

BMJ Open Staff experiences of diabetes care in residential care facilities for people with severe disabilities in Denmark: a mixed-methods assessment of access to screening for diabetes complications

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To cite: Nexø MA, Baumgarten SV, Willaing I, *et al.* Staff experiences of diabetes care in residential care facilities for people with severe disabilities in Denmark: a mixed-methods assessment of access to screening for diabetes complications. *BMJ Open* 2022;**12**:e062403. doi:10.1136/bmjopen-2022-062403

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2022-062403>).

Received 14 March 2022
Accepted 15 November 2022



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ABSTRACT

Objectives To identify the prevalence of diabetes among adults (>18 years) living in residential care facilities in Denmark and to identify the structural, practical, and individual barriers and drivers related to their participation in screening programmes.

Design

Setting The register-based study included all residents living in residential care facilities in Denmark. The survey and qualitative analysis were carried out exclusively in the Capital Region of Denmark.

Participants For the register-based study, we identified 11 620 residents of care facilities in Denmark (>18 years) and identified the number of residents with diagnosis codes of type 1 or type 2 diabetes or dispensed prescriptions of blood glucose-lowering medication. Staff from 102 psychiatric facilities housing adults with severe psychiatric disabilities were invited to participate in the survey. Of these, 56 facilities participated with one responder each, of which n=16 also participated in follow-up qualitative interviews.

Results Register-based study: of the residents at the facilities, 954 (8%) were diagnosed with diabetes. Descriptive statistics of responses and results from content analysis of interviews were summarised in five themes that illuminated how a screening programme could be tailored to the care facilities: (1) characteristics of residents and care facilities, (2) the care needs of residents, (3) the way care was organised, (4) the specific barriers and drivers for participating in programmes, (5) number of hours and settings for screening programmes.

Conclusion To increase the participation of people living in psychiatric care facilities in screening programmes, future programmes should be tailored to the identified needs and barriers experienced by the residential care staff.

BACKGROUND

Diabetes complications have major individual and societal costs.¹ Although daily diabetes management can help prevent or delay the onset of complications, diabetes can

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The mixed-methods design of this study enabled assessment of the complex diabetes care needs of people with psychiatric disabilities living in residential care facilities in Denmark.
- ⇒ The barriers and drivers to improving diabetes care for this population were assessed via the staff of the facilities and not directly from the perspective of people living with psychiatric disabilities or their relatives.
- ⇒ Although the identified barriers and drivers can help improve future diabetes care programmes, future studies are needed to generalise the structural and practical barriers to other countries with different healthcare and residential care systems.

damage microvascular and macrovascular functioning over time, increasing the risk of heart attack or stroke, limb amputations, blindness and kidney failure.² Early detection and treatment of complications are essential parts of diabetes care, and effective screening programmes are pivotal for improving long-term outcomes.³

People with diabetes and low socioeconomic status, such as those living in residential care facilities, experience the most severe diabetes complications and have the highest risk of premature death.⁴ For example, among people with severe mental disorders, high diabetes prevalence,⁵ poor treatment of complications^{6–8} and early mortality^{9 10} are well documented. Antipsychotic medications account in part for the risk of metabolic abnormalities and weight gain associated with developing type 2 diabetes.⁶ However, structural factors such as low socioeconomic status due to severe mental disorders have also been associated with unhealthy lifestyle behaviours, limited resources and a lack of



external support for prioritising daily diabetes management.^{49 11}

In Denmark, citizens who depend on daily care provided by others due to mental, physical or social disabilities are offered housing in state-financed residential care facilities. Facility residents have either severe mental health problems (eg, schizophrenia), severe substance abuse or a history of social problems (eg, homelessness), developmental disorders (eg, autism or Down syndrome), intellectual or physical disabilities or communication disorders (eg, deafness, muteness, blindness). Although adverse health outcomes are well documented among people with severe mental disorders, a few studies have examined diabetes outcomes in people with other severe disabilities, suggesting similar risks.^{12–14}

Developing new interventions to effectively promote diabetes care requires careful consideration of barriers and drivers, as well as the context and settings for implementation.^{15 16} These factors have not yet been examined among people with diabetes living in residential care facilities. Thus, the study aims were to identify: (1) what characterises the prevalence of diabetes among adults (>18 years) living in residential care facilities in Denmark and (2) which structural, practical, and individual barriers and drivers related to their participation in screening programmes for diabetes complications.

METHODS

The mixed-methods study was conducted in January–December 2020 and included a register-based study of all residents in the target group, a survey and individual interviews with staff members in Danish residential care facilities.

