Equity of referrals to type 2 diabetes rehabilitation in a universal welfare state

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A B S T R A C T

Objective: Despite aims of equal access to treatment and care in the Nordic countries, marked socioeconomic inequality in the development of type 2 diabetes (T2D) complications persists. The study purpose was to estimate the associations of individual socioeconomic position and deprivation at the general practitioner (GP) level with referrals to T2D rehabilitation.

Research Design and Methods: In 2015–2018, 3390 people affiliated with 432 primary GPs living in the municipality of Copenhagen were identified through registry data as newly diagnosed with T2D. Of these, 656 (19%) individuals were referred to municipal rehabilitation services in 2015–2021. Individual socioeconomic position was measured by education, income, and employment. The Danish Deprivation Index (DADI) was used as a measure of GP-level deprivation.

Results: Patients were more likely to be referred to municipal rehabilitation if they had low vs. high income (hazard ratio (HR) 2.87 [women], 1.64 [men]), were not employed vs. employed (HR 1.95 [women], 1.23 [men]) and were affiliated with GPs with a low vs. very high level of deprivation (HR 7.63 [women], 4.30 [men]). The results suggest that GPs practice proportionate universalism by allocating treatment to lower socioeconomic individuals in likely higher need of care. However, the overall HR for referrals was lower among GPs with more deprived patient populations, indicating unequal treatment of all citizens, which conflicts with the aims of general universal healthcare. Inequality in rehabilitation healthcare services must be further addressed and investigated to prevent exacerbating health disparities.

1. Introduction

International comparisons of healthcare systems consistently rank the Nordic countries highest on equitable access to care (Mackenbach, 2019). This has primarily been explained by universal tax-financed healthcare systems providing free access to treatment and care based on needs, rather than financial capacity and social status (Vrangbæk, 2021). Despite legally equal access to healthcare, persistent socioeconomic inequalities exist in the development of type 2 diabetes (T2D) complications (Sortsø et al., 2018) and assignment of disability pension benefits (Bender et al., 2021). Suggested explanations include varying engagement in preventive health and diabetes care (Bender et al., 2014, 2015; Tapager et al., 2022), self-care resources (Kristensen et al., 2016) and social support (Weyers et al., 2008) across socioeconomic groups.

Theories of universal healthcare in welfare systems have roots in sociology, political science, economy and public health and are reflected in two universalist policymaking paradigms: general universalism and specific universalism. Given a social right to receive free healthcare on the basis of citizenship, general universalism aims to provide impartial healthcare provision and treatment and specific universalism targets care to groups with specific needs (e.g., smoking cessation and maternal health care) (Thompson & Hoggett, 1996). As a part of the 2010 Fair Society, Healthy Lives report, Marmot and colleagues proposed a new paradigm of universal welfare, proportionate universalism, in which the scale and intensity of care should be both universal and proportionately targeted to reduce the socioeconomic gradient in health (2022 Fair Society Healthy Lives).

Denmark is often characterized as a universal welfare state (Arts & Gelissen, 2010), meaning that all citizens/legal residents are entitled to a range of welfare services paid through general taxation rather than private or social insurance. Diabetes care in Denmark is governed by national guidelines and regional disease management programs (DMPs), which comprise structured descriptions of patient pathways for different chronic diseases (Vrangbæk, 2021). As in other Nordic countries, the UK and Netherlands, GPs in Denmark serve as gatekeepers and play a pivotal role in referring patients to hospitals, private clinics and municipal care, which too is free of charge upon referral (Olejaz et al., 2012). The GPs are responsible for treatment and management of patients with well-regulated type 2 diabetes, while DMPs state that GPs should refer patients with complicated diabetes to treatment and

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monitoring in specialized regional diabetes centers at the hospitals (Vrangbæk, 2021). Both GPs and hospitals may offer disease management and individual lifestyle counseling, but the Danish national treatment guidelines recommend that health care personnel encourage all patients with type 2 diabetes to consider participation in municipal based rehabilitation program (2021 Dansk Endokrinologisk Selskab). GPs are thus obliged to consider referral to municipal chronic care treatment for all patients with newly diagnosed T2D. At the municipal centers patients are offered individual and/or group based education in disease management and behavioral interventions based on individual assessments of needs and resources.

