.org/10.1177/0020764013511794

Engberg, M. (1991). Involuntary commitment in Greenland, the Faroe Islands and Denmark. *Acta Psychiatrica Scandinavica*, *84*(4), 353–356. https://doi.org/10.1111/j.1600-0447.1991.tb03159.x

Ewuoso, C. O. (2018). Beneficial Coercion in Psychiatric Care: Insights from African Ethico-Cultural System. *Developing World Bioethics*, *18*(2), 91–97. https://doi.org/10.1111/dewb.12137

Fairbrother, M. (2014). Two Multilevel Modeling Techniques for Analyzing Comparative Longitudinal Survey Datasets. *Political Science Research and Methods*, *2*(1), 119–140. http://dx.doi.org/10.1017/psrm.2013.24

Feinberg, J. (1971). Legal Paternalism. *Canadian Journal of Philosophy*, *1*(1), 105–124. https://doi.org/10.1080/00455091.1971.10716012

Feiring, E., & Ugstad, K. N. (2014). Interpretations of legal criteria for involuntary psychiatric admission: A qualitative analysis. *BMC Health Services Research*, *14*(1), 500. https://doi.org/10.1186/s12913-014-0500-x

Flammer, E., Hirsch, S., Thilo, N., & Steinert, T. (2022). “Our Patients Are Different”: Predictors of Seclusion and Restraint in 31 Psychiatric Hospitals. *Frontiers in Psychiatry*, *13*. https://doi.org/10.3389/fpsyt.2022.791333

Frederick, D. E., & VanderWeele, T. J. (2019). Supported employment: Meta-analysis and review of randomized controlled trials of individual placement and support. *PLOS ONE*, *14*(2), e0212208. https://doi.org/10.1371/journal.pone.0212208

Freeman, G., & Crawford, M. (2002). *Promoting continuity of care for people with severe mental illness*. National Co-ordinating Centre for NHS Service Delivery and Organisation R & D (NCCSDO).

Freeman, M. C., Kolappa, K., de Almeida, J. M. C., Kleinman, A., Makhashvili, N., Phakathi, S., Saraceno, B., & Thornicroft, G. (2015). Reversing hard won victories in the name of human rights: A critique of the General Comment on Article 12 of the UN Convention on the Rights of Persons with Disabilities. *The Lancet Psychiatry*, *2*(9), 844–850. https://doi.org/10.1016/S2215-0366(15)00218-7

Gandré, C., Gervaix, J., Thillard, J., Macé, J.-M., Roelandt, J.-L., & Chevreul, K. (2017). Involuntary Psychiatric Admissions and Development of Psychiatric Services as an Alternative to Full-Time Hospitalization in France. *Psychiatric Services (Washington, D.C.)*, *68*(9), 923–930. https://doi.org/10.1176/appi.ps.201600453

Gandré, C., Gervaix, J., Thillard, J., Macé, J.-M., Roelandt, J.-L., & Chevreul, K. (2018). Geographic variations in involuntary care and associations with the supply of health and social care: Results from a nationwide study. *BMC Health Services Research*, *18*. https://doi.org/10.1186/s12913-018-3064-3

Gedwongen verblijven in PZ en PAAZ [Forced stay in psychiatric hospital or psychiatric department in general hospital]. (2021). DGGS - Gezondheidszorg. https://www.health.belgium.be/sites/default/files/uploads/fields/fpshealth_theme_file/2021-09-07_rapport_gedwongen_opnamen_nl.pdf

Gelman, A. (2006). Multilevel (Hierarchical) Modeling: What It Can and Cannot Do. *Technometrics*, *48*(3), 4. https://doi.org/10.1198/004017005000000661

Gelman, A., & Hill, J. (2006). *Data analysis using regression and multilevel/hierarchical models*. Cambridge university press.

Giacco, D., & Priebe, S. (2016). Suicidality and Hostility following Involuntary Hospital Treatment. *PLoS ONE*, *11*(5), e0154458. https://doi.org/10.1371/journal.pone.0154458

Gillon, R. (2003). Ethics needs principles—Four can encompass the rest—And respect for autonomy should be “first among equals”. *Journal of Medical Ethics*, *29*(5), 307–312. https://doi.org/10.1136/jme.29.5.307

Glasziou, P., Straus, S., Brownlee, S., Trevena, L., Dans, L., Guyatt, G., Elshaug, A. G., Janett, R., & Saini, V. (2017). Evidence for underuse of effective medical services around the world. *The Lancet*, *390*(10090), 169–177. https://doi.org/10.1016/S0140-6736(16)30946-1

Gooding, P. (2021). *Good practices for reducing and preventing coercion in mental health settings in the Council of Europe*. Council of Europe. https://www.coe.int/en/web/bioethics/good-practices-for-reducing-and-preventing-coercion-in-mental-health-settings-in-the-council-of-europe

Gooding, P., McSherry, B., & Roper, C. (2020). Preventing and reducing ‘coercion’ in mental health services: An international scoping review of English-language studies. *Acta Psychiatrica Scandinavica*, *142*(1), 27–39. https://doi.org/10.1111/acps.13152

Gooding, P., McSherry, B., Roper, C., & Grey, F. (2018). Alternatives to coercion in mental health settings: A literature review. *Melbourne: Melbourne Social Equity Institute, University of Melbourne*.

Gupta, M. (2009). Ethics and Evidence in Psychiatric Practice. *Perspectives in Biology and Medicine*, *52*(2), 276–288. https://doi.org/10.1353/pbm.0.0081

Gutwinski, S., Schreiter, S., Deutscher, K., & Fazel, S. (2021). The prevalence of mental disorders among homeless people in high-income countries: An updated systematic review and meta-regression analysis. *PLOS Medicine*, *18*(8), e1003750. https://doi.org/10.1371/journal.pmed.1003750

Haddad, P. M., & Correll, C. U. (2018). The acute efficacy of antipsychotics in schizophrenia: A review of recent meta-analyses. *Therapeutic Advances in Psychopharmacology*, *8*(11), 303–318. https://doi.org/10.1177/2045125318781475

Hamaker, E. L., & Muthén, B. (2020). The fixed versus random effects debate and how it relates to centering in multilevel modeling. *Psychological Methods*, *25*(3), 365–379. https://doi.org/10.1037/met0000239

Hanlon, C., Tesfaye, M., Wondimagegn, D., & Shibre, T. (2010). Ethical and professional challenges in mental health care in low- and middle-income countries. *International Review of Psychiatry (Abingdon, England)*, *22*(3), 245–251. https://doi.org/10.3109/09540261.2010.482557

Hansson, L., Muus, S., Saarento, O., Vinding, H. R., Göstas, G., Sandlund, M., Zandrén, T., & Öiesvold, T. (1999). The Nordic comparative study on sectorized psychiatry: Rates of compulsory care and use of compulsory admissions during a 1-year follow-up. *Social Psychiatry and Psychiatric Epidemiology*, *34*(2), 99–104. https://doi.org/10.1007/s001270050118

Hatling, T., Krogen, T., & Ulleberg, P. (2002). Compulsory admissions to psychiatric hospitals in norway—International comparisons and regional variations. *Journal of Mental Health*, *11*(6), 623–634. https://doi.org/10.1080/09638230021000058184

Hauschildt, K., Vögtle, E. M., & Gwosc, C. (2018). *Social and Economic Conditions of Student Life in Europe: Synopsis of indicators-Final report-Eurostudent VI 2016-2018*. W. Bertelsmann Verlag. https://www.eurostudent.eu/download_files/documents/EUROSTUDENT_VI_Synopsis_of_Indicators.pdf/

Haussleiter, I. S., Lehmann, I., Ueberberg, B., Heinz, J., Zielasek, J., Gouzoulis-Mayfrank, E., & Juckel, G. (2022). Homelessness among psychiatric inpatients in North Rhine-Westphalia: A retrospective routine data analysis. *BMC Psychiatry*, *22*(1), 132. https://doi.org/10.1186/s12888-022-03786-6

Hawkins, J. S., & Emanuel, E. J. (2005). Clarifying Confusions about Coercion. *The Hastings Center Report*, *35*(5), 16–19. https://doi.org/10.2307/3528329

Lov om spesialisthelsetjenesten [Act relating to specialist health services], LOV-1999-07-02-61 (1999). https://lovdata.no/dokument/NL/lov/1999-07-02-61

Forskrift om prioritering av helsetjenester, rett til nødvendig helsehjelp fra spesialisthelsetjenesten, rett til behandling i utlandet og om klagenemnd [Regulation on prioritisation of health services, right to necessary health care from specialist services, right to treatment abroad and about complaints tribunal], FOR-2000-12-01-1208 (2000). https://lovdata.no/dokument/SF/forskrift/2000-12-01-1208

Helse- og omsorgsdepartementet. (2012). *Bedre kvalitet—Økt frivillighet. Nasjonal strategi for økt frivillighet i psykiske helsetjenester (2012-2015) [Better quality—Increased voluntariness. National strategy for increased voluntariness in mental health services (2012-2015)]*. Helse- og omsorgsdepartementet. http://www.regjeringen.no/upload/hod/bedrekvalitet-okt_frivillighet.pdf

Proposition to the Storting (draft resolution), no. Prop. 1 S HOD (2016–2017) (2016). https://www.regjeringen.no/no/dokumenter/prop.-1-s-hod-20162017/id2513924/

Hem, M. H., Gjerberg, E., Husum, T. L., & Pedersen, R. (2018). Ethical challenges when using coercion in mental healthcare: A systematic literature review. *Nursing Ethics*, *25*(1), 92–110. https://doi.org/10.1177/0969733016629770

Herrman, H., Allan, J., Galderisi, S., Javed, A., Rodrigues, M., & Care, the W. T. F. on I. A. to C. in M. H. (2022). Alternatives to coercion in mental health care: WPA Position Statement and Call to Action. *World Psychiatry*, *21*(1), 159–160. https://doi.org/10.1002/wps.20950

Hoff, P. (2019). Compulsory Interventions Are Challenging the Identity of Psychiatry. *Frontiers in Psychiatry*, *10*. https://www.frontiersin.org/article/10.3389/fpsyt.2019.00783

Hofmann, B. (2020). Biases distorting priority setting. *Health Policy*, *124*(1), 52–60. https://doi.org/10.1016/j.healthpol.2019.11.010

Hofstad, T., Rugkåsa, J., Ose, S. O., Nyttingnes, O., & Husum, T. L. (2021). Measuring the level of compulsory hospitalisation in mental health care: The performance of different measures across areas and over time. *International Journal of Methods in Psychiatric Research*, e1881. https://doi.org/10.1002/mpr.1881

Hofstad, T., Rugkåsa, J., Ose, S. O., Nyttingnes, O., Kjus, S. H. H., & Husum, T. L. (2021). Service Characteristics and Geographical Variation in Compulsory Hospitalisation: An Exploratory Random Effects Within–Between Analysis of Norwegian Municipalities, 2015–2018. *Frontiers in Psychiatry*, *12*. https://www.frontiersin.org/article/10.3389/fpsyt.2021.737698

Holley, H. L. (1998). Geography and mental health: A review. *Social Psychiatry and Psychiatric Epidemiology*, *33*(11), 535–542. https://doi.org/10.1007/s001270050091

Holm, S. (1995). Not just autonomy—The principles of American biomedical ethics. *Journal of Medical Ethics*, *21*(6), 332–338. https://doi.org/10.1136/jme.21.6.332

Holm, S. (2022). What is the Foundation of Medical Ethics—Common Morality, Professional Norms, or Moral Philosophy? *Cambridge Quarterly of Healthcare Ethics*, *31*(2), 192–198. https://doi.org/10.1017/S0963180121000591

Holum, L. C. (2012). "Individual plan" in a user-oriented and empowering perspective: A qualitative study of "individual plans" in Norwegian mental health services. *Nordic Psychology*, *64*(1), 44–57. https://doi.org/10.1080/19012276.2012.693725

Howard, A. L. (2015). Leveraging Time-Varying Covariates to Test Within- and Between-Person Effects and Interactions in the Multilevel Linear Model. *Emerging Adulthood*, *3*(6), 400–412. https://doi.org/10.1177/2167696815592726

Howe, E. (2013). Five Ethical and Clinical Challenges Psychiatrists May Face When Treating Patients with Borderline Personality Disorder Who Are or May Become Suicidal. *Innovations in Clinical Neuroscience*, *10*(1), 14–19.

Høyer, G. (2000). On the justification for civil commitment. *Acta Psychiatrica Scandinavica*, *101*(399), 65–71. https://doi.org/10.1111/j.0902-4441.2000.007s020[dash]16.x

Høyer, G. (2008). Involuntary hospitalization in contemporary mental health care. Some (still) unanswered questions. *Journal of Mental Health*, *17*(3), 281–292. https://doi.org/10.1080/09638230802156723

Høyer, G., Kjellin, L., Engberg, M., Kaltiala-Heino, R., Nilstun, T., Sigurjónsdóttir, M., & Syse, A. (2002). Paternalism and autonomy: A presentation of a Nordic study on the use of coercion in the mental health care system. *International Journal of Law and Psychiatry*, *25*(2), 93–108. https://doi.org/10.1016/S0160-2527(01)00108-X

Huckshorn, K. A. (2006). Re-Designing State Mental Health Policy to Prevent the Use of Seclusion and Restraint. *Administration and Policy in Mental Health and Mental Health Services Research*, *33*(4), 482–491. https://doi.org/10.1007/s10488-005-0011-5

Huitfeldt, A. (2016). Is caviar a risk factor for being a millionaire? *BMJ*, *355*, i6536. https://doi.org/10.1136/bmj.i6536

Human Development Index. (2021). United Nations. http://hdr.undp.org/en/countries

Huntington-Klein, N. (2021). *The Effect: An Introduction to Research Design and Causality | The Effect*. https://theeffectbook.net/index.html

Huque, M. H., Moreno-Betancur, M., Quartagno, M., Simpson, J. A., Carlin, J. B., & Lee, K. J. (2020). Multiple imputation methods for handling incomplete longitudinal and clustered data where the target analysis is a linear mixed effects model. *Biometrical Journal*, *62*(2), 444–466. https://doi.org/10.1002/bimj.201900051

Huseby, B., Pedersen, P. B., Mjelde, A., & Huus, G. (2015). *Internasjonalt perspektiv på psykisk helse og helsetjenester til mennesker med psykiske lidelser [International perspective on mental health and health services for persons with mental illness]* (IS-2314). Helsedirektoratet. https://www.helsedirektoratet.no/rapporter/internasjonalt-perspektiv-pa-psykisk-helse-og-helsetjenester-til-mennesker-med-psykiske-lidelser

Hustoft, K., Larsen, T. K., Auestad, B., Joa, I., Johannessen, J. O., & Ruud, T. (2013). Predictors of involuntary hospitalizations to acute psychiatry. *International Journal of Law and Psychiatry*, *36*(2), 136–143. https://doi.org/10.1016/j.ijlp.2013.01.006

Husum, T. L., Bjørngaard, J. H., Finset, A., & Ruud, T. (2010). A cross-sectional prospective study of seclusion, restraint and involuntary medication in acute psychiatric wards: Patient, staff and ward characteristics. *BMC Health Services Research*, *10*(1), 89. https://doi.org/10.1186/1472-6963-10-89

Hwang, T.-Y., Jung, G., Lee, C.-J., & Kim, H.-Y. (2020). Analysis of involuntary admissions in Korea through the admission management information system. *International Journal of Law and Psychiatry*, *68*, 101542. https://doi.org/10.1016/j.ijlp.2020.101542

Ibáñez, B., Librero, J., Bernal-Delgado, E., Peiró, S., López-Valcarcel, B. G., Martínez, N., & Aizpuru, F. (2009). Is there much variation in variation? Revisiting statistics of small area variation in health services research. *BMC Health Services Research*, *9*, 60. https://doi.org/10.1186/1472-6963-9-60

Indu, N. V., Vidhukumar, K., & Sarma, P. S. (2018). Determinants of compulsory admissions in a state psychiatric hospital-Case control study. *Asian Journal of Psychiatry*, *35*, 141–145. https://doi.org/10.1016/j.ajp.2016.11.007

Inglehart, R. (2006). Mapping global values. *Comparative Sociology*, *5*(2–3), 115–136. https://doi.org/10.1163/156913306778667401

Iversen, K. I., Høyer, G., & Sexton, H. C. (2009). Rates for civil commitment to psychiatric hospitals in Norway. Are registry data accurate? *Nordic Journal of Psychiatry*, *63*(4), 301–307. https://doi.org/10.1080/08039480902730607

Iversen, K. I., Høyer, G., Sexton, H., & Grønli, O. K. (2002). Perceived coercion among patients admitted to acute wards in Norway. *Nordic Journal of Psychiatry*, *56*(6), 433–439. https://doi.org/10.1080/08039480260389352

Iversen, V. C., & Morken, G. (2003). Acute admissions among immigrants and asylum seekers to a psychiatric hospital in Norway. *Social Psychiatry and Psychiatric Epidemiology*, *38*(9), 515–519. https://doi.org/10.1007/s00127-003-0664-x

Jacobson, N., & Curtis, L. (2000). Recovery as policy in mental health services: Strategies emerging from the states. *Psychiatric Rehabilitation Journal*, *23*(4), 333–341. https://doi.org/10.1037/h0095146

Jaeger, S., Pfiffner, C., Weiser, P., Längle, G., Croissant, D., Schepp, W., Kilian, R., Becker, T., Eschweiler, G., & Steinert, T. (2013). Long-term effects of involuntary hospitalization on medication adherence, treatment engagement and perception of coercion. *Social Psychiatry and Psychiatric Epidemiology*, *48*(11), 1787–1796. https://doi.org/10.1007/s00127-013-0687-x

Jardim, P. S. J. (2021). *Effekt av antipsykotika ved behandling uten pasientens samtykke sammenlignet med frivillig behandling [The effect of involuntary treatment with antipsychotic medication: A systematic review]* (p. 51) [Systematic Review]. Folkehelseinstituttet. https://fhi.brage.unit.no/fhi-xmlui/bitstream/handle/11250/2756756/Jardim-2021-Eff.pdf?sequence=1

Jarrett, M., Bowers, L., & Simpson, A. (2008). Coerced medication in psychiatric inpatient care: Literature review. *Journal of Advanced Nursing*, *64*(6), 538–548. https://doi.org/10.1111/j.1365-2648.2008.04832.x

Jensen-Dahm, C., Zakarias, J. K., Gasse, C., & Waldemar, G. (2019). Geographical Variation in Opioid Use in Elderly Patients with Dementia: A Nationwide Study. *Journal of Alzheimer's Disease: JAD*, *70*(4), 1209–1216. https://doi.org/10.3233/JAD-190413

Jones, A., Hannigan, B., Coffey, M., & Simpson, A. (2018). Traditions of research in community mental health care planning and care coordination: A systematic meta-narrative review of the literature. *PLOS ONE*, *13*(6), e0198427. https://doi.org/10.1371/journal.pone.0198427

Kallert, T. W., Glöckner, M., & Schützwohl, M. (2008). Involuntary vs. voluntary hospital admission: A systematic literature review on outcome diversity. *European Archives of Psychiatry and Clinical Neuroscience*, *258*(4), 195–209. https://doi.org/10.1007/s00406-007-0777-4

Kallert, T. W., Katsakou, C., Adamowski, T., Dembinskas, A., Fiorillo, A., Kjellin, L., Mastrogianni, A., Nawka, P., Onchev, G., Raboch, J., Schützwohl, M., Solomon, Z., Torres-González, F., Bremner, S., & Priebe, S. (2011). Coerced hospital admission and symptom change—A prospective observational multi-centre study. *PloS One*, *6*(11), e28191. https://doi.org/10.1371/journal.pone.0028191

Karasch, O., Schmitz-Buhl, M., Mennicken, R., Zielasek, J., & Gouzoulis-Mayfrank, E. (2020). Identification of risk factors for involuntary psychiatric hospitalization: Using environmental socioeconomic data and methods of machine learning to improve prediction. *BMC Psychiatry*, *20*. https://doi.org/10.1186/s12888-020-02803-w

Karlsson, P., Helgesson, G., Titelman, D., Sjöstrand, M., & Juth, N. (2018). Skepticism towards the Swedish vision zero for suicide: Interviews with 12 psychiatrists. *BMC Medical Ethics*, *19*(1), 26. https://doi.org/10.1186/s12910-018-0265-6

Katsakou, C., & Priebe, S. (2006). Outcomes of involuntary hospital admission – a review. *Acta Psychiatrica Scandinavica*, *114*(4), 232–241. https://doi.org/10.1111/j.1600-0447.2006.00823.x

Katsakou, C., & Priebe, S. (2007). Patient's experiences of involuntary hospital admission and treatment: A review of qualitative studies. *Epidemiology and Psychiatric Sciences*, *16*(2), 172–178. https://doi.org/10.1017/S1121189X00004802

Keele, L., & Kelly, N. J. (2006). *Dynamic Models for Dynamic Theories: The Ins and Outs of Lagged Dependent Variables*. 20. https://doi.org/10.1093/pan/mpj00

Keet, R., de Vetten-Mc Mahon, M., Shields-Zeeman, L., Ruud, T., van Weeghel, J., Bahler, M., Mulder, C. L., van Zelst, C., Murphy, B., Westen, K., Nas, C., Petrea, I., & Pieters, G. (2019). Recovery for all in the community; position paper on principles and key elements of community-based mental health care. *BMC Psychiatry*, *19*(1), 174. https://doi.org/10.1186/s12888-019-2162-z

Keown, P., McBride, O., Twigg, L., Crepaz-Keay, D., Cyhlarova, E., Parsons, H., Scott, J., Bhui, K., & Weich, S. (2016). Rates of voluntary and compulsory psychiatric in-patient treatment in England: An ecological study investigating associations with deprivation and demographics. *British Journal of Psychiatry*, *209*(2), 157–161. https://doi.org/10.1192/bjp.bp.115.171009

Keown, P., Weich, S., Bhui, K. S., & Scott, J. (2011). Association between provision of mental illness beds and rate of involuntary admissions in the NHS in England 1988-2008: Ecological study. *BMJ*, *343*. https://doi.org/10.1136/bmj.d3736

Killaspy, H., Harvey, C., Brasier, C., Brophy, L., Ennals, P., Fletcher, J., & Hamilton, B. (2022). Community-based social interventions for people with severe mental illness: A systematic review and narrative synthesis of recent evidence. *World Psychiatry*, *21*(1), 96–123. https://doi.org/10.1002/wps.20940

Kisely, S. R., Campbell, L. A., & O'Reilly, R. (2017). Compulsory community and involuntary outpatient treatment for people with severe mental disorders. *The Cochrane Database of Systematic Reviews*, *3*, CD004408. https://doi.org/10.1002/14651858.CD004408.pub5

Kishimoto, T., Hagi, K., Nitta, M., Kane, J. M., & Correll, C. U. (2019). Long-term effectiveness of oral second-generation antipsychotics in patients with schizophrenia and related disorders: A systematic review and meta-analysis of direct head-to-head comparisons. *World Psychiatry*, *18*(2), 208–224. https://doi.org/10.1002/wps.20632

Kjellin, L. (1997). Compulsory psychiatric care in Sweden 1979–1993. *Social Psychiatry and Psychiatric Epidemiology*, *32*(2), 90–96. https://doi.org/10.1007/BF00788926

Kjellin, L., Andersson, K., Candefjord, I.-L., Palmstierna, T., & Wallsten, T. (1997). Ethical benefits and costs of coercion in short-term inpatient psychiatric care. *Psychiatric Services*, *48*(12), 1567–1570. https://doi.org/10.1176/ps.48.12.1567

Kjellin, L., Candefjord, I.-L., Machl, M., Westrin, C.-G., Eriksson, K., Ekblom, B., Ängfors, G., Axelsson-Östman, M., & Östman, O. (1993). Coercion in psychiatric care: Problems of medical ethics in a comprehensive empirical study. *Behavioral Sciences & the Law*, *11*(3), 323–334. https://doi.org/10.1002/bsl.2370110309

Kjellin, L., Høyer, G., Engberg, M., Kaltiala-Heino, R., & Sigurjónsdóttir, M. (2006). Differences in perceived coercion at admission to psychiatric hospitals in the Nordic countries. *Social Psychiatry and Psychiatric Epidemiology*, *41*(3), 241–247. https://doi.org/10.1007/s00127-005-0024-0

Kleinert, S., & Horton, R. (2017). From universal health coverage to right care for health. *The Lancet*, *390*(10090), 101–102. https://doi.org/10.1016/S0140-6736(16)32588-0

Kokkonen, P. (1993). Coercion and Legal Protection in Psychiatric Care in Finland. *Medicine and Law*, *12*(1), 113–124.

Kuhns, J. B., Exum, M. L., Clodfelter, T. A., & Bottia, M. C. (2014). The Prevalence of Alcohol-Involved Homicide Offending: A Meta-Analytic Review. *Homicide Studies*, *18*(3), 251–270. https://doi.org/10.1177/1088767913493629

Kumar, M. T. (2018). Mental Healthcare Act 2017: Liberal in Principles, Let Down in Provisions. *Indian Journal of Psychological Medicine*, *40*(2), 101–107. https://doi.org/10.4103/IJPSYM.IJPSYM_23_18

Landheim, A., & Odden, S. (2020). *Evaluering av FACT-team i Norge – Sluttrapport [Evaluation of FACT-teams in Norway—Final report]*. Nasjonal kompetansetjeneste for samtidig rusmisbruk og psykisk lidelse (NKROP), Sykehuset Innlandet HF. https://rop.no/contentassets/d4f50ab571e84e24a9bd879ae14a9690/evaluering-av-fact-team-i-norge_sluttrapport_nasjonal-kompetansetjeneste-for-samtidig-rusmisbruk-og-psykisk-lidelse-nkrop.pdf

Large, M., Smith, G., & Nielssen, O. (2009). The relationship between the rate of homicide by those with schizophrenia and the overall homicide rate: A systematic review and meta-analysis. *Schizophrenia Research*, *112*(1), 123–129. https://doi.org/10.1016/j.schres.2009.04.004

Lash, T. L., Rothman, K. J., VanderWeele, T. J., & Haneuse, S. (2020). *Modern Epidemiology*. Wolters Kluwer.

Lauber, C., Lay, B., & Rössler, W. (2005). Homelessness among people with severe mental illness in Switzerland. *Swiss Medical Weekly*, *135*(3–4), 50–56. https://doi.org/2005/03/smw-10815

Leamy, M., Bird, V., Boutillier, C. L., Williams, J., & Slade, M. (2011). Conceptual framework for personal recovery in mental health: Systematic review and narrative synthesis. *The British Journal of Psychiatry*, *199*(6), 445–452. https://doi.org/10.1192/bjp.bp.110.083733

Lebenbaum, M., Chiu, M., Vigod, S., & Kurdyak, P. (2018). Prevalence and predictors of involuntary psychiatric hospital admissions in Ontario, Canada: A population-based linked administrative database study. *BJPsych Open*, *4*(2), 31–38. https://doi.org/10.1192/bjo.2017.4

Lee, G., & Cohen, D. (2020). Incidences of Involuntary Psychiatric Detentions in 25 U.S. States. *Psychiatric Services*, appi.ps.2019004. https://doi.org/10.1176/appi.ps.201900477

Lenz, G. S., & Sahn, A. (2021). Achieving Statistical Significance with Control Variables and Without Transparency. *Political Analysis*, *29*(3), 356–369. https://doi.org/10.1017/pan.2020.31

Leszczensky, L., & Wolbring, T. (2019). How to Deal With Reverse Causality Using Panel Data? Recommendations for Researchers Based on a Simulation Study. *Sociological Methods & Research*, 0049124119882473. https://doi.org/10.1177/0049124119882473

Light, E., Kerridge, I., Ryan, C., & Robertson, M. (2012). Community treatment orders in Australia: Rates and patterns of use. *Australasian Psychiatry*, *20*(6), 478–482. https://doi.org/10.1177/1039856212466159

Lilleeng, S. E., Pedersen, P. B., & Sitter, M. (2019). *Tjenester i psykisk helsevern og TSB 2014-2018 [Services in mental health care and Interdisciplinary specialised addiction treatment 2014-2018]* (IS-2850). Helsedirektoratet. https://www.helsedirektoratet.no/rapporter/is-2850-tjenester-i-psykisk-helsevern-og-tsb-2014-2018

Lin, E., Or, Z., Coldefy, M., Urbanoski, K., Seitz, D., Carlisle, C., Szatmari, P., & Kurdyak, P. (2016). Medical Practice Variations in Mental Health and Addictions Care. In A. Johnson & T. A. Stukel (Eds.), *Medical Practice Variations* (pp. 161–198). Springer US. https://doi.org/10.1007/978-1-4899-7603-1_78

Lov om kommunale helse- og omsorgstjenester m.m. [Act relating to municipal Health and care services, etc.], no. LOV-2011-06-24-30, Helse- og omsorgsdepartementet [Ministry of Health and Care Services] (2011). https://lovdata.no/dokument/NL/lov/2011-06-24-30

Lov om medisinsk og helsefaglig forskning (helseforskningsloven) [The Act on medical and health research (the Health Research Act)], Helse- og omsorgsdepartementet (2009). https://lovdata.no/dokument/NL/lov/2008-06-20-44#KAPITTEL_4

Lov om sosiale tjenester i arbeids- og velferdsforvaltningen [Act relating to social services in the labour and welfare administration], no. LOV-2009-12-18-131, Arbeids- og inkluderingsdepartementet (2009). https://lovdata.no/dokument/NL/lov/2009-12-18-131

Løvsletten, M., Husum, T. L., Granerud, A., & Haug, E. (2020). Outpatient commitment in mental health services from a municipal view. *International Journal of Law and Psychiatry*, *69*, 101550. https://doi.org/10.1016/j.ijlp.2020.101550

Luciano, M., Sampogna, G., Del Vecchio, V., Pingani, L., Palumbo, C., De Rosa, C., Catapano, F., & Fiorillo, A. (2014). Use of coercive measures in mental health practice and its impact on outcome: A critical review. *Expert Review of Neurotherapeutics*, *14*(2), 131–141. https://doi.org/10.1586/14737175.2014.874286

Ludvigsson, J. F., Håberg, S. E., Knudsen, G. P., Lafolie, P., Zoega, H., Sarkkola, C., Kraemer, S. von, Weiderpass, E., & Nørgaard, M. (2015). Ethical aspects of registry-based research in the Nordic countries. *Clinical Epidemiology*, *7*, 491–508. https://doi.org/10.2147/CLEP.S90589

Lundahl, A., Helgesson, G., & Juth, N. (2018). Psychiatrists' motives for practising in-patient compulsory care of patients with borderline personality disorder (BPD). *International Journal of Law and Psychiatry*, *58*, 63–71. https://doi.org/10.1016/j.ijlp.2018.03.005

Lundahl, A., Hellqvist, J., Helgesson, G., & Juth, N. (2021). Psychiatrists' motives for compulsory care of patients with borderline personality disorder – a questionnaire study. *Clinical Ethics*, 14777509211040190. https://doi.org/10.1177/14777509211040190

Macklin, R. (2022). Another Defense of Common Morality. *Cambridge Quarterly of Healthcare Ethics*, *31*(2), 177–184. https://doi.org/10.1017/S0963180121000578

Madianos, M. G., Zacharakis, C., Tsitsa, C., & Stefanis, C. (1999). Geographical variation in mental hospital discharges in Greece and socioeconomic correlates: A nationwide study (1978–1993). *Social Psychiatry and Psychiatric Epidemiology*, *34*(9), 477–483. https://doi.org/10.1007/s001270050223

Madsen, K. B., Ersbøll, A. K., Olsen, J., Parner, E., & Obel, C. (2015). Geographic analysis of the variation in the incidence of ADHD in a country with free access to healthcare: A Danish cohort study. *International Journal of Health Geographics*, *14*(1), 24. https://doi.org/10.1186/s12942-015-0018-4

Mahdanian, A. A., Laporta, M., Drew Bold, N., Funk, M., & Puras, D. (2022). Human rights in mental healthcare; A review of current global situation. *International Review of Psychiatry*, 1–13. https://doi.org/10.1080/09540261.2022.2027348

Mahomed, F., Stein, M. A., & Patel, V. (2018). Involuntary mental health treatment in the era of the United Nations Convention on the Rights of Persons with Disabilities. *PLoS Medicine*, *15*(10), e1002679. https://doi.org/10.1371/journal.pmed.1002679

Maskell, G. (2018). Think before you scan. *BMJ*, *362*, k3754. https://doi.org/10.1136/bmj.k3754

Matthews, E. (2000). Autonomy and the Psychiatric Patient. *Journal of Applied Philosophy*, *17*(1), 59–70. https://doi.org/10.1111/1468-5930.00140

Matuschek, H., Kliegl, R., Vasishth, S., Baayen, H., & Bates, D. (2017). Balancing Type I error and power in linear mixed models. *Journal of Memory and Language*, *94*, 305–315. https://doi.org/10.1016/j.jml.2017.01.001

McEvoy, J. P., Applebaum, P. S., Apperson, L. J., Geller, J. L., & Freter, S. (1989). Why must some schizophrenic patients be involuntarily committed? The role of insight. *Comprehensive Psychiatry*, *30*(1), 13–17. https://doi.org/10.1016/0010-440x(89)90113-2

McGarvey, E. L., Leon-Verdin, M., Wanchek, T. N., & Bonnie, R. J. (2013). Decisions to Initiate Involuntary Commitment: The Role of Intensive Community Services and Other Factors. *Psychiatric Services*, *64*(2), 120–126. https://doi.org/10.1176/appi.ps.000692012

McKeown, A., Mortimer, R., Manzini, A., & Singh, I. (2019). Is coercion ever beneficent? Public health ethics in early intervention and prevention for mental health. In K. Cratsley & J. Radden (Eds.), *Developments in Neuroethics and Bioethics* (Vol. 2, pp. 45–68). Academic Press. https://doi.org/10.1016/bs.dnb.2019.04.004

McPherson, K., Gon, G., & Scott, M. (2013). *International Variations in a Selected Number of Surgical Procedures*. OECD. https://doi.org/10.1787/5k49h4p5g9mw-en

McPherson, K., Wennberg, J. E., Hovind, O. B., & Clifford, P. (1982). Small-Area Variations in the Use of Common Surgical Procedures: An International Comparison of New England, England, and Norway. *The New England Journal of Medicine; Boston*, *307*(21), 1310–1314. http://dx.doi.org.ezproxy.uio.no/10.1056/NEJM198211183072104

The Mental Health Care Act of July 2 1999 No. 62 with amendments of Jan 1 2007, 18 (1999) (testimony of Ministry of health and care services). https://app.uio.no/ub/ujur/oversatte-lover/data/lov-19990702-062-eng.pdf

Morgan, S. L., & Winship, C. (2015). *Counterfactuals and causal inference*. Cambridge University Press.