Identifying care facility residents with diabetes

We identified all adult citizens in Denmark, who were alive and living in a residential care facility on 1 December 2018 from the national register of social services, to which municipalities responsible for residential care facilities must report information annually. Duration of their stay and reasons for citizens' referral to facilities were identified in accordance with the register of social services classifications: physical disability (eg, deafness, blindness, mobility disabilities), intellectual disability (eg, brain damage, developmental disorders, autism), severe mental disorder (eg, schizophrenia, personality disorder) or socially marginalised (eg, substance abuse, homelessness).

We used encrypted unique personal identification numbers given to all Danish citizens by the Central Population Register to link data from the Social Service Register with other national registers of demographics (eg, age, sex, educational attainment), the Danish National Hospital Register and the Danish National Prescription Registry. We used a previously tested method to identify the number of residents with diabetes.^{17 18} Residents were classified as having diabetes if they were registered with

diabetes in the Danish National Patient Registry¹⁹ with the diagnostic codes E10 for type 1 diabetes or E11 for type 2 diabetes or had at least three dispensed prescriptions of insulin or blood glucose-lowering medication corresponding to the Anatomical Therapeutic Chemical (ATC) codes A10A for type 1 diabetes or A10B for type 2 diabetes in the Danish National Prescription Registry²⁰ between 1 January 2010 and 1 December 2018. These registers include all citizens in Denmark who have visited any hospital in Denmark and all prescriptions filled at any pharmacy in Denmark. All descriptive analyses were performed in SAS EG V.7.1 in databases hosted at Statistics Denmark.

Assessing drivers and barriers related to diabetes care at residential care facilities

Through a national online register, we identified 112 residential care facilities in the Capital Region of Denmark providing housing for adults (aged >18 years) with severe mental, intellectual, physical, and/or social disabilities that included substantial needs for daily support and care. We included only facilities allowing long-term (>1 year) stay to allow time to initiate, plan and follow up on screening for diabetes complications. Facilities offering only short-term care, such as homeless shelters providing accommodations overnight, were excluded.

Guided by existing literature, we developed a 20-item online questionnaire assessing five main themes (online supplemental table 1).

We used survey items validated in Danish where possible (eg, demographics and characteristics of staff²¹) but mostly we developed or adapted closed-ended items and response categories from existing self-administered questionnaire measuring health, functioning and diabetes management in people with psychiatric disabilities.^{22–25} The inclusion of pre-existing items or adjustment of content of items was guided by the structural, practical and individual barriers identified in the existing literature^{10 12 26} along with advice from practitioners with experience of screening programmes or diabetes management of people with psychiatric disabilities. The 20-item online questionnaire was organised into five major themes (online supplemental table 1):

- ▶ Characteristics of the facility, staff and residents (six items).
- ▶ Residents' diabetes care needs (five items).
- ▶ Diabetes care at the facility (four items).
- ▶ Barriers and drivers related to screening programmes for diabetes complications (two items).
- ▶ Time and setting for screening (three items).

The survey was pilot tested and adjusted according to feedback from an interdisciplinary research team with expertise in survey methodology at Steno Diabetes Center Copenhagen (two PhD students, two postdoctoral research fellows, two senior researchers), a nurse from Center for Diabetes in the Copenhagen Municipality and three staff members (two nurses and an assistant) at

two different residential care facilities. The survey took approximately 10 min to complete.

Managers at each residential care facility were contacted by phone up to three times to inform them about the survey and invite them to participate in the study. They were asked to select one employee to respond to the survey who oversaw or had the best understanding of residents' daily healthcare needs. Phone calls were followed by an email message with a link to the online survey and an informed consent form. Up to three reminders were sent. Survey data were analysed with IBM SPSS V.25.

Semistructured qualitative interviews

Survey respondents from each of the 56 facilities were asked if we could contact them for individual interviews to further explore their responses. Each respondent who agreed to participate in a follow-up interview was contacted by email or phone and offered a choice of an interview in person or by phone or video conferencing, according to facility COVID-19 restrictions. Interview participants received monetary compensation for their time and completed informed consent forms before interviews. COVID-19 precautions precluded interviewing residents.