Among GPs, the decision to refer patients to municipal rehabilitation programs is influenced by multiple contextual, personal and clinical factors that complicate the decision-making process (Tzartzas et al., 2019). Factors may include barriers related to the organization of healthcare services and patients’ socioeconomic and psychosocial resources. Organizational barriers to access may include perceived lack of relevant treatment offers (Dixon-Woods et al., 2006). When patients lack resources to participate in municipal rehabilitation, they can be offered some disease management and lifestyle counseling in collaboration with nurses and/or dietitians affiliated with GP clinics. Thus, allocating resources reasonably according to proportionate universalism and ensuring equity by matching healthcare services to patients’ needs is a complex process that is highly dependent on interactions between GPs and patients (Reibling & Wendent, 2012).

Area-based characteristics may also influence patterns of healthcare use. Segregation in urban areas due to labor and housing markets clusters individuals with similar educational, occupational and income levels in neighborhoods, resulting in large health inequalities between districts (Didderichsen et al., 2012). To date, limited attention has been paid to area-level factors that promote or hinder referral to and delivery of health care. GPs residing in deprived areas describe challenges in establishing effective dialogue with patients and in developing well-informed treatment plans within the timeframe of a usual consultation (Mercer et al., 2021; Søndergaard et al., 2015). Higher rates of GP burnout have also been documented in deprived areas (Pedersen et al., 2020; Pedersen & Vedsted, 2014).

The aim of this study was to analyze the associations of individual socioeconomic position and GP-level deprivation with referral to municipal rehabilitation for individuals with T2D.

2. Research design and methods

2.1. Setting

Since 2015, the Copenhagen Municipality has systematically collected data on all patients referred to municipal diabetes-specific rehabilitation. After an electronic referral has been issued, the Center takes contact to the patient, who is invited to take part in a clarifying conversation with the aim of developing a personal rehabilitation plan. This plan may include individual and group-based education in disease management, physical training, cooking classes and lifestyle education (Anbefalinger for forebyggelsestilbud til borgere, 2022). The Center is situated in the center of Copenhagen and is a maximum of four straight-line kilometers from municipality borders.

2.2. Study population

From January 12, 2015 to December 31, 2017, 3396 individuals were estimated as newly diagnosed with T2D in the municipality of Copenhagen. Data on T2D status were obtained through algorithmic criteria using registrations in several national health registries using an algorithm developed by Carstensen and colleagues (Carstensen et al., 2020). Online supplementary material S1 contains a detailed description of the inclusion criteria for T2D. Data from the National Health Service Register (The Danish National Health Service Register - John Sahl Andersen, 2011), which includes information on primary healthcare services, was used to link diagnosed individuals with their primary GPs, defined as the GP with whom they had the highest number of contacts from six months before to six months after the date of their diabetes diagnosis. Most GPs work in multipractice settings, but some solo practices exist. Patients must register with a specific GP or multipractice and most often select a GP located close to their place of residence (Olejaz et al., 2012). If individuals had no GP contact during this year-long interval, the GP with whom they had the most contacts from 18 months before to 18 months after their diabetes diagnosis was identified as primary. Six individuals had no contact with a GP during the extended period and were excluded from the study population, leaving 3390 people (1446 women and 1944 men) for analyses. A total of 432 primary GPs were included in the study.

2.3. Data

Data were obtained from national registers (Thygesen et al., 2011) and the Copenhagen Center for Diabetes database. Unique personal identification numbers and unique GP clinic identifiers linked data.

