Challenges in maintaining satisfactory documentation routines and evidence-based diabetes management in nursing homes

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Introduction: The increasing prevalence of diabetes worldwide entails an expected rise in the number of older individuals with diabetes needing nursing home placement. Internationally, a consistent lack of adherence to clinical guidelines has been identified in the care of older people. In this study, we therefore investigated whether diabetes management in a sample of nursing homes in Norway and Iceland was in accordance with clinical guideline recommendations.

Methods: We used a descriptive cross-sectional study design to assess diabetes management in 12 nursing homes: eight in Norway and four in Iceland.

Results: We identified 162 residents with diabetes. The diagnosis of diabetes was available for 100% of the residents in the nursing homes in Iceland and respectively for 81 and 51% of the residents in southwestern and northern Norway. Totally, 3% of the residents with diabetes had a treatment goal for blood glucose regulation (HbA_{1c}) documented in their medical record, 48% had agreed individualized routines for blood glucose measurements and 37% had a HbA_{1c} value measured within the past 6 months available in their medical record.

Conclusion: This study has shown a significant discrepancy between diabetes guideline recommendations and clinical diabetes practice related to documenting the diagnosis and type of diabetes, the establishment of individualized treatment goals for HbA_{1c} and the establishment of routines for blood glucose and HbA_{1c} measurements in nursing homes in Norway and Iceland. The results indicate a potential for improvement and a need for more nurses with advanced competence within diabetes in nursing homes.

Key words: Diabetes, Nursing home, Guideline recommendations

Introduction

An increasing prevalence of diabetes worldwide and an increasing number of older individuals in many societies entail an expected rise in the number of older individuals with diabetes in need for nursing home placement.[1] A systematic review has shown a variation in the prevalence of diabetes in nursing homes from 8 to 53%, with a mean prevalence of 18.5%.[2] In a nationwide study from 2012, the prevalence of diabetes in nursing homes in Iceland was 14.2%.[3] In Norway, a study among 19 randomly selected nursing homes indicated a diabetes prevalence of 16.0%.[4]

Nursing home residents with diabetes have a higher burden of comorbidity and are more vulnerable to polypharmacy than those without diabetes.[5–7] In the United Kingdom, older people with diabetes in nursing homes have on average four comorbid conditions in addition to diabetes.[8] Diabetes enhances the risk of defects in mobility, instrumental activities of daily living and

activities of daily living.[9] Thus, residents with diabetes are a demanding care group in nursing homes.[2,10] Nursing personnel must handle an extensive list of medications, treatments and care deficiencies that often are both time consuming and expensive. The symptoms of both hyper- and hypoglycaemia are often altered and atypical among older people with diabetes and can be confused with general aging symptoms.[11] Cognitive impairment makes recognizing and interpreting symptoms even more challenging, and an altered psychomotor performance may also hinder older people from taking steps to treat hypoglycaemia.[12] Asymptomatic hypoglycaemia as assessed by continuous glucose monitoring has been shown to be frequent among older people.[13]

The specific challenges related to diabetes in frail older people have brought along a development of specific evidence-based guidelines for this group of diabetes patients.[12,14–18] All these guidelines for older people with diabetes highlight the importance of well-defined

and individual treatment goals for blood glucose regulation and individual routines for blood glucose measurements among older people with diabetes. The necessity for regular assessment of glycosylated haemoglobin (HbA_{1c}) is also emphasized. It is essential to minimize the risk of hypoglycaemia in frail older people with diabetes. Accordingly, the recommendation for the HbA_{1c} treatment goal also has changed in recent years, with less strict glycaemic control recommended for frail older people (HbA_{1c} 7.5–8.5% (NGSP/DCCT units) and 58.5–69.4 mmol/mol (IFCC units)).[12,18]

Despite that the specific guidelines for managing diabetes in older people are available, a consistent lack of adherence to clinical guidelines has been identified in nursing homes.[2,19] Thus, suboptimal care challenges health and well-being for this group of older people with diabetes.[2,19,20] However, little is known about the quality of care of people with diabetes in nursing homes in Norway and Iceland. In this study, we therefore aimed to investigate whether diabetes management and — documentation routines were in accordance with clinical guideline recommendations in a sample of nursing homes in Norway and Iceland. We proposed the following research questions.

1. Is the diagnosis of diabetes clearly documented and available in the patients' medical records?
2. Is the treatment goal for blood glucose regulation (HbA_{1c}) defined and available in the patients' medical records?
3. Are individual routines for blood glucose measurement clearly defined and available in the patients' medical records?
4. Is the HbA_{1c} value measured within the past 6 months available in the patients' medical records?

Design and methods

We used a descriptive cross-sectional design to assess diabetes management in 12 nursing homes: eight in Norway and four in Iceland.

The sample

The sample comprised residents from four nursing homes in southwestern Norway, four in northern Norway and four in southern and northern Iceland (Table 1). The nursing homes in southwestern Norway had 100–120 residents each; the nursing homes in northern Norway had 18, 22, 29 and 52, respectively. The nursing homes in Iceland had 44, 160, 165 and 168 residents, respectively. By investigating medical records regarding the diagnosis of diabetes and/or treatment with medication to lower blood glucose, we identified 162 residents with diabetes in the 12 nursing homes (Table 1).

Data collection

The data were collected in 2011–2014. Eleven of the 12 nursing homes used electronic records; one in Iceland used paper-based records. We collected data from the medical records only. We did not assess notes available

Table 1 The 12 nursing homes presented in clusters related to country and region.