The five themes of the online questionnaire were used as a pre-existing framework to guide the semistructured interviews and analysis (online supplemental table 1). A semistructured guide included both open-ended questions about participants' questionnaire responses to each theme and about the staff's perception of the residents' needs and preferences related to screening initiatives. The participants were also encouraged to share suggestions and reflections that were not solicited by the survey items. All the interviews were recorded and transcribed verbatim and analysed by directed content analysis,²⁷ a deductive approach in which text of interviews was first coded into meaning units (keywords of sentences or quotes) and then grouped into subcodes and condensed into overall thematic codes. The thematic codes were placed into one of the five predefined themes. Codes that could not be placed within the five predefined themes were also coded following the same procedure and organised into the predefined: 'emerging themes'. Although the coding of the emergent themes was not directed by the predefined survey responses, it was interpreted within the context of the overall deductive analysis. Therefore, the coding of emergent themes had both inductive and deductive elements. First, SVB coded all the data, then MAN revised, and in collaboration with SVB, finalised the coding. Analysis of interview data was performed in NVivo V.12.

Patient and public involvement

This study had no patient and public involvement. We had planned to interview residents and/or their relatives at three different facilities, but COVID-19 restrictions at the facilities decided against it.

Table 1 Characteristics of 11 620 individuals living in residential care facilities in Denmark, n (%)

	Diabetes (N=954)	No diabetes (N=10 666)
Diabetes diagnosis		
Type 1	107 (11.2)	Not applicable
Type 2	847 (88.8)	Not applicable
Duration of care		
Long term	583 (61.0)	4592 (43.0)
Intermediate	371 (39.0)	6074 (57.0)
Sex		
Men	536 (56.1)	6720 (63.0)
Women	411 (43.2)	3946 (37.0)
Missing	7 (0.7)	0
Age		
<35 years	186 (19.5)	5718 (53.6)
35–49 years	206 (21.6)	2069 (19.4)
50–64 years	361 (37.8)	2050 (19.2)
≥65 years	194 (20.3)	829 (7.8)
Missing	7 (0.7)	0
Education		
No formal education/ primary school	650 (68.1)	8588 (80.5)
Vocational school	140 (14.7)	672 (6.3)
High school (including vocational)	49 (5.1)	370 (3.5)
Higher education	49 (5.1)	272 (2.6)
Missing	66 (6.9)	764 (7.2)
Reason for referral to residential care		
Physical disability (deafness, blindness, muteness, mobility)	109 (11.4)	1088 (10.2)
Intellectual disability (brain damage, developmental disorder, autism)	318 (33.3)	5717 (53.6)
Severe mental disorder (eg, schizophrenia, personality disorder)	463 (48.6)	3132 (29.4)
Socially marginalised (eg, substance abuse, homelessness)	61 (6.4)	692 (6.5)
Missing	3 (0.3)	37 (0.3)

RESULTS

Among 11 620 residents of intermediate or long-term residential care facilities, 954 (8%) had been diagnosed with diabetes; of these, 107 (11%) had type 1 diabetes and 847 (89%) had type 2 diabetes (table 1). Approximately half of residents with diabetes had severe mental disorders and one-third had intellectual disabilities.

Table 2 Characteristics of residential care facilities participating in survey and interviews, n (%)*

	Facilities participating in survey (n=56)	Facilities participating in survey and interviews (n=16)
Size		
0–10 places	16 (28.6)	4 (25.0)
11–20 places	14 (25.8)	5 (31.3)
>20 places	17 (30.4)	6 (37.5)
Missing	9 (16.1)	1 (6.2)
Main disabilities cared for at facilities		
Physical disabilities	4 (7.1)	2 (12.3)
Severe mental disorders	20 (35.7)	6 (33.3)
Substance or alcohol abuse	1 (1.8)	1 (6.7)
Brain damage	7 (12.5)	1 (6.7)
Developmental disorders (eg, autism, Down syndrome)	19 (33.9)	6 (40.0)
Respondent's position at facility		
Residential social worker	5 (8.9)	2 (18.6)
Nurse or consultant nurse	14 (25.0)	5 (31.3)
Care assistant	11 (19.6)	2 (6.3)
Manager	20 (35.7)	6 (40.0)
Other (eg, specialised healthcare professional)	2 (4.4)	1 (6.3)
Missing	4 (7.1)	0 (0)
Educational level of respondents		
Short (up to 3 years after primary school)	4 (7.1)	1 (6.3)
Medium long (up to 3 years after high school)	30 (53.6)	13 (81.3)
Long (5 years or more after high school)	4 (7.1)	2 (12.3)
Missing	18 (32.1)	0 (0)

*The 56 facilities participated with one respondent each, of which respondents from 16 different facilities also participated in interviews.