Individual level variables included referral (yes/no) to T2D rehabilitation from the Copenhagen Center for Diabetes. Data on education, income and employment status were obtained from administrative registers. Individuals’ highest recorded educational attainment was categorized according to the International Standard Classification of Education (ISCED 2011) into short education (primary and lower secondary education; < 2 years of vocational training), medium education (upper secondary and post-secondary education; 2–4 years of vocational training) and long education (tertiary education; > 4 years of education, academic degree completion). Equalized disposable income was calculated as median household income after tax and interest, divided by the weighted sum of the number of household adult equivalents (Glossary: Equivalent disposable income, 2022). Employment was measured categorically as employed, currently not employed (e.g., students, unemployed) and retired. Using data from the Danish National Patient Register (NPR) (Schmidt et al., 2015) that included ICD-10 disease codes, we created 20 major disease categories (see supplementary material S3 for ICD-10 codes). People with one or more recorded ICD-10 codes within the past 10 years were identified as having a somatic morbidity. Additional information on psychiatric conditions was obtained from the Psychiatric Central Research Register (PCR) (Mors et al., 2011) and the Danish National Prescription Register (DNPR) (Wallach Kildemoes et al., 2011). Individuals with a psychiatric record in the NPR or PCR or ≥ 5 prescriptions of psychiatric medications in the DNPR within the previous ten years were identified as having a psychiatric condition. Data on the additional covariates of sex, age and ethnicity (Danish/Western, or other origin) were obtained from the Danish Central Population Register (Pedersen, 2011).

GP-level variables were based on the health and socioeconomic position of all patients, regardless of T2D status (N = 861,125), affiliated with the 432 included GPs. We used the Danish Deprivation Index (DADI) to assess the level of deprivation for each GP’s patient population. DADI aggregates eight measures of patient-population proportions: those without current employment, those with short education, low-income families with children < 18 years, low-income middle-aged individuals, low-income elders > 70 years, single households, individuals receiving transfer benefits and immigrants from non-western countries (Pedersen et al., 2020; Pedersen & Vedsted, 2014). Data from nationwide administrative registers were used to create GP-level DADIs (supplementary material S2 contains additional detail on the DADI and its calculation in our study). Across all practices, we calculated the range for each of the eight deprivation measures and divided each into deciles. The upper bounds of the lowest deciles were weighted and summed to form a compositional GP-level deprivation index with theoretical values ranking from 10 to 100, with higher scores reflecting more deprivation. The weights, developed by Pedersen & Vedsted, were based on GPs’
opinions of the burden of socioeconomic factors (Pedersen & Vedsted, 2014). Deprivation level of patients affiliated with GPs was inspired by and validated in accordance with the Jarman index (Jarman, 1984). We categorized and divided the study population according to the compositional GP-level deprivation score into four groups: low deprivation, <25 (n = 323); moderate deprivation, 25–49 (n = 2472); high deprivation, 50–74 (n = 471); and very high deprivation ≥75 (n = 94). We also included the average patient morbidity at the GP-level, defined as the average number of people affiliated with each GP who had one or two + recorded codes for major diseases within the past 10 years (supplementary material S3 contains ICD-10 disease codes).

2.4. Statistical analyses

Descriptive statistics included the distribution of individuals with T2D by explanatory variables. Due to relocations out of the study area (n = 53) and deaths (n = 352) during the follow-up period, we conducted a survival analysis censoring these individuals at the date of relocation or death. Individuals were included in the study on the date they fulfilled the registry-based inclusion criteria for T2D and followed until the date of referral to T2D rehabilitation or the end of study follow-up. Age was used as the underlying timescale. All analyses were conducted separately for men and women due to the differing prevalence and manifestation of T2D between sexes.

All analyses were conducted as multi-level analyses, we conducted a series of Cox frailty models, with patients nested within GP clinics by including the unique GP number in the random statement. A series of univariate analyses (Models 1) each included one exposure variable and referral to rehabilitation as the outcome. Multivariate analyses (Models 2) were comparable to the univariate models but additionally including potential confounders; patient-deprivation at the GP-level was adjusted for income, and income and employment status were each adjusted for GP-level deprivation. Psychiatric disease, somatic morbidity and patient-morbidity at the GP-level were also included as potential explanatory variables in Model 2. In both Model 1 and Model 2, we conducted statistical tests for linear associations between the ordinal exposures of education and income and GP-level deprivation among women. Because we had no assumption of an ordinal relation between categories of employment status and referral we assessed statistical differences using a type III test. We also used a type III test to assess differences in referral between GPs with different patient-deprivation levels, among men. In separate analyses, we tested for interaction between individual socioeconomic measures and GP patient-deprivation level by adding interaction terms to Model 2. All assumptions of the Cox proportional hazards model were fulfilled. All statistical analyses were conducted by use of the program SAS 9.4.