Mundlak, Y. (1978). On the Pooling of Time Series and Cross Section Data. *Econometrica*, *46*(1), 69–85. https://www.jstor.org/stable/1913646

Munk-Jørgensen, P. (1999). Has deinstitutionalization gone too far? *European Archives of Psychiatry and Clinical Neuroscience*, *249*(3), 136–143. https://doi.org/10.1007/s004060050078

Murphy, M. E., Bennett, K., Fahey, T., & Smith, S. M. (2017). Geographical variation in anti-diabetic prescribing in Ireland in 2013 and 2014: A cross-sectional analysis. *Family Practice*, *34*(5), 587–592. https://doi.org/10.1093/fampra/cmx036

Myklebust, L. H., Sørgaard, K., & Wynn, R. (2014). Local psychiatric beds appear to decrease the use of involuntary admission: A case-registry study. *BMC Health Services Research*, *14*(1), 64. https://doi.org/10.1186/1472-6963-14-64

Mykletun, A., Widding-Havneraas, T., Chaulagain, A., Lyhmann, I., Bjelland, I., Halmøy, A., Elwert, F., Butterworth, P., Markussen, S., Zachrisson, H. D., & Rypdal, K. (2021). Causal modelling of variation in clinical practice and long-term outcomes of ADHD using Norwegian registry data: The ADHD controversy project. *BMJ Open*, *11*(1), e041698. https://doi.org/10.1136/bmjopen-2020-041698

Nakagawa, S., & Schielzeth, H. (2013). A general and simple method for obtaining R2 from generalized linear mixed-effects models. *Methods in Ecology and Evolution*, *4*(2), 133–142. https://doi.org/10.1111/j.2041-210x.2012.00261.x

Ness, E., Steen, O., Reichelt, J. G., & Walby, F. A. (2016). Reduksjon av tvangsinnleggelser fra legevakt [Reduced number of involuntary commitments from an emergency outpatient clinic]. *Tidsskrift for Norsk Psykologforening*, *53*, 624–631.

Neuhaus, J. M., & Kalbfleisch, J. D. (1998). Between- and Within-Cluster Covariate Effects in the Analysis of Clustered Data. *Biometrics*, *54*(2), 638–645. https://doi.org/10.2307/3109770

Neuhaus, J. M., & McCulloch, C. E. (2006). Separating between- and within-cluster covariate effects by using conditional and partitioning methods. *Journal of the Royal Statistical Society: Series B (Statistical Methodology)*, *68*(5), 859–872. https://doi.org/10.1111/j.1467-9868.2006.00570.x

Newton-Howes, G., Kininmonth, L., & Gordon, S. (2020). Substituted Decision Making and Coercion: The Socially Accepted Problem in Psychiatric Practice and a CRPD-Based Response to Them. *International Journal of*

Mental Health and Capacity Law, *26*, 4–12. https://doi.org/10.19164/ijmhcl.26.1091

Newton-Howes, G., & Mullen, R. (2011). Coercion in Psychiatric Care: Systematic Review of Correlates and Themes. *Psychiatric Services*, *62*(5), 465–470. https://doi.org/10.1176/ps.62.5.pss6205_0465

NICE Do not Do prompts. (2013). [SharedLearningArticle]. Nottinghamshire Healthcare NHS Trust. https://www.nice.org.uk/sharedlearning/nice-do-not-do-prompts

Norum, J., Olsen, A., Nybrodahl, I., & Sørgaard, K. W. (2013). Compulsory and voluntary admission in psychiatric hospitals in northern Norway 2009–2010. A national registry-based analysis. *Nordic Journal of Psychiatry*, *67*(1), 47–52. https://doi.org/10.3109/08039488.2012.675589

Norvoll, R. (2011). Kunnskapsstaus med hensyn til skadevirkninger av tvang i det psykiske helsevernet. Utredning for Paulsrudutvalget. [Knowledge status with regard to adverse effects of coercion in the mental health field. Study for the Paulsrud Committee]. *NOU*, *9*. https://www.regjeringen.no/no/dokumenter/nou-2011-9/id647625/?ch=12

Norwegian Labour and Welfare Administration. (2022). *Historisk statistikk om arbeidsmarkedet [Historical statistics on the labour market]*. nav.no. https://www.nav.no/no/nav-og-samfunn/statistikk/arbeidssokere-og-stillinger-statistikk/historisk-statistikk

Novella, E. J. (2010). Mental Health Care in the Aftermath of Deinstitutionalization: A Retrospective and Prospective View. *Health Care Analysis*, *18*(3), 222–238. https://doi.org/10.1007/s10728-009-0138-8

Nyttingnes, O. (2018). *Patients' Experience of Coercion in Mental Health Care* [University of Oslo]. http://urn.nb.no/URN:NBN:no-64278

Nyttingnes, O., & Rugkåsa, J. (2021). The Introduction of Medication-Free Mental Health Services in Norway: An Analysis of the Framing and Impact of Arguments From Different Standpoints. *Frontiers in Psychiatry*, *12*, 685024. https://doi.org/10.3389/fpsyt.2021.685024

O'Brien, A., & Golding, C. (2003). Coercion in Mental Healthcare: The Principle of Least Coercive Care. *Journal of Psychiatric and Mental Health Nursing*, *10*, 167–173. https://doi.org/10.1046/j.1365-2850.2003.00571.x

O'Brien, A. J. (2014). Community treatment orders in New Zealand: Regional variability and international comparisons. *Australasian Psychiatry*, *22*(4), 352–356. https://doi.org/10.1177/1039856214531080

O'Brien, A. J., Kydd, R., & Frampton, C. (2012). Social deprivation and use of mental health legislation in New Zealand. *International Journal of Social Psychiatry*, *58*(6), 581–586. https://doi.org/10.1177/0020764011415339

OECD. (2014). *Geographic Variations in Health Care: What Do We Know and What Can Be Done to Improve Health System Performance?* [Text]. http://www.oecd.ilibrary.org/social-issues-migration-health/geographic-variations-in-health-care_9789264216594-en

Olsen, J. (2011). Register-based research: Some methodological considerations. *Scandinavian Journal of Public Health*, *39*(3), 225–229. https://doi.org/10.1177/1403494811402719

Opjordsmoen, S., Friis, S., Melle, I., Haahr, U., Johannessen, J. O., Larsen, T. K., Røssberg, J. I., Rund, B. R., Simonsen, E., Vaglum, P., & McGlashan, T. H. (2010). A 2-year follow-up of involuntary admission's influence upon adherence and outcome in first-episode psychosis. *Acta Psychiatrica Scandinavica*, *121*(5), 371–376. https://doi.org/10.1111/j.1600-0447.2009.01536.x

O'Reilly, R., Allison, S., & Bastiampiallai, T. (2019). Observed Outcomes: An Approach to Calculate the Optimum Number of Psychiatric Beds. *Administration and Policy in Mental Health and Mental Health Services Research*, *46*(4), 507–517. https://doi.org/10.1007/s10488-018-00917-8

Ose, S. O., Kaspersen, S., Ådnanes, M., Lassemo, E., & Kalseth, J. (2018). *IS 24/8: Kommunalt psykisk helse- og rusarbeid: Årsverk, kompetanse og innhold i tjenestene [Municipal mental health and addiction work: Labour-years, competence and contents of the services]*. Sintef. https://www.sintef.no/prosjekter/2015/kommunalt-psykisk-helse-og-rusarbeid/

Paul-Shaheen, P., Clark, J. D., & Williams, D. (1987). Small Area Analysis: A Review and Analysis of the North American Literature. *Journal of Health Politics, Policy and Law*, *12*(4), 741–809. https://doi.org/10.1215/03616878-12-4-741

Pearl, J. (2009). *Causality*. Cambridge university press.

Perälä, J., Saarni, S. I., Ostamo, A., Pirkola, S., Haukka, J., Härkänen, T., Koskinen, S., Lönnqvist, J., & Suvisaari, J. (2008). Geographic variation and sociodemographic characteristics of psychotic disorders in Finland. *Schizophrenia Research*, *106*(2), 337–347. https://doi.org/10.1016/j.schres.2008.08.017

Pettersen, H., & Lofthus, A.-M. (2018). Brukererfaringer med psykiske helsetjenester. Hva viser oppsummert forskning? [User experience with mental health care. What research shows]. *Tidsskrift for Psykisk Helsearbeid*, *15*(2–03), 112–123. https://doi.org/10.18261/issn.1504-3010-2018-02-03-03

Priebe, S., Katsakou, C., Yeeles, K., Amos, T., Morriss, R., Wang, D., & Wykes, T. (2011). Predictors of clinical and social outcomes following involuntary hospital admission: A prospective observational study. *European Archives of Psychiatry and Clinical Neuroscience*, *261*(5), 377–386. https://doi.org/10.1007/s00406-010-0179-x

Psykisk helsevernloven med kommentarer [The Mental Health Care Act with comments]. (2020). Helsedirektoratet. https://www.helsedirektoratet.no/rundskriv/psykisk-helsevernloven-med-kommentarer

Puras, D., & Gooding, P. (2019). Mental health and human rights in the 21st century. *World Psychiatry*, *18*(1), 42–43. https://doi.org/10.1002/wps.20599

Quirk, A., Lelliott, P., Audini, B., & Buston, K. (2003). Non-clinical and extra-legal influences on decisions about compulsory admission to psychiatric hospital. *Journal of Mental Health*, *12*(2), 119–130. https://doi.org/10.1080/0963823031000103434

Rabben, M. B., & Thomassen, Ø. (2019). Humane treatment versus means of control: Coercive measures in Norwegian high-security psychiatry, 1895–1978. *History of Psychiatry*, *30*(4), 424–442. https://doi.org/10.1177/0957154X19867256

Raboch, J., Kališová, L., Nawka, A., Kitzlerová, E., Onchev, G., Karastergiou, A., Magliano, L., Dembinskas, A., Kiejna, A., Torres-Gonzales, F., Kjellin, L., Priebe, S., & Kallert, T. W. (2010). Use of Coercive Measures During Involuntary Hospitalization: Findings From Ten European Countries. *Psychiatric Services*, *61*(10), 1012–1017. https://doi.org/10.1176/ps.2010.61.10.1012

Rains, L. S., Weich, S., Maddock, C., Smith, S., Keown, P., Crepaz-Keay, D., Singh, S. P., Jones, R., Kirkbride, J., Millett, L., Lyons, N., Branthonne-Foster, S., Johnson, S., & Lloyd-Evans, B. (2020). Understanding increasing rates of psychiatric hospital detentions in England: Development and preliminary testing of an explanatory model. *BJPsych Open*, *6*(5). https://doi.org/10.1192/bjo.2020.64

Reme, S. E., Monstad, K., Fyhn, T., Sveinsdottir, V., Løvvik, C., Lie, S. A., & Øverland, S. N. (2019). A randomized controlled multicenter trial of individual placement and support for patients with moderate-to-severe mental illness. *Scandinavian Journal of Work, Environment and Health*. https://doi.org/10.5271/sjweh.3753

Rhodes, R. (2022). The Uncommon Ethics of the Medical Profession: A Response to My Critics. *Cambridge Quarterly of Healthcare Ethics*, *31*(2), 212–219. https://doi.org/10.1017/S0963180121000670

Riecher-Rössler, A., & Rössler, W. (1993). Compulsory admission of psychiatric patients—An international comparison. *Acta Psychiatrica Scandinavica*, *87*(4), 231–236. https://doi.org/10.1111/j.1600-0447.1993.tb03363.x

Riksrevisjonens kontroll med forvaltningen av statlige selskaper – 2018 [The Office of the Auditor General's control of the management of governmental companies—2018] (Dokument 3:2 (2019-2020)). (2019). Riksrevisjonen. https://www.stortinget.no/no/Saker-og-publikasjoner/Publikasjoner/Dokumentserien/2019-2020/dok3-201920/dok3-201920-002/?lvl=0

Riksrevisjonens undersøkelse av psykiske helsetjenester [The Office of the Auditor General's examination of mental health services] (Dokument 3:13 (2020–2021)). (2021). Riksrevisjonen. https://www.riksrevisjonen.no/rapporter-mappe/no-2020-2021/undersokelse-av-psykiske-helsetjenester/

Roelandt, J.-L., Crétin, A., Askevis-Leherpeux, F., Baucheron, J.-P., Brun-Rousseau, H., Coldefy, M., Daoud, V., Defromont, L., Giordana, J.-Y., Maillard, I., Roguet, J., Saint-Jean, H., Thalassinos, M., Triantafyllou, M., Varomme, S., Béhal, H., Baleige, A., & Duhamel, A. (2017). Compulsory Hospitalization, Severity of Disorders and Territorial Landscape: A French Study. *Global Journal of Health Science*, *9*(12), p64. https://doi.org/10.5539/gjhs.v9n12p64

Rohlfing, I., & Zuber, C. I. (2019). Check Your Truth Conditions! Clarifying the Relationship between Theories of Causation and Social Science Methods for Causal Inference. *Sociological Methods & Research*, 0049124119826156. https://doi.org/10.1177/0049124119826156

Rohrer, J. M., & Murayama, K. (2021). *These are not the effects you are looking for: Causality and the within-/between-person distinction in longitudinal data analysis*. PsyArXiv. https://doi.org/10.31234/osf.io/tg4vj

Rommetvedt, H., & Nødland, S. I. (2020). Samarbeidsavtalene mellom helseforetak og kommuner – før og etter samhandlingsreformen [Coordination Agreements between Norwegian Health Enterprises and Municipalities – before and after the Coordination Reform]. *Tidsskrift for Omsorgsforskning*, *6*(3), 1–17. https://doi.org/10.18261/issn.2387-5984-2020-03-05

Rosling, H., Rönnlund, A. R., & Rosling, O. (2018). *Factfulness: Ten Reasons We're Wrong About the World--and Why Things Are Better Than You Think*. Flatiron Books.

Røtvold, K., & Wynn, R. (2015). Involuntary psychiatric admission: The referring general practitioners' assessment of patients' dangerousness and need for psychiatric hospital treatment. *Nordic Journal of Psychiatry*, *69*(8), 637–642. https://doi.org/10.3109/08039488.2015.1046915

Rugkåsa, J. (2016). Effectiveness of Community Treatment Orders: The International Evidence. *The Canadian Journal of Psychiatry*, *61*(1), 15–24. https://doi.org/10.1177/0706743715620415

Rugkåsa, J. (2017). Why we need to understand service variation in compulsion. *The Lancet Psychiatry*, *4*(8), 577–578. https://doi.org/10.1016/S2215-0366(17)30237-7

Rugkåsa, J., & Burns, T. (2017). Community treatment orders: Are they useful? *BJPsych Advances*, *23*(4), 222–230. https://doi.org/10.1192/apt.bp.115.015743

Ruud, T., Aarre, T. F., Boeskov, B., Husevåg, P. S., Klepp, R., Kristiansen, S. A., & Sandvik, J. (2016). Satisfaction with primary care and mental health care among individuals with severe mental illness in a rural area: A seven-year follow-up study of a clinical cohort. *International Journal of Mental Health Systems*, *10*(1), 33. https://doi.org/10.1186/s13033-016-0064-8

Ruud, T., & Friis, S. (2021). Community-based Mental Health Services in Norway. *Consortium Psychiatricum*, *2*(1), 47–54. https://doi.org/10.17816/CP43

Sagerschnig, S., Nowotny, M., & Ladurner, J. (2017). *Analyse der Unterbringungen nach UbG in Österreich. Berichtsjahre 2014/2015 [Analysis of accommodations according to UbG in Austria. Reporting years 2014/2015]* (p. 100). Bundesministeriums für Gesundheit und Frauen. https://jasmin.goeg.at/262/

Salinsky, E., & Loftis, C. (2007). *Shrinking Inpatient Psychiatric Capacity: Cause for Celebration or Concern?* (Issue Brief No. 823). National Health Policy Forum. https://hsrc.himmelfarb.gwu.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1187&context=sphhs_centers_nhpf

Salize, H. J., & Dressing, H. (2004). Epidemiology of involuntary placement of mentally ill people across the European Union. *British Journal of Psychiatry*, *184*(2), 163–168. https://doi.org/10.1192/bjp.184.2.163

Salize, H. J., Dreßing, H., & Peitz, M. (2002). *Compulsory admission and involuntary treatment of mentally ill patients-legislation and practice in EU-member states* [Project Final Report]. Central Institute of Mental Health

Research. https://ec.europa.eu/health/ph_projects/2000/promotion/fp_promotion_2000_frep_08_en.pdf

Sashidharan, S. P., Mezzina, R., & Puras, D. (2019). Reducing coercion in mental healthcare. *Epidemiology and Psychiatric Sciences*, *28*(6), 605–612. https://doi.org/10.1017/S2045796019000350

Saya, A., Brugnoli, C., Piazzi, G., Liberato, D., Di Ciaccia, G., Niolu, C., & Siracusano, A. (2019). Criteria, Procedures, and Future Prospects of Involuntary Treatment in Psychiatry Around the World: A Narrative Review. *Frontiers in Psychiatry*, *10*. https://doi.org/10.3389/fpsyt.2019.00271

Schmidt, M., Schmidt, S. A. J., Adelborg, K., Sundbøll, J., Laugesen, K., Ehrenstein, V., & Sørensen, H. T. (2019). The Danish health care system and epidemiological research: From health care contacts to database records. *Clinical Epidemiology*, *11*, 563–591. https://doi.org/10.2147/CLEP.S179083

Schuler, D., Tuch, A., & Peter, C. (2018). *Placements en établissement psychiatrique à des fins d'assistance [Placements in psychiatric institutions for assistance purposes]*. Observatoire suisse de la santé (Obsan). https://www.obsan.admin.ch/fr/publications/2018-placements-en-etablissement-psychiatrique-des-fins-dassistance

Schunck, R. (2013). Within and between Estimates in Random-Effects Models: Advantages and Drawbacks of Correlated Random Effects and Hybrid Models. *The Stata Journal*, *13*(1), 65–76. https://doi.org/10.1177/1536867X1301300105

Schunck, R., & Perales, F. (2017). Within- and Between-cluster Effects in Generalized Linear Mixed Models: A Discussion of Approaches and the Xthybrid command. *The Stata Journal*, *17*(1), 89–115. https://doi.org/10.1177/1536867X1701700106

Scully, P. J., Owens, J. M., Kinsella, A., & Waddington, J. L. (2004). Schizophrenia, schizoaffective and bipolar disorder within an epidemiologically complete, homogeneous population in rural Ireland: Small area variation in rate. *Schizophrenia Research*, *67*(2), 143–155. https://doi.org/10.1016/S0920-9964(03)00194-4

Seed, T., Fox, J. R. E., & Berry, K. (2016). The experience of involuntary detention in acute psychiatric care. A review and synthesis of qualitative studies. *International Journal of Nursing Studies*, *61*, 82–94. https://doi.org/10.1016/j.ijnurstu.2016.05.014

Seo, M. K., Kim, S. H., & Rhee, M. (2013). The impact of coercion on treatment outcome: One-year follow-up survey. *International Journal of Psychiatry in Medicine*, *45*(3), 279–298. https://doi.org/10.2190/PM.45.3.g

Series, L. (2015). Relationships, autonomy and legal capacity: Mental capacity and support paradigms. *International Journal of Law and Psychiatry*, *40*, 80–91. https://doi.org/10.1016/j.ijlp.2015.04.010

Sharpe, V. A. (Virginia A. (1997). The Politics, Economics, and Ethics of 'Appropriateness'. *Kennedy Institute of Ethics Journal*, *7*(4), 337–343. https://doi.org/10.1353/ken.1997.0039

Sheridan Rains, L., Zenina, T., Dias, M. C., Jones, R., Jeffreys, S., Branthonne-Foster, S., Lloyd-Evans, B., & Johnson, S. (2019). Variations in patterns of involuntary hospitalisation and in legal frameworks: An international comparative study. *The Lancet Psychiatry*, *6*(5), 403–417. https://doi.org/10.1016/S2215-0366(19)30090-2

Sigurjónsdóttir, M. (2021). For få døgnplasser til psykisk syke [Not enough beds for mentally ill]. *Tidsskrift for Den norske legeforening*. https://doi.org/10.4045/tidsskr.21.0448

Sjöstrand, M., & Helgesson, G. (2008). Coercive treatment and autonomy in psychiatry. *Bioethics*, *22*(2), 113–120. https://doi.org/10.1111/j.1467-8519.2007.00610.x

Slade, M., Amering, M., Farkas, M., Hamilton, B., O'Hagan, M., Panther, G., Perkins, R., Shepherd, G., Tse, S., & Whitley, R. (2014). Uses and abuses of recovery: Implementing recovery-oriented practices in mental health systems. *World Psychiatry*, *13*(1), 12–20. https://doi.org/10.1002/wps.20084

Slade, M., Leamy, M., Bacon, F., Janosik, M., Boutillier, C. L., Williams, J., & Bird, V. (2012). International differences in understanding recovery: Systematic review. *Epidemiology and Psychiatric Sciences*, *21*(4), 353–364. https://doi.org/10.1017/S2045796012000133

Solbakk, J. H. (2011). Vulnerability: A futile or useful principle in healthcare ethics. *The SAGE Handbook of Health Care Ethics. London: SAGE*, 228–238. https://dx.doi.org/10.4135/9781446200971.n20

Sosial- og Helsedirektoratet. (2006). *Tiltaksplan for redusert og kvalitetssikret bruk av tvang [Action-plan for reduced and quality assured use of coercion]* (IS-1370). Sosial- og Helsedirektoratet. http://www.sintef.no/upload/Helse/Psykisk%20helse/Pdf-filer/Tiltaksplan_for_redusert_og_kvalitetssikret_bruk_av_tvang_i_psykisk_helsevern.pdf

Statistics Norway. (2012, June). *Hvor bor egentlig studentene? [Where do students really reside?]*. ssb.no. https://www.ssb.no/befolkning/statistikker/fobhoved/hvert-10-aar/2012-06-21

Statistics Norway. (2022a). *03814: Students in higher education in Norway. Sex and college municipality*. SSB. https://www.ssb.no/en/statbank/table/03814

Statistics Norway. (2022b). *07459: Population, by sex and one-year age groups (M) 1986 - 2021-PX-Web SSB*. SSB. https://www.ssb.no/en/statbank/table/07459

Statistics Norway. (2022c). *09218: Resident students in higher education in Norway and abroad, in per cent of registered cohort.* SSB. https://www.ssb.no/en/statbank/table/09218

Statistics Norway. (2022d). *11093: Crowded dwelling. Households (M) (UD) 2015 - 2020*. SSB. https://www.ssb.no/en/statbank/table/11093

Statistics Norway. (2022e). *11924: Care services - man-years, by education (M) 2015 - 2020*. SSB. https://www.ssb.no/en/statbank/table/11924

Statistics Norway. (2022f). *11996: Man-years for physicians in the municipal health and care services, by wage agreements and function (M) 2015 - 2020*. SSB. https://www.ssb.no/en/statbank/table/11996

Statistics Norway. (2022g). *12008: Municipal disposed dwellings*. SSB. https://www.ssb.no/en/statbank/table/12008/

Statistikdatabaser—Psykiatrisk tvångsvård [Statistics databases—Compulsory psychiatric care]. (2021). Statistikdatabas För Psykiatrisk Tvångsvård. https://sdb.socialstyrelsen.se/if_tvangsvard/val.aspx

Stegenga, J. (2015). Measuring effectiveness. *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences*, *54*, 62–71. https://doi.org/10.1016/j.shpsc.2015.06.003

Steinert, T., Martin, V., Baur, M., Bohnet, U., Goebel, R., Hermelink, G., Kronstorfer, R., Kuster, W., Martinez-Funk, B., Roser, M., Schwink, A., & Voigtländer, W. (2007). Diagnosis-related frequency of compulsory measures in 10 German psychiatric hospitals and correlates with hospital characteristics. *Social Psychiatry and Psychiatric Epidemiology*, *42*(2), 140–145. https://doi.org/10.1007/s00127-006-0137-0

Storvik, M. (2017). *Rettslig vern av pasienters integritet i psykisk helsevern [Legal protection of patients' integrity in mental health care]: Vol. PhD i rettvitenskap*. Universitetet i Tromsø.

Strand, N. (2011). *Lagarbeid – ikke profesjonsmakt – gir resultater [Team work—Not professional power—Gives results]*. https://psykologtidsskriftet.no/reportasje/2011/11/lagarbeid-ikke-profesjonsmakt-gir-resultater

Stylianidis, S., Peppou, L. E., Drakonakis, N., Douzenis, A., Panagou, A., Tsikou, K., Pantazi, A., Rizavas, Y., & Saraceno, B. (2017). Mental health care in Athens: Are compulsory admissions in Greece a one-way road? *International Journal of Law and Psychiatry*, *52*, 28–34. https://doi.org/10.1016/j.ijlp.2017.04.001

Sutherland, K., & Levesque, J.-F. (2020). Unwarranted clinical variation in health care: Definitions and proposal of an analytic framework. *Journal of Evaluation in Clinical Practice*, *26*(3), 687–696. https://doi.org/10.1111/jep.13181

Svindseth, M. F., Dahl, A. A., & Hatling, T. (2007). Patients' experience of humiliation in the admission process to acute psychiatric wards. *Nordic Journal of Psychiatry*, *61*(1), 47–53. https://doi.org/10.1080/08039480601129382

Svindseth, M. F., Nøttestad, J. A., & Dahl, A. A. (2010). A study of outcome in patients treated at a psychiatric emergency unit. *Nordic Journal of Psychiatry*, *64*(6), 363–371. https://doi.org/10.3109/08039481003690273

Szmukler, G. (2019). "Capacity", "best interests", "will and preferences" and the UN Convention on the Rights of Persons with Disabilities. *World Psychiatry*, *18*(1), 34–41. https://doi.org/10.1002/wps.20584

Szmukler, G., & Appelbaum, P. S. (2008). Treatment pressures, leverage, coercion, and compulsion in mental health care. *Journal of Mental Health*, *17*(3), 233–244. https://doi.org/10.1080/09638230802052203

Szmukler, G., & Holloway, F. (1998). Mental health legislation is now a harmful anachronism. *Psychiatric Bulletin*, *22*(11), 662–665. https://doi.org/10.1192/pb.22.11.662

Taylor, T. L., Killaspy, H., Wright, C., Turton, P., White, S., Kallert, T. W., Schuster, M., Cervilla, J. A., Brangier, P., Raboch, J., Kališová, L., Onchev, G., Dimitrov, H., Mezzina, R., Wolf, K., Wiersma, D., Visser, E., Kiejna, A., Piotrowski, P., … King, M. B. (2009). A systematic review of the international published literature relating to quality of institutional care for people with longer term mental health problems. *BMC Psychiatry*, *9*(1), 55. https://doi.org/10.1186/1471-244X-9-55

Testa, M., & West, S. G. (2010). Civil Commitment in the United States. *Psychiatry (Edgmont)*, *7*(10), 30–40.

Textor, J., van der Zander, B., Gilthorpe, M. S., Liśkiewicz, M., & Ellison, G. T. (2016). Robust causal inference using directed acyclic graphs: The R package 'dagitty'. *International Journal of Epidemiology*, *45*(6), 1887–1894. https://doi.org/10.1093/ije/dyw341

The Finnish Institute for Health and Welfare. (2022). *Results table—Sotkanet.fi Statistics and Indicator Bank*. Admissions to Involuntary Care / 1 000 Residents. https://sotkanet.fi/sotkanet/en/taulukko/?indicator=szZMSwEA&region=s7YssM7SM4y3BAA=&year=sy6rBAA=&gender=t&abs=f&color=f&buildVersion=3.0-SNAPSHOT&buildTimestamp=202109301228

The Fourth Australian Atlas of Healthcare Variation (ISBN: 978-1-922563-06-4). (2021). Australian Commission on Safety and Quality in Health Care and Australian Institute of Health and Welfare. https://www.safetyandquality.gov.au/publications-and-resources/resource-library/fourth-australian-atlas-healthcare-variation-2021

The Norwegian Directorate of Health. (2018). *Habilitering og rehabilitering i spesialisthelsetjenesten: Veiledningsplikten [Habilitation and rehabilitation in specialist health services: Duty to provide guidance]*. https://www.helsedirektoratet.no/veiledere/rehabilitering-habilitering-individuell-plan-og-koordinator/habilitering-og-rehabilitering-i-spesialisthelsetjenesten/veiledningsplikten

The Norwegian Directorate of Health. (2019). *Geografiske forskjeller i tjenestetilbudet i det psykiske helsevernet [Geographical variations in service availability in mental health care]* (IS-2807). The Norwegian Directorate of Health. https://www.helsedirektoratet.no/rapporter/geografiske-forskjeller-i-tjenestetilbudet-i-det-psykiske-helsevernet/

The Norwegian Directorate of Health. (2022). *Tvang – forebygging av tvang i psykisk helsevern for voksne [Coercion—Prevention of coercion in mental health care for adults]*. Helsedirektoratet. https://www.helsedirektoratet.no/faglige-rad/tvang-forebygging-av-tvang-i-psykisk-helsevern-for-voksne

Thobroe, G. (2021, October 26). Tror drap kunne vært unngått om loven åpnet for mer bruk av tvang [Believes homicide could have been avoided if the law opened up for more use of compulsion]. *NRK*. https://www.nrk.no/trondelag/tror-drap-kunne-vaert-unngatt-om-loven-apnet-for-mer-bruk-av-tvang-1.15700551

Thornicroft, G., Deb, T., & Henderson, C. (2016). Community mental health care worldwide: Current status and further developments. *World Psychiatry*, *15*(3), 276–286. https://doi.org/10.1002/wps.20349

Thygesen, L. C., & Ersbøll, A. K. (2014). When the entire population is the sample: Strengths and limitations in register-based epidemiology. *European Journal of Epidemiology*, *29*(8), 551–558. https://doi.org/10.1007/s10654-013-9873-0

Totland, H. (2021). *Internrevisjonen: Tvangsbruk i psykisk helsevern [Internal revision: Use of coercion in mental health care]*. Helse Vest. https://helse-vest.no/seksjon/styresaker/Documents/2021/30.09.2021/Sak%2008721%20Vedl.%201%20-%20Rapport%20fr%C3%A5%20internrevisjon.pdf

Tvangsbruk i barneverninstitusjoner [Use of coercion in child welfare institutions] (ISBN 978-82-93595-34-2; Rapport Fra Helsetilsynet). (2021). Helsetilsynet. https://www.helsetilsynet.no%2Fglobalassets%2Fopplastinger%2Fpublikasjoner%2Frapporter2021%2Fhelsetilsynetrapport_1_2021.pdf&usg=AOvVaw0LvJbA5gS3nQH5QfV9uTsr

Universal declaration of human rights, 14 (1948). https://www.refworld.org/docid/3ae6b3712c.html [accessed 27 April 2022]

Convention on the Rights of Persons with Disabilities: Resolution / adopted by the General Assembly, Pub. L. No. A/RES/61/106 (2007). https://www.refworld.org/docid/45f973632.html

Välimäki, M., Yang, M., Vahlberg, T., Lantta, T., Pekurinen, V., Anttila, M., & Normand, S.-L. (2019). Trends in the use of coercive measures in Finnish psychiatric hospitals: A register analysis of the past two decades. *BMC Psychiatry*, *19*(1), 1–15. https://doi.org/10.1186/s12888-019-2200-x

Verdoux, H., Pambrun, E., Cortaredona, S., Coldefy, M., Le Neindre, C., Tournier, M., & Verger, P. (2016). Geographical disparities in prescription practices of lithium and clozapine: A community-based study. *Acta Psychiatrica Scandinavica*, *133*(6), 470–480. https://doi.org/10.1111/acps.12554

Walker, S., Mackay, E., Barnett, P., Sheridan Rains, L., Leverton, M., Dalton-Locke, C., Trevillion, K., Lloyd-Evans, B., & Johnson, S. (2019). Clinical and social factors associated with increased risk for involuntary psychiatric hospitalisation: A systematic review, meta-analysis, and narrative synthesis. *The Lancet Psychiatry*, *6*(12), 1039–1053. https://doi.org/10.1016/S2215-0366(19)30406-7

Wallsten, T., Kjellin, L., & Lindström, L. (2006). Short-term outcome of inpatient psychiatric care—Impact of coercion and treatment characteristics. *Social Psychiatry and Psychiatric Epidemiology*, *41*(12), 975–980. https://doi.org/10.1007/s00127-006-0131-6

Wallstroem, I. G., Pedersen, P., Christensen, T. N., Hellström, L., Bojesen, A. B., Stenager, E., White, S., Mueser, K. T., Bejerholm, U., van Busschbach, J. T., Michon, H., & Eplov, L. F. (2021). A Systematic Review of Individual Placement and Support, Employment, and Personal and Clinical Recovery. *Psychiatric Services*, appi.ps.202000070. https://doi.org/10.1176/appi.ps.202000070

Wasserman, D., Apter, G., Baeken, C., Bailey, S., Balazs, J., Bec, C., Bienkowski, P., Bobes, J., Ortiz, M. F. B., Brunn, H., Bôke, Ö., Camilleri, N., Carpiniello, B., Chihai, J., Chkonia, E., Courtet, P., Cozman, D., David, M., Dom, G., … Vahip, S. (2020). Compulsory admissions of patients with mental disorders: State of the art on ethical and legislative aspects in 40 European countries. *European Psychiatry*, *63*(1), e82. https://doi.org/10.1192/j.eurpsy.2020.79

Weich, S., McBride, O., Twigg, L., Duncan, C., Keown, P., Crepaz-Keay, D., Cyhlarova, E., Parsons, H., Scott, J., & Bhui, K. (2017). Variation in compulsory psychiatric inpatient admission in England: A cross-classified, multilevel analysis. *The Lancet Psychiatry*, *4*(8), 619–626. https://doi.org/10.1016/S2215-0366(17)30207-9

Wennberg, J. E. (2010). *Tracking medicine: A researcher's quest to understand health care*. Oxford University Press.