Staff members from 56 of the 112 invited residential care facilities completed the survey. Thirty-one (55%) respondents agreed to being contacted for interviews. Of these, 16 (52%) were available for an interview during the data collection period. Two residential care facilities received monetary compensation for the time their employees spent in interviews. Four interviews were carried out at care facilities, nine over the telephone and three via video conference. Most respondents were managers or nurses, had up to 3 years of education after high school and had been employed at facilities for up to 5 years (table 2).

Characteristics of facilities, staff and residents

Among 56 survey respondents, 44 (79%) reported current or former residents with diabetes: of these, 23 (52%) had residents with type 1 diabetes and 36 (80%) had residents with type 2 diabetes (online supplemental table 1). A single interviewee worked at a facility that had no experience with residents with diabetes.

Half of the facilities provided care for people with developmental disorders and one-third housed people with severe mental disorders (table 2). Interviewees who worked at facilities housing people with autism explained that their residents had several disabilities, with the most

common combination being autism and intellectual and physical disabilities (eg, blindness). Interviewees from facilities housing people with severe mental disorders explained that disabilities were often combined with substance abuse (figure 1 and online supplemental appendix table 1). Residential care facilities' social workers or social and healthcare assistants primarily provided residents' daily care, but most facilities also had at least one consultant nurse available.

Diabetes care needs at the facility

In Denmark, treatment of uncomplicated type 2 diabetes takes place in general practice, whereas specialised treatment for people with type 1 diabetes is standard care. We found that 32 (72%) residents received diabetes care at a hospital or specialised clinic. Most residents needed assistance with all aspects of daily diabetes management, from every aspect of medical appointments to daily medication (N=39, 89%), healthy eating habits (N=38, 86%) and physical activity (N=38, 86%).

Residents had severely impaired daily functioning and their diabetes represented one of many needs that were difficult to accommodate (figure 1). Some residents completely lacked speech and language abilities and

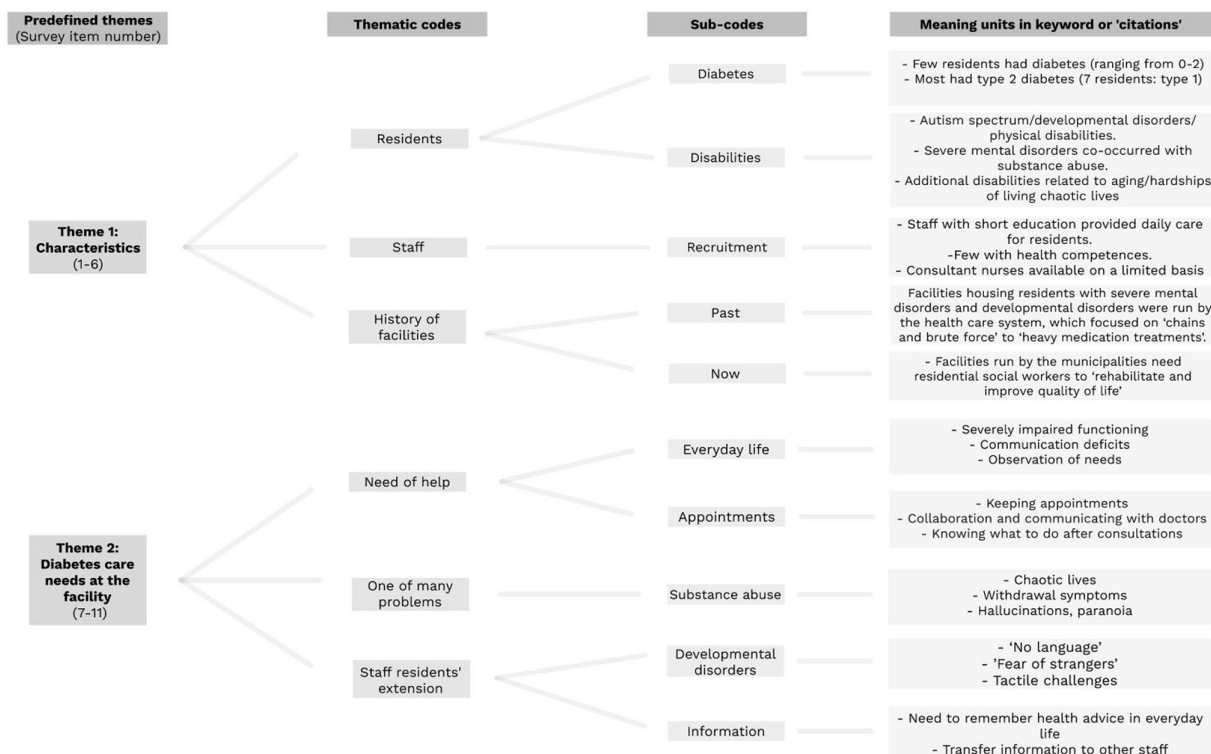


Figure 1 Overview of the structure and organisation of themes in the qualitative analysis (themes 1–2).