In order to test if the results were disproportionally affected by the group of patients potentially receiving rehabilitation within a different chronic care program, in a sensitivity analyses we excluded individuals with comorbidity leaving 1091 men and 770 women. Using this selected population, we rerun the multi-level analyses of patient-deprivation at the GP-level associations with referral.

3. Results

Among 1944 men and 1446 women newly diagnosed with T2D from January 2015 to December 2017, 366 (19%) men and 290 (20%) women were referred to rehabilitation in the municipal diabetes center. The proportion of referred patients was relatively stable over time (supplementary material S4). The mean follow-up time was 3.5 years (range, 1 day to 6 years). Nearly half of the GPs with newly diagnosed T2D patients referred no patients to municipal rehabilitation (supplementary material S5). Twenty percent of all newly diagnosed patients were affiliated with these GPs, meaning that GP clinics with fewer newly diagnosed T2D patients had a lower rate of referral.

In univariate analyses, the likelihood of referral was higher for those below the age of 70 years, women who were not currently employed, and men and women with lower incomes (Table 1). Patients with no comorbidities had a higher probability of referral than those with two comorbidities, and individuals with psychiatric disease had a higher probability of referral than those without it (Table 1). We found no significant differences in referral by educational level, partner status or immigrant status.

The likelihood of referral to municipal rehabilitation was twice as high for men affiliated with GPs whose patient populations had the lowest morbidity, compared to men affiliated with GPs whose populations had the highest morbidity (HR, 1.92; 95% CI, 1.37–2.67) (Table 1). Among women, no significant differences were observed in the probability (HR) of referral by GP-level patient morbidity.

In multilevel analyses, people with lower income (Fig. 1, Model 1) and those not currently employed (Fig. 2, Model 1) had a higher probability of referral, while lower GP-level patient deprivation was associated with a higher probability of referral (Fig. 3, Model 1). No significant association between education and referral was found, and none of the interaction terms between GP-level deprivation and individual-level income, employment status or education were significant.

In Model 2 analyses, which in addition to the variables in Model 1 also included potential confounders, accentuated HR of referral was observed among women for income, employment status and GP-level patient deprivation (Figs. 1–3). Particularly large differences in referral rates were observed between GPs with unlike patient deprivation levels. The likelihood of referral to rehabilitation was more than seven times greater among women (HR, 7.63; 95% CI 1.81–32.13) and four times greater among men (HR, 4.30; 95% CI 1.11–16.72) affiliated with GPs with the least, compared to most, deprived patient populations. The results of the sensitivity analyses (supplementary material S6) in which we excluded persons with comorbidity, did not differ notably from those shown in Fig. 3.

4. Discussion

Our multilevel study found that referrals to T2D rehabilitation were characterized by two paradigms of universalism. Lower individual socioeconomic position (lower income and no current employment) was associated with higher referral rates, indicating that GPs carried out proportionate universalism in practice or simply that persons with lower socioeconomic position to a larger degree accept the GP’s offer of rehabilitation referral; i.e., persons with unequal need were offered treatment in proportion to the inequality in need (Carey et al., 2015; Culyer & Wagstaff, 1993). These results contrast with previous reports in which patients with T2D and higher socioeconomic status, particularly higher educational attainment, received more offers of outpatient services, rehabilitation and specialists in primary care (Sortse et al., 2017). In keeping with these findings, the Capital Region of Denmark has stated that the proportion of patients with T2D treated in municipal rehabilitation is too low and that more patients would likely benefit from referral in terms of treatment outcomes (Snorgaard et al., 2016). In the context of our findings, we can only speculate about the reasons behind these referral patterns. One potential reason for the low number of patients referred to rehabilitation may be that GPs offer rehabilitation activities within their own clinics and may be more likely to treat patients with the most resources in their clinic, opting to refer patients for whom they feel they cannot offer suitable rehabilitation in the form of a specialized and structured program. Another explanation may be that people with permanent jobs may lack the time to participate in municipal rehabilitation activities. Lastly, people with higher socioeconomic position may be reluctant to accept municipal rehabilitation due to potential stigma and negative stereotypes of welfare recipients, which is also administered by municipalities in Denmark (Schofield & Butterworth, 2018) and persons with higher income and education may have more options to seek care or guidance privately.