Country and region	Total number of residents	Number of residents with diabetes	Diabetes prevalence rate
Hordaland County, Norway: 4 nursing homes	451	67	14.9%
Nordland County, Norway: 4 nursing homes	121	20	16.5%
Iceland: 4 nursing homes	549	75	13.7%
Total: 12 nursing homes	1121	162	14.5%

in the residents' room or in the charge room. We collected data on sex, age, documented diagnosis in medical records (yes/no), type of diabetes (type 1, type 2 or others), available treatment goal for blood glucose regulation (HbA_{1c}) in the medical records (yes/no), defined routines for measuring blood glucose available in the medical records (yes/no), treatment regimen (only diet, oral medication and/or insulin) and HbA_{1c} measured within the past 6 months and available in the medical records (yes/no).

Data analysis

We used SPSS version 22 (IBM SPSS, Armonk, NY, USA). We performed simple descriptive analysis to assess diabetes management in the nursing homes. Such methods are often preferable when investigating whether disease management is in accordance with clinical guidelines.[21]

Ethical considerations

In Norway, the studies were exhibited for the Western or Northern Norway Regional Committee for Medical and Health Research Ethics and approved by the Norwegian Data Protection Official for Research. In Iceland, the National Bioethics Committee and the Data Protection Authority approved the study. The study was performed according to the Declaration of Helsinki.

Results

The 162 residents identified with diabetes included 67% ($n = 109$) women (Table 2). Totally, 53% ($n = 86$) were ≥85 years old and 15% ($n = 24$) were ≤74 years old. The age composition of the residents with diabetes was quite similar in Norway and Iceland. The mean HbA_{1c} was 7.5% (min/max, SD) (4.8/13.4, 2.0) (NGSP/DCCT units) (58.5 mmol/mol (IFCC units)):7.2% (5.0/10.7, 1.3) (55.2 mmol/mol) in southwestern Norway, 8.0% (5.3/13.4, 2.9) (63.9 mmol/mol) in northern Norway and 7.2% (4.8/12.0, 1.9) (55.2 mmol/mol) in Iceland. More of the residents in Iceland ($n = 26$ (35%)) were on a diet without any oral medications than in Norway ($n = 8$ (10%)). In Norway, 41% ($n = 36$) of the

Table 2 Characteristics of residents with diabetes at 12 nursing homes in southwestern Norway, in northern Norway and in Iceland.

	Hordaland County n = 67 n (%)	Nordland County n = 20 n (%)	Iceland n = 75 n (%)	Total n = 162 n (%)
Women (%)	47 (70)	9 (45)	40 (53)	109 (67)
Age (years)				
≤74	9 (13)	6 (30)	9 (12)	24 (15)
75–79	9 (13)	3 (15)	9 (12)	21 (13)
80–84	12 (18)	4 (20)	15 (20)	31 (19)
85–89	20 (30)	1 (5)	23 (31)	44 (27)
≥90	17 (25)	6 (30)	19 (25)	42 (26)
Type of diabetes				
Type 1	2 (3)	0 (0)	7 (9)	9 (6)
Type 2	43 (64)	2 (10)	68 (91)	113 (70)
Other	0 (0)	0 (0)	0 (0)	0 (0)
Not available	22 (33)	18 (90)	0 (0)	40 (25)
Treatment regimen				
Only diet	6 (9)	2 (10)	26 (35)	34 (21)
Oral medication	33 (49)	7 (35)	33 (44)	73 (45)
Insulin (and oral medication)	28 (42)	8 (40)	16 (21)	52 (32)
Newer treatment options (such as DPP4 inhibitors or GLP1 analogs)	0 (0)	0 (0)	2 (3)	2 (00.1)
Not available	0 (0)	3 (15)	0 (0)	3 (2)

residents were on insulin (only or in combination with oral medication) versus 21% ($n = 16$) of the residents in Iceland. Two residents in Iceland used DP4 inhibitors, but no residents used other newer treatment regimens such as glucagon-like peptide 1 (GLP-1) analogs. Of the 75 residents with diabetes in Iceland, 32% ($n = 24$) were using sulphonylurea medications. At least three residents had discontinued sulphonylurea treatment due to low HbA_{1c}. We had no information about sulphonylurea use in Norway.

Regarding the first research question, the diagnosis and type of diabetes were available for 100% ($n = 75$) of the residents in Iceland (Table 3) versus 81% ($n = 54$) in southwestern Norway and 55% ($n = 11$) in northern Norway. The type of diabetes was only available for 67% ($n = 45$) and 10% ($n = 10$) (respectively) of the Norwegian residents.

Regarding research questions 2–4, totally 3% ($n = 5$) of the residents with diabetes had a treatment goal for blood glucose regulation (HbA_{1c}) available in their medical records, 48% ($n = 77$) had documented individualized routines for blood glucose measurements and 37% ($n =$ 60) had the HbA_{1c} value measured within the past 6 months available. Table 3 shows the national and regional differences.

Discussion

This study showed a substantial discrepancy between diabetes guideline recommendations and clinical diabetes practice related to documenting the diagnosis and type of diabetes, establishing individualized treatment goals for HbA_{1c} and establishing individualized routines for blood glucose and HbA_{1c} measurements in nursing homes in Norway and Iceland.

High-quality diabetes care for older people with diabetes in nursing homes requires that the diagnosis is clear and available for the nursing home staff. Not explicitly documenting the diagnosis in the medical records may threaten patient safety and optimal care. All the Icelandic residents had the diagnosis and type of diabetes available in their medical record. In Norway, the diagnosis was not explicitly available for one-fourth of the residents. One possible explanation for