others had limited communication or were generally afraid to connect with people due to paranoid delusions. Staff often had to observe and interpret their needs. Some residents lived very chaotic lives, and substance abuse made it particularly difficult to plan and attend to basic healthcare needs. Some residents could attend medical appointments by themselves but, for many residents, staff needed to escort them to and from consultations, thus serving as 'the citizen's extension' and helping to interpret and transfer information to and from the doctor, such as changes in daily care at the facility.

Organisation of diabetes care

Most staff had been trained in diabetes care by peer-to-peer knowledge transfer (N=36, 82%), and the majority reported feeling that they had 'some' or 'low' sufficient knowledge about diabetes (N=25, 57%), diabetes complications (N=30, 68%) or how diabetes complications could be prevented ('some' and 'low' N=30, 68%).

In interviews, staff clarified that the extent to which they felt sufficiently supervised to meet the diabetes care needs of residents depended on collaboration with diabetes care providers (figure 2). When residents had type 1 diabetes or complicated type 2 diabetes, specialised healthcare professionals were easily reached by telephone if needed. In other cases, general practitioners (GPs) were responsible for the treatment of diabetes and facility staff found them much more difficult to reach, particularly if GPs were unable to come to facilities during office hours. Staff generally felt competent to manage residents' medication which relied on a written plan from a qualified healthcare professional. With regard to other

aspects of the daily diabetes management, they mostly relied on informal knowledge exchange and advice from colleagues, which was often transferred at the start or end of the shift. The degree to which this exchange was based on updated diabetes knowledge and competencies varied. Some residential care facilities had no healthcare professionals available during daily shifts and often based their strategies on their personal experiences with friends or family members who had diabetes. Regardless of availability of diabetes care competencies, most staff did not know how to motivate residents to make healthier lifestyle choices. Many interviewees expressed concerns about or provided examples of not being aware of or able to prevent complications. They described many residents as feeling strongly about their right to smoke and consume high-calorie and high-fat foods and sugary drinks. Due to intellectual disabilities, other residents did not understand why healthy behaviour was relevant for them. A few interviewees described examples of successful initiatives to make healthy alternatives available for residents, such as 'soda stream machines at the care facility halved the daily coca cola consumption' or 'we give them the same food, but with more vegetables'. Physical activity options at facilities varied.

Many interviewees expressed a variety of educational needs to update their knowledge, improve competencies and have a more systematic approach to daily diabetes management. Some preferred courses at facilities, while others thought e-learning courses were a more flexible and realistic option. Moreover, many interviewees expressed the need for continuous updates on diabetes