The second paradigm of universalism is illustrated by our findings
related to GP-level patient deprivation. Greater patient deprivation was associated with a lower probability of referral by the GP, suggesting that the GPs may fail to provide general universal health care in more resource-demanding settings. A greater share of vulnerable patients may require more complex treatment plans that involve proactive coordination with hospitals, specialist care and municipal social services, among others which can be difficult to complete within the timeframe of a usual consultation (Hessler et al., 2019).

In 2018, a new payment model for GPs was implemented to adjust capitation to compensate GPs with more allocated high-need patients. Our results suggest that there was inequality in the referral probability by characteristics of sex, age and morbidity. However, when adjusting for sex, age and morbidity we still found much lower probability of referral with increasing GP-level deprivation. This suggests that the funding structures for GP services adjust only indirectly and to a limited extent for the socioeconomic position of individuals. Further research is needed to elucidate how capitation adjustment schemes may or may not contribute to levelling out inequalities in care according to patient casemix.

4.1. Strengths and limitations

The data used in the analyses are highly valid due to the universal nature of the Danish healthcare system and standardized digital reporting requirements that enable fee-for-service reimbursement and administrative surveillance of health services (Schmidt et al., 2015; The Danish National Health Service Register - John Sahl Andersen, 2011). The database from Copenhagen Center for Diabetes may be influenced by misclassification if individuals who were referred, were not recorded in the database. However, the Center views this possibility as minimal,
with any omitted recordings unrelated to the socioeconomic position of patients or GP patient populations. The lower levels of referral among patients with multimorbidity could reflect the fact that they received rehabilitation within different organizations (e.g., as a part of a cardiovascular rehabilitation program or private training or in a specialized setting at the hospital). Despite the recommendations of the Danish national treatment guidelines recommending T2D patients to participate in a municipal based rehabilitation program, participation in rehabilitation activities outside the municipality of Copenhagen may have contributed to the explanation of unexpectedly low rates of referral to the municipal T2D rehabilitation services. We unfortunately do not have access to data on rehabilitation activities in hospitals and private settings, but results from the sensitivity analyses excluding all patients with comorbidity confirmed the results of this paper.

We chose to categorize GP-level deprivation scores in four equal groups, rather than on the population distribution. This resulted in a small number of persons in the lowest and highest groups but enabled distinguishing between different levels of deprivation, which was the study aim. We tested other cut-points, finding no association between deprivation level and participation in rehabilitation activities outside the municipality of Copenhagen may have contributed to the explanation of unexpectedly low rates of referral to the municipal T2D rehabilitation services. We unfortunately do not have access to data on rehabilitation activities in hospitals and private settings, but results from the sensitivity analyses excluding all patients with comorbidity confirmed the results of this paper.

This study is set within a Scandinavian welfare state and results may thus be limited in generalizability to a wider global setting, e.g. addressing the rising burdens of diabetes in developing nations (Jakovljevic et al., 2021). However, designing the best systems of care and addressing social inequalities in diabetes care and health outcomes is a pertinent issue both in this setting and beyond.

5. Conclusions

Approximately one in five individuals with newly diagnosed T2D is referred to type 2 diabetes rehabilitation.

Ethics

In Denmark, researchers can use registers for conducting statistical analyses of population-level outcomes without persons’ informed consent, provided compliance with current legal and ethical regulation for the use of personal data for research.

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Authorship

CG together with colleagues from the Copenhagen Center for Diabetes was responsible for data collection. MB conducted the analysis and was responsible for writing the manuscript. MB, ITW, KV, HBH, and IA were involved in the conception and design of the study and discussed data analyses. All authors critically revised the manuscript and approved the final version of the manuscript. AMB is responsible for the integrity of the work as a whole.

Data availability

The data that has been used is confidential.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssmph.2022.101303.

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