Wennberg, J. E., Barnes, B. A., & Zubkoff, M. (1982). Professional uncertainty and the problem of supplier-induced demand. *Social Science & Medicine*, *16*(7), 811–824. https://doi.org/10.1016/0277-9536(82)90234-9

Wennberg, J. E., Fisher, E. S., Goodman, D. C., Skinner, J. S., & Bronner, K. K. (2008). *Tracking the care of patients with severe chronic illness—The Dartmouth Atlas of health care 2008*. The Dartmouth Institute for Health Policy & Clinical Practice. https://data.dartmouthatlas.org/downloads/atlases/2008_Chronic_Care_Atlas.pdf

Wennberg, J. E., McPherson, K., & Goodman, D. (2015). Small Area Analysis and the Challenge of Practice Variation. In A. Johnson & T. Stukel (Eds.), *Medical Practice Variations* (pp. 1–25). Springer US. https://doi.org/10.1007/978-1-4899-7573-7_65-1

Wertheimer, A. (1993). A philosophical examination of coercion for mental health issues. *Behavioral Sciences & the Law*, *11*(3), 239–258. https://doi.org/10.1002/bsl.2370110303

White, J., Gutacker, N., Jacobs, R., & Mason, A. (2014). Hospital admissions for severe mental illness in England: Changes in equity of utilisation at the small area level between 2006 and 2010. *Social Science & Medicine*, *120*, 243–251. https://doi.org/10.1016/j.socscimed.2014.09.036

Widdershoven, G., & Berghmans, R. (2007). Coercion and pressure in psychiatry: Lessons from Ulysses. *Journal of Medical Ethics*, *33*(10), 560–563. https://doi.org/10.1136/jme.2005.015545

Widding-Havneraas, T., Chaulagain, A., Lyhmann, I., Zachrisson, H. D., Elwert, F., Markussen, S., McDaid, D., & Mykletun, A. (2021). Preference-based instrumental variables in health research rely on important and underreported assumptions: A systematic review. *Journal of Clinical Epidemiology*. https://doi.org/10.1016/j.jclinepi.2021.06.006

Wierdsma, A. I., Poodt, H. D., & Mulder, C. L. (2007). Effects of community-care networks on psychiatric emergency contacts, hospitalisation and involuntary admission. *Journal of Epidemiology and Community Health*, *61*(7), 613–618. https://doi.org/10.1136/jech.2005.044974

Wild, G., Alder, R., Weich, S., McKinnon, I., & Keown, P. (2021). The Penrose hypothesis in the second half of the 20th century: Investigating the relationship between psychiatric bed numbers and the prison population in England between 1960 and 2018–2019. *The British Journal of Psychiatry*, 1–7. https://doi.org/10.1192/bjp.2021.138

Wilson, J. (2009). Justice and the Social Determinants of Health: An Overview. *Public Health Ethics*, *2*(3), 210–213. https://doi.org/10.1093/phe/php034

Woodhall-Melnik, J. R., & Dunn, J. R. (2016). A systematic review of outcomes associated with participation in Housing First programs. *Housing Studies*, *31*(3), 287–304. https://doi.org/10.1080/02673037.2015.1080816

World Health Organization. (1992). *The ICD-10 Classification of Mental and Behavioural Disorders: Clinical Descriptions and Diagnostic Guidelines* (Vol. 1). World Health Organization. https://apps.who.int/iris/handle/10665/37958

World Health Organization. Regional Office for Europe. (2008). *Policies and practices for mental health in Europe: Meeting the challenges*. World Health Organization. Regional Office for Europe. https://apps.who.int/iris/handle/10665/107366

Wormdahl, I., Husum, T. L., Rugkåsa, J., & Rise, M. B. (2020). Professionals' perspectives on factors within primary mental health services that can affect pathways to involuntary psychiatric admissions. *International Journal of Mental Health Systems*, *14*(1). https://doi.org/10.1186/s13033-020-00417-z

Wynn, R. (2018). Involuntary admission in Norwegian adult psychiatric hospitals: A systematic review. *International Journal of Mental Health Systems*, *12*(1), 10. https://doi.org/10.1186/s13033-018-0189-z

Zinkler, M., & Priebe, S. (2002). Detention of the mentally ill in Europe—A review. *Acta Psychiatrica Scandinavica*, *106*(1), 3–8. https://doi.org/10.1034/j.1600-0447.2002.02268.x

Zinkler, M., & von Peter, S. (2019). End Coercion in Mental Health Services—Toward a System Based on Support Only. *Laws*, *8*(3), 19. https://doi.org/10.3390/laws8030019

Received: 22 December 2020 | Revised: 24 March 2021 | Accepted: 7 May 2021

DOI: 10.1002/mpr.1881

ORIGINAL ARTICLE

WILEY

Measuring the level of compulsory hospitalisation in mental health care: The performance of different measures across areas and over time

Tore Hofstad[1] | **Jorun Rugkåsa**[2,3] | **Solveig O. Ose**[4] | **Olav Nyttingnes**[2,5] | **Tonje L. Husum**[1]

[1]Centre for Medical Ethics, University of Oslo, Oslo, Norway

[2]Health Services Research Unit, Akershus University Hospital, Lørenskog, Norway

[3]Centre for Care Research, University of South-Eastern Norway, Porsgrunn, Norway

[4]SINTEF, Health Services Research, Trondheim, Norway

[5]R&D Department, Division of Mental Health, Akershus University Hospital, Lørenskog, Norway

Correspondence

Tore Hofstad, Centre for Medical Ethics, University of Oslo, 0318 Oslo, Norway.
Email: tore.hofstad@medisin.uio.no

Funding information

Norges Forskningsråd, Grant/Award Number: 273546

Abstract

Objective: A variety of measures are used for reporting levels of compulsory psychiatric hospitalisation. This complicates comparisons between studies and makes it hard to establish the extent of geographic variation. We aimed to investigate how measures based on events, individuals and duration portray geographical variation differently and perform over time, how they correlate and how well they predict future ranked levels of compulsory hospitalisation.

Methods: Small-area analysis, correlation analysis and linear regressions of data from a Norwegian health registry containing whole population data from 2014 to 2018.

Results: The average compulsory hospitalisation rate per 100,000 inhabitant was 5.6 times higher in the highest area, compared to the lowest, while the difference for the compulsory inpatient rate was 3.2. Population rates based on inpatients correlate strongly with rates of compulsory hospitalisations ($r = 0.88$) and duration ($r = 0.78$). 68%–81% of ranked compulsory hospitalisation rates could be explained by each area's rank the previous year.

Conclusion: There are stable differences in service delivery between catchment areas in Norway. In future research, multiple measures of the level of compulsory hospitalisation should ideally be included when investigating geographical variation. It is important that researchers describe accurately the measure upon which their results are based.

KEYWORDS

compulsory hospitalisation, geographic variation, measurement, small area analysis

1 | INTRODUCTION

Health service delivery is based on ethical principles of voluntariness and respect for autonomy (Etchells et al., 1996). Compulsory care, such as compulsory psychiatric hospitalisation represents a breach of individual autonomy and should therefore be used as a last resort and in the patient's best interest, and this is usually reflected in legislation that regulates such practice (Saya et al., 2019). Nonetheless, considerable concerns about current practice have been raised (Molodynski et al., 2016). This is, among other things, due to

---

variation in the extent to which compulsory hospitalisation is used. A number of studies report practice variation when comparing the level of compulsory hospitalisation between countries (Hansson et al., 1999; Riecher-Rössler & Rössler, 1993; Salize & Dressing, 2004; Sheridan Rains et al., 2019; Zinkler & Priebe, 2002) and within areas regulated by the same legislation (Bindman et al., 2002; Engberg, 1991; Keown et al., 2016; Kjellin, 1997). For instance, the highest admission rates among mental health departments in the Veneto region in Italy 2000–2007 were 14 times higher than the lowest rates (Donisi et al., 2016), while in France in 2012, the rate of compulsory hospitalised patients in the highest 10th percentile of psychiatric sectors' catchment areas was 10 times higher than the 90th percentile (Gandré et al., 2018). Such large differences indicate that some areas might use more compulsion than necessary. If that is the case, it would constitute *unwanted variation* which is described as 'variation that cannot be explained on the basis of illness, medical evidence or patient preference' (Wennberg, 2010, p. 4). Geographical variation is commonly observed in most health service delivery and might reflect differences in local practice, culture or service dimensioning. Given the implications of compulsory interventions for personal autonomy, it is particularly important to detect potential geographical variation in such practice, as a precursor to identify ways of improving the organisation and delivery of services in the best interest of patients.

In order to establish the extent of geographical variation in compulsory hospitalisations, both within and between jurisdictions, reliable measures are required. Trustworthy measures are also needed to track compulsion use over time, which would be necessary to monitor progress towards reduced compulsion levels, following political ambitions. However, there is a long lamented lack of agreement on standardisation of measuring and reporting compulsory mental health care, both in national statistics and the research literature (de Stefano & Ducci, 2008; Høyer, 2008; Riecher-Rössler & Rössler, 1993; Sheridan Rains et al., 2019; Zinkler & Priebe, 2002). This heterogeneity complicates comparisons, as different studies often employ different measures of the level of compulsory hospitalisation and also because the descriptions of how measures are operationalised is not always clear. Studies that compare measures from various sources or areas are therefore conventionally accompanied by a note of caution.

Based on our reading of the research literature we have categorised the most frequently used measures according to three concepts, which are also fundamental to general epidemiology (Rothman et al., 2008): events, individuals and duration. *Event* measures are most common and are usually based on counts of compulsory admissions (Riecher-Rössler & Rössler, 1993; Zinkler & Priebe, 2002). Some studies employ counts of *individuals* with minimum one compulsory hospitalisation (Gandré et al., 2018; Keown et al., 2016; Sheridan Rains et al., 2019; Weich et al., 2017). A number of studies include measures based on *duration*, normally the number of days between admission and discharge (Aguglia et al., 2016; Girolamo et al., 2008; Wierdsma & Mulder, 2009), although it varies whether studies include days of voluntary stay during an admission (Iversen et al., 2009; Kelly et al., 2018).

In order to make comparisons between countries, regions or institutions, raw numbers are often recalculated to population-based rates per person year. Quotas or shares of compulsory hospitalisations/inpatients of the total number of hospitalisations/inpatients is sometimes used. While quotas can be useful when the population-at-risk is unknown, they are less suitable for comparison between areas, since they rely heavily on the total admission frequency, which is dependent on the available resources and coverage of mental health care in each country (Høyer, 2008; Riecher-Rössler & Rössler, 1993). Quotas are therefore not part of this study.

While a more nuanced picture of the level of compulsory hospitalisation is likely to emerge through the inclusion of multiple measures, data availability might restrict options. It is therefore important to understand whether and how the selection of measures impacts inferences drawn about the level of compulsory hospitalisation, to limit biases due to methodology and choice of operationalisation.

Increasingly comprehensive, reliable and accessible hospital registries with individual level data hold potential for more valid estimates of variation in health care delivery, including variation in the level of compulsory hospitalisation. The Norwegian Patient Registry (NPR) ranks among the world's most complete and reliable health registries (Bakken et al., 2020) and enables us not only to describe the level of compulsory hospitalisation within selected samples, but the entire population. This also makes it possible to apply different measures, over an extended period of time, and to compare them across health care regions regulated by the same legislation. We have not found any study that has investigated how the commonly used measures appear and diverge when applied to a whole population, over time and how the resulting picture of variation might depend on the choice of measure. Therefore, this will be the focus of our study. Specifically, we aim to answer the following research questions:

1. How does the extent of geographical variation in the level of compulsory hospitalisation vary when captured by different measures and over time?
2. How do different measures applied to one population correlate?
3. How well can the different measures predict future ranked levels of compulsory hospitalisation in different areas?

2 | METHODS

2.1 | Setting

Our research questions will be addressed by calculating, and comparing and contrasting measures based on every episode of compulsory psychiatric hospitalisation in Norway in 2014–2018. In Norway, all use of psychiatric compulsion is managed by the specialist services. These are the responsibility of four Regional Health Authorities that are owned by the State. A total of 356 municipalities are nested within catchment areas of 65 Community Mental Health Centres (CMHC), which are part of the specialist service and constitute our main level of analysis. The annual populations of the catchment areas ranged from 6636 to 160,909 during the study period.

Compulsory hospitalisation is regulated by the 1999 Norwegian Mental Health Act. The main legal criterion is the presence of severe mental illness. In addition, the patient's condition must be likely to deteriorate without treatment, or the patient poses an immediate danger to themselves or others. Section 3.2 permits compulsory observation in hospital, which may last 10 days, and can be extended for another 10 days. Section 3.3 permits compulsory mental health care. Here, no time limit applies, but there are legal requirements to assess whether the criteria are met every 3 months. Section 3.4 prohibits the compulsory detention of patients admitted voluntary, except when there is immediate and serious danger to the patient or others. A legislation change in 2017 restricted compulsory care to patients without the capacity to consent to treatment, unless there is immediate danger. As intended, compulsion numbers were reduced initially, but figures rose again the following year (Bremnes & Skui, 2020).

2.2 | Data inclusion

Data on all episodes of compulsory hospitalisation in the period 2014–2018 was obtained from NPR. The registry is person identifiable through unique patient numbers, which enabled us to follow individuals over time and across institutions. Only the *population at risk* of compulsory hospitalisation was included in the study, which was defined as all individuals between 18 and 65 years living in a Norwegian municipality during the study period. The age scope was primarily selected because services are organised differently for other age groups. Forensic admissions were not included, as this can be considered a distinct population, regulated through a different legal framework (Salize & Dressing, 2004).

Analyses were based on residency prior to each hospitalisation. This is likely to result in more homogeneous categories compared to analyses of where people were treated, since the numbers will not be impacted by service organisation (Wennberg, 2010). One percent of all patients relocated and were subsequently readmitted compulsory in a different area the same year. They were counted in both areas.

Population counts for municipalities, stratified by age and gender were collected from Statistics Norway (2020). Individuals without a Norwegian national identity number or missing values on residency were excluded (1% and <0.001% of persons compulsory hospitalised, respectively). The population of homeless people in Norway is small; 0.75 homeless per 1000 inhabitants (Dyb & Lid, 2017). Individuals in this category were included based on their last recorded residency.

Data completeness was in general good. The 11 catchment areas in Central Norway were excluded in 2014 due to incomplete reporting, but all areas were included in 2015–2018. In two cities, two CMHCs operate within the same urban district. Since we lacked sufficiently detailed information on residence for those living in these areas to determine to which CMHC they belonged, we combined the relevant two areas in both cities. The boundaries of some of the CMHC's catchment areas changed during the study period, so the number of catchment areas included in analyses varied ($N = 60_{2014}/69_{2015\text{–}2016}/67_{2017}/65_{2018}/74_{2014\text{–}2018}$).

2.3 | Variables

2.3.1 | Events, individuals and duration

Compulsory hospitalisation was defined by the registered legal status of each event, and included compulsory observation, compulsory mental health care and episodes where the patient was admitted voluntarily, but legal status was later converted to compulsion. If a patient was transferred between wards or institutions during the same episode of compulsion, this was counted as part of the same hospitalisation. The number of new compulsory hospitalisations was counted for each calendar year.

Compulsory inpatients were defined as individuals with at least one compulsory hospitalisation and this was counted for each calendar year.

Duration of compulsion excluded voluntary days during the admission, and was calculated in two ways: for the *Compulsory Length of Stay* (LoS) *rate*, the total number of days of compulsory hospitalisation was counted for each year. This included compulsory hospitalisations that commenced in earlier years, and hospitalisations that extended into the following year. This was done to ensure that compulsory hospitalisations that lasted more than 1 year were also included, providing a more valid estimate of prevalence. For *median compulsory LoS* and *average compulsory LoS*, number of days of compulsory hospitalisation was counted for each completed hospitalisation, after discharge, each year. This included days of compulsory hospitalisations that commenced in earlier years.

2.3.2 | Measures

The following measures of the level of compulsory hospitalisation were calculated for each CMHC catchment area for each year of the study.

1. Compulsory hospitalisation rate: number of compulsory admissions that year, divided by the population at risk, multiplied by 100,000.
2. Compulsory inpatient rate: number of compulsory admitted patients that year, divided by population at risk, multiplied by 100,000.

3. Compulsory LoS rate: annual number of days of compulsory hospitalisation, divided by the population at risk, multiplied by 100,000.
4. Median compulsory LoS: median number of days of compulsory hospitalisation.
5. Average compulsory LoS: average number of days of compulsory hospitalisation.

2.4 | Statistical analysis

In order to answer the first research question of the extent of geographic variation when measured in different ways, four analyses were conducted to test how much each measure varied between areas. First, the extremal quotient (EQ) was calculated to quantify the magnitude of difference, by dividing the highest with the lowest rate. Second, while the EQ is a popular measure, it is impacted by the number of cases compared (Kazandjian et al., 1989). Therefore, to reduce the influence of outliers, the ratio of the 90th percentile to the 10th percentile ($EQ_{90/10}$) of the distribution of each measure was also calculated (OECD, 2014). Third, the coefficient of variation (CV), which is the ratio of the standard deviation to the mean was calculated. The CV is useful for comparing the different measures of the level of compulsory hospitalisation, since the CV is scale invariant and shows the relative variability. Fourth, while both EQ and CV might be impacted by unstable rates due to small populations and rare occurrences, the systematic component of variation (SCV), which is specifically developed to investigate geographical variation, subtracts the random component from the variance (McPherson et al., 1982). For the hospitalisation rate and the LoS rate, the adjusted formula for SCV suggested by Cain and Diehr (1992) and Diehr et al. (1993) was employed, which accounts for the extra Poisson variation introduced by individuals with multiple admissions.

For all variation measures, higher values indicate higher levels of variation between areas. Univariate scatter plots were created for each measure to aid in the analysis. These included average scores for each CMHC area, grouped by health region.

In order to answer the second research question on the relationships between measures, Spearman's rank order correlation coefficient was calculated to investigate the pairwise relationships between the different measures of compulsory hospitalisation.

The third research question concerning the ability to predict future ranked levels of compulsory hospitalisation was answered by ranking each CMHC area for each year according to each measure of compulsion. Linear regression was performed using each year's rank as independent variable, and the subsequent year's ranking as dependent variable. This procedure was repeated for each compulsion measure, and R^2 was used as measure of explained variance. As a further test of stability, we performed the same analysis with ranks from 2014 as independent variable, as well as ranks based on the average values from 2014 to 2017, to predict ranks in 2018.

To reduce the impact of random fluctuation, the average over the 5-year period for each area was used to answer research question one and two. In order to account for risk differences due to varying gender and age distribution, direct standardisation was performed for the rates, using the countrywide population as reference population (Ash et al., 2003). Expected cases were calculated based on six age categories (18–25, 26–33, 34–41, 42–49, 50–57, 58–65). Indirect standardisation using countrywide compulsory hospitalisation rates as reference was used for SCV. As robustness tests to avoid undue impact of unstable rates, all analyses were repeated without areas with less than 35,000 inhabitants, resulting in a reduction of catchment areas to 35–40.

All calculations were performed and figures generated in R-version 3.6.2 (R Team, 2019), with the following packages: data.table 1.12.8 (Dowle et al., 2019), tidyverse 1.3.0 (Wickham et al., 2019), GGally 2.0.0 (Schloerke et al., 2020), lubridate 1.7.4 (Grolemund & Wickham, 2011) and fhidata: Structural Data for Norway (White, 2019).

2.5 | Ethics

The Research Ethics Committee deemed the study to fall outside their remit as specified by the Norwegian Health Research Act (ref: 2018/795). After a detailed data protection impact assessment the study was approved by the Privacy Ombudsman at Akershus University Hospital (ref: 2018-090). Prior to release from NPR, ID-numbers were deidentified in accordance with relevant regulations.

3 | RESULTS

During 2014–2018, 16,189 distinct individuals between 18 and 65 years were compulsory hospitalised 36,153 times in Norway, averaging 151 inpatients and 222 hospitalisations per 100,000 person per year. LoS for compulsory hospitalisations was 12 days (median) and 40 days (average). The total number of days of compulsory hospitalisation averaged 8514 per 100,000 person per year. A total of 423 individuals had their legal status changed after being admitted voluntarily, which equals 2.6% of all compulsory hospitalised patients.

3.1 | Geographical variation by measure, health region and over time

Table 1 displays the average amount of geographical variation between CMHC areas during the study period. According to the EQ values, the difference between the CMHC areas with the highest and lowest values ranged from 3.2 to 8.4, depending on which measure of the level of compulsory hospitalisation was used. According to all four measures of variability, the inpatient rate showed least variability across areas. Most variation was seen among the measures based on duration.

Figure 1 shows the different measures applied to each CMHC area, grouped by health region. National average, minimum and maximum values are indicated on the *x*-axis. Each compulsion measure painted a slightly different picture of the geographical variation in the level of compulsory hospitalisation. In Northern Norway outliers were seen for hospitalisation rates. Central Norway was lower than average on all measures, and also showed least variation within the health region. Median and average LoS were longer in Southern and Eastern Norway, and shorter than the country average for most CMHC areas in Western Norway.

TABLE 1 Variation in the level of compulsory hospitalisation among 74 CMHC areas in Norway 2014–2018

		EQ	$EQ_{90/10}$	CV	SCV
Rates	Hospitalisations	5.6	2.4	35	10.9[a]
Per 100,000	Inpatients	3.2	2.0	26	5.1
Person per year	Los	8.0	2.9	40	16.5[a]
Median	Los	8.4	2.6	40	-
Average	Los	4.9	2.9	36	-

Note: Extremal quotient (EQ) = max/min. $EQ_{90/10}$ = 90th decile/10th decile. Coefficient of variation (CV) = standard deviation/mean × 100. Systematic component of variation (SCV) × 100; reference for calculation in text.

Abbreviation: CMHC, Community Mental Health Centres.

[a] SCV adjusted for multiple admissions.

Figure 2 shows the variation in the different measures over the period 2014–2018. Inpatient rates consistently showed least variability for each year of the study compared with the other measures. Some reduction in geographic variation occurred during the study period, particularly the hospitalisation rate.

3.2 | Correlation between measures

Results from the correlation analyses are displayed in Figure 3. The strongest correlations were found between the hospitalisation rate and the inpatient rate (*r* = 0.88), and the inpatient rate and the LoS rate (*r* = 0.78). Negative correlations were seen between

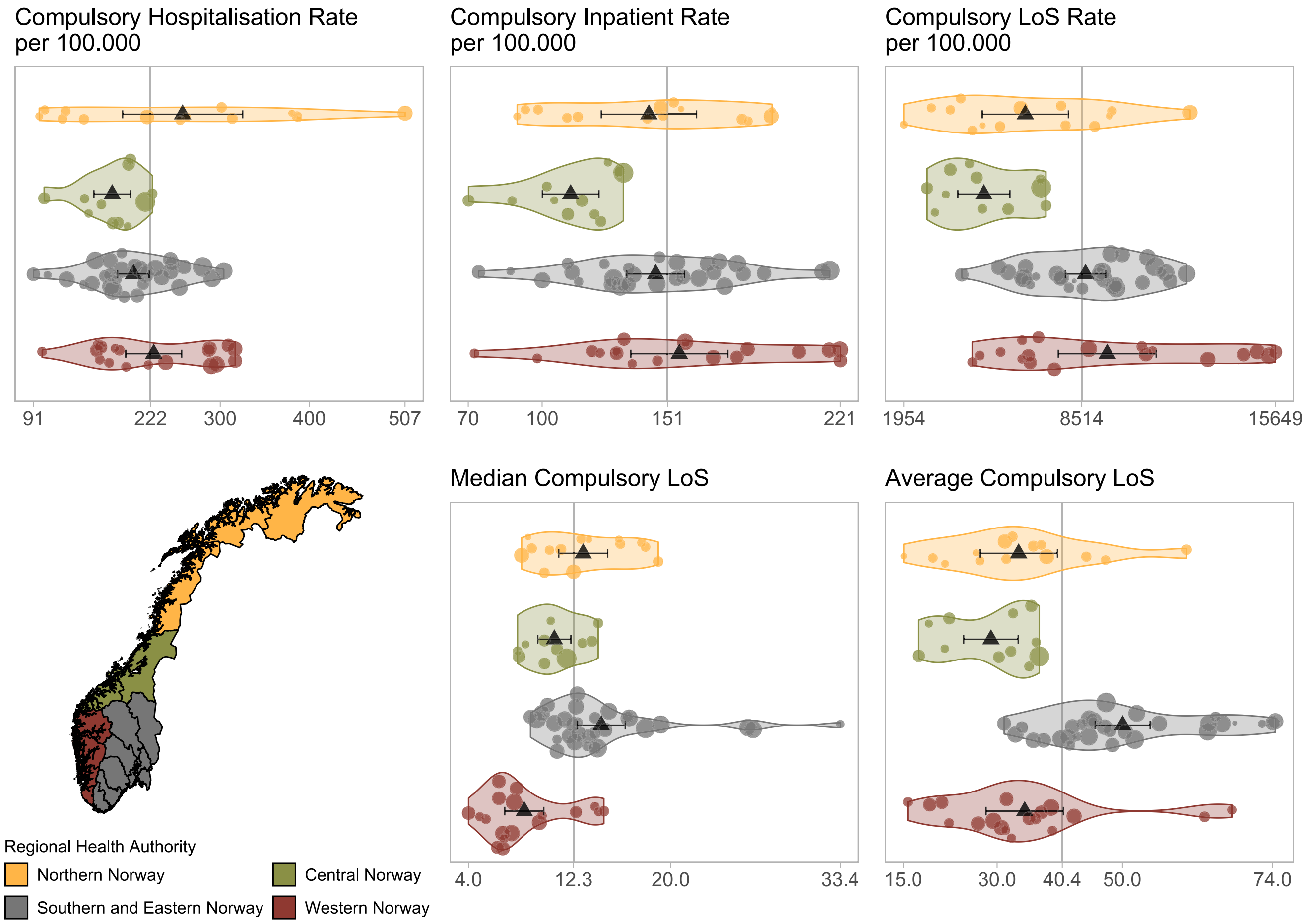


FIGURE 1 Scatter and violin plot of measures of the level of compulsory mental health care in Norway 2014–2018, grouped by Regional Health Authority. Scatter points represent the average value for each CMHC for the study period, with point size reflecting population count. Triangles show health region average with 95% confidence intervals. *X*-axes include minimum, maximum and national average, which can also be seen in the vertical line. Map of Norway shows boundaries for Regional Health Authorities. CMHC, Community Mental Health Centre

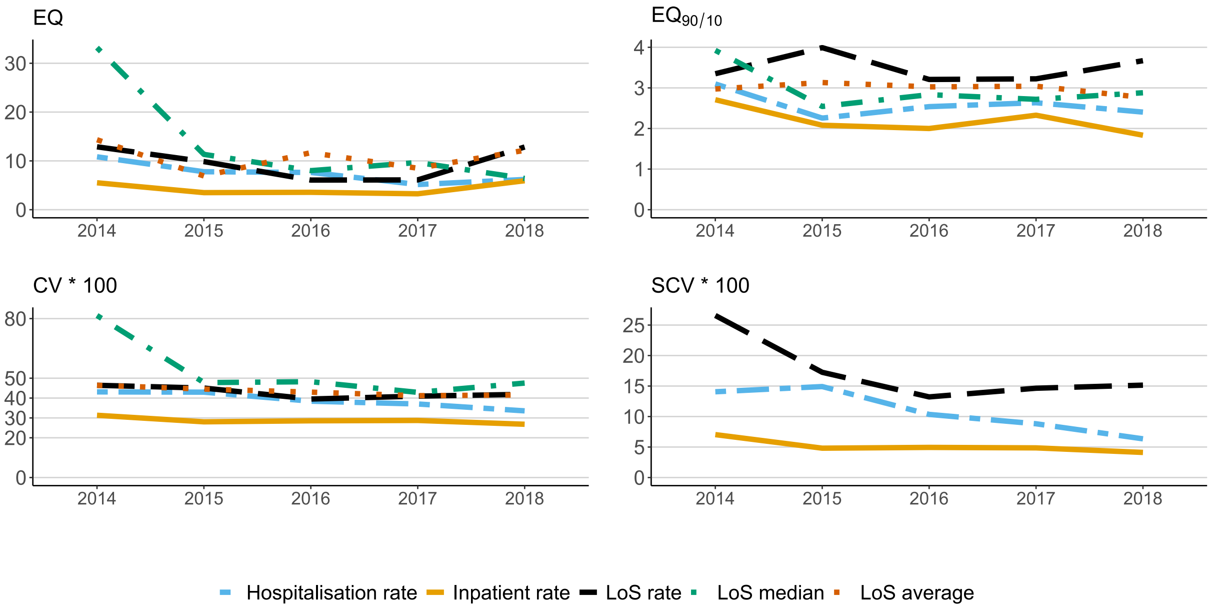


FIGURE 2 Variation in the average level of compulsory hospitalisation among 74 CMHC areas in Norway 2014–2018. Extremal quotient (EQ) = max/min. EQ$_{90/10}$ = 90th decile/10th decile. Coefficient of variation = standard deviation/mean × 100. Systematic component of variation × 100. CMHC, Community Mental Health Centre

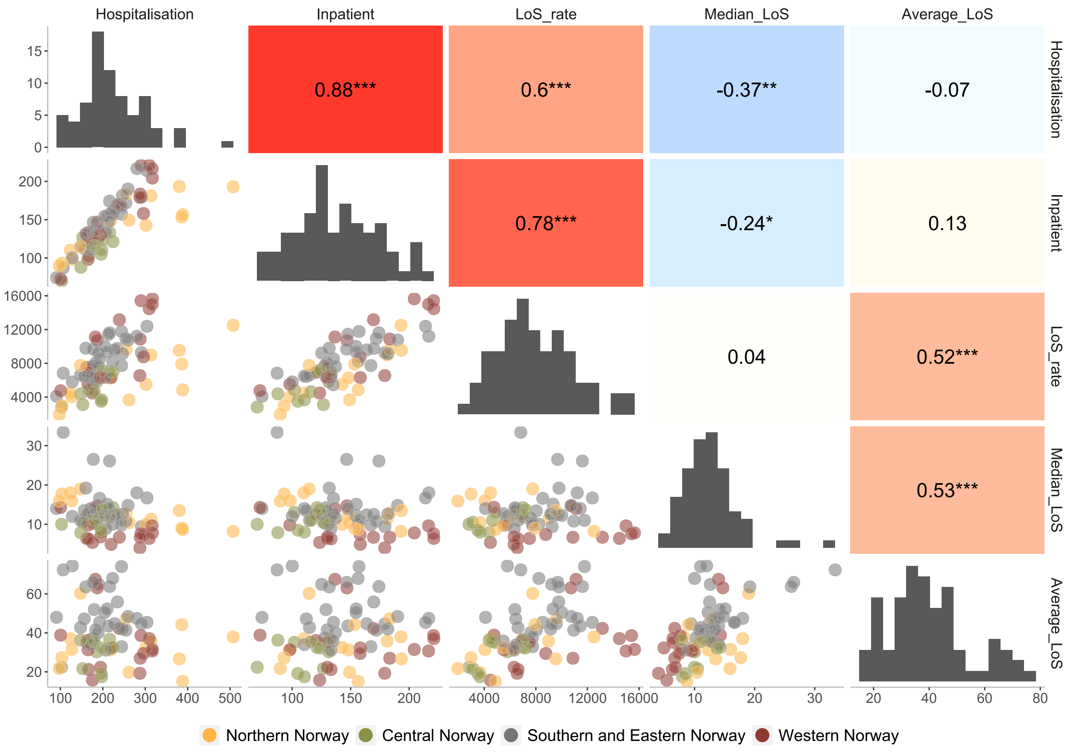


FIGURE 3 Correlation plot of measures of the level of compulsory mental health care in Norway 2014–2018. Upper half: heatmap with Spearman's rho. $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$. Lower half: bivariate scatter plot. Diagonal: univariate distribution

median LoS and the hospitalisation rate (r = −0.37), as well as between median LoS and the inpatient rate (r = −0.24). The upper left scatter plot shows that there is a ratio of roughly 2.5 between the highest hospitalisation rate (500) and the inpatient rate (200).