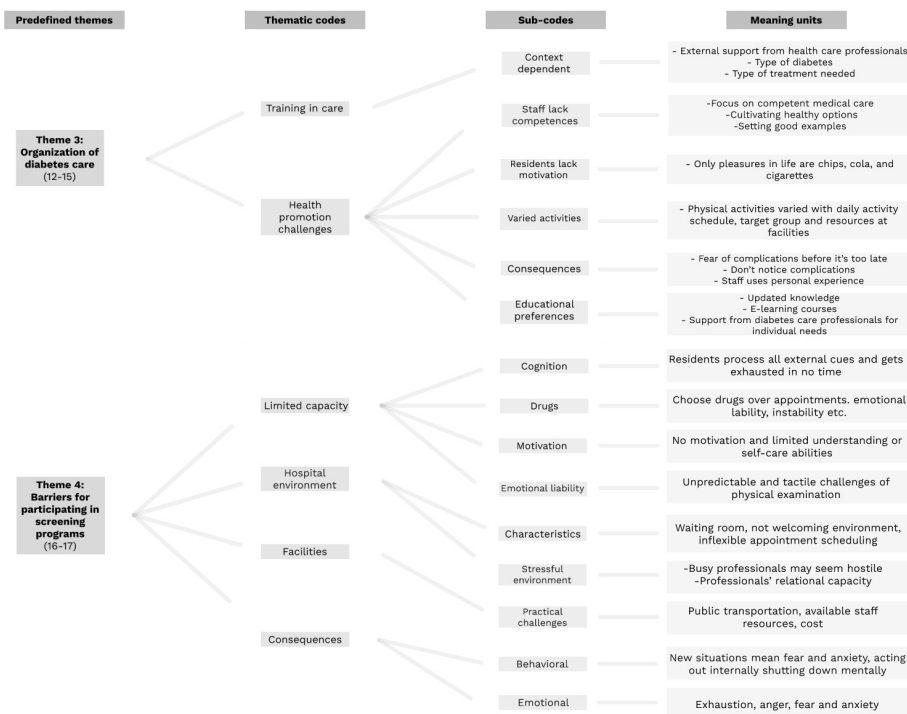


Figure 2 Overview of the structure and organisation of themes in the qualitative analysis (themes 3–4).

knowledge or readily available help from diabetes care professionals to meet the challenges of daily diabetes care.

Barriers to participating in screening programmes

The survey listed several conditions that might pose a challenge to resident participation in screening programmes; respondents reported that all listed conditions did so. The most frequently reported challenge was transportation to and from appointments (N=48, 86%), followed by residents' emotional reactions during or after consultations (N=38, 68%) or residents' exhaustion (N=35, 63%). However, staff suggested that creating a plan to accommodate those challenges could help residents get through screening appointments (N=43, 77%), as would the participation of familiar staff or family members (N=42, 75%), preparing the residents for consultations (N=35, 63%), and meeting hospital or clinic healthcare professionals ahead of time (N=19, 33%).

Interviewees explained that mental disabilities impaired residents' ability to take responsibility for or motivation to participate in screening examinations. As one said, "(The resident) does not understand why she has to be there and she just wants to return to the facility" (figure 2). A visit to the hospital was also extremely mentally draining for most residents. Staff provided a variety of examples of emotional, tactile and cognitive challenges for residents with autism diagnoses: 'He analyzes every external cue, from the pattern on your shirt, to what's on the walls'. Meeting new healthcare professionals could evoke a range of negative feelings

among residents, including suspicion, distrust and fear. A chaotic life or substance abuse made it difficult for residents to prioritise hospital visits over more immediate daily needs.

Another challenge was an environment at the hospital or clinic that might reject 'quirky characters'. Busy clinical settings, the constant flow of people in waiting rooms and sometimes inappropriate communication from hospital staff made residents feel stigmatised or treated with hostility: 'One wrong word from the secretary and he is out of there.' Overstepping mental boundaries or capacity could have severe emotional or behavioural consequences: 'Three staff members have to accompany him in case he acts out.' The staff often had to balance the benefits of a medical consultation with the emotional, physical or practical costs to residents: 'He does not like to be touched and needs full anesthesia whenever he needs a blood test.'

Transportation to and from medical appointments drained residents' energy and facilities' economic and human resources. Some interviewees explained that a lack of resources forced them to send residents on public transportation alone, knowing that the odds of their arrival in time for an appointment were small. The administrative system, waiting in long telephone queues, and lack of suitable times or long waiting lists for new appointments were commonly reported as practical obstacles to staff participation in medical consultations.

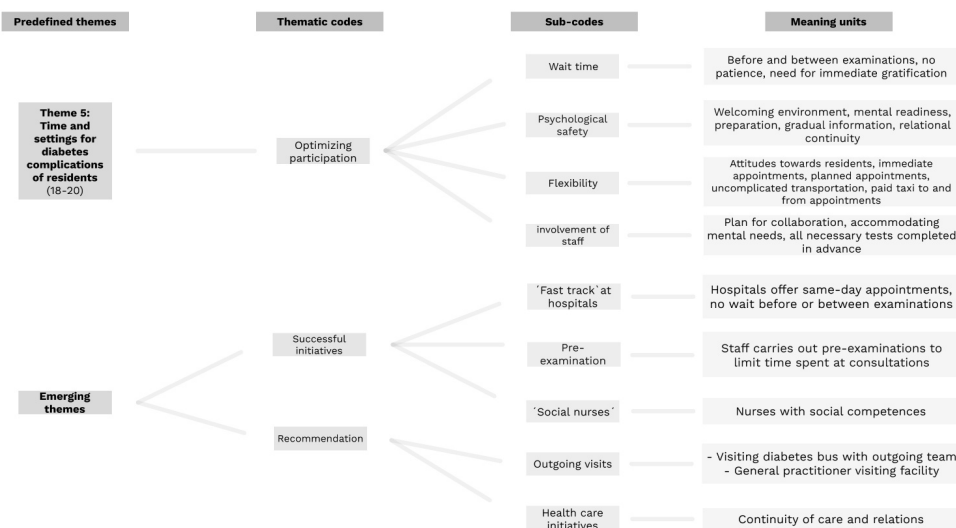


Figure 3 Overview of the structure and organisation of themes in the qualitative analysis (theme 5 and emerging themes).