3.3 | Predicting ranked levels of compulsory hospitalisation

Figure 4 displays R^2 from linear regressions of ranked measures. Hospitalisation rates were most useful for predicting ranks from year

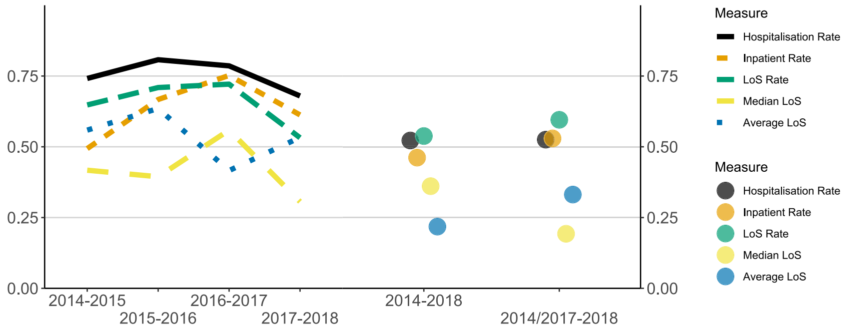


FIGURE 4 R^2 from OLS. The left part of the figure shows the amount of explained variance in ranked levels of compulsory hospitalisation, as predicted from the previous year's levels. The right part shows explained variance for 2018 predicted by levels from 2014, and from the average levels during 2014–2017

to year, explaining between 68% and 81% of the variation in the subsequent year's rank. 53%–60% of the variation in ranked rates in 2018 could be explained by the ranked average between 2014 and 2017.

3.4 | Robustness test

The results of the robustness analyses without areas less than 35,000 can be seen in the Appendix Table A1. A reduction in geographical variation is observed, and predictions were improved.

4 | DISCUSSION

To our knowledge, this is the first study to quantify geographical variation in the level of compulsory hospitalisation in mental health care for an entire population and over time, using different measures based on events, individuals and duration. The observed geographical variation was relatively stable across the years, and the variation in compulsory hospitalisation rates can be considered high compared to reference procedures (OECD, 2014). Furthermore, all duration measures showed considerable variation, suggesting substantial practice variation in the extent to which people remain compulsory hospitalised over time.

4.1 | Inpatient rates vary less than hospitalisation rates

The number of compelled inpatients is necessarily less than or equal to the number of events in a period. Consequently, measures based on inpatient counts will by necessity never display more variation than measures based on hospitalisation counts when applied to the same dataset. How large the difference in variation will be is an empirical question which will differ between populations. In this study, population rates based on counts of inpatients displayed less than half the amount of geographical variation of rates based on hospitalisations and LoS according to the SCV, but the difference was reduced during the study period. The variation in inpatient rates can be categorised as medium-to-high variation compared to reference procedures (OECD, 2014). The scatter plot in the lower half of Figure 3 showed that in some areas the compulsory hospitalisation rate was roughly the same as the inpatient rate, which means that there were almost no compulsory readmissions each year in those areas. In contrast, the ratio of the hospitalisation rate to the patient rate was roughly 2.5 in the area with the highest hospitalisation rate. This means that every patient in that area on average had more than two compulsory hospitalisations each year. The consequences of whether rates based on events or individuals are used in research and official statistics is thus highly contingent on the practice of compulsory readmissions.

The extent of geographical variation was relatively stable over the years, particularly so for the compulsory inpatient rate, as displayed in Figure 2. Most geographical variation was seen in 2014 for most measures. Still, the extent of geographical variation regularly appears larger when considering numbers for each year separately, than the average for the whole period. This underlines the importance of caution when interpreting geographical variations based on numbers from a short time interval, since these might be impacted by fluctuation over time. By averaging over the 5-year period, the more extreme differences due to random outliers were smoothed out. Substantial differences remained, however, indicating that there are stable differences in service delivery between different catchment areas of CMHCs.

The observed geographical variation pales in comparison with findings from catchment areas in France, where $EQ_{90/10}$ for the inpatient rate was 10, and CV roughly 80% (Gandré et al., 2018). The $EQ_{90/10}$ is impacted by the number of areas compared (Kazandjian et al., 1989), which was much larger in France ($N = 514$), and this can explain some of the discrepancy. While the CV is also a function of sample size, such large differences are not expected solely on the basis of the differing number of areas compared.

4.2 | Inpatient rates correlate strongly with hospitalisation rates

Rates based on inpatients correlate strongly with rates based on hospitalisations in this study. In other words, areas where the level of compulsory hospitalisation is ranked higher, as measured by rates of hospitalisations, also tend to rank higher when measured by rates of inpatients. Despite the strong correlations, different health regions with higher or lower levels of compulsory hospitalisation than average stuck out, depending on measure. This implies that ranking areas using only one measure, might give different results based on the choice of measure.

Moreover, the correlation analysis showed that areas that tend to have shorter median duration of compulsory hospitalisations, also tend to have higher hospitalisation rates. An interpretation of this is that shorter compulsory LoS might not cause significant improvement in health, resulting in a need for further compulsory readmission. Another possible explanation is that some areas might require hospitalisation in order to administer involuntary depot medication, lowering the median and average LoS. On the other hand, the strong correlation between the LoS rate and both hospitalisation and patient rates indicate that more days are spent under compulsion in areas where more people are detained.

4.3 | Compulsory hospitalisation rates predict future ranked levels of compulsory hospitalisation

The high amount of variance explained in ranked levels of compulsory hospitalisation, solely on the basis of last years ranking, suggest considerable stability over time. This has implications for efforts at reducing compulsion levels in high-ranking areas. If random fluctuation dominates ranking, it would be difficult to identify areas that could benefit most from interventions to reduce compulsion levels. In this study however, areas that ranked higher one year were very likely to be ranked higher the subsequent year, particularly when ranked by the compulsory hospitalisation rate.

4.4 | Ways of measuring: Events, individuals, duration

Researchers who are primarily concerned with the burden imposed on the hospitalised individuals in terms of infringed autonomy might emphasise different elements of the level of compulsory hospitalisation, than researchers who, for instance, set out to calculate costs associated with compulsory hospitalisations. The focus of each study might therefore impact the choice of measures.

Each compulsory hospitalisation will constitute additional breach of autonomy, so if the burden of compulsion experienced by patients in an area is under study, counts of events might provide better estimates than counts of individuals. Also, one individual who is subject to many events of compulsory hospitalisation might significantly impact the hospitalisation rate in an area, but not the inpatient rate. It is, therefore, an advantage of inpatient based rates that they are less prone to random fluctuation, which means that they will be more stable, even when data is only available for shorter time periods (Bowers, 2000).

A limitation with measures based on both events and individuals is that they do not distinguish between longer and shorter durations; one hospitalisation counts as one event regardless of length. The number of days under involuntary confinement thus provides an alternative take on the level of compulsory hospitalisation, and has been recommended in the compulsion literature (Høyer, 2008), but is not often reported. LoS is conventionally counted at discharge, which can be difficult to measure for individuals with very long involuntary hospitalisations. Those detained for more than a year might, in fact, not be included in annual statistics, although they in reality contribute 365 days to an area's total number of days of compulsory hospitalisation. The LoS rates in our study are therefore based on the actual number of days of involuntary hospitalisation for each year, regardless of which year the person was admitted or discharged. Arguably, this provides a better duration measure of the level of compulsory hospitalisation in an area. For average or median LoS however, including unfinished episodes would bias the estimate downwards.

4.5 | National registers of compulsory admissions

This study was possible because of the existence of a national comprehensive population-based registry (Bakken et al., 2020). Comprehensive health registries are required to analyse variation in compulsory hospitalisation at national levels, but are not available, or not of sufficient quality in many countries. As compulsory hospitalisation might compromise individual autonomy, a lack of high quality registers could constitute a democratic as well as a methodological problem.

4.6 | The need for unambiguous terms

Høyer (2008) elaborated on difficulties in comparing rates of compulsory hospitalisation from different sources, since some studies only count involuntary admissions, while others include orders issued after admission; and the age range of the study population might differ and is often not reported. In a similar vein, based on the results from this study, we urge increased awareness of the importance of reporting accurately what measures are being used and how they are operationalised. At face value, terms that are commonly used in the research literature, such as *compulsory hospitalisation rate* and *involuntary admission rate* signify that they are based on *events*. But a closer reading shows that they are sometimes based on the number of patients who had at least one compulsory hospitalisation—in other words *individuals* (Gandré et al., 2018; Sheridan Rains et al., 2019; Weich et al., 2017). The extent to which rates based on hospitalisations or inpatients differ will depend on the compulsory readmission factor. As we have seen, the hospitalisation rate can be considerably larger, and vary substantially more, than the inpatient rate. Consequently, researchers should provide detailed and unambiguous descriptions of their measures, and what amounts to admission rates or patient rates should be named accordingly.

4.7 | Further research

Further research is needed to establish the performance of measures of the level of compulsory hospitalisation in other populations. While our study focuses on inpatient compulsion it is clearly of interest to consider the extent and variation of outpatient commitment as well, which is another area of research that would benefit from adopting more standardised measures (Rugkåsa, 2016). It would be especially interesting to calculate continued duration of compulsion when inpatient stays result in discharge to outpatient commitment.

4.8 | Strengths and limitations

A considerable strength of this paper is that we had access to complete information about all compulsory hospitalisations from the whole population in Norway over a 5-year period. The data are routinely collected, which is simultaneously a strength and limitation with register data, since they are not primarily intended for research. Differences in the way events are registered can exist between areas. We rely on the evaluation of the NPR for the validity and completeness of the variables used. Furthermore, other risk factors that can be unevenly distributed, such as patient mix, were not accounted for. Consequently, it would not be right to label all the observed geographic variation as *unwarranted.*

5 | CONCLUSION

This study showed that measures based on events, individuals and duration, paint different pictures of the extent and geographical variation of the level of compulsory hospitalisation. The geographical variation was high for hospitalisation rates and duration measures, and was stable across the years. Future studies describing the level of compulsory hospitalisation are likely to yield a richer and more accurate picture by including multiple measures. Since inpatient rates can be significantly lower than hospitalisation rates, and display less geographical variation, it is important that measures are accurately described to reflect how they are constructed and what they are based on.

ACKNOWLEDGEMENT

The authors are grateful to the Research Council of Norway for funding the research project ReCoN—Reducing Coercion in Norway (Project number 273546), which this work is part of.

CONFLICT OF INTERESTS

The author declares that there is no conflict of interest.

AUTHOR CONTRIBUTIONS

This study forms part of a larger research program for which Jorun Rugkåsa, in collaboration with Olav Nyttingnes and Tonje L. Husum obtained funding and accessed data. Tore Hofstad, Jorun Rugkåsa, Solveig O. Ose and Tonje L. Husum designed the present study. Tore Hofstad designed and performed the data analysis and wrote the first draft of the manuscript. All authors revised the manuscript in several rounds and approved the final version.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from The Norwegian Patient Registry. Restrictions apply to the availability of these data, which were used under license for this study.

ORCID

Tore Hofstad https://orcid.org/0000-0003-0718-7931
Olav Nyttingnes https://orcid.org/0000-0003-0991-7176

REFERENCES

Aguglia, A., Moncalvo, M., Solia, F., & Maina, G. (2016). Involuntary admissions in Italy: The impact of seasonality. *International Journal of Psychiatry in Clinical Practice*, *20*(4), 232–238. https://doi.org/10.1080/13651501.2016.1214736

Ash, A. S., Shwartz, M., & Pekoz, E. A. (2003). Comparing outcomes across providers. *Risk Adjustment for Measuring Health Care Outcomes*, *3*, 297–333.

Bakken, I. J., Ariansen, A. M. S., Knudsen, G. P., Johansen, K. I., & Vollset, S. E. (2020). The Norwegian patient registry and the Norwegian registry for primary health care: Research potential of two nationwide health-care registries. *Scandinavian Journal of Public Health*, *48*(1), 49–55. https://doi.org/10.1177/1403494819859737

Bindman, J., Tighe, J., Thornicroft, G., & Leese, M. (2002). Poverty, poor services, and compulsory psychiatric admission in England. *Social Psychiatry and Psychiatric Epidemiology*, *37*(7), 341–345. https://doi.org/10.1007/s00127-002-0558-3

Bowers, L. (2000). The expression and comparison of ward incident rates. *Issues in Mental Health Nursing*, *21*(4), 365–374. https://doi.org/10.1080/016128400247988

Bremnes, R., & Skui, H. (2020). *Tvang i psykisk helsevern: Status etter lovendringene i 2017 (IS-2888).* Helsedirektoratet.

Cain, K. C., & Diehr, P. (1992). Testing the null hypothesis in small area analysis. *Health Services Research*, *27*(3), 267–294.

de Stefano, A., & Ducci, G. (2008). Involuntary admission and compulsory treatment in Europe: An overview. *International Journal of Mental Health*, *37*(3), 10–21. https://doi.org/10.2753/IMH0020-7411370301

Diehr, P., Cain, K., Ye, Z., & Abdul-Salam, F. (1993). Small area variation analysis: Methods for comparing several diagnosis-related groups. *Medical Care*, *31*(5), YS45–YS53.

Donisi, V., Tedeschi, F., Salazzari, D., & Amaddeo, F. (2016). Differences in the use of involuntary admission across the Veneto Region: Which role for individual and contextual variables? *Epidemiology and Psychiatric Sciences*, *25*(1), 49–57. https://doi.org/10.1017/S2045796014000663

Dowle, M., Srinivasan, A., Gorecki, J., Chirico, M., Stetsenko, P., Short, T., Lianoglou, S., Antonyan, E., Bonsch, M., & Parsonage, H. (2019). Package ‘data.table’. Extension of ‘data.frame’ [Computer software].

Dyb, E., & Lid, S. (2017). *Homelessness in Norway 2016—A survey*. NIBR. https://www.veiviseren.no/forstaa-helheten/forskning-og-utredninger/rapport/bostedslose-i-norge-2016---en-kartlegging

Engberg, M. (1991). Involuntary commitment in Greenland, the Faroe Islands and Denmark. *Acta Psychiatrica Scandinavica*, *84*(4), 353–356. https://doi.org/10.1111/j.1600-0447.1991.tb03159.x

Etchells, E., Sharpe, G., Dykeman, M. J., Meslin, E. M., & Singer, P. A. (1996). Bioethics for clinicians: 4. Voluntariness. *Canadian Medical Association Journal*, *155*(8), 1083–1086.

Gandré, C., Gervaix, J., Thillard, J., Macé, J.-M., Roelandt, J.-L., & Chevreul, K. (2018). Geographic variations in involuntary care and associations with the supply of health and social care: Results from a nationwide study. *BMC Health Services Research*, *18*, 253. https://doi.org/10.1186/s12913-018-3064-3

Girolamo, G. de, Rucci, P., Gaddini, A., Picardi, A., & Santone, G. (2008). Compulsory admissions in Italy: Results of a national survey. *International Journal of Mental Health*, *37*(4), 46–60. https://doi.org/10.2753/IMH0020-7411370404

Grolemund, G., & Wickham, H. (2011). Dates and times made easy with lubridate. *Journal of Statistical Software*, *40*(3), 1–25.

Hansson, L., Muus, S., Saarento, O., Vinding, H. R., Göstas, G., Sandlund, M., Zandrén, T., & Öiesvold, T. (1999). The Nordic comparative study on sectorized psychiatry: Rates of compulsory care and use of compulsory admissions during a 1-year follow-up. *Social Psychiatry and Psychiatric Epidemiology*, *34*(2), 99–104. https://doi.org/10.1007/s001270050118

Høyer, G. (2008). Involuntary hospitalization in contemporary mental health care. Some (still) unanswered questions. *Journal of Mental Health*, *17*(3), 281–292. https://doi.org/10.1080/09638230802156723

Iversen, K. I., Høyer, G., & Sexton, H. C. (2009). Rates for civil commitment to psychiatric hospitals in Norway. Are registry data accurate? *Nordic Journal of Psychiatry*, *63*(4), 301–307. https://doi.org/10.1080/08039480902730607

Kazandjian, V. A., Durance, P. W., & Schork, M. A. (1989). The extremal quotient in small-area variation analysis. *Health Services Research*, *24*(5), 665–684.

Kelly, B. D., Curley, A., & Duffy, R. M. (2018). Involuntary psychiatric admission based on risk rather than need for treatment: Report from the Dublin Involuntary Admission Study (DIAS). *Irish Medical Journal*, *111*(4), 736.

Keown, P., McBride, O., Twigg, L., Crepaz-Keay, D., Cyhlarova, E., Parsons, H., Scott, J., Bhui, K., & Weich, S. (2016). Rates of voluntary and compulsory psychiatric in-patient treatment in England: An ecological study investigating associations with deprivation and demographics. *British Journal of Psychiatry*, *209*(2), 157–161. https://doi.org/10.1192/bjp.bp.115.171009

Kjellin, L. (1997). Compulsory psychiatric care in Sweden 1979–1993. Prevalence of committed patients, discharge rates and area variation. *Social Psychiatry and Psychiatric Epidemiology*, *32*(2), 90–96. https://doi.org/10.1007/BF00788926

McPherson, K., Wennberg, J. E., Hovind, O. B., & Clifford, P. (1982). Small-area variations in the use of common surgical procedures: An international comparison of New England, England, and Norway. *New England Journal of Medicine*, *307*(21), 1310–1314.

Molodynski, A., Khazaal, Y., & Callard, F. (2016). Coercion in mental healthcare: Time for a change in direction. *BJPsych International*, *13*(1), 1–3. https://doi.org/10.1192/S2056474000000854

OECD. (2014). Geographic variations in health care: What do we know and what can Be done to improve health system performance? http://www.oecd.ilibrary.org/social-issues-migration-health/geographic-variations-in-health-care_9789264216594-en

R Team. (2019). *R: A language and environment for statistical computing version 3.0. 2*. Vienna, Austria: R Foundation for Statistical Computing.

Riecher-Rössler, A., & Rössler, W. (1993). Compulsory admission of psychiatric patients—An international comparison. *Acta Psychiatrica Scandinavica*, *87*(4), 231–236. https://doi.org/10.1111/j.1600-0447.1993.tb03363.x

Rothman, K. J., Greenland, S., & Lash, T. L. (2008). *Modern epidemiology*. Lippincott Williams & Wilkins.

Rugkåsa, J. (2016). Effectiveness of community treatment orders: The international evidence. *Canadian Journal of Psychiatry*, *61*(1), 15–24. https://doi.org/10.1177/0706743715620415

Salize, H. J., & Dressing, H. (2004). Epidemiology of involuntary placement of mentally ill people across the European Union. *British Journal of Psychiatry*, *184*(2), 163–168. https://doi.org/10.1192/bjp.184.2.163

Saya, A., Brugnoli, C., Piazzi, G., Liberato, D., Di Ciaccia, G., Niolu, C., & Siracusano, A. (2019). Criteria, procedures, and future prospects of involuntary treatment in psychiatry around the world: A narrative review. *Frontiers in Psychiatry*, *10*, 271. https://doi.org/10.3389/fpsyt.2019.00271

Schloerke, B., Cook, D., Larmarange, J., Briatte, F., Marbach, M., Thoen, E., Elberg, A., Toomet, O., Crowley, J., Hofmann, H., & Wickham, H. (2020). GGally: Extension to 'ggplot2' (2.0.0) [Computer software]. https://CRAN.R-project.org/package=GGally

Sheridan Rains, L., Zenina, T., Dias, M. C., Jones, R., Jeffreys, S., Branthonne-Foster, S., Lloyd-Evans, B., & Johnson, S. (2019). Variations in patterns of involuntary hospitalisation and in legal frameworks: An international comparative study. *The Lancet Psychiatry*, *6*(5), 403–417. https://doi.org/10.1016/S2215-0366(19)30090-2

Statistics Norway. (2020). *07459: Population, by sex and one-year age groups (M) 1986—2020*. PX-Web SSB. http://www.ssb.no/en/statbanken/statbank/table/07459/

Weich, S., McBride, O., Twigg, L., Duncan, C., Keown, P., Crepaz-Keay, D., Cyhlarova, E., Parsons, H., Scott, J., & Bhui, K. (2017). Variation in compulsory psychiatric inpatient admission in England: A cross-classified, multilevel analysis. *The Lancet Psychiatry*, *4*(8), 619–626. https://doi.org/10.1016/S2215-0366(17)30207-9

Wennberg, J. E. (2010). *Tracking medicine: A researcher's quest to understand health care*. Oxford University Press.

White, R. (2019). fhidata: Structural data for Norway (2019.8.27). [Computer software]. https://CRAN.R-project.org/package=fhidata

Wickham, H., Averick, M., Bryan, J., Chang, W., McGowan, L., François, R., Grolemund, G., Hayes, A., Henry, L., Hester, J., Kuhn, M., Pedersen, T., Miller, E., Bache, S., Müller, K., Ooms, J., Robinson, D., Seidel, D., Spinu, V., …, Yutani, H. (2019). Welcome to the tidyverse. *Journal of Open Source Software*, *4*(43), 1686.

Wierdsma, A. I., & Mulder, C. L. (2009). Does mental health service integration affect compulsory admissions? *International Journal of Integrated Care*, *9*, e90.

Zinkler, M., & Priebe, S. (2002). Detention of the mentally ill in Europe—A review. *Acta Psychiatrica Scandinavica*, *106*(1), 3–8. https://doi.org/10.1034/j.1600-0447.2002.02268.x

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

How to cite this article: Hofstad, T., Rugkåsa, J., Ose, S. O., Nyttingnes, O., & Husum, T. L. (2021). Measuring the level of compulsory hospitalisation in mental health care: The performance of different measures across areas and over time. *International Journal of Methods in Psychiatric Research*, *30*(3), e1881. https://doi.org/10.1002/mpr.1881

APPENDIX

TABLE A1 Variation in the level of compulsory hospitalisation among 40 CMHC areas in Norway 2014-2018

		EQ	$EQ_{90/10}$	CV	SCV
Rates	Hospitalisations	5.6	1.9	32	6.1[a]
Per 100,000	Inpatients	3.2	1.9	24	3.4
Person per year	Los	5.6	2.6	36	8.0[a]
Median	Los	6.6	2.4	39	-
Average	Los	4.2	2.2	32	-

Note: Population >35,000. Extremal quotient (EQ) = max/min. $EQ_{90/10}$ = 90th decile/10th decile. Coefficient of variation (CV) = standard deviation/mean × 100. Systematic component of variation (SCV) × 100; reference for calculation in text.

Abbreviation: CMHC, Community Mental Health Centre.

[a] SCV adjusted for multiple admissions.

Appendix A2

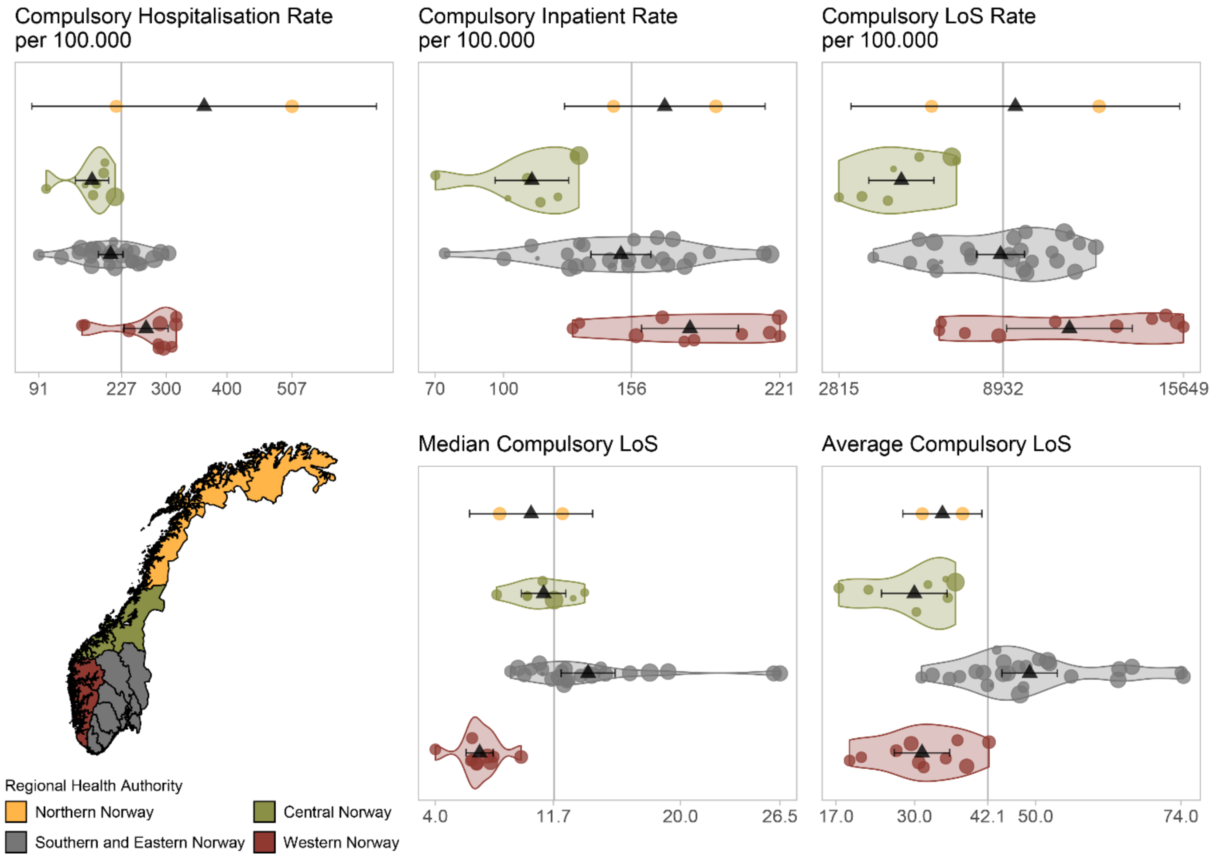


Figure 1A: Scatter points represent the average value for each CMHC with > 35 000 inhabitants in Norway 2014–2018, with point size reflecting population. Triangles show health region average with 95% confidence intervals. X-axes include minimum, maximum, and national average, which can also be seen in the vertical line. Map of Norway shows boundaries for Regional Health Authorities. CMHC: Community Mental Health Centre.

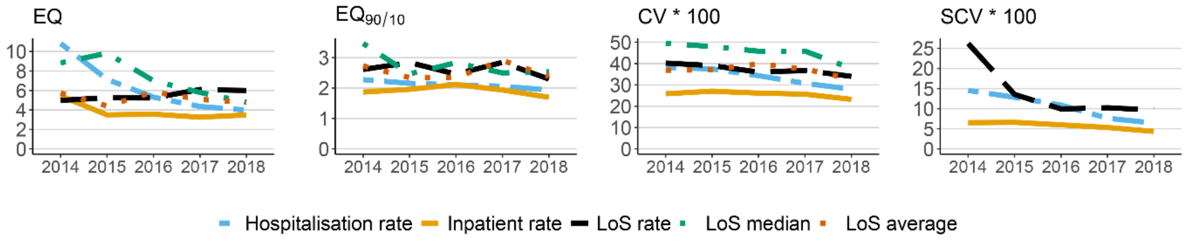


Figure 2A: Annual measures of geographical variation in levels of compulsory hospitalisation among CMHC areas with > 35 000 inhabitants in Norway 2014–2018. Extremal quotient (EQ) = max / min. EQ90/10 = 90th decile / 10th decile. Coefficient of Variation = standard deviation / mean × 100. SCV = Systematic Component of Variation × 100.

Appendix A2

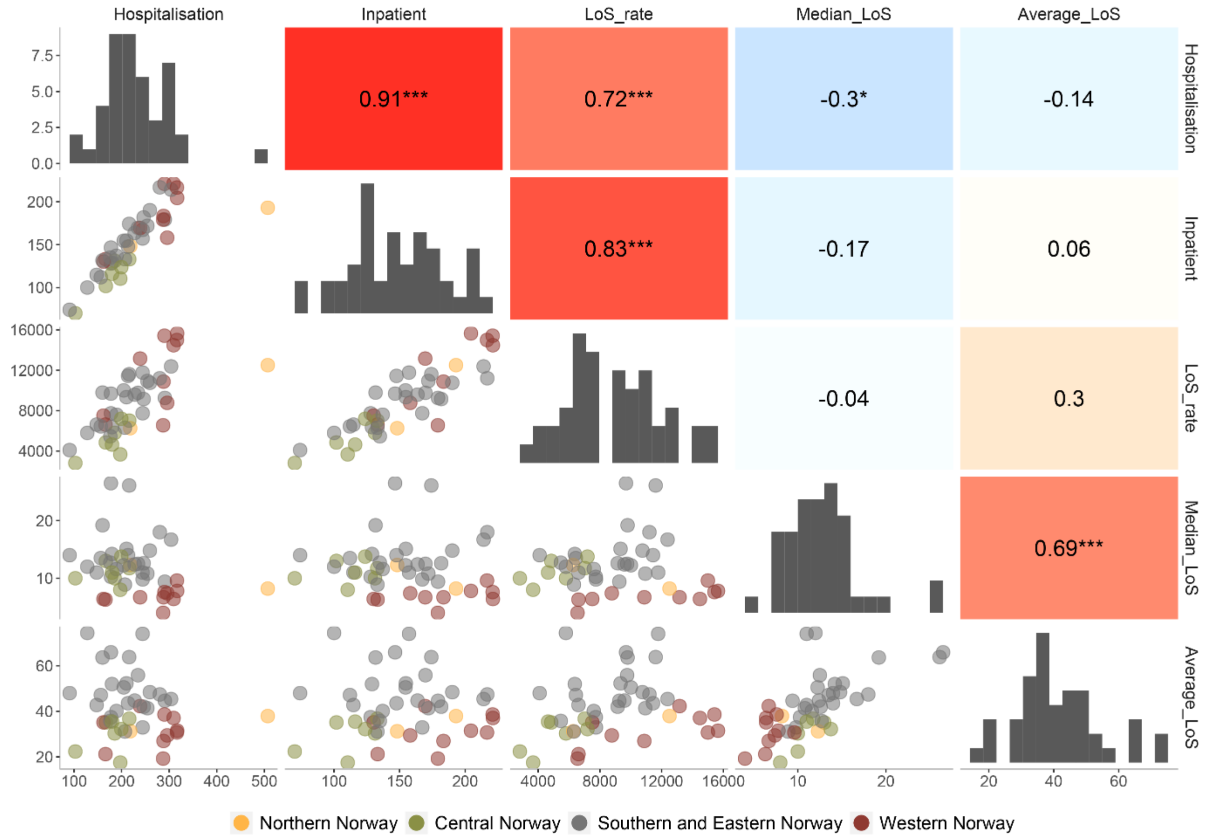


Figure 3A: Correlation plot shows measures of the level of compulsory mental health care in Norway 2014–2018 in CMHC areas with $>$ 35 000 inhabitants. Upper half: heatmap with Spearman's rho. Lower half: bivariate scatter plot. Diagonal: univariate distribution.