Time and settings for screening of diabetes complications of residents

Survey respondents reported that most of their residents were unable to participate in a screening programme for more than 1 hour (N=29, 52%) or 1–2 hours (46%) per day. The majority (N=43, 77%) reported that the care facility was the most appropriate setting for screening examinations and that there should only be one examination planned per day (N=26, 64%).

Although all interviewees agreed that it would be best to get all screening examinations done on the same day, only a single example was given of a resident able to spend 6 hours at a hospital (figure 3). However, if screening was conducted at care facilities, the many obstacles associated with screening visits at the hospital could be removed, such as waiting time that poses unrealistic demands on residents' patience and their immediate need to gratify impulses, such as smoking a cigarette or withdrawing from social contact after interactions with new people. Being at residents' homes might enhance their feeling of safety and enable them to better collaborate with healthcare professionals. While acknowledging that screening at facilities would increase participation in screening programmes, some interviewees also expressed concern that it could also represent the adoption of the sick role for residents through decreasing their engagement in everyday activities such as going to the doctor.

Staff described flexibility before, during and after hospital visits as enhancing residents' participation in screening programmes. Planning appointments ahead of time at specific days or time during the day that suited residents enabled the staff to prepare the resident for the visit. Ideally, hospital staff also needed preparation to understand screening barriers for residents. Several interviewees suggested a short meeting with hospital staff to make a 'pedagogical preplan' before appointments to guide healthcare professionals on how to best approach residents to minimise emotional harm and

coordinate examinations. Most interviewees spontaneously mentioned the importance of relational continuity of hospital staff. They suggested that diabetes screening could be coordinated so facility staff could be trained to carry out as many tests as possible in advance (eg, foot screening, blood tests), minimising the amount of time required at the hospital.

During analysis, new themes emerged about specific initiatives. While some interviewees had recommendations about how to enhance participation in screening at hospital or clinic setting, others recommended a 'diabetes bus' that visited facilities once a year for diabetes screening. Drawing on another initiative at the hospital dermatology department for people with substance abuse disorders, a 'fast-track' initiative was suggested. Residents would be offered immediate appointments with limited waiting time and a nurse who is trained to guide and support marginalised citizens. Although the many barriers associated with medical consultations would be minimised if GPs conducted visits at facilities, many interviewees mentioned the difficulties of getting them to do so. While acknowledging the resources needed for a diabetes bus with a specialised diabetes team, many interviewees also described it as the easiest way of increasing participation in screening programmes.

DISCUSSION

This register-based study showed that 8% of all residents in intermediate or long-term care facilities in Denmark had diabetes, the vast majority of whom had type 2 diabetes. Given their age distribution, the prevalence of diabetes among care facility residents is high compared with national numbers.^{28 29} This is consistent with previous research suggesting increased risk of type 2 diabetes onset among people with mental and physical disabilities.³⁰ Previous studies have shown that severe mental disorder is a risk factor for developing type 2 diabetes,⁶ but less

is known about diabetes risks related to developmental, intellectual or physical disabilities.^{12–14} However, people who have severe mental or developmental disabilities and type 1 diabetes may be over-represented in residential care due to their high care needs.

The study findings revealed significant practical and psychosocial challenges associated with participation in screening programmes to prevent diabetes complications in people living in residential care facilities in Denmark. Limited diabetes care competencies were available at residential care facilities and the staff lacked knowledge about preventing and managing diabetes. Motivating residents to make healthy behaviour choices was particularly challenging for facility staff, who often based their attempts on personal experiences. Although not researched previously in facility staff or in people with intellectual disabilities, research in people with severe mental health problems may help illuminate important needs and preferences. These studies suggest that lack of social support, poor relationships with healthcare professionals or fragmented care,³¹ emotional well-being priority given to diabetes and perceived ability to diabetes management or routines²³ are important barriers and enablers of health promotion. While this body of evidence highlights the influential role of staff in accommodating needs for support and motivating daily diabetes management,²⁵ our study highlighted the staff's educational needs to be able to provide the daily diabetes management support to their residents.