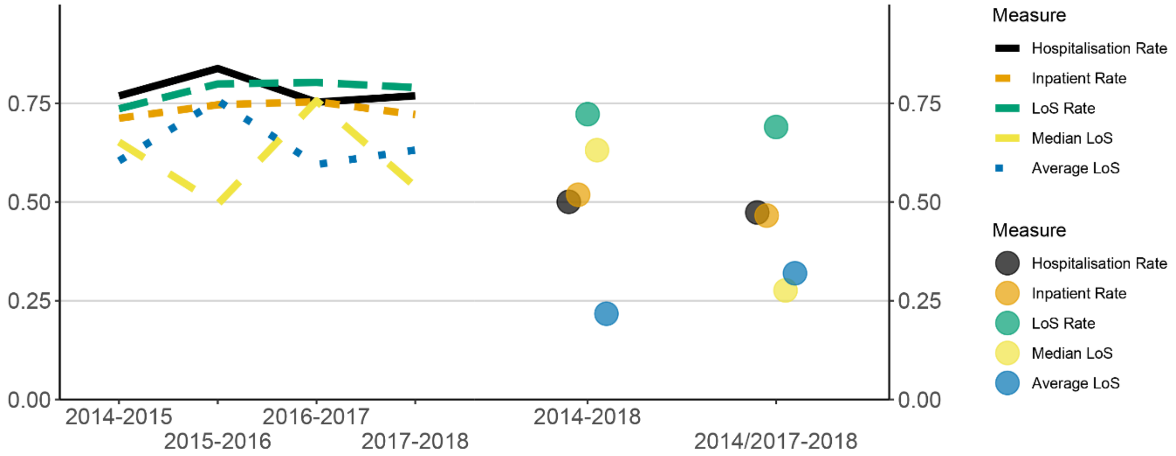


Figure 4A: The left section of the figure shows explained variance in ranked levels of compulsory hospitalisation as predicted from the previous year's levels. The right section shows explained variance for 2018 predicted by levels from 2014 and from the average levels during 2014–2017 in CMHC areas with $>$ 35 000 inhabitants.

frontiers in Psychiatry

ORIGINAL RESEARCH
published: 09 December 2021
doi: 10.3389/fpsyt.2021.737698

Service Characteristics and Geographical Variation in Compulsory Hospitalisation: An Exploratory Random Effects Within–Between Analysis of Norwegian Municipalities, 2015–2018

Tore Hofstad[1*], *Jorun Rugkåsa*[2,3], *Solveig Osborg Ose*[4], *Olav Nyttingnes*[2], *Solveig Helene Høymork Kjus*[5] *and Tonje Lossius Husum*[1,6]

[1] Centre for Medical Ethics, Institute of Health and Society, University of Oslo, Oslo, Norway, [2] Health Services Research Unit, Akershus University Hospital, Lørenskog, Norway, [3] Centre for Care Research, University of South-Eastern Norway, Porsgrunn, Norway, [4] SINTEF, Health Services Research, Trondheim, Norway, [5] NTNU Social Research, Norwegian Resource Centre for Community Mental Health, Trondheim, Norway, [6] Department of Nursing and Health Promotion, Faculty of Health Sciences, Oslo Metropolitan University, Oslo, Norway

Edited by:
Sonja Mötteli,
Psychiatric University Hospital
Zurich, Switzerland

Reviewed by:
Graham Mellsop,
The University of Auckland,
New Zealand
Adam Gerace,
Central Queensland
University, Australia

***Correspondence:**
Tore Hofstad
tore.hofstad@medisin.uio.no

Specialty section:
This article was submitted to
Public Mental Health,
a section of the journal
Frontiers in Psychiatry

Received: *07 July 2021*
Accepted: *28 October 2021*
Published: *09 December 2021*

Citation:
Hofstad T, Rugkåsa J, Ose SO, Nyttingnes O, Kjus SHH and Husum TL (2021) Service Characteristics and Geographical Variation in Compulsory Hospitalisation: An Exploratory Random Effects Within–Between Analysis of Norwegian Municipalities, 2015–2018. Front. Psychiatry 12:737698. doi: 10.3389/fpsyt.2021.737698

Background: Compulsory hospitalisation in mental healthcare is contested. For ethical and legal reasons, it should only be used as a last resort. Geographical variation could indicate that some areas employ compulsory hospitalisation more frequently than is strictly necessary. Explaining variation in compulsory hospitalisation might contribute to reducing overuse, but research on associations with service characteristics remains patchy.

Objectives: We aimed to investigate the associations between the levels of compulsory hospitalisation and the characteristics of primary mental health services in Norway between 2015 and 2018 and the amount of variance explained by groups of explanatory variables.

Methods: We applied random-effects within–between Poisson regression of 461 municipalities/city districts, nested within 72 community mental health centre catchment areas ($N = 1,828$ municipality-years).

Results: More general practitioners, mental health nurses, and the total labour-years in municipal mental health and addiction services per population are associated with lower levels of compulsory hospitalisations within the same areas, as measured by both persons (inpatients) and events (hospitalisations). Areas that, on average, have more general practitioners and public housing per population have lower levels of compulsory hospitalisation, while higher levels of compulsory hospitalisation are seen in areas with a longer history of supported employment and the systematic gathering of service users' experiences. In combination, all the variables, including the control variables, could account for 39–40% of the variation, with 5–6% related to municipal health services.

Conclusion: Strengthening primary mental healthcare by increasing the number of general practitioners and mental health workers can reduce the use of compulsory hospitalisation and improve the quality of health services.

Keywords: compulsory hospitalisation, geographical variation, service characteristics, nested generalised linear mixed model, random effects within-between models

INTRODUCTION

Compulsory hospitalisation deprives patients of their liberty and remains contested. This is due to both negative experiences with coercion reported by patients (1, 2) and a lack of reliable studies that demonstrate beneficial outcomes of such hospitalisations. Compulsory hospitalisation is bound by law as a last resort, after voluntary care has been tried or deemed futile. There have been multiple initiatives to reduce its use, including the European Council's recommendation to abolish coercion in mental healthcare (3). Yet, clinicians continue to assess patients to occasionally require admission against their will (4), for instance to prevent serious harm, which might partly explain why no jurisdiction seems able to do entirely away with coercive practice (5).

The observed variation in the levels of compulsory hospitalisation within jurisdictions is noteworthy (6–12) and shows up to a sixfold difference between the highest and lowest average rate of compulsory hospitalisation per 100,000 inhabitants in hospital catchment areas (13). If such variation does not have any clear explanation, this could indicate that certain areas use more compulsion than strictly necessary and, thus, have a potential for reduction.

The risk of compulsory hospitalisation has repeatedly been linked to individual level characteristics, such as the presence of severe mental illness (SMI), previous compulsory hospitalisation, male gender, single or divorced marital status, unemployment, and receipt of welfare benefits (14). However, only a few studies have focused on the organisation of health services, which might complement our understanding of what we consider risk or preventive factors, for compulsory hospitalisation.

There are reasons to believe that the existence of supportive, voluntary alternatives acceptable to both patients and health professionals can reduce the need for compulsory hospitalisation by facilitating recovery or crisis management. A study from Belgium showed that the lack of less restrictive alternatives was a stronger predictor for compulsory hospitalisation than was the presence of a mental disorder or dangerousness (15). This suggests that, to help minimise excessive compulsion usage, it is important to ascertain whether differences in the organisation and resources of primary mental health services are associated with more, or less, compulsory hospitalisation (16). To widen the scope of the existing literature, which primarily focuses on patient-related factors, we will specifically investigate the role of service characteristics, and we select factors that have been associated with compulsory admissions in the literature or, there is good reason to believe have such associations.

Service Characteristics Related to Compulsory Hospitalisation

Compulsory hospitalisation has been associated with the size and constitution of the primary mental health *labour force*. A report from Norway found lower rates of compulsory hospitalisation in hospital catchment areas with more labour-years in primary mental health services per population (17). Poor housing or homelessness can both be a consequence of and a risk factor for SMI. Providing *public housing* for individuals in high-risk groups might thus reduce the need for compulsory hospitalisation. A French study found lower rates of involuntary inpatients in areas with increased housing capacity for disabled individuals and slightly higher rates in areas with more general practitioners (GPs) (6). Explanations for the latter finding ranged from GPs' lack of ability to identify and treat mental health needs to a possible confounding with urbanisation.

Unemployment has been associated with a higher risk of compulsory hospitalisation (18). Unemployment reduces income and impacts social status, both of which might lead to the deterioration of mental well-being. In addition, unemployment might also result from mental illness. Area-based coordinated initiatives for *employment support* that aim to facilitate the employment of individuals with SMI (19) might therefore impact the risk of compulsory hospitalisation.

It seems likely that the quality of *cooperation between service levels* might impact the levels of compulsory hospitalisation. In Norway, staff in specialist services are expected to supervise and offer consultations to their colleagues in primary health services (20). Those working in these services have identified good collaboration as a factor that has the potential to reduce the use of compulsion (21). Furthermore, *recovery-oriented practice* focuses on rehabilitation and empowerment (22). Recovery principles, including the *systematic gathering of experiences from service users*, can influence how primary mental health services are organised and delivered, for instance by contributing unique expertise through lived experience (23), which might increase the likelihood of services being received voluntarily.

Finally, *early intervention services* that seek to identify mental health problems and intervene at an early stage (24) could theoretically be associated with the level of compulsory hospitalisation.

Aims

The overarching aim of this investigation is to explore the relationships between the levels of compulsory hospitalisation and the organisation of primary mental health services. We will answer the following research questions:

1) What is the direction and the strength of association between selected characteristics of primary mental health services and the area level of compulsory hospitalisation?
2) How much of the variation in compulsory hospitalisation is accounted for by the area's *age distribution, deprivation level, SMI prevalence*, and *municipal mental health services?*

METHODS

Study Design

The study design is a retrospective exploratory panel analysis with hierarchical models that account for clusters at different levels, using an approach that separates variation within and between areas.

Study Context

Primary healthcare in Norway is delivered by local authorities, which are also responsible for social care and public housing. These consist of municipalities and the city districts of the four largest cities (Oslo, Stavanger, Bergen, and Trondheim). These 461 areas (hereafter referred to as municipalities) constitute our level of analysis. All use of compulsory mental healthcare is initiated by specialist services, which is delivered by 22 state-owned Hospital Trusts. The Hospital Trusts have acute inpatient wards and Community Mental Health Centres (CMHC) that deliver decentralised specialist treatment, often in cooperation with the municipalities. During the study period, the number of municipalities reduced from 459 to 457 in 2017 and to 453 in 2018, and the CMHC catchment areas reduced from 69 to 67 in 2017 and to 65 in 2018.

Compulsory hospitalisation is regulated by the 1999 Norwegian Mental Health Care Act. The main legal criterion for admitting patients for involuntary observation or treatment is that the patient must suffer from a serious mental disorder. Additionally, voluntariness must have been tried, the patient's condition must be likely to deteriorate without treatment, or the patient poses an immediate risk to themselves or others. From 2017, compulsory care is only permitted for patients who lack the capacity to consent to treatment, unless there is immediate and serious risk to the patient's own life or the life or health of others.

Sample and Data Sources

Individual level data on all contacts with specialist services in Norway are routinely recorded in the National Patient Register (25). We acquired data for each episode of compulsory hospitalisation during 2015–2018 and for each contact with specialist services by people with SMI. The population at risk of compulsory hospitalisation was defined as all individuals between 18 and 65 years residing within a Norwegian municipality during the study period. This range was chosen since services are organised differently for the other age groups. We excluded individuals without a Norwegian identification number or those from whom information on residency was missing (1 and <0.001% of people compulsorily hospitalised, respectively).

Information on population, public housing, and labour-years of GPs and mental health nurses was collected from Statistics Norway. To calculate the population-based rates, we included all individuals between 18 and 65 years residing in each municipality during the study period.

Information on the remaining service characteristics was obtained from the annual report to the Norwegian Directorate of Health by the mental health and addiction services in each municipality (26). Unemployment data were provided by the Norwegian Labour and Welfare Administration. **Table 1** contains the description and data source for outcomes and the explanatory and control variables. More detailed information about the data sources can be found in the **Appendix**.

Variables

We have previously shown that the geographical variation in the level of compulsory hospitalisation appears larger when rates are based on the number of hospitalisations (events), rather than the number of patients hospitalised (individuals), and that including both outcomes is likely to yield a more encompassing picture (13). Two outcome measures were therefore employed in the present analysis: (i) the annual number of compulsory hospitalisations (for observation or treatment) and (ii) the annual number of patients with at least one compulsory hospitalisation.

The municipal mental health and addiction services are interdisciplinary, and the total number of labour-years included nurses, healthcare workers, GPs, and psychologists. The rates were calculated by dividing counts by the population aged 18–65 years. The question of the perceived quality of the cooperation between primary and secondary mental health services and the question on the recovery orientation of services were scored by service managers in each municipality. Answers for the latter two were recoded as numeric variables ranging from one to five, where a higher score represented better cooperation or greater extent of recovery orientation. Housing First, employment support, early intervention, and service users' perspectives were included as dummy variables. Data on recovery perspectives were only available for 2017–2018, while data on Housing First and early intervention were only available for 2015.

To adjust for differing risks due to age distribution, the population share aged 20–39 years was included as a covariate since this age group has a higher risk of compulsory hospitalisation. Similarly, the municipality's share of population aged 65 years and over was included due to the lower risk in this age group. The annual number of individuals who had or received a diagnosis of SMI and were in contact with specialist services, divided by the area's at-risk population and multiplied by 1,000, was included to account for differences in case mix. SMI was defined according to the International Classification of Diseases 10th revision (ICD-10) diagnosis codes F20–F31 (27). To account for differences in area deprivation level, the proportion of people living in crowded housing and the unemployment rate were included as covariates. Finally, dummy variables were added for each year. Neither of these control variables were assumed to be caused by the outcomes or the exposures of interest, but they could theoretically impact both.

TABLE 1 | Description of measures and data sources.

Name of measure	Description of measure	Data source
Outcomes		
Compulsory hospitalisations	Number of episodes of compulsory hospitalisation per year. Population aged 18-65	NPR
Compulsory hospitalised patients	Number of individuals hospitalised compulsory per year.	NPR
Explanatory variables		
Overall labour-years	Total number of labour-years within municipal mental health and addiction services per 1,000 population.	IS 24/8
General practitioners	Labour-years for physicians in the municipal health and care services per 1,000 population.	Statistics Norway
Mental health nurses	Labour-years for psychiatric nurses in the municipal health and care services per 1,000 population.	Statistics Norway
Public housing	Total number of municipal disposed dwellings per 100 inhabitant.	Statistics Norway
Housing first	Has the municipality/city district employed "Housing First?" (Yes/No).	IS 24/8
Employment support	Has the municipality used IPS/Supported Employment within mental health and substance misuse work? (Yes/No).	IS 24/8
Quality of cooperation between municipality and specialist services	How do you evaluate that the cooperation agreement between municipality and health trust. is working for adults with mental health difficulties/illness? (Very good/Good/Medium/Poor/Very poor).	IS 24/8
Early intervention	Has the municipality made initiatives to uncover mental health or addiction problems as early as possible? (Yes/No).	IS 24/8
Recovery Perspectives	To what extent would you say that the services in mental health and addiction in your municipality is recovery oriented? (Very great extent/Great extent/Some extent/Small extent/Very small extent).	IS 24/8
Service users' Perspectives	Has the municipality in a systematic way gathered user experiences within mental health or addiction services during the last 12 months? (Yes/No).	IS 24/8
Control variables		
Share of population aged 20–39	Number of individuals aged 20–39 divided by total population in area.	Statistics Norway
Share of population 65 +	Number of individuals older than 65 years divided by total population in area.	Statistics Norway
SMI per 1,000	Annual number of people with severe mental illness who was in contact with specialist services divided by total population in area, multiplied by 1,000.	NPR
Crowded housing	Percentage of households that live in crowded housing.	Statistics Norway
Unemployment rate	Percentage of work force, age 15–74, that is unemployed.	Norwegian Labour and Welfare Administration

Statistical Analysis

In order to answer research question one, associations between the health service characteristics and compulsory hospitalisations were explored using generalised linear mixed models, which account for non-independence of observations (28). Random intercepts for municipalities nested within CMHC catchment areas were modelled to allow for differences in compulsory hospitalisation between areas at both levels. A random-effects within–between approach was employed, as recommended in the literature (29). Between-area associations are investigated by comparing areas cross-sectionally, while longitudinal data also contain within-area variance which can be used to compare each area with itself at different time points. In order to disentangle the two sources of variation, each time-varying predictor was split into two, where the municipality average during the study period was used to estimate between-area associations, while the deviation from the municipality average was used to estimate within-area associations. These within-area associations are useful for predicting change in the levels of compulsory hospitalisation when specific service characteristics change, as they are not biased by omitted variables at the municipality level since all unmeasured time-invariant variables are absorbed into the between effect. For the binary variables, the between association represents the proportion of time the municipality employed that measure.

Since the outcomes were counts, a Poisson error distribution was assumed and a log link function was used (30). Since the municipalities differ in population size, the log of the population aged 18–65 years was used as offset, which changed the outcome to rate per population. Rather than combining all variables in one large model, separate models were run for each explanatory variable to avoid conditioning on potential colliders and mediators. Models were fit using the Laplace approximation. In order to quantify the predicted change in the levels of compulsory hospitalisation between and within areas, conditional effect plots were created for the four continuous explanatory variables. The equations for the hierarchical models and the descriptions of the effect plots are found in the **Appendix**. For the two explanatory variables where only one wave of data was available, cross-sectional analysis in the form of Poisson regression was performed using CMHC catchment area as fixed effect.

In order to answer the second research question of variance explained for groups of explanatory variables, the marginal R^2 suggested by Nakagawa and Schielzeth was calculated (31), which only considers the variance of the modelled variables, in other words the fixed effects, and not the random effects. Separate values were calculated for *age distribution in the area; area deprivation level*, which included the unemployment rate and share living in crowded housing; and *illness prevalence*, which is the number of individuals diagnosed with SMI who were in contact with specialist services each year. All variables on *service characteristics* were included in the same model in order to evaluate the combined explanatory power. The explained variance of the labour-years of mental health nurses and recovery perspectives was estimated in a separate model due to the higher number of missing values. Finally, all groups were included in the same model in order to estimate the *total* variance explained by all groups of variables. To ensure that the same number of units were compared for all groups of variables, only units without missing values for all groups of variables were included in these analyses. Finally, model performance and robustness were checked by estimating models differing in nesting, models controlling for grand mean change of predictors over time, and models using the fixed-effect Poisson estimator with White's heteroscedasticity robust standard errors and area-clustered standard errors. All analyses were performed using R version 4.0.3 (32) and the following packages: *tidyverse* (33) and *data.table* (34) for data wrangling, *ggplot2* for graphs (35), and *ggeffects* 1.0.2 (36) for calculating marginal effects. For multilevel analyses, *lme4* 1.1.26 (37) was used with the "bobyqa" optimiser. For the fixed-effect Poisson estimator, the *fixest* package was used (38). The *performance* 0.7.0 package (39) was used to evaluate model performance and to calculate R^2.

Missing Values

Completeness across all data sources was in general very good, except for three explanatory variables with 12–21% missing. Two of these were only available for 2015 (Housing First and early intervention). In these two cases, multiple imputation was performed using the *mice* package (40), with default settings and 20 imputations. For the third variable, labour-years of mental health nurses, 392 observations (21.4%) were missing among municipality-years, and 51 municipalities (12.2%) had missing values for the level 2 between-area association. This and the remaining variables with missing values were handled by listwise deletion.

Ethics

The South-Eastern Regional Research Ethics Committee gave permission to analyse de-identified registry data, but otherwise deemed the study as falling outside their remit as specified by the Norwegian Health Research Act (ref. 2018/795). The project was therefore approved by the Privacy Ombudsman at Akershus University Hospital following a detailed data protection impact assessment (ref. 2018-090).

RESULTS

Descriptive Statistics

The average number of compulsory hospitalisations in each municipality varied from 0 to 206, with a mean value of 14.6. Descriptive statistics of the municipalities' average values during the study period can be seen in **Table 2**.

Associations Between Features of Mental Health Services and Levels of Compulsory Hospitalisation

The intraclass correlation is equal to the variance partition coefficient for models with only random intercepts and shows the amount of variation due to systematic differences between the municipalities nested within the CMHC catchment areas. For compulsorily hospitalised patients, the clustering accounted for 40% of the variation (CMHC = 15%, municipality = 25%); for compulsory hospitalisations, the clustering accounted for 62% of the variation (CMHC = 19%, municipality = 43%).

Figure 1 shows the exponentiated regression coefficients from eight different multilevel Poisson models, which can be interpreted as rate ratios. They represent the relative change in the annual rates of patients and hospitalisations per population that would be expected for a one unit increase in each explanatory variable, while accounting for control variables. Unadjusted models are included in the **Appendix**, along with the robustness checks and model performance.

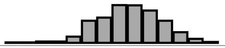
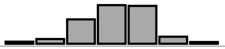
Most associations were larger when the outcome was hospitalisations compared to patients. The largest unstandardised rate ratios were seen within areas for GPs and mental health nurses. A 12–16% increase of GPs per population from the area average was associated with a reduction of one compulsory hospitalisation, as seen in the conditional effect plots in the **Appendix**. For the total number of labour-years in municipal mental health and addiction services, the trends were weaker, and the association was marginally in the opposite direction for the between-area comparisons.

Higher numbers of public housing were also associated with lower levels of compulsory hospitalisation, as measured by both patients and hospitalisations, and both within and between municipalities. In contrast, areas with supported employment had 0.09 times higher rates of compulsorily hospitalised patients and 0.16 times higher rates of compulsory hospitalisation compared to areas without supported employment.

For the measurements of cooperation between municipal and specialist services, there was no discernible within association, but municipalities that more often rated the cooperation to be good had lower levels of compulsory hospitalisation compared to municipalities where the cooperation was rated as poorer; however, the 95% confidence intervals (CIs) included 1.

For recovery perspectives in municipal services, three of four associations pointed towards higher levels of compulsory hospitalisations, particularly within municipalities. Similarly, areas that systematically gathered service user's perspectives had

TABLE 2 | Characteristics of Norwegian municipalities and city districts, 2015–2018.

Name of measure	Municipality-years	% missing	Mean	Min	Max	SD	Distribution
Compulsory hospitalisations	1,828	0	14.6	0	206	25.2	
Compulsory hospitalised patients	1,828	0	10.8	0	120	18.0	
Population aged 18–65	1,828	0	7,198	120	76,681	10,057	 *
Share of population aged 20–39	1,828	0	23.6	16.2	69.5	5.0	
Share of population 65+	1,828	0	18.3	3.0	28.7	4.0	
Severe mental illness per 1,000	1,828	0	1.6	0	9.1	0.9	
Crowded housing share	1,828	0	8.2	2.4	29.6	3.7	
Unemployment share	1,821	0.4	2.3	0.5	9.5	1.1	
Labour years per 1,000							
Total in municipal mental health	1,828	0	3.7	0.7	14	1.6	
General practitioners	1,828	0	1.3	0.2	3.4	0.5	
Mental health nurses	1,604	12.2	0.4	0.01	2.3	0.4	
Public housing per 100	1,828	0	2.6	0.1	9.0	1.2	
Housing first[†]	387	15.7	0.1	0	1	0.4	
Supported employment	1,824	0.2	0.2	0	1	0.3	
Quality of cooperation	1,820	0.4	3.5	1	5	0.5	
Early intervention[†]	403	12.2	0.8	0	1	0.4	
Recovery perspectives[††]	900	1.1	3.8	1	5	0.7	
Systematic gathering of user experiences	1,824	0.2	0.5	0	1	0.3	

Descriptive statistics are based on the average values for Norwegian municipality/city districts in 2015-2018.

**Distribution shows logged values.*

[†] *Data available from 2015.*

[††] *Data available from 2017 and 2018.*

0.13 times higher rates of compulsorily hospitalised patients and 0.19 times higher rates of compulsory hospitalisation compared to areas that did not gather service user's perspectives systematically.

The cross-sectional analyses (only reported in text) showed that the levels of compulsory hospitalisation were higher in municipalities that reported initiatives to uncover mental health problems as early as possible, after adjusting for area demographics and socio-economic status (patients: $\beta = 1.1$, 95% CI = 0.96–1.26, $p = 0.16$; hospitalisations: $\beta = 1.19$, 95% CI = 1.06–1.34, $p = 0.004$) compared to municipalities without such measures. Similarly, municipalities that employed Housing First had more compulsorily hospitalised patients compared to areas without a Housing First policy (patients: $\beta = 1.14$, 95% CI = 1.00–1.30, $p = 0.049$; hospitalisations: $\beta = 0.97$, 95% CI = 0.82–1.14, $p = 0.69$).

Amount of Variance Explained by Groups of Explanatory Variables

In total, all the groups of variables accounted for 39–40% of the variation, as seen in **Figure 2**. The municipal mental health services accounted for 5% of the variation in compulsorily hospitalised patients and 6% of compulsory hospitalisations. The separate model containing the labour-years of mental health nurses and recovery perspectives accounted for roughly 1.5% of the variation. In contrast, the annual number of individuals diagnosed with SMI per 1,000 alone accounted for 29–33% of the variation.

DISCUSSION

This study showed considerable geographical variation in compulsory hospitalisation between Norwegian municipalities

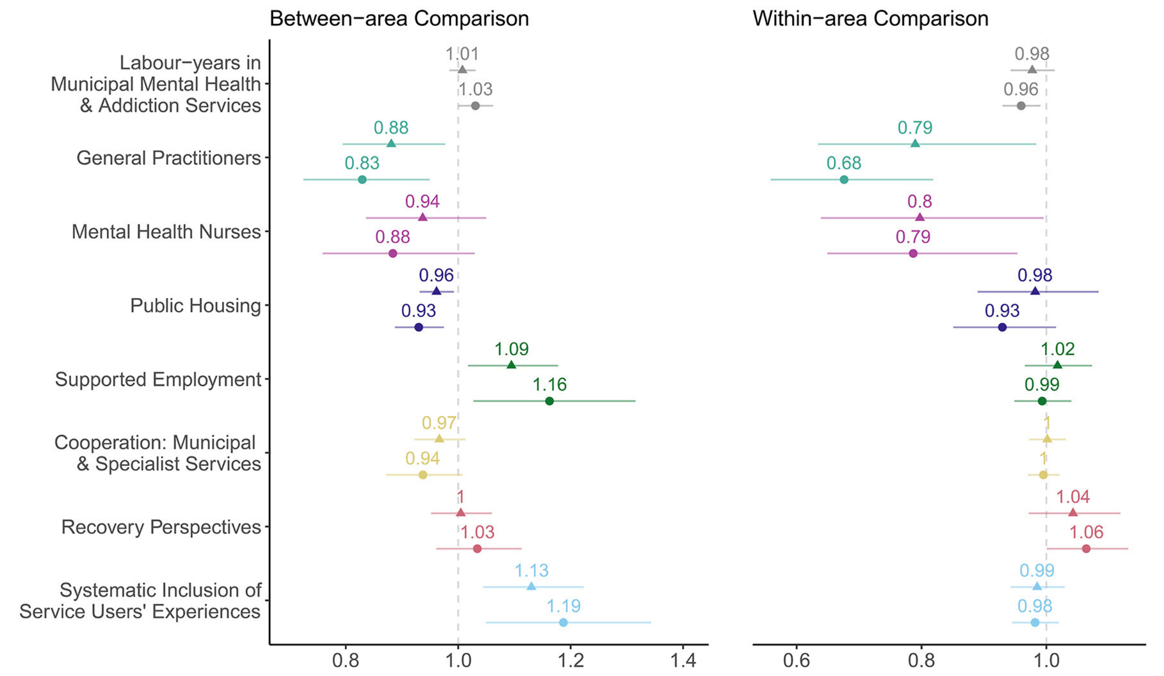


FIGURE 1 | Between- and within-area associations of municipal mental health service in Norway, 2015–2018. ▲, patients; ●, hospitalisations. Rate ratios with 95% Wald confidence intervals.

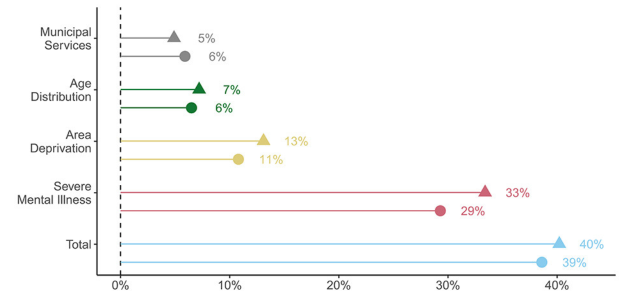


FIGURE 2 | Amount of total variance explained by groups of explanatory variables. ▲, patients; ●, hospitalisations.

in 2015–2018, which was associated with several characteristics of the municipal mental health services, both when comparing areas cross-sectionally and when comparing each area with itself over time. Higher levels of labour-years of GPs and mental health nurses were associated with lower levels of compulsory hospitalisation. Furthermore, areas that on average had more public housing had lower levels of compulsory hospitalisation compared to areas that on average had less public housing. Higher levels of compulsory hospitalisation were observed in areas that had strategies for employment support for longer time periods compared to areas with shorter or no employment support. Similarly, areas that reported to systematically include user experiences in multiple years showed higher levels of compulsory hospitalisation compared to areas that, to a lower extent, included user experiences. Somewhat higher levels of compulsory hospitalisation were also seen within municipalities over time for services reporting high levels of recovery orientation. Combined, the variables on municipal mental health services could account for a modest 5–6% of the observed variation.

Our findings suggest that GPs play an important role in reducing compulsory hospitalisations. GPs often serve as the first, and only, health service for mental disorders and as the gateway to other services. More GP capacity may provide more time for treatment and continuity and help patients avoid deterioration. In a Norwegian study, referrals to compulsory hospitalisation were more often made by physicians who did not know the patient (41), as opposed to GPs. Our results imply that the risk of compulsory hospitalisation could increase in areas that struggle to maintain their GP-to-inhabitant ratio and that strengthening the GP service could aid in preventing compulsory admissions. This association was slightly weaker between areas, but still robust to different model specifications. This is seemingly in contrast to the finding of Gandré et al. (6) from France of increased levels of compulsorily hospitalised patients in areas with more GPs. However, their variable suffered from collinearity, and the 95% CI for the regression coefficient included 1. Furthermore, since the organisation and the content of healthcare services differ between countries, the results are not directly comparable.

The labour-years of mental health nurses showed somewhat weaker negative within- and between-area associations with both compulsory hospitalisations and compulsorily hospitalised patients, which is in line with previous findings from Norway (17) and Finland (42). More labour-years can enable frequent contact and group activities, facilitating peer discussions and the development of a therapeutic alliance (43). Furthermore, increased availability of personalised supervision for coping and maintaining a stable everyday life can enable early discovery and prevent the deterioration of known SMI, reducing the need for compulsory hospitalisation. Conversely, in small, rural municipalities where one or two mental health nurses might represent the only staff, services are more vulnerable, and challenges can arise when there is sick leave among the staff, or when the need for service arises outside of office hours.

The total number of labour-years in municipal mental health services showed less pronounced associations, but demonstrated the benefits of separating within- and between-variation (29). More labour-years within each area was associated with fewer compulsory hospitalisations, while municipalities that on average employed more labour-years had higher levels of compulsory hospitalisation compared to municipalities with fewer labour-years. Such a finding could emerge if more labour-years resulted in reduced levels of compulsory mental healthcare, but that the increase in labour-years primarily occurred in areas with challenging case mix and high rates of compulsory mental healthcare.

There was a slightly lower rate of compulsory hospitalisations for each additional public housing per 100 inhabitants. Insecurity regarding living conditions is likely to have a major impact on individuals who are already vulnerable (21, 44).

There were more compulsorily hospitalised patients in areas that employed Housing First and slightly higher levels of compulsory hospitalisations in areas that had employment support. These are services that are found in a minority of municipalities and are likely to be initiated based on needs. As these services are not mandatory, they will have to be prioritised in competition with other municipal initiatives. Consequently, employment support or Housing First does not necessarily increase the risk of compulsory hospitalisation, but could rather indicate that these programs may have been initiated in areas with more compulsory hospitalisation.

Concerning cooperation between municipalities and health trusts, we observed slightly lower levels of compulsory hospitalisation in municipalities that gave a favourable rating of their cooperation with specialist services compared to areas with a less favourable rating. This is in line with perspectives from professionals within primary mental health services, who considered poor collaboration with secondary mental health services a risk factor for compulsory hospitalisation (21).

Municipalities that reported initiatives to uncover mental health problems as early as possible showed moderately higher levels of compulsory hospitalisation. One explanation could be that these initiatives uncover individuals who are in need of treatment, but are unable or unwilling to receive voluntary treatment, in line with the findings of Weich et al. (45). Their study identified higher awareness of treatment needs as a possible explanation for the higher levels of compulsory hospitalisation. Alternatively, it could be that areas with low levels of compulsory hospitalisation see less need to initiate early intervention measures.

Recovery-oriented services showed a somewhat surprising positive, but weak, within-area association. Since we only had access to 2 years of data for this variable, the within-area comparisons are less likely to reliably measure weak associations. Furthermore, our measure says nothing about what a recovery-oriented service actually implies (46). Still, we remain open to the possibility that applying more recovery perspectives in municipal mental health services could result in more compulsory hospitalisations, and that recovery perspectives may also exist within services with high levels of compulsory hospitalisation (47).

The systematic gathering of user experiences was associated with slightly higher levels of compulsory hospitalisations between areas. A possible explanation of this could be that municipalities with higher levels of compulsory hospitalisation are more inclined to include user experiences. However, the users of municipal mental health services who inform the municipalities might not be the patient group most likely to be compulsorily hospitalised, which would give less reason to expect reductive effects of including user experiences.

In summary, several of the explanatory variables showed negative associations with the levels of compulsory hospitalisation. Meanwhile, some measures, such as Housing First, employment support, and inclusion of user perspectives, showed somewhat surprising between-area associations. This raises the question whether these measures were initiated based on needs, or that perhaps municipalities attempt to remedy service sectors that they find particularly challenging.

BOX 1 | Commentary: Lived Experience by Solveig H. H. Kjus.

I have personal experience of community and inpatient mental health services, both voluntary and compulsory hospitalisation. I commented on drafts of this article and contributed to discussions concerning the design of the project.

The study finds that higher levels of labour-years of GPs and mental health nurses were associated with lower levels of compulsory hospitalisation. This seems reasonable from a patient's view. The availability of GPs and mental health staff might secure and contribute to the alliance between the person and the healthcare system.

The study also indicates that more public housing was associated with lower levels of compulsory hospitalisation. Having a home that feels secure and comfortable is important for all people, also persons with SMI, and feeling secure and comfortable at home might reduce stress and deterioration that otherwise could end in a compulsory hospitalisation. The possibility to achieve this might be higher if the municipality has more public housing.

The study indicates that good cooperation between municipalities and specialist services was associated with lower levels of compulsory hospitalisation. This cooperation is important for the person to feel taken care of, and it increases the experience of continuity in the services, which is especially important for persons with SMI.

It is a limitation of the study that it does not include all involuntary *referrals*-only those that ended in a compulsory hospitalisation. The possible experience of being taken by force to compulsory hospitalisation is similar, even if the referral did not result in a compulsory hospitalisation. This might represent a trauma for the patient, next of kin, and other persons watching. A compulsory referral can therefore initiate that the person withdraws from future voluntary treatment, which, in turn, might end in new compulsory hospitalisations.

The geographical variation was larger for counts of hospitalisations than patients, and so were most associations. In combination, the variables on municipal mental health services could account for 5–6% of the total variation, which was equal to or less than the variation due solely to age distribution or area deprivation, and far less than the variation explained by the rates of individuals with SMI. This could indicate that improving municipal mental health services, at least the parameters included here, is no panacea for reducing the levels of compulsory hospitalisation. When all groups of variables were included in the same model, they were able to account for 39–40% of the variation according to the marginal R^2. Further research is required to uncover other possible explanations for the geographical variation.

STRENGTHS AND LIMITATIONS

The major strength of our study is that we had access to the entire population of people who were compulsorily hospitalised in Norway during the study period, yielding few selection problems. Furthermore, we employed a methodology that allowed us to separate variation at different levels of hierarchical clusters, as well as differentiating within- and between-area associations. Since we included data from all municipalities during the study period, these findings are likely to be representative of current practise.

The decision to also include measures of hospitalisations and not only patients, or first events, violate principles of independent observations that underlie the use of Poisson models and could result in deflated standard errors. This could be a concern if certain patients living in small municipalities contributed many hospitalisations; however, this was not a pervasive problem.

Since our study was exploratory, we did not adjust for multiple comparison (48). Future studies employing pre-planned hypotheses ought to be performed to confirm the associations observed in this study. Finally, the results from this study are not necessarily generalisable to other countries with different legislation and organisation of health services.

CONCLUSION

This study shows considerable geographical variation in compulsory hospitalisation between municipalities. It indicates that increases in labour-years of GPs and mental health nurses, as well as public housing, are associated with lower levels of compulsory hospitalisation, as measured by inpatients and hospitalisations. Strengthening the municipal mental health services by providing resources for more GPs and mental health workers in the municipal services, and providing more public housing might thus contribute toward reaching health political ambitions of reducing the use of compulsory hospitalisation. This study also illustrates the importance of combining analyses of within- and between-area variation in longitudinal research on compulsory mental healthcare.

DATA AVAILABILITY STATEMENT

The data analysed in this study is subject to the following licences/restrictions: The data that support the findings of this study are available from the Norwegian Patient Registry and the Norwegian Directorate of Health. Restrictions apply to the availability of these data, which were used under licence for this study. Requests to access these datasets should be directed to https://www.helsedirektoratet.no/tema/statistikk-registre-og-rapporter/helsedata-og-helseregistre/norsk-pasientregister-npr/sok-om-data-fra-npr.

ETHICS STATEMENT

Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

This study forms part of a larger research program for which JR, in collaboration with ON and TLH, obtained funding and accessed data. TH, JR, SOO, and TLH designed the present study. TH designed and performed the data analysis, created the figures, and wrote the first draft of the manuscript. SHHK wrote the lived experience commentary. All authors revised the manuscript in several rounds and approved the final version.

FUNDING

The study is part of the ReCoN—Reducing Coercion in Norway research project, which was funded by the Research Council of Norway (project no. 273546).

ACKNOWLEDGMENTS

The authors would like to thank Magne Thoresen at the University of Oslo for valuable comments regarding the mixed modelling, and the Research Council of Norway for funding.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyt.2021.737698/full#supplementary-material

REFERENCES

1. Norvoll R. Kunnskapsstaus med Hensyn til Skadevirkninger av Tvang I det Psykiske Helsevernet. Utredning for paulsrudutvalget. [Knowledge Status With Regard to Adverse Effects of Coercion in the Mental Health Field. Study for the Paulsrud Committee]. *NOU*. (2011) 9:367–79. Available online at: https://www.regjeringen.no/no/dokumenter/nou-2011-9/id647625/?ch=12
2. Katsakou C, Priebe S. Outcomes of Involuntary Hospital Admission–a Review. *Acta Psychiatr Scand*. (2006) 114:232–41. doi: 10.1111/j.1600-0447.2006.00823.x
3. Council of Europe. *Ending Coercion in Mental Health: The Need for a Human Rights-Based Approach. Recommendation (2158)*. (2019). Available online at: https://Pace.coe.int/pdf/C16722d6137d2709fcacd22cfa7e55a2d95f5fb63326667a8259ffe25682ae_848428feba12/Resolution%202291.pdf
4. Freeman MC, Kolappa K, de Almeida JMC, Kleinman A, Makhashvili N, Phakathi S, et al. Reversing hard won victories in the name of human rights: a critique of the general comment on article 12 of the UN convention on the rights of persons with disabilities. *Lancet Psychiatry*. (2015) 2:844–50. doi: 10.1016/S2215-0366(15)00218-7
5. Saya A, Brugnoli C, Piazzi G, Liberato D, Di Ciaccia G, Niolu C, et al. Criteria, procedures, and future prospects of involuntary treatment in psychiatry around the world: a narrative review. *Front Psychiatry*. (2019) 10:271. doi: 10.3389/fpsyt.2019.00271
6. Gandré C, Gervaix J, Thillard J, Macé J-M, Roelandt J-L, Chevreul K. Geographic variations in involuntary care and associations with the supply of health and social care: results from a nationwide study. *BMC Health Serv Res*. (2018) 18:253. doi: 10.1186/s12913-018-3064-3
7. Donisi V, Tedeschi F, Salazzari D, Amaddeo F. Differences in the use of involuntary admission across the veneto region: which role for individual and contextual variables? *Epidemiol Psychiatr Sci*. (2016) 25:49–57. doi: 10.1017/S2045796014000663
8. Bindman J, Tighe J, Thornicroft G, Leese M. Poverty, poor services, and compulsory psychiatric admission in England. *Soc Psychiatry Psychiatr Epidemiol*. (2002) 37:341–5. doi: 10.1007/s00127-002-0558-3
9. Engberg M. Involuntary Commitment in Greenland, the Faroe Islands and Denmark. *Acta Psychiatr Scand*. (1991) 84:353–6. doi: 10.1111/j.1600-0447.1991.tb03159.x
10. Kjellin L. Compulsory Psychiatric Care in Sweden 1979–1993. *Soc Psychiatry Psychiatr Epidemiol*. (1997) 32:90–6. doi: 10.1007/BF00788926
11. Keown P, McBride O, Twigg L, Crepaz-Keay D, Cyhlarova E, Parsons H, et al. Rates of voluntary and compulsory psychiatric in-patient treatment in England: an ecological study investigating associations with deprivation and demographics. *Br J Psychiatry*. (2016) 209:157–61. doi: 10.1192/bjp.bp.115.171009
12. Hwang T-Y, Jung G, Lee C-J, Kim H-Y. Analysis of involuntary admissions in Korea through the admission management information system. *Int J Law Psychiatry*. (2020) 68:101542. doi: 10.1016/j.ijlp.2020.101542
13. Hofstad T, Rugkåsa J, Ose SO, Nyttingnes O, Husum TL. Measuring the level of compulsory hospitalisation in mental health care: the performance of different measures across areas and over time. *Int J Methods Psychiatr Res*. (2021) 30:e1881. doi: 10.1002/mpr.1881
14. Walker S, Mackay E, Barnett P, Sheridan Rains L, Leverton M, Dalton-Locke C, ET AL. Clinical and social factors associated with increased risk for involuntary psychiatric hospitalisation: a systematic review, meta-analysis, and narrative synthesis. *Lancet Psychiatry*. (2019) 6:1039–53. doi: 10.1016/S2215-0366(19)30406-7
15. Lorant V, Depuydt C, Gillain B, Guillet A, Dubois V. Involuntary commitment in psychiatric care: what drives the decision? *Soc Psychiatry Psychiatr Epidemiol*. (2007) 42:360–5. doi: 10.1007/s00127-007-0175-2
16. Rugkåsa J. Why we need to understand service variation in compulsion. *Lancet Psychiatry*. (2017) 4:577–8. doi: 10.1016/S2215-0366(17)30237-7
17. Bremnes R, Hatling T, Bjørngaard JH. *Tvungent Psykisk Helsevern med Døgnopphold I Perioden 2001-2006. Sluttrapport*. Trondheim, Norway: Sintef (2008). Report No.: A4319. Available online at: https://www.Sintef.no/Globalassets/Upload/Helse/Psykisk-Helse/pdf-Filer/Rapport_Sintef_A4319_Tvungent_Psykiskhelsevern_med_Dognopphold_2001_2006_Sluttrapport.pdf
18. Luciano M, Sampogna G, Del Vecchio V, Pingani L, Palumbo C, De Rosa C, et al. Use of Coercive Measures in Mental Health Practice and Its Impact on Outcome: A Critical Review. *Expert Rev Neurother*. (2014) 14:131–41. doi: 10.1586/14737175.2014.874286
19. Reme SE, Monstad K, Fyhn T, Sveinsdottir V, Løvvik C, Lie SA, ET AL. A randomized controlled multicenter trial of individual placement and support for patients with moderate-to-severe mental illness. *Scand J Work Environ Health*. (2019) 45:33–41. doi: 10.5271/sjweh.3753
20. The Norwegian Directorate of Health. *National Guidelines*. (2018). Available online at: https://www.Helsedirektoratet.no/Veiledere/Rehabilitering-Habilitering-Individuell-Plan-Og-Koordinator/Habilitering-Og-Rehabilitering-I-Spesialisthelsetjenesten/Veiledningsplikten
21. Wormdahl I, Husum TL, Rugkåsa J, Rise MB. Professionals' perspectives on factors within primary mental health services that can affect pathways to involuntary psychiatric admissions. *Int J Ment Health Syst*. (2020) 14:86. doi: 10.1186/S13033-020-00417-Z
22. Anthony WA. Recovery from mental illness: the guiding vision of the mental health service system in the (1990s). *Psychosoc Rehabil J*. (1993) 16:11–23. doi: 10.1037/h0095655
23. Jacobson N, Curtis L. Recovery as policy in mental health services: strategies emerging from the states. *Psychiatr Rehabil J*. (2000) 23:333–41. doi: 10.1037/h0095146
24. Marshall M, Rathbone J. Early intervention for psychosis. *Cochrane Database Syst Rev*. (2011) CD004718. doi: 10.1002/14651858.CD004718.pub2
25. Bakken IJ, Ariansen AMS, Knudsen GP, Johansen KI, Vollset SE. The Norwegian patient registry and the Norwegian registry for primary health care: research potential of two nationwide health-care registries. *Scand J Public Health*. (2020) 48:49–55. doi: 10.1177/1403494819859737
26. Ose SO, Kaspersen S, Ådnanes M, Lassemo E, Kalseth J. *IS 24/8: Kommunalt Psykisk Helse-Og Rusarbeid: Årsverk, Kompetanse og Innhold I Tjenestene*. Trondheim: SINTEF (2018). Available online at: https://www.Sintef.no/Prosjekter/2015/Kommunalt-Psykisk-Helse-Og-Rusarbeid/
27. World Health Organization. *The ICD-10 Classification of Mental and Behavioural Disorders: Clinical Descriptions and Diagnostic Guidelines. Vol. 1*. Geneva: World Health Organization (1992).
28. Bolker BM, Brooks ME, Clark CJ, Geange SW, Poulsen JR, Stevens MHH, ET AL. Generalized linear mixed models: a practical guide for ecology and evolution. *Trends Ecol Evol*. (2009) 24:127–35. doi: 10.1016/j.tree.2008.10.008
29. Bell A, Fairbrother M, Jones K. Fixed and Random Effects Models: Making an Informed Choice. *Qual Quant*. (2019) 53:1051–74. doi: 10.1007/s11135-018-0802-x
30. Gelman A, Hill J. *Data Analysis Using Regression and Multilevel/Hierarchical Models*. Cambridge University Press (2006).
31. Nakagawa S, Schielzeth H. A general and simple method for obtaining R2 from generalized linear mixed-effects models. *Methods Ecol Evol*. (2013) 4:133–42. doi: 10.1111/j.2041-210x.2012.00261.x
32. Team RC. *R: A Language and Environment for Statistical Computing, Version 3.0. 2*. Vienna, Austria: R Foundation for Statistical Computing (2013).
33. Wickham H, Averick M, Bryan J, Chang W, McGowan L, François R, et al. Welcome to the Tidyverse. *J Open Source Softw*. (2019) 4:1686. doi: 10.21105/joss.01686
34. Dowle M, Srinivasan A, Gorecki J, Chirico M, Stetsenko P, Short T, et al. *Package 'Data. Table'. Ext 'Data Frame'* (2019).
35. Wickham H. *Ggplot2: Elegant Graphics for Data Analysis*. New York, NY: Springer-Verlag (2016). Available online at: https://cran.r-project.org/web/packages/data.table/data.table.pdf
36. Lüdecke D. ggeffects: tidy data frames of marginal effects from regression models. *J Open Source Softw*. (2018) 3:772. doi: 10.21105/joss.00772
37. Bates D, Mächler M, Bolker B, Walker S. Fitting linear mixed-effects models using Lme4. *arXiv[Preprint].arXiv:14065823*. (2014). doi: 10.18637/jss.v067.i01
38. Bergé L. Efficient estimation of maximum likelihood models with multiple fixed-effects: the R Package FENmlm. Center for Research in Economic Analysis, University of Luxembourg (2018).

39. Lüdecke D, Makowski D, Waggoner P, Patil I. *Performance: Assessment of Regression Models Performance. R Package Version 04* (2020).
40. Buuren S van, Groothuis-Oudshoorn K. mice: multivariate imputation by chained equations in R. *J Stat Softw.* (2010) 45:1–68. doi: 10.18637/jss.v045.i03
41. Hustoft K, Larsen TK, Auestad B, Joa I, Johannessen JO, Ruud T. Predictors of involuntary hospitalizations to acute psychiatry. *Int J Law Psychiatry.* (2013) 36:136–43. doi: 10.1016/j.ijlp.2013.01.006
42. Kokkonen P. Coercion and Legal Protection in Psychiatric Care in Finland Law. *Med Law.* (1993) 12:113–24.
43. Mueser KT, Meyer PS, Penn DL, Clancy R, Clancy DM, Salyers MP. The illness management and recovery program: rationale, development, and preliminary findings. *Schizophr Bull.* (2006) 32:S32–43. doi: 10.1093/schbul/sbl022
44. de Jong MH, Wierdsma AI, Zoeteman J, van Boeijen CA, Van Gool AR, Mulder CL. Risk factors for repeated emergency compulsory psychiatric admissions. *BJPsych Open.* (2021) 7:e19. doi: 10.1192/bjo.2020.153
45. Weich S, McBride O, Twigg L, Duncan C, Keown P, Crepaz-Keay D, et al. Variation in compulsory psychiatric inpatient admission in England: a cross-classified, multilevel analysis. *Lancet Psychiatry.* (2017) 4:619–26. doi: 10.1016/S2215-0366(17)30207-9
46. Harper D, Speed E. Uncovering Recovery: The Resistible Rise of Recovery and Resilience. In: *De-Medicalizing Misery II*. Springer (2014). p. 40–57.
47. Roberts G, Dorkins E, Wooldridge J, Hewis E. Detained-what's my choice? part 1: discussion. *Adv Psychiatr Treat.* (2008) 14:172–80. doi: 10.1192/apt.bp.107.003533
48. Althouse AD. Adjust for Multiple Comparisons? *it's not that simple. Ann Thorac Surg.* (2016) 101:1644–5. doi: 10.1016/j.athoracsur.2015.11.024

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Appendix A: Data sources

Individual level data on all contacts with specialist services in Norway are routinely recorded in the NPR. We acquired data for each episode of compulsory hospitalisation during 2015-2018. Counts were based on the patients' residency at the time of hospitalisation, and the number of compulsory hospitalisations were counted for each individual, within each municipality. Consequently, patients who moved during the study period were counted in multiple municipalities, but each episode was only counted once.

Information on population, public housing, and labour-years of GPs and mental health nurses was collected from Statistics Norway. Labour-years are defined as the number of full-time equivalent positions during a year. Information on the remaining service characteristics was obtained from a dataset on municipal mental health and addiction services (33). Unemployment data were provided by the Norwegian Labour and Welfare Administration.

For total number of labour-years in municipal mental health and addiction services, detailed information was unavailable for city districts in Bergen, Trondheim, and Stavanger. The municipal total was allotted according to each city districts' population under the assumption that labour-years were equally distributed across city districts. Labour-years of GPs included approximately 20% municipal employed physicians in other functions. For the number of mental health nurses, detailed information was lacking in all four cities, so the city total was allotted according to the distribution of total number of labour-years in mental health services.

Data from the Norwegian Patient Registry (NPR)

NPR contains information on all contacts with specialised services, and we received access to information on all episodes of compulsory hospitalisation and admissions converted to compulsory care during the study period, including age and gender of the patients, legal formality and dates of formality change, admission date, discharge date, institution. Furthermore, we received data on all contacts for people diagnosed with a severe mental disorder.

Data from Statistics Norway

Population, by sex and one-year age groups:
https://www.ssb.no/en/statbank/table/07459

Labour-years for physicians in the municipal health and care services:
https://www.ssb.no/en/statbank/table/11996 (municipalities)
https://www.ssb.no/en/statbank/table/12405 (urban districts)

Care services, labour-years, by education:
Registered nurses for the mentally subnormal (sic!)
https://www.ssb.no/en/statbank/table/11924

Public housing:
"A dwelling with municipal right of disposal is a dwelling that the municipality can rent to its inhabitants through a tenancy agreement, for example nursing and care dwellings, dwellings

for refugees, dwellings for socially and/or financially disadvantaged etc. Nursing homes, old people's homes etc without tenancy agreement are not included."
https://www.ssb.no/en/statbank/table/12008 (municipalities)
https://www.ssb.no/en/statbank/table/13203 (urban districts)

Crowded dwelling: "Lives in crowded dwelling, many rooms and sq.m.: Households are considered as living crowded if: 1. the number of rooms is lower than the number of residents or one resident lives in one room, and 2. the number of square metres (P-area) is below 25 sq.m. per person. If the number of rooms or the P-area is not specified, a household will be regarded as living in cramped conditions if one of these criteria is met."
https://www.ssb.no/en/statbank/table/11093

Data from the Norwegian Labour and Welfare Administration

Number of unemployed:
https://www.nav.no/no/nav-og-samfunn/statistikk/arbeidssokere-og-stillinger-statistikk/historisk-statistikk

Historical data from urban districts was graciously provided by email from the Norwegian Labour and Welfare Administration.

Data from IS 24/8 - Kommunalt psykisk helse- og rusarbeid

https://www.helsedirektoratet.no/rapporter/kommunalt-psykisk-helse-og-rusarbeid-%C3%A5rsrapporter_

IS 24/8 is a long-term research project commissioned by the national health authorities to follow the development of municipal mental health services since 1998. Data has been collected from every municipality since 2006. Since the mental health services are highly labour-intensive services, the resources allocated are measured in number of (full-time equivalent) person-labour years.

Total labour-years: How many labour-years are provided for people with mental and/ or addiction difficulties/illnesses? (This includes labour-years for physicians in the municipal health and care services)
Employment Support: Has the municipality used Individual Placement and Support (IPS)/Supported Employment (SE) in mental health work? (Yes/No).
User perspectives: Has the municipality in a systematic way gathered experiences from users of mental health and addiction work during the last 12 months, as basis for improving services? (Yes/No).
Recovery: To what degree would you say that mental health and addiction services in your municipality are recovery oriented? (To a very high degree, to a high degree, to some degree, to a small degree, to a very small degree).
Quality of cooperation: How do you evaluate that the cooperation agreement between municipality and health trust is working for adults with mental health difficulties/illness? (Very good/Good/Medium/Poor/Very poor)

Early Intervention: Has the municipality made efforts to uncover mental health or addiction problems as early as possible? (Yes/No).
Housing First: Has the municipality employed ”Housing First”? (Yes/No).

Appendix B: Methods

The hierarchical models were fit using equations of the following structure:

$$
\begin{aligned}
&\quad \text{Hospitalisations/Patients}_i \sim Poisson(\lambda_i) \\
&\log(\lambda_i) = \log(population\ at\ risk) + \alpha_{j[i],k[i]} + \\
&\beta_1(year_{2016}) + \beta_2(year_{2017}) + \beta_3(year_{2018}) + \\
&\quad \beta_4(Population\ share\ aged\ 20\ to\ 39\ within) + \beta_5(Population\ share\ aged\ 20\ to\ 39\ between) + \\
&\quad \beta_6(Population\ share\ over\ 65\ within) + \beta_7(Population\ share\ over\ 65\ between) + \\
&\quad \beta_8(SMI\ per\ 1000\ within) + \beta_9(SMI\ per\ 1000\ between) + \\
&\quad \beta_{10}(Share\ in\ crowded\ dwelling\ within) + \beta_{11}(Share\ in\ crowded\ dwelling\ between) + \\
&\quad \beta_{12}(Unemployment\ share\ within) + \beta_{13}(Unemployment\ share\ between) + \\
&\quad \beta_{14}(Service\ characteristic\ within) + \beta_{15}(Service\ characteristic\ between), \\
&\alpha_j \sim N\left(\mu_{\alpha_j}, \sigma^2_{\alpha_j}\right), for\ municipality\ in\ CMHC\ catchment\ area\ j = 1, \ldots, J \\
&\alpha_k \sim N\left(\mu_{\alpha_k}, \sigma^2_{\alpha_k}\right), for\ CMHC\ catchment\ area\ k = 1, \ldots, K
\end{aligned}
$$

In order to quantify predicted change in the level of compulsory hospitalisation between and within-areas, conditional effect plots were created for the four continuous explanatory variables. Within-area associations were calculated at low, medium, and high average levels of the variable in question, where low values included areas within the first quartile, medium included areas between the first and third quartile, and areas above the third quartile were considered high.

Appendix C: Results

Unadjusted hierarchical models

Figure 1A shows exponentiated regression coefficients from eight different multilevel Poisson models which can be interpreted as rate ratios. They represent the relative change in the annual rate of patients or hospitalisations per population that would be expected for a one-unit increase in the explanatory variable. These models are not adjusted for control variables.

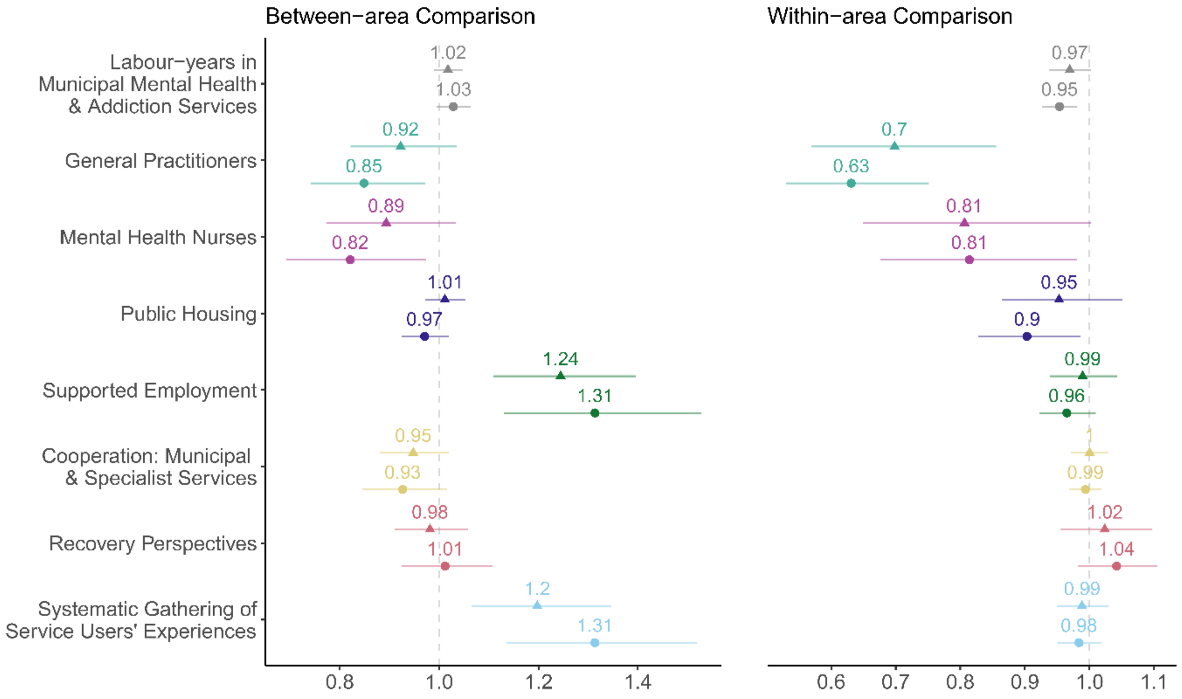


Figure 1A: Unadjusted between- and within-area associations of municipal mental health service in Norway 2015-2018. ▲ = Patients. ● = Hospitalisations. Rate ratios with 95% Wald confidence intervals.

Predicted values of compulsory hospitalisations and patients

Figure 2A shows the predicted values of compulsory hospitalisations and patients per 10 000 inhabitants associated with changes in municipal services, keeping control variables at their mean level. The right column of the figure shows the between-association, and the rug plot, which are the small lines above the x-axis, represents variation in the area means of the particular variable. The shaded ribbons represent 95% confidence intervals. The left column shows within-area associations at low, medium, and high average values of each variable in question. The x-axis and the accompanying rug plot show the distribution of deviations from the within-area average. The dashed lines represent the expected change for rates of compulsory hospitalised patients, while the solid lines show expected change in compulsory hospitalisation rates. The top row illustrates how the associations with total number of labour-years in municipal mental health per 1 000 differ, with a slightly negative within-effect and a positive aggregate cross-sectional association. The second and third row shows that the association of labour-years of general practitioners and mental health nurses is roughly the same within- and between-areas, but the within-effect is somewhat stronger for mental health nurses.

A 12-16% increase of general practitioners per population from the area average is associated with a reduction of one compulsory hospitalisation. The fourth row shows how within-area deviations in public housing per 100 have near zero effect on compulsory hospitalised patients, but a negative effect on compulsory hospitalisations, and a negative between-association for both outcomes. A 42% increase of municipal residencies per population from the area average in areas with high average levels, and a 67% increase of municipal residencies in areas with low average levels is associated with a reduction of one compulsory hospitalisation.

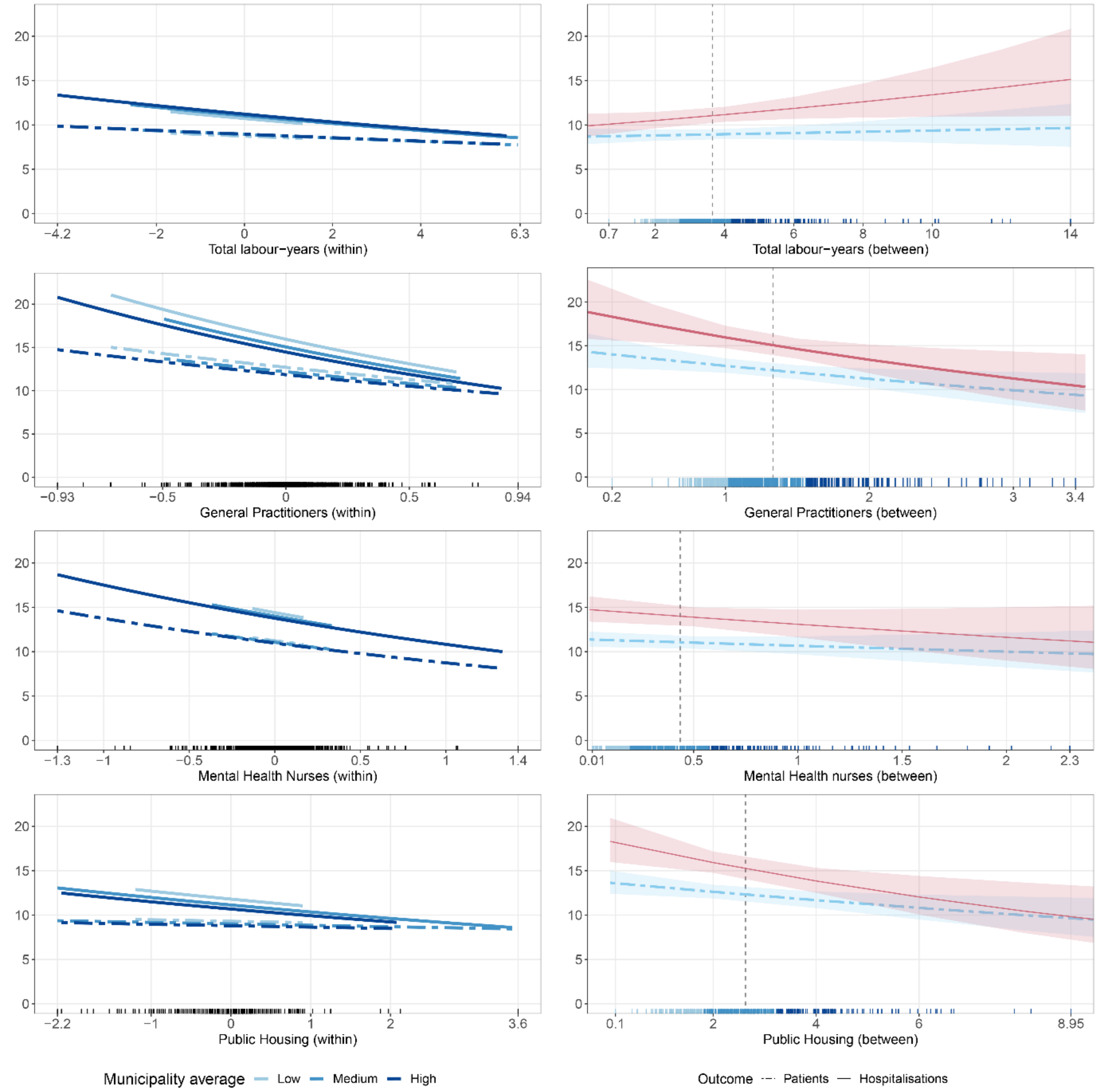


Figure 2A: Conditional effect plots, predicted average change in number of compulsory hospitalised patients and hospitalisations per 10 000 inhabitants within- and between municipalities in Norway 2015-2018. Y-axis shows predicted number of compulsory hospitalisations and compulsory hospitalised patients per 10 000, keeping control variables at their mean value, while the x-axis shows change in each explanatory variable per 1 000 inhabitant and includes minimum and maximum value. Dotted vertical line shows country average. Ribbons represent 95% confidence intervals.