Although lack of knowledge, proximity of screening facility, fear and worry identified as barriers and enablers in general diabetes populations may also apply to people in residential care,³² the staff of residential care facilities were also an important link to overcoming barriers. Residents depend on staff assistance to be motivated, organise appointments, and travel to and from the hospital. No other study has examined the barriers of staff, but our study suggests that new initiatives to overcoming barriers of staff include optimising transportation (eg, taxi rather than public transportation), planning appointments at appropriate time of the day with minimal waiting time and acute appointments when hard-to-reach residents were motivated to seek screening. Facility staff also described the need to prepare residents for appointments, plan in advance with hospital or clinic healthcare professionals how to approach residents during examinations and possibly complete pre-examinations at the facility to minimise the required time and mental resources and potential negative consequences associated with hospital visits. Even though it is in the interest of all concerned parties to have screening examinations completed in one visit, residents can generally manage only a few hours of examination on the same day. On the one hand, facility staff expected screening programmes provided by an outreach team at the care facility would enhance participation. On the other hand, they noted that much could be improved by minimising barriers associated with hospital visits.

Strengths and limitations

A main strength of the study was the mixed-methods approach allowing for different perspectives of the complex diabetes care needs. Registers provided high-quality and complete health information data while qualitative interviews informed by survey data provided in-depth information about experiences at the individual level in care facilities. All residential care facilities were contacted personally by phone several times to increase responses and half of the 112 residential care facilities responded via respondents from each of the 56 facilities of which 16 were available for interviews. Since the managers of each residence were the ones who selected one staff member to respond to the survey, selection bias may have occurred. We offered economic compensation for time spent in the study, but staff from residential care facilities with fewer resources may nevertheless be under-represented in this survey and thus limits the representativeness of barriers experienced by staff. Due to COVID-19 restrictions at the residential care facilities, the needs of residents were only examined via the staff. Direct involvement of residents or relatives from residential care facilities could have offered further insights into the challenges experienced by residents. Also, this study is unlikely to fully capture the complexity of support needs represented by the wide range of disabilities cared for at the residential care facilities. Although the identified barriers and drivers can help improve future diabetes care programmes, care should be taken when generalising the study results to countries with social and healthcare systems different from those in Denmark.

Implications and conclusions

The study findings identify approaches that are likely to increase participation in screening of residents in residential care facilities. Hospital screening programmes may benefit from a fast-track option minimising waiting times during examinations and options for easy and flexible transportation to and from examination sites. Flexibility in acute and scheduled times might minimise cancellations and absences, and careful planning would clarify how all involved parties can best accommodate residents' needs.

Screening by a specialised team at the care facility can minimise practical and psychosocial barriers associated with hospital programmes. However, only a few residents at each location have diabetes; this approach may only be cost-effective when it is combined with other initiatives aiming to prevent type 2 diabetes among a larger group of residents.

Educational initiatives to enhance continuous professional development of diabetes competencies among residential care facility staff are needed, particularly regarding health promotion. Such initiatives can both help prevent diabetes complications and minimise modifiable risks for residents who are already at high risk of developing diabetes. Educational initiatives and easy

access to expert advice from diabetes care professionals may allow staff at residential care facilities to conduct pre-examinations, tests and prescreening for residents who cannot participate in screening programmes at hospitals or clinics.

Acknowledgements We thank Trine Møller from Center for Diabetes, Copenhagen, Denmark, and practitioners from the 'Supplementary treatment initiatives' team for valuable and relevant insights and feedback at all stages of this study.

Contributors MAN, SVB, IW and KO developed the research question and planned the analyses. KO carried out the statistical analyses of the register-based study. MAN and SVB carried out the analysis of the survey and the qualitative interviews. MAN wrote the manuscript and all the authors revised it. MAN is a guarantor of this manuscript.

Funding The study was part of Steno Diabetes Center Copenhagen's larger initiative to improve the quality of diabetes care: 'Supplementary treatment initiatives', which is supported by the Novo Nordisk Foundation (award/grant number not available).

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not required.

Ethics approval This study involves human participants, but an Ethics Committee exempted this study. The Danish Ethics Committee exclusively reviews studies including biological material ('the Danish Act on Research Ethics Review of Health Research Projects'). This study was approved by the Danish Data Protection Agency (identification number: p-2020-322), which is required by Danish law and requires adherence to protocol procedures securing data anonymity and confidentiality. We also adhered to ethical principles (eg, voluntary participation, informed consent, anonymity, confidentiality, avoiding harm and free from scientific misconduct) as for example outlined in the Declaration of Helsinki.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement No data are available.

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