1.4 Model performance and robustness checks

To test the appropriateness of the cluster structure, separate models were run using only municipality or CMHC catchment area as random intercept. Likelihood ratio tests showed that the models where municipalities were nested within CMHC catchment areas performed significantly better. One assumption of Poisson regression is that the variance is equal to the mean. Out of the final 32 estimated mixed models (eight unadjusted and eight fully adjusted, with patients and hospitalisations as outcomes), only one had significant overdispersion, with a dispersion parameter = 1.068. Nevertheless, we also calculated standard errors via quasi-likelihood by multiplying the regular standard errors with the square root of the dispersion parameter for all mixed models (1). The difference in standard errors had little impact on interpretation for any model. Furthermore, the inclusion of year as either fixed effect or random intercept had virtually no impact on coefficients, and the minor changes in standard errors did not affect interpretation.

Since some of the explanatory variables showed a slight increasing trend during the study period, estimation of the between-association using the area average could be biased by time. Following suggestions of Curran and Bauer (2) we de-trended the time-varying predictors by running area fixed effect linear regressions of the time-varying predictors on grand-mean centred time. The fitted values and residuals were then used to estimate the between- and within-effects. The resulting minor changes in coefficients and standard errors did not alter interpretation.

Not all within and between associations were significantly different, which could suggest that a standard random effects model would be more efficient for those explanatory variables (3). For ease of comparison, we decided to maintain the more general random effects within-between approach throughout.

Unlike the situation with linear models by ordinary least squares regression, the within-estimates obtained by within-between Poisson regression are similar, but not identical to those obtained using fixed effects. As another test of robustness, we therefore used the fixed effects Poisson estimator with log of population-at-risk as offset, and municipality and year as fixed effects, with and without the same set of control variables used in the main analysis. The resulting coefficients and standard errors were very similar to the within-estimates from the main analysis.

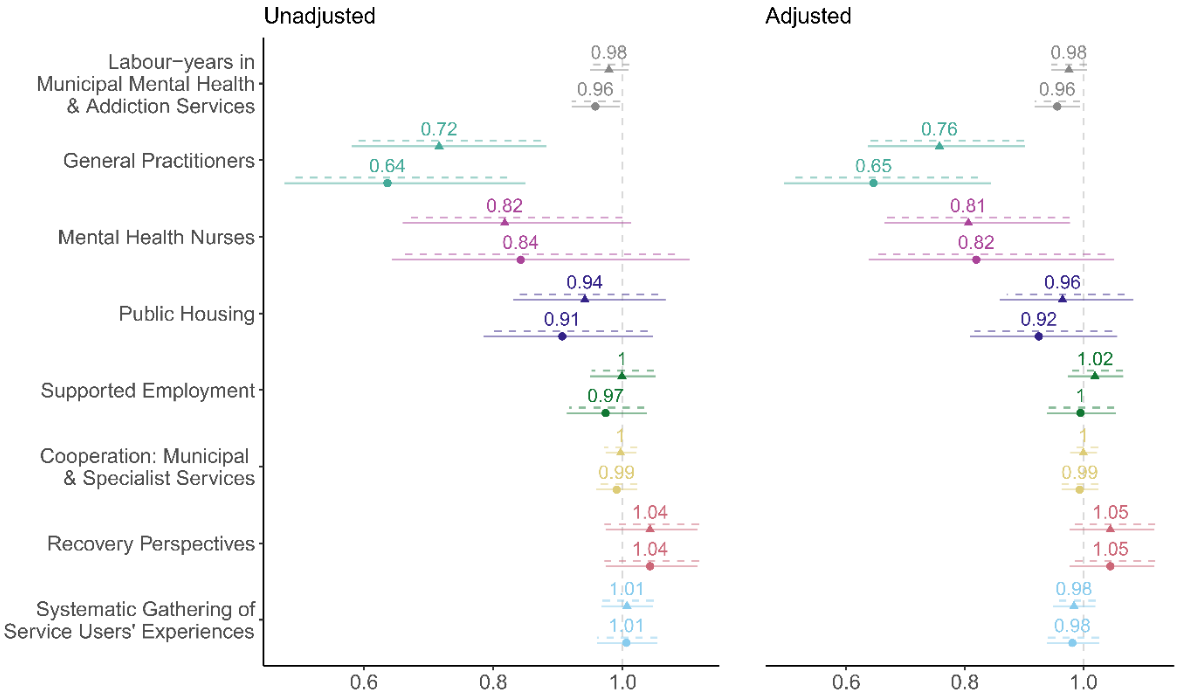


Figure 3A: Poisson estimator with municipality and year fixed effects. Solid lines show 95% confidence intervals based on municipality clustered standard errors, while dashed lines are based on White's heteroskedasticity robust SEs.

1. Gelman A, Hill J. Data analysis using regression and multilevel/hierarchical models. Cambridge university press; 2006.

2. Curran PJ, Bauer DJ. The Disaggregation of Within-Person and Between-Person Effects in Longitudinal Models of Change. Annu Rev Psychol. 2011;62(1):583–619.

3. Bell A, Fairbrother M, Jones K. Fixed and random effects models: making an informed choice. Qual Quant. 2019 Mar 1;53(2):1051–74.

Geographical Variation in Compulsory Hospitalisation – Ethical Challenges

Tore Hofstad[1*], Tonje Lossius Husum[1,2], Jorun Rugkåsa[3,4],
Bjørn Morten Hofmann[1,5]
1 Centre for Medical Ethics, University of Oslo, Norway
2 Faculty of Health Sciences, Oslo Metropolitan University, Norway
3 Health Services Research Unit, Akershus University Hospital, Lørenskog, Norway
4 Centre for Care Research, University of South-Eastern Norway, Porsgrunn, Norway
5 Department of Health Sciences, Norwegian University of Science and Technology, Norway

Key issues: service delivery variation, involuntary hospitalisation, coercion, small area analysis, autonomy, beneficence, non-maleficence, justice, right care, ethical analysis
Word count: 5 991
Word count abstract: 130

Abstract

Background

Compulsory hospitalisation in mental health care restricts patients' liberty and is often experienced as harmful. Such hospitalisations continue to be used due to their assumed benefit, despite limited scientific evidence. Observed geographical variation in compulsory hospitalisation raises concern that rates are higher than necessary in some areas but also that they can be too low in others.

Methods/Discussion

We present a specific normative ethical analysis of how geographical variation in compulsory hospitalisation challenges four core principles of health care ethics. We then consider the theoretical possibility of a "right", or appropriate, level of compulsory hospitalisation, as a general norm for assessing the moral divergence, i.e., too little, or too much. Finally, we discuss implications of our analysis and how they can inform the future direction of mental health services.

Introduction

Geographical variation in health care delivery raises concerns about equity and efficiency of services (1), and it is considered one of the most important topics in health services research (2). Geographical variations can indicate overuse and underuse of health services (3). Overuse describes unnecessary or ineffective health care where the benefits do not outweigh potential harm. Underuse represents the failure to provide necessary, effective care. Geographical variation in service delivery has been observed in a wide range of areas in medicine and health care (1). Examples from mental health care (4) include the use of electroconvulsive therapy (5); dimensioning of services (6); prevalence or diagnosing of mental disorders (7–9); medication use (10,11); community treatment orders (12,13); and voluntary psychiatric admissions (14,15); discharges (16); and readmissions (17).

Health care delivery is based on informed consent. Compulsory hospitalisation in mental health care constitutes an exception as it is enforced without the patients' consent. Moreover, it restricts their liberty (18) and is often experienced as an intrusion or abuse (19). For legal and ethical reasons, compulsory hospitalisation should be a last resort after voluntary options have been exhausted. There is growing evidence that voluntary approaches, such as Assertive Community Treatment, can contribute to strengthening patient autonomy while reducing the need for compulsory hospitalisation (18,20). A recent compendium from the Council of Europe contains examples from fifteen countries of good practices to promote voluntary initiatives that have reduced coercion and the use of compulsory hospitalisation (21).

Criteria for compulsory hospitalisation differ between legislations, but are typically restricted to persons with severe mental illness who represent a danger to themselves or others, or are in need of treatment to prevent serious deterioration of their mental or physical health (22). Compulsory hospitalisations are usually only permitted if voluntariness has failed, or is clearly futile, and the admission is perceived to be in the patient's best interest. The exception to this is if there is serious and imminent risk to the life or health of others. Following the United Nations' Convention on the Rights of Persons with Disabilities (CRPD)

(23,24), the ethics of compulsory hospitalisation has increasingly been discussed in terms of patient rights and human rights. The convention highlights that persons with mental and/or physical disabilities should have equal rights to freely accept or reject health services. In response to the CRPD, several countries have amended their mental health legislations to incorporate supported decision-making to ensure that patients are allowed to express their wills and preferences (24). Despite political initiatives and sustained attempts at reducing compulsory hospitalisation, its use remains widespread and in many countries is increasing (25).

Studies of health care variation often investigate geographical variation within areas that are legally, epidemiologically, or demographically comparable. Variation that can be accounted for by factors known to impact the issue under study - for instance age, gender, area morbidity or disease prevalence - is usually not considered problematic. Analyses are therefore conventionally performed on population-based rates that are risk-adjusted. The term unwarranted variation is used to describe variation that is unexplained by such warranting factors. The existence of considerable geographic variation in compulsory hospitalisation, beyond that which can be expected based on known risk factors (26), suggests that the supply and organisation of services may contribute to this variation, or that practise is based more on experience than evidence (27). Unwarranted variation raises concern that coercion is used more than strictly necessary in some areas (28). However, concern has also been voiced that too low rates of coercion can fail to meet patient needs and result in serious mental or physical harm (29–31).

Geographical variation in compulsory hospitalisation has been documented in several countries, including Denmark (32), England (33,34), Finland (35), France (36), Germany (37), Ireland (38), Italy (39), Korea (40), the Netherlands (41), New Zealand (42), Sweden (43), Switzerland (44), and the United States (45). In Norway between 2014-2018, the average rate of compulsory hospitalisation in the highest ranked catchment area was 5.6 times higher than the rate in the lowest ranked area, and the number of days of compulsory hospitalisation was eight times higher (46). Compared to other health services (1), the observed geographical variation in compulsory hospitalisation was considered high to very high (46).

The ethics of compulsory hospitalisation have been debated for a long time (47–56). Topics include the tension between principles of autonomy and beneficence; between a focus on self-determination and civil liberties as argued from a deontological position, versus patients' right to treatment as perceived from a paternalistic viewpoint, primarily motivated by consequentialist reasoning (52). Furthermore, controversy arises due to the evidence of harm to patients resulting from compulsory hospitalisation (57). There is also disagreement on the use of compulsory hospitalisation for public safety when there is risk of harm to others (47). To date, no ethical analysis of geographical variation in compulsory hospitalisation has been published. Therefore, this is the focus of our article. First, we report a normative ethical analysis structured according to four core principles of health care ethics (58), to identify how they may be challenged by geographical variation in compulsory hospitalisation. We define an ethical challenge (59) in this context as a situation where an ethical principle is infringed, where two or more principles appear to be in conflict, or there is uncertainty about what constitutes "right care" (see below). Second, to facilitate reflections on overuse and underuse, we consider the theoretical possibility of a "right", or appropriate, level of compulsory hospitalisation. Finally, we discuss implications of our analysis and how they can inform mental health services.

Ethical Analysis Using the 'Four Principles' Model

Principlism has been prominent within health care ethics since the Belmont report in 1978 and the first edition of Beauchamp and Childress' book Principles of Biomedical Ethics in 1979 (58). According to Beauchamp and Childress, four principles can be derived from a common morality and have wide applicability. They are summarised as follows: "respect for autonomy (the obligation to respect the decision making capacities of autonomous persons); non-maleficence (the obligation to avoid causing harm); beneficence (obligations to provide benefits and to balance benefits against risks), and justice (obligations of fairness in the distribution of benefits and risks)” (60 p269). The principles are not hierarchically ordered and should be considered in combination.

Respect for Autonomy

The principle of respecting autonomy implies that people have the right to make independent decisions about their lives, including the right to refuse health care. Compulsory hospitalisation appears to fundamentally conflict with this principle (61). Thus, geographical variations in compulsory hospitalisation are ethically challenging as they indicate variation in respect for autonomy.

There are, however, three requirements for autonomy according to Beauchamp and Childress’ model: intentionality, understanding, and voluntariness (58), each of which could be impeded by severe mental illness. Intentionality involves an individual’s ability to plan their actions. If this capacity is lacking, a person is not considered autonomous within this framework. Likewise, severe mental illness can impair a person’s capacity for understanding (62), obviating the possibility for informed consent. Some persons may also resist the care that health professionals consider to be in their best interest due to a psychological condition, such as command hallucinations (63). This could impact the voluntariness of their actions, so one can argue that they are not truly autonomous (64).

Therefore, while geographical variation in compulsory hospitalisation challenges the principle of respect for autonomy, from the point of view laid out in Principles of Biomedical Ethics, this applies only among patients who have intentionality, understanding, and do not experience command hallucinations or other forms of more internally controlling conditions. For persons who are not considered autonomous within this framework, other principles, such as non-maleficence, can still be infringed and would be accorded more weight. We return to different perspectives on autonomy and approaches to facilitate autonomous decisions below.

Beneficence

Compulsory admissions for treatment or prevention of harm to self are performed on the assumption that patients benefit from them. The principle of beneficence thus underlies the paternalistic justification for compulsory hospitalisation. Patients are expected to be better off because of the intervention, even if they do not want it, compared to a scenario without it. This is justified by conferring a benefit or avoiding or limiting harm.

The efficacy of compulsory hospitalisation has proven difficult to establish, not least due to ethical and legal concerns surrounding randomisation. Therefore, limited evidence is available to inform whether higher or lower levels of compulsory hospitalisation in an area is beneficial to patients with severe mental illness or their peers.

A number of case control studies suggest that most patients improve somewhat as a result of compulsory hospitalisation, but there is also evidence that many patients show limited or no improvement (49,65–68). No reliable method for predicting who is likely to benefit, or not, from a compulsory hospitalisation has been established.

Systematic reviews of patient surveys demonstrate mixed experiences with compulsory hospitalisation. Relatively high shares of patients report positive views on their compulsory admission in retrospect and perceive it as beneficial (65). However, a systematic review still found less treatment satisfaction among patients who had been hospitalised compulsorily compared to voluntarily (69).

Compulsory hospitalisations may be beneficial because they reduce the risk of harm to others. In such situations, there is less emphasis on expected benefit to the patient. Here other principles, particularly “the harm principle” (70), are likely to be given more weight. Some argue that such interventions, where the primary objective is not to benefit the patient, ought to be considered public safety measures rather than health care (71). Others claim that interests beyond the patient's own should be secondary when considering compulsory hospitalisation, but that it can be in the patient's interest not to harm other people (72).

While the evidence for benefit from compulsory hospitalisation remains unclarified, it is difficult to decide what is best for patients. Hence, it remains complicated to identify whether, or to what extent, overuse or underuse infringes the principle of beneficence. This would also depend on the extent to which less restrictive courses of action have been attempted. If benefit resulting from a compulsory hospitalisation could also have resulted from voluntary initiatives, then any benefit should not be attributed to the coercive practice.

Non-maleficence

The extensive literature documenting various ways that people experience harm related to involuntary hospitalisations raises concern (19). Such harm has been categorised as emotional, cognitive, or physical (73). Additionally, social and relational harm due to stigma, could affect patients as a result of hospitalisation. Therefore, overuse of compulsory hospitalisation would result in more such harm than necessary. Underuse could also result in unnecessary harm in cases where the patient does not receive required care or presents a risk of harm to themselves or others. In both cases, geographical variation in compulsory hospitalisation would represent different exposure to various kinds of harm, which means that the principle of non-maleficence would be infringed more in some areas than in others.

It is difficult to predict who might be harmed by compulsory hospitalisation and to what degree. Nonetheless, geographical variation suggests that populations are more exposed to the risk of harm in some areas than others, which infringes the principle of non-maleficence.

Justice

The principle of justice implies that equal cases should be treated equally and unequal cases differentially. If the legal status of the hospitalisation depends on where the patient lives or is treated - for instance, due to differences in evaluating capacity for consent (74), interpretation of legal criteria (75), or experience-based local practice (27) - then the resulting geographical variation would violate the principle of justice.

According to this principle, all citizens should have access to health services of the same type and quality regardless of where they live. Overuse of compulsory hospitalisation may indicate a lower quality of care (76), which would violate the ethical principle of justice. Underuse of compulsory hospitalisation may also be unjust, particularly in the case of danger to self or others.

Ethical considerations surrounding health care delivery involve the equitable distribution of limited goods or benefits. Resources spent on one patient group can result in less resources available to another group. As discussed, it is unclear whether compulsory hospitalisation constitutes a good, an unfair disservice, or both, and opinions might also differ according to the perspective of patients, relatives, or society. Some stakeholder groups strongly disagree that compulsory hospitalisation represents beneficence. This complicates the analysis but can contribute to explain the diverging opinions on compulsory hospitalisation. In any case, unwarranted geographical variations in compulsory hospitalisation violate the principle of justice and are thus ethically challenging.

A "Right" Level of Compulsory Hospitalisations?

From the analysis on how variation in the form of underuse or overuse of compulsory admission in different ways would violate the principles of respect for autonomy, beneficence, non-maleficence, and justice, the question of what represents the "right" or appropriate level of use appears to be central (77). To determine what is too much or too little we need to define what is optimal. To disentangle the ethical dilemmas stemming from geographical variations and to improve care, we need to establish what provides the maximal benefit-risk ratio of involuntary admissions (78,79).

The notion of "right care" is central to the study of geographical variation in health services (2). The definition used in the Lancet series devoted to the issue is explicitly or implicitly based on the four ethical principles as discussed above: "What is right care? In its simplest definition it is care that weighs up benefits [beneficence] and harms [non-maleficence], is patient-centred (taking individual circumstances, values, and wishes into account) [autonomy], and is informed by evidence [beneficence], including cost-effectiveness [justice]" (80 p101).

As asserted, there is disagreement surrounding the benefits of compulsory hospitalisations. Compulsory hospitalisations that are initiated in the best interest of the patient (for treatment or prevention of harm to self) appear in the literature to be more controversial than those aimed to prevent harm to others (49,54,81–83). While some argue for the total abolishment of coercion (31), most stakeholders seem to agree that compulsory hospitalisation is likely to remain necessary in some cases to prevent serious harm (49,84). Health authorities in many jurisdictions strive towards reduced and appropriate use of coercion but, with lacking evidence and ongoing controversy, theoretical consideration concerning the possible existence of a "right" of compulsory hospitalisation is warranted.

What level is "right" is likely to vary between contexts but would never be higher than what is necessary. What is necessary would depend on several factors, some of which can be altered by policy makers. If there are few or no other available interventions, compulsory hospitalisation more easily appears necessary from the clinician's perspective, than if a broader range of voluntary options existed (18,21,85,86). Therefore, compulsory hospitalisation that arises because of a lack of less restrictive interventions, in other words supply-driven (2) compulsory hospitalisation, should not be considered necessary, and would consequently not define "right care", and not be ethically justifiable.

If "right care" cannot be defined by empirical evidence, then professionals frequently apply experience-based consensus. Consider the conceptual model illustrated in Figure 1, which is intended as a heuristic device. The dots represent patients with a mental health condition in acute need of hospitalisation, with severity of symptoms or risk of danger to self along the x-axis, and risk of danger to other along the y-axis. Health professionals tend to agree that most patients are not in need of compulsory hospitalisation, as illustrated by the brown circles. The grey squares represent a small share of patients that most health professionals would agree need compulsory hospitalisation, because of danger or treatment needs. The triangles represent the patients where there is clinical disagreement over best treatment. Disagreement can arise from uncertainty about capacity for consent, diagnoses, danger, or physician-opinion on the use of compulsory hospitalisation. It is likely for this group of patients that the risk of being admitted involuntarily versus voluntarily differs considerably between areas, as observed in the geographical variation in rates of compulsory hospitalisation. This is because the patients in the other two categories are likely to be admitted according to the same legal status regardless of area. For patients in this group, moving from one of the areas with the highest level of compulsory hospitalisation, to one of the areas with the lowest level, might cause them to be received and treated differently. If this is due to factors such as the existence of superior, less restrictive forms of care in the low-coercion area, it will violate the ethical principle of justice.

In theory, there is a "right" level of compulsory admission, which can be described as those that are necessary, even if evidence lacks for which situations those are. Although it can be difficult to identify precisely in which situations compulsory hospitalisation is necessary, stakeholders tend to agree that such situations exist.[1][2]

If compulsory hospitalisations are used in situations where they are not necessary, it would constitute overuse. Such overuse would possibly violate all the four mentioned principles of health care ethics. It could also be unlawful (75). If patients in the necessary situations are not compulsory hospitalised, it would constitute underuse. This could violate their rights as patients, which would infringe on the principle of justice. Moreover, if their condition deteriorates because of a lack of health care, it would violate the principle of non-maleficence.

---

[1] This might explain why legislative changes designed to reduce compulsory hospitalisation seem to have limited impact on observed rates (49,87).

[2] Although most stakeholders agree that compulsory hospitalisation can be necessary in certain situations, there is ample disagreement concerning the content of such hospitalisations, like the use of forced medication.

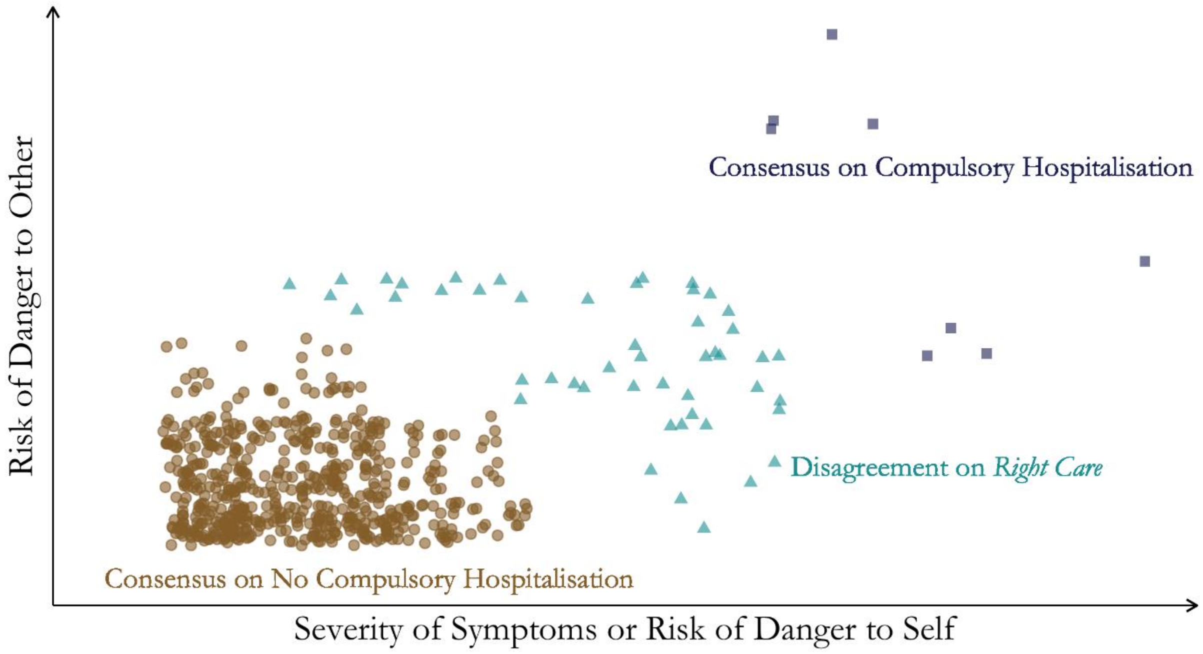


Figure 1: **Disagreement on Right Care for Patients in Mental Health Care (but not for all patient groups).** The figure is for illustration purposes and does not contain real data.

In situations where a crisis has already developed, it may be too late to attempt voluntariness, and professionals in acute mental health care may be required to handle such "unmanageable" situations through coercive interventions. Prior to crisis development, it is possible that sustained, high quality mental health services can reduce the need for compulsory hospitalisation in a geographical area through approaches that promote recovery or increased willingness to interact with services. Research from various countries shows that the use of compulsory hospitalisation can be reduced through targeted efforts and development of good practices that promote voluntariness (21). The "right" level of compulsory hospitalisation would thus not be higher than those situations that are necessary over time within a health system with voluntary services of adequate quality. Consequently, it is important to develop health services that can encourage people to receive help voluntarily, even while in a severely affected state of mental health (88).

Discussion with Implications for Service Delivery

We have argued that unwarranted geographical variation in compulsory hospitalisation challenges basic principles of health care ethics, such as beneficence, non-maleficence, justice, and respect for autonomy. Our focus has been on geographical variations of compulsory admissions and not coercive practices in mental health care more broadly, where there are many ethical challenges that are discussed by others in detail (47–56).

When discussing the ethics of geographical variation, it seems morally relevant to consider the reasons why such variation manifests. In this final section we will therefore consider our analyses in the context of theory and empirical evidence, and discuss situations where the variation is related to the interests of the patient (treatment outcome, danger to self), the interests of others (danger to others), or professional or organisational differences.

Wennberg has shown that the medical procedures most prone to professional disagreement or controversy display the highest amount of geographical variation (2). In contrast, conditions such as heart attacks or hip fractures display little geographical variation because physicians tend to agree on appropriate treatment for these conditions. Given the uncertainty surrounding outcomes of compulsory hospitalisation, situations can arise where it is neither clear if voluntary care is viable, nor evident if compulsory hospitalisation is indicated, as illustrated by the triangles in Figure 1. In these situations, there is little agreement on what constitutes “right care”, and geographical variation might be expected. Theoretically, it seems reasonable that varying treatment philosophies or differences in clinical practice could result in higher or lower levels of compulsory hospitalisation in an area. For example, when facing a patient with newly developed psychotic symptoms and no history of severe mental illness, one clinician might follow a strategy of early intervention and consider compulsory hospitalisation to be necessary at an early stage. On the other hand, a clinician who prefers “watchful waiting” and encourages voluntary follow-up outside of hospital may continue to treat according to interventions that are more tolerable to the patient. Contrasting treatment philosophies, experience-based local practices, or a variation clinical gaze among professionals facing a complex evidence base, could thus theoretically result in different levels of compulsory hospitalisation. This would infringe the principle of justice.

We argued that there exists a small share of situations in mental health care where there is a consensus among professionals that compulsory hospitalisation is the right intervention, as illustrated by the squares in Figure 1. If this agreement is real, it would imply that compulsory hospitalisation is considered effective care (2) for the patients involved. A consensus is not a substitute for evidence of efficacy, however, of which the practice of insulin coma therapy is but one example (89). It is therefore of paramount importance to clarify whether enforcing health care on patients is truly of benefit through continued research on compulsory hospitalisation, preferably including outcomes of relevance to patients, professionals, relatives, and society at large (56,90).

Outcomes of compulsory hospitalisation are not identical for different patients or patient groups, and persons with certain conditions may be more likely than others to benefit, or become harmed, from admission. The current scarcity of evidence for beneficial outcomes of compulsory care is itself an ethical problem. The use of similarly invasive procedures is not likely to be considered in other fields of medicine on such a weak evidence base (91). Importantly, if compulsory hospitalisations do not produce the benefits expected from the intervention, they can not be considered necessary (92).

While the ethical principle of beneficence has been used as justification for compulsory hospitalisation on the assumption that it promotes the well-being of the patient, those who argue against compulsory hospitalisation tend to place more emphasis on the principles of non-maleficence and respect for autonomy. For persons who have been involuntarily hospitalised but experienced no benefit from the coercive practice, it can appear particularly troubling that what is perceived as benefits at a group level are used to justify what they perceive as harm to them.

It is also concerning that no “safety valve” exists for people who have had particularly harmful experiences of compulsory hospitalisation, if they are facing compulsory rehospitalisation. In other health services, patients who experience high maleficence can abstain from further care, regardless of the physician's recommendation. Patients who are compulsorily hospitalised do not automatically have this option. Some stakeholder groups have therefore requested that a right to reserve oneself from coercive treatment be instated for patients who have previously been medicated involuntarily (93).

Geographical variations resulting from differences in evaluating capacity for consent, interpretation of legal criteria, or uncertainty regarding diagnosis, were argued to violate the ethical principle of justice. Further work on best practices can inform guidelines and is likely to result in more reliable evaluations of whether compulsory hospitalisation is necessary. This will contribute to reducing overuse, underuse, and improve services.

Different Approaches to Facilitate Autonomous Decisions

One of the most frequent complaints from individuals who have been involuntarily committed is the experience of not being listened to concerning decisions about their treatment (57). This is perceived as a violation of integrity or dignity, which is connected to, and synonymous with, autonomy according to some theorists (94).

The CRPD states that "measures relating to the exercise of legal capacity [shall] respect the rights, will and preferences of the person… and [be] tailored to the person's circumstances" (23 p9). This implies that the wills and preferences of individuals with reduced capacity for consent ought to be respected, including persons who do not fulfil all autonomy criteria of Beauchamp and Childress. This can, for instance, take the form of advance care planning, supported decision-making, or through preference for medication during detention (95,96). If patients are allowed to express their preference for a particular "treatment regime", for example several shorter admissions to prevent deterioration, instead of one longer involuntary admission, resulting geographical variation would be more in accordance with the principles of respect for autonomy and non-maleficence.

Self-binding advance decision-making is one suggested approach (97,98) which appears particularly relevant for individuals with "fluctuating" capacity for consent (99). While in remission, patients are encouraged to formulate wishes for their possible future manic or psychotic episodes, based on previous experiences with their illness and mental health services. By formulating such a Ulysses contract in stable periods when the patient has capacity for consent, their autonomy is retained, even though their liberty will be restricted during periods of compulsory hospitalisation.

In this way, patient autonomy can be increased by extending the evaluation period prior to initiating a compulsory hospitalisation. It could also be increased by delaying invasive procedures and attempting other strategies first, such as Open Dialogue (100), which might help reduce psychotic symptoms and alleviate the perceived need to use coercion. Areas without such alternative interventions might infringe the principle of autonomy more than necessary.

Autonomy is better understood as a matter of degrees, rather than dichotomies, even within Beauchamp and Childress' framework. Coercive interventions, such as compulsory hospitalisation, are sometimes temporarily justified with the aim of restoring or strengthening the autonomy of individuals who are considered to lack the ability to consent (72). As Beauchamp and Childress state: "…the criteria of the autonomous person and of the competent person are strikingly similar" (58 p114). Some argue that restoring autonomy is the only situation where coercive mental health treatment is justified (101). According to interview-based studies, coercive interventions are deemed more acceptable by patients if the practice is perceived as restoring their autonomy (102).

Right Level of Compulsory Hospitalisation

A mental health service system with no overuse or underuse, where compulsory hospitalisation is only used when truly necessary, and there would, thus, be no false positives or false negatives, could be claimed to have the "optimal level" of compulsory hospitalisation. Public reporting of geographical variation in compulsory hospitalisation can increase awareness of overuse and trigger reductive efforts in outlier regions. The systematic monitoring of coercive interventions with feedback to decision makers has previously been shown to reduce the use of seclusion and restraint (18).

While our ethical analysis and discussion provides no immediate solution to identify the “right” level of compulsory hospitalisation, it shows that compulsory hospitalisations which arise from a lack of less restrictive initiatives are not ethically justifiable. One possible strategy for estimating the “right” level of compulsory hospitalisations could be to base it on observed population health outcomes. Following the reasoning of O’Reilly et al. (103) we can hypothesise that a lower threshold exists for rates of compulsory hospitalisation, below which negative effects will appear in a geographical area. Relevant outcomes used to identify this minimum rate could be suicide rates; all-cause mortality rates; rates of violent crime committed by persons with severe mental illness; rates of incarceration of persons with severe mental illness, as well as the level of burden on care givers. This threshold would be the minimum level of compulsory hospitalisation required in an area which could be considered responsible. Use below this rate would be underuse and use above this threshold would be considered unnecessary so would constitute overuse. Therefore, it can be argued that the “right” level would be the minimal necessary to avoid negative outcomes for the patients and wider community.

Lack of Less Restrictive Interventions

Services that are contingent on local capacity, and not on the patient’s needs or preferences, are labelled supply-driven care within Wennberg’s framework of types of health services (2). If organisation of mental health services at a local level can be shown to promote voluntariness and prevent the need for compulsory hospitalisation, an uneven distribution of less restrictive initiatives is likely to constitute an ethical challenge. As we have shown previously, there were lower levels of compulsory hospitalisation in areas that had more general practitioners per capita in Norway 2015-2018, and an increase in general practitioners per capita was associated with significantly lower levels of compulsory hospitalisation within those areas (104). This suggests that compulsory hospitalisation is partly supply-driven. Variations in supply-driven services are ethically problematic, as they do not relate to patients’ preferences or needs but are the result of the dimensioning and organisation of services. Service user researchers often focus on unmet needs - a “type of support that is desired but may not be available” (18 p23) - which may help avert compulsory hospitalisation. Professionals in primary mental health services in Norway suggested that improving everyday life for persons with severe mental illness or addiction challenges, such as living conditions and employment support, was conducive to reducing the need for compulsory hospitalisation (105). Continued research into community health services that could prevent the need for compulsory hospitalisation to develop in the first place is therefore crucial.

Identifying effective and good practices that reduce the need for compulsory hospitalisation will improve mental health services (106) and likely reduce geographical variation. One example of services only offered in certain areas is Assertive Community Treatment, which has been documented to reduce frequency (20) and length (107) of compulsory hospitalisation. Preventing the need for compulsory hospitalisation to develop in the first place would allow patients to maintain their autonomy whilst simultaneously averting possible harm from coercion.

Compulsory hospitalisation is not only controversial, but it also creates the possibility for the use of other coercive practices with uncertain outcomes, such as forced medication, mechanical restraints, seclusion, or outpatient commitment, that would be less likely to have been initiated without the admission. There is therefore reason to believe that geographical variation in compulsory hospitalisation concurs with geographical variation in other coercive practices (27). This can have serious consequences for individual patients if they are treated unfairly. The use of forced medication appears to be at least as controversial as compulsory hospitalisation and it has been argued that medication-free alternatives ought to be instated - especially considering that a proportion of patients do not seem to benefit from anti-psychotic medication (108). It is likely that the existence of such alternatives could increase the willingness to engage voluntarily with mental health services, particularly for patients with previously negative experiences. Experiences from Heidenheim in Germany suggest that a service system practically free of coercion is possible in practice (88).

Professionals are generally unaware of overuse of health services due to supply-driven health care (2). In highly specialised and disjointed services, physicians in an emergency department might rarely be provided with feedback on whether they refer patients to compulsory hospitalisation more often than other colleagues. A study of a Norwegian emergency unit that had considerable success in reducing the number of compulsory referrals suggested that personal feedback was the strongest driver of the reduction (109). Considering this alongside other reports of successful efforts at reducing coercive practice (110) might indicate that overuse is not uncommon.

Clinicians report that patients are sometimes referred to compulsory hospitalisation on the assumption that there are few available hospital beds, and that a compulsory referral is more likely than a voluntary referral to result in hospitalisation (111). Such cases would constitute a supply-driven use of coercion and would not be ethically justifiable. This is concerning in light of the continued reduction of beds in mental health institutions observed internationally for decades (112,113).

Admission Criteria

Since we cannot precisely identify the situations in which compulsion is necessary and thus the “right” level, one can argue that it is better to aim below, rather than above, since overuse appears to be more ethically problematic than underuse. Indeed, the current policy drive towards reduced use of compulsion (114,115) suggests that overuse of compulsory hospitalisation is considered a more prevalent problem than underuse. This can be related to the ethical principles, since overuse involves the potential violation of all four principles, while this is not necessarily the case for underuse.

However, when considering danger to others, underuse can result in considerable harm. This has been seen to cause newspaper discussions to call for increased use of compulsory hospitalisation following serious crimes committed by persons with severe mental illness. This conundrum highlights the tension and conflicting interests under current legislations - human rights discussions pull towards reduced levels of compulsory hospitalisation for treatment, while protection of society from persons with severe mental illness and a high risk of violence continues to be part of mental health services' policing function. The “right” level of compulsory hospitalisation may well differ with admission criteria. In countries with multiple criteria for compulsory hospitalisation, it could be worthwhile to separately investigate the geographical variation among persons committed out of concern for others and admissions for treatment or prevention of harm to self (49).

Risk assessment is challenging due to the low rate of events and high likelihood of false positives (116). As highlighted by the CRPD, there could also be an inherent injustice in the way danger due to mental illness is handled versus other dangerous situations that do not involve mental illness (117). This could also perpetuate stigma towards persons with mental health disabilities.

Finally, when contemplating the “right” level of compulsory hospitalisation it is relevant to compare rates between jurisdictions and consider the fact that some countries appear to manage with considerably lower rates of compulsory hospitalisation per population (25). Similarly, it is also necessary to consider the existence of exceptional catchment areas with very low or non-existent rates of compulsory hospitalisation (88). While low rates can be due to low prevalence of severe mental illness, it is also possible that they result from health services with a high rate of recovery. If it can be demonstrated that similarly low admission numbers are possible elsewhere this will strongly alter the numbers of the so-called “right level”.

Limitations

While we restricted the analysis of principles to the four traditional principles of health care ethics, other principles could also be relevant in this context. These include: respect for privacy; solidarity; respect for integrity; sanctity of life; efficiency (118), and vulnerability (119).

The focus of this study is geographical variation in compulsory hospitalisation, but many of the challenges identified and discussed are relevant to variation in other types of compulsory interventions – both diagnostic and therapeutic. For example, the use of mechanical restraints, seclusion, forced medication and outpatient commitment. However, these warrant special attention since the ethical considerations would not apply equally to all these cases.

Conclusion

Compulsory hospitalisation represents an unusual type of health service since it is not based on consent, restricts patients' liberty, and is often experienced as harmful. Therefore, geographical variation in compulsory hospitalisation poses special ethical challenges. The ethical principles of respect for autonomy, non-maleficence, beneficence, and justice, are all potentially infringed by unwarranted geographical variation in compulsory hospitalisation. Uncertainty regarding outcomes of compulsory hospitalisation is likely to preserve geographical variation and further research on outcomes for different patient groups and admission criteria is needed. Geographical variation in compulsory hospitalisation can be contingent on local capacity (supply-driven) but can also be the result of physician-opinion; both sources of variation can be considered ethically challenging. The "right" level of compulsory hospitalisation might differ with admission criteria but would never exceed the level that is minimally necessary over time within a health service system that promotes voluntariness through good practices. Standardised guidelines for assessing capacity to consent, diagnosing, and interpretation of legal criteria ought to be established or continued to reduce geographical variation and increase adherence to the principle of justice.

Acknowledgments

Thanks to Carl Tollef Solberg, Søren Holm, and other colleagues at the Centre for Medical Ethics at the University of Oslo, Arnstein Mykletun at the Norwegian Institute of Public Health, Olav Nyttingnes at Akershus University Hospital, and Solveig Helene Høymork Kjus at the Norwegian University of Science and Technology, for valuable feedback on drafts of this manuscript.

Funding

This study was part of the Reducing Coercion in Norway (ReCoN) research project, which is funded by the Research Council of Norway (NFR 273546). The funder had no role in the conduct of the study.

Competing Interests

The authors declare no competing interests.

Author Contributions

TH wrote the first draft and created Figure 1. JR, in collaboration with TLH, obtained funding for the research project which this study is part of. All authors contributed in designing the study. All authors revised the manuscript in several rounds and approved the final version.

Bibliography

1. OECD. Geographic Variations in Health Care: What Do We Know and What Can Be Done to Improve Health System Performance? [Internet]. 2014 [cited 2020 Sep 17]. Available from: http://www.oecd.ilibrary.org/social-issues-migration-health/geographic-variations-in-health-care_9789264216594-en

2. Wennberg JE. Tracking medicine: a researcher's quest to understand health care. Oxford University Press; 2010.

3. Muche-Borowski C, Abiry D, Wagner HO, Barzel A, Lühmann D, Egidi G, et al. Protection against the overuse and underuse of health care – methodological considerations for establishing prioritization criteria and recommendations in general practice. BMC Health Serv Res. 2018 Oct 11;18:768.

4. van Spijker BA, Salinas-Perez JA, Mendoza J, Bell T, Bagheri N, Furst MA, et al. Service availability and capacity in rural mental health in Australia: Analysing gaps using an Integrated Mental Health Atlas. Aust N Z J Psychiatry. 2019 Oct 1;53(10):1000–12.

5. Bertolín-Guillén JM, Peiró-Moreno S, Hernández-de-Pablo ME. Patterns of electroconvulsive therapy use in Spain. Eur Psychiatry J Assoc Eur Psychiatr. 2006 Oct;21(7):463–70.

6. Wattis JP. Geographical variations in the provision of psychiatric services for old people. Age Ageing. 1988 Jan 1;17(3):171–80.

7. Perälä J, Saarni SI, Ostamo A, Pirkola S, Haukka J, Härkänen T, et al. Geographic variation and sociodemographic characteristics of psychotic disorders in Finland. Schizophr Res. 2008 Dec 1;106(2):337–47.

8. Madsen KB, Ersbøll AK, Olsen J, Parner E, Obel C. Geographic analysis of the variation in the incidence of ADHD in a country with free access to healthcare: a Danish cohort study. Int J Health Geogr. 2015 Aug 22;14(1):24.

9. Scully PJ, Owens JM, Kinsella A, Waddington JL. Schizophrenia, schizoaffective and bipolar disorder within an epidemiologically complete, homogeneous population in rural Ireland: small area variation in rate. Schizophr Res. 2004 Apr 1;67(2):143–55.

10. Jensen-Dahm C, Zakarias JK, Gasse C, Waldemar G. Geographical Variation in Opioid Use in Elderly Patients with Dementia: A Nationwide Study. J Alzheimers Dis JAD. 2019;70(4):1209–16.

11. Verdoux H, Pambrun E, Cortaredona S, Coldefy M, Le Neindre C, Tournier M, et al. Geographical disparities in prescription practices of lithium and clozapine: a community-based study. Acta Psychiatr Scand. 2016 Jun;133(6):470–80.

12. O'Brien AJ. Community treatment orders in New Zealand: regional variability and international comparisons. Australas Psychiatry. 2014 Aug 1;22(4):352–6.

13. Light E. Rates of use of community treatment orders in Australia. Int J Law Psychiatry. 2019 Mai;64:83–7.

14. Almog M, Curtis S, Copeland A, Congdon P. Geographical variation in acute psychiatric admissions within New York City 1990-2000: growing inequalities in service use? Soc Sci Med 1982. 2004 Jul;59(2):361–76.

15. White J, Gutacker N, Jacobs R, Mason A. Hospital admissions for severe mental illness in England: Changes in equity of utilisation at the small area level between 2006 and 2010. Soc Sci Med. 2014 Nov 1;120:243–51.

16. Madianos MG, Zacharakis C, Tsitsa C, Stefanis C. Geographical variation in mental hospital discharges in Greece and socioeconomic correlates: a nationwide

study (1978-1993). Soc Psychiatry Psychiatr Epidemiol. 1999 Oct 12;34(9):477–83.

17. Tedeschi F, Donisi V, Salazzari D, Cresswell-Smith J, Wahlbeck K, Amaddeo F. Clinical and organizational factors predicting readmission for mental health patients across Italy. Soc Psychiatry Psychiatr Epidemiol. 2020 Feb 1;55(2):187–96.

18. Gooding P, McSherry B, Roper C, Grey F. Alternatives to Coercion in Mental Health Settings: A Literature Review. Melbourne: Melbourne Social Equity Institute, University of Melbourne.; 2018.

19. Norvoll R. Kunnskapsstaus med hensyn til skadevirkninger av tvang i det psykiske helsevernet. Utredning for Paulsrudutvalget. [Knowledge status with regard to adverse effects of coercion in the mental health field. Study for the Paulsrud Committee]. NOU. 2011;9.

20. Aagaard J, Tuszewski B, Kølbæk P. Does assertive community treatment reduce the use of compulsory admissions? Arch Psychiatr Nurs. 2017;31(6):641–6.

21. Gooding P. Good practices for reducing and preventing coercion in mental health settings in the Council of Europe [Internet]. Council of Europe; 2021 Oct [cited 2022 Jan 14]. Available from: https://www.coe.int/en/web/bioethics/good-practices-for-reducing-and-preventing-coercion-in-mental-health-settings-in-the-council-of-europe

22. Saya A, Brugnoli C, Piazzi G, Liberato D, Di Ciaccia G, Niolu C, et al. Criteria, Procedures, and Future Prospects of Involuntary Treatment in Psychiatry Around the World: A Narrative Review. Front Psychiatry [Internet]. 2019 [cited 2021 Aug 9];0. Available from: https://www.frontiersin.org/articles/10.3389/fpsyt.2019.00271/full

23. UN General Assembly. Convention on the Rights of Persons with Disabilities : resolution / adopted by the General Assembly [Internet]. A/RES/61/106 Jan 24, 2007. Available from: https://www.refworld.org/docid/45f973632.html

24. Sugiura K, Mahomed F, Saxena S, Patel V. An end to coercion: rights and decision-making in mental health care. Bull World Health Organ. 2020 Jan 1;98(1):52–8.

25. Sheridan Rains L, Zenina T, Dias MC, Jones R, Jeffreys S, Branthonne-Foster S, et al. Variations in patterns of involuntary hospitalisation and in legal

frameworks: an international comparative study. Lancet Psychiatry. 2019 May;6(5):403–17.

26. Walker S, Mackay E, Barnett P, Sheridan Rains L, Leverton M, Dalton-Locke C, et al. Clinical and social factors associated with increased risk for involuntary psychiatric hospitalisation: a systematic review, meta-analysis, and narrative synthesis. Lancet Psychiatry. 2019 Dec 1;6(12):1039–53.

27. Husum TL. Staff attitudes and use of coercion in acute psychiatric wards in Norway [Internet]. [Oslo]: University of Oslo; 2011. Available from: https://www.duo.uio.no/bitstream/handle/10852/27999/3/Husum-avhandling.pdf

28. Rugkåsa J. Why we need to understand service variation in compulsion. Lancet Psychiatry. 2017 Aug 1;4(8):577–8.

29. Appelbaum PS. Protecting the Rights of Persons With Disabilities: An International Convention and Its Problems. Psychiatr Serv. 2016 Apr;67(4):366–8.

30. Freeman MC, Kolappa K, de Almeida JMC, Kleinman A, Makhashvili N, Phakathi S, et al. Reversing hard won victories in the name of human rights: a critique of the General Comment on Article 12 of the UN Convention on the Rights of Persons with Disabilities. Lancet Psychiatry. 2015 Sep 1;2(9):844–50.

31. Wilson K. The Call for the Abolition of Mental Health Law: The Challenges of Suicide, Accidental Death and the Equal Enjoyment of the Right to Life. Hum Rights Law Rev. 2018 Dec 14;18(4):651–88.

32. Engberg M. Involuntary commitment in Greenland, the Faroe Islands and Denmark. Acta Psychiatr Scand. 1991;84(4):353–6.

33. Weich S, McBride O, Twigg L, Duncan C, Keown P, Crepaz-Keay D, et al. Variation in compulsory psychiatric inpatient admission in England: a cross-classified, multilevel analysis. Lancet Psychiatry. 2017;4(8):619–26.

34. Keown P, McBride O, Twigg L, Crepaz-Keay D, Cyhlarova E, Parsons H, et al. Rates of voluntary and compulsory psychiatric in-patient treatment in England: An ecological study investigating associations with deprivation and demographics. Br J Psychiatry. 2016 Aug;209(2):157–61.

35. Kokkonen P. Coercion and Legal Protection in Psychiatric Care in Finland. Med Law. 1993;12:113–24.

36. Gandré C, Gervaix J, Thillard J, Macé JM, Roelandt JL, Chevreul K. Geographic variations in involuntary care and associations with the supply of health and social care: results from a nationwide study. BMC Health Serv Res [Internet]. 2018 Apr 6 [cited 2020 Apr 13];18. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5889610/

37. Brieger P, Kling Lourenço P, Steinert T, Längle G, Lemke U, Herpertz SC, et al. [Involuntary psychiatric hospital admissions: a comparison between five hospitals in three German federal states]. Nervenarzt. 2014 May;85(5):606–13.

38. Daly A, Craig S. Activities of Irish Psychiatric Units and Hospitals 2020 [Internet]. Dublin: Health Research Board; 2021. Report No.: HRB StatLink Series ISSN 2737-7652. Available from: https://www.hrb.ie/fileadmin/2._Plugin_related_files/Publications/2021_publications/NPIRS/Tables/NPIRS_Activities_2020_all_tables.pdf

39. Di Cesare M, Di Fiandra T, Di Minco L, La Sala L, Magliocchetti N, Romanelli M, et al. Rapporto salute mentale - Analisi dei dati del Sistema Informativo per la Salute Mentale (SISM)[Mental Health Report - Data analysis of the Mental Health Information System] [Internet]. Roma: Direzione generale della digitalizzazione, del sistema informativo sanitario e della statistica Direzione generale della prevenzione sanitaria; 2017 Dec. Available from: https://www.salute.gov.it/imgs/C_17_pubblicazioni_2731_allegato.pdf

40. Hwang TY, Jung G, Lee CJ, Kim HY. Analysis of involuntary admissions in Korea through the admission management information system. Int J Law Psychiatry. 2020;68:101542.

41. Broer J, Wierdsma AI, Mulder CL. [Regional differences in compulsory treatment in mental health care in the Netherlands during 2013-2017]. Tijdschr Voor Psychiatr. 2020;62(2):104–13.

42. O'Brien AJ, Kydd R, Frampton C. Social deprivation and use of mental health legislation in New Zealand. Int J Soc Psychiatry. 2012 Nov 1;58(6):581–6.

43. Kjellin L, Östman O, Östman M. Compulsory psychiatric care in Sweden—Development 1979–2002 and area variation. Int J Law Psychiatry. 2008;31(1):51–9.

44. Schuler D, Tuch A, Peter C. Placements en établissement psychiatrique à des fins d'assistance [Placements in psychiatric institutions for assistance purposes] [Internet]. Observatoire suisse de la santé (Obsan); 2018 Jun [cited 2021

Nov 8]. Available from: https://www.obsan.admin.ch/fr/publications/2018-placements-en-etablissement-psychiatrique-des-fins-dassistance

45. Lee G, Cohen D. Incidences of involuntary psychiatric detentions in 25 US states. Psychiatr Serv. 2021;72(1):61–8.

46. Hofstad T, Rugkåsa J, Ose SO, Nyttingnes O, Husum TL. Measuring the level of compulsory hospitalisation in mental health care: The performance of different measures across areas and over time. Int J Methods Psychiatr Res. 2021;e1881.

47. Wertheimer A. A philosophical examination of coercion for mental health issues. Behav Sci Law. 1993;11(3):239–58.

48. Wynn R. Coercion in psychiatric care: clinical, legal, and ethical controversies. Int J Psychiatry Clin Pract. 2006 Jan 1;10(4):247–51.

49. Høyer G. On the justification for civil commitment. Acta Psychiatr Scand. 2000;101(399):65–71.

50. Levenson JL. Psychiatric commitment and involuntary hospitalization: An ethical perspective. Psychiatr Q. 1986;58(2):106–12.

51. Saks ER. Refusing Care: Forced Treatment and the Rights of the Mentally Ill. University of Chicago Press; 2010.

52. Chodoff P. Involuntary hospitalization of the mentally ill as a moral issue. Am J Psychiatry. 1984 Mar;141(3):384–9.

53. Dunn M, Canvin K, Rugkåsa J, Sinclair J, Burns T. An empirical ethical analysis of community treatment orders within mental health services in England. Clin Ethics. 2016 Dec 1;11(4):130–9.

54. Steinert T. Ethics of Coercive Treatment and Misuse of Psychiatry. Psychiatr Serv. 2017 Mar 1;68(3):291–4.

55. Chieze M, Clavien C, Kaiser S, Hurst S. Coercive Measures in Psychiatry: A Review of Ethical Arguments. Front Psychiatry. 2021;12:2338.

56. Hem MH, Gjerberg E, Husum TL, Pedersen R. Ethical challenges when using coercion in mental healthcare: A systematic literature review. Nurs Ethics. 2018 Feb 1;25(1):92–110.

57. Katsakou C, Priebe S. Patient's experiences of involuntary hospital admission and treatment: A review of qualitative studies. Epidemiol Psychiatr Sci. 2007 Jun;16(2):172–8.

58. Beauchamp TL, Childress JF. Principles of biomedical ethics. New York: Oxford University Press; 2019.

59. Schofield G, Dittborn M, Selman LE, Huxtable R. Defining ethical challenge(s) in healthcare research: a rapid review. BMC Med Ethics. 2021 Sep 29;22(1):135.

60. Beauchamp TL. Methods and principles in biomedical ethics. J Med Ethics. 2003 Oct 1;29(5):269–74.

61. McLachlan AJ, Mulder RT. Criteria for Involuntary Hospitalisation. Aust N Z J Psychiatry. 1999 Oct 1;33(5):729–33.

62. Okai D, Owen G, McGuire H, Singh S, Churchill R, Hotopf M. Mental capacity in psychiatric patients: Systematic review. Br J Psychiatry. 2007 Oct;191(4):291–7.

63. Shawyer F, Mackinnon A, Farhall J, Trauer T, Copolov D. Command Hallucinations and Violence: Implications for Detention and Treatment. Psychiatry Psychol Law. 2003 Jun 1;10(1):97–107.

64. Nelson RM, Beauchamp T, Miller VA, Reynolds W, Ittenbach RF, Luce MF. The concept of voluntary consent. Am J Bioeth AJOB. 2011 Aug;11(8):6–16.

65. Katsakou C, Priebe S. Outcomes of involuntary hospital admission – a review. Acta Psychiatr Scand. 2006;114(4):232–41.

66. Kallert TW, Katsakou C, Adamowski T, Dembinskas A, Fiorillo A, Kjellin L, et al. Coerced hospital admission and symptom change--a prospective observational multi-centre study. PloS One. 2011;6(11):e28191.

67. Priebe S, Katsakou C, Yeeles K, Amos T, Morriss R, Wang D, et al. Predictors of clinical and social outcomes following involuntary hospital admission: a prospective observational study. Eur Arch Psychiatry Clin Neurosci. 2011 Aug 1;261(5):377–86.

68. Luciano M, Sampogna G, Del Vecchio V, Pingani L, Palumbo C, De Rosa C, et al. Use of coercive measures in mental health practice and its impact on outcome: a critical review. Expert Rev Neurother. 2014 Feb;14(2):131–41.

69. Kallert TW, Glöckner M, Schützwohl M. Involuntary vs. voluntary hospital admission: A systematic literature review on outcome diversity. Eur Arch Psychiatry Clin Neurosci. 2008 Jun;258(4):195–209.

70. Mill JS. On liberty [Internet]. 1859. Available from: https://en.wikisource.org/wiki/On_Liberty

69. Storvik M. Rettslig vern av pasienters integritet i psykisk helsevern [Legal protection of patients' integrity in mental health care]. Tromsø: UiT Norges arktiske universitet; 2017.

72. Sjöstrand M, Helgesson G. Coercive treatment and autonomy in psychiatry. Bioethics. 2008 Feb;22(2):113–20.

73. Oberleitner LL. Aversiveness of traditional psychiatric patient restriction. Arch Psychiatr Nurs. 2000;14(2):93–7.

74. Lamont S, Jeon YH, Chiarella M. Assessing patient capacity to consent to treatment: an integrative review of instruments and tools. J Clin Nurs. 2013;22(17–18):2387–403.

75. Feiring E, Ugstad KN. Interpretations of legal criteria for involuntary psychiatric admission: a qualitative analysis. BMC Health Serv Res. 2014 Dec;14(1):500.

76. Salize HJ, Dressing H. Coercion, involuntary treatment and quality of mental health care: is there any link? Curr Opin Psychiatry. 2005 Sep;18(5):576–84.

77. Danleavy DJ. Re: Is psychiatry becoming more coercive? Questions abound. BMJ [Internet]. 2017 [cited 2022 Feb 7]; Available from: https://www.bmj.com/content/357/bmj.j2904/rr-0

78. DaSilva P, Gray JM. English lessons: can publishing an atlas of variation stimulate the discussion on appropriateness of care? Med J Aust. 2016;205(S10):S5–7.

79. Wennberg JE. Future Directions for Small Area Variations. Med Care. 1993;31(5):YS75–80.

80. Kleinert S, Horton R. From universal health coverage to right care for health. The Lancet. 2017 Jul 8;390(10090):101–2.

81. Wynn R, Myklebust LH, Bratlid T. Psychologists and coercion: decisions regarding involuntary psychiatric admission and treatment in a group of Norwegian psychologists. Nord J Psychiatry. 2007;61(6):433–7.

82. Luchins DJ, Cooper AE, Hanrahan P, Rasinski K. Psychiatrists' Attitudes Toward Involuntary Hospitalization. Psychiatr Serv. 2004 Sep 1;55(9):1058–60.

83. Borecky A, Thomsen C, Dubov A. Reweighing the Ethical Tradeoffs in the Involuntary Hospitalization of Suicidal Patients. Am J Bioeth. 2019 Oktober;19(10):71–83.

84. Szmukler G. Compulsion and "coercion" in mental health care. World Psychiatry. 2015 Oct;14(3):259–61.

85. Sjöstrand M, Sandman L, Karlsson P, Helgesson G, Eriksson S, Juth N. Ethical deliberations about involuntary treatment: interviews with Swedish psychiatrists. BMC Med Ethics. 2015 May 28;16(1):37.

86. McGarvey EL, Leon-Verdin M, Wanchek TN, Bonnie RJ. Decisions to Initiate Involuntary Commitment: The Role of Intensive Community Services and Other Factors. Psychiatr Serv. 2013 Feb 1;64(2):120–6.

87. Appelbaum PS. Almost a revolution: an international perspective on the law of involuntary commitment. J Am Acad Psychiatry Law. 1997;25(2):135–47.

88. Zinkler M, von Peter S. End Coercion in Mental Health Services—Toward a System Based on Support Only. Laws. 2019 Sep;8(3):19.

89. Jones K. Insulin coma therapy in schizophrenia. J R Soc Med. 2000;93(3):147–9.

90. Kjellin L, Candefjord IL, Machl M, Westrin CG, Eriksson K, Ekblom B, et al. Coercion in psychiatric care: Problems of medical ethics in a comprehensive empirical study. Behav Sci Law. 1993;11(3):323–34.

91. Heun R, Dave S, Rowlands P. Little evidence for community treatment orders – a battle fought with heavy weapons. BJPsych Bull. 2016 Jun;40(3):115–8.

92. Helse-og omsorgsdepartementet. NOU 2019: 14 Tvangsbegrensningsloven - Forslag til felles regler om tvangs og inngrep uten samtykke i helse- og omsorgstjenesten [Law for the limitation of coercion - suggestions for common regulations of coercion and non-consensual interventions in health and care

services] [Internet]. regjeringen.no; 2019 Jun [cited 2022 Feb 18]. Available from: https://www.regjeringen.no/no/dokumenter/nou-2019-14/id2654803/

93. Nesset M, Teien AG. Reservasjonsrett i psykiatrien nå! [Right of reservation in psychiatry now!]. Tidsskr Den Nor Legeforening [Internet]. 2017 Jun 16 [cited 2022 Jan 20]; Available from: https://tidsskriftet.no/2017/06/debatt/reservasjonsrett-i-psykiatrien-na

94. Hofmann B. The death of dignity is greatly exaggerated: Reflections 15 years after the declaration of dignity as a useless concept. Bioethics. 2020;34(6):602–11.

95. Roberts G, Dorkins E, Wooldridge J, Hewis E. Detained - What’s my choice? Part 1: Discussion. Adv Psychiatr Treat. 2008 May 1;14:172–80.

96. Burn E, Conneely M, Leverton M, Giacco D. Giving Patients Choices During Involuntary Admission: A New Intervention. Front Psychiatry. 2019;10:433.

97. Owen GS, Gergel T, Stephenson LA, Hussain O, Rifkin L, Keene AR. Advance decision-making in mental health – Suggestions for legal reform in England and Wales. Int J Law Psychiatry. 2019 May 1;64:162–77.

98. Stephenson LA, Gergel T, Gieselmann A, Scholten M, Keene AR, Rifkin L, et al. Advance Decision Making in Bipolar: A Systematic Review. Front Psychiatry. 2020 Oct 16;11:538107.

99. Gergel T, Owen GS. Fluctuating capacity and advance decision-making in Bipolar Affective Disorder - Self-binding directives and self-determination. Int J Law Psychiatry. 2015 Jun;40:92–101.

100. Lakeman R. The Finnish open dialogue approach to crisis intervention in psychosis: A review. Psychother Aust. 2014;20(3):28–35.

101. Matthews E. Autonomy and the Psychiatric Patient. J Appl Philos. 2000;17(1):59–70.

102. Lorem GF, Hem MH, Molewijk B. Good coercion: Patients’ moral evaluation of coercion in mental health care. Int J Ment Health Nurs. 2015;24(3):231–40.

103. O’Reilly R, Allison S, Bastiampiallai T. Observed Outcomes: An Approach to Calculate the Optimum Number of Psychiatric Beds. Adm Policy Ment Health Ment Health Serv Res. 2019 Jul 1;46(4):507–17.

104. Hofstad T, Rugkåsa J, Ose SO, Nyttingnes O, Kjus SHH, Husum TL. Service Characteristics and Geographical Variation in Compulsory Hospitalisation: An Exploratory Random Effects Within–Between Analysis of Norwegian Municipalities, 2015–2018. Front Psychiatry [Internet]. 2021 [cited 2022 Mar 27];12. Available from: https://www.frontiersin.org/article/10.3389/fpsyt.2021.737698

105. Wormdahl I, Husum TL, Rugkåsa J, Rise MB. Professionals' perspectives on factors within primary mental health services that can affect pathways to involuntary psychiatric admissions. Int J Ment Health Syst. 2020 Nov 19;14(1):86.

106. Hospital based mental health services: Promoting person-centred and rights-based approaches. Geneva: World Health Organization; 2021.

107. Clausen H, Landheim A, Odden S, Šaltytė Benth J, Heiervang KS, Stuen HK, et al. Hospitalization of high and low inpatient service users before and after enrollment into Assertive Community Treatment teams: a naturalistic observational study. Int J Ment Health Syst. 2016 Feb 29;10(1):14.

108. Nyttingnes O, Rugkåsa J. The Introduction of Medication-Free Mental Health Services in Norway: An Analysis of the Framing and Impact of Arguments From Different Standpoints. Front Psychiatry. 2021 Jul 19;12:685024.

109. Ness E, Steen O, Reichelt JG, Walby FA. Reduksjon av tvangsinnleggelser fra legevakt [Reduced number of involuntary commitments from an emergency outpatient clinic]. Tidsskr Nor Psykologforening. 2016;53:624–31.

110. Gooding P, McSherry B, Roper C. Preventing and reducing 'coercion' in mental health services: an international scoping review of English-language studies. Acta Psychiatr Scand. 2020;142(1):27–39.

111. Bergem AK. Hvorfor varierer tvangsbruken, og hva kan vi gjøre med det? [Why does the use of coercion vary, and what can we do about it?]. Tidsskr Den Nor Legeforening [Internet]. 2016 Jul 5 [cited 2021 Aug 12]; Available from: https://tidsskriftet.no/2016/07/kommentar-og-debatt/hvorfor-varierer-tvangsbruken-og-hva-kan-vi-gjore-med-det

112. Fakhoury W, Priebe S. The process of deinstitutionalization: an international overview. Curr Opin Psychiatry. 2002 Mar;15(2):187–92.

113. Pedersen PB, Kolstad A. De-institutionalisation and trans-institutionalisation - changing trends of inpatient care in Norwegian mental health institutions 1950-2007. Int J Ment Health Syst. 2009 Dec 25;3(1):28.

114. Bhugra D, Tasman A, Pathare S, Priebe S, Smith S, Torous J, et al. The WPA-Lancet Psychiatry Commission on the Future of Psychiatry. Lancet Psychiatry. 2017 Oct 1;4(10):775–818.

115. Council of Europe. Ending coercion in mental health: the need for a human rights-based approach [Internet]. Recommendation 2158 Jun 26, 2019. Available from: https://pace.coe.int/pdf/c16722d6137d2709fcacd22cfa7e55a2d95f5fb63326667a8259ffe25682ae848428feba12/resolution%202291.pdf

116. Szmukler G, Rose N. Risk Assessment in Mental Health Care: Values and Costs. Behav Sci Law. 2013;31(1):125–40.

117. Szmukler G, Kelly BD. We should replace conventional mental health law with capacity-based law. Br J Psychiatry. 2016 Dec;209(6):449–53.

118. Syse A, Nilstun T. Ulike regler - lik lovforståelse? Om tvangsregulering og verdikonflikter i nordisk psykiatri [Different rules—similar understanding. On regulations of coercive measures and value conflicts in Nordic psychiatry]. Tidsskr Rettsvitensk. 1997;110(05):837–916.

119. Solbakk JH. Vulnerability: A futile or useful principle in healthcare ethics. SAGE Handb Health Care Ethics Lond SAGE. 2011;228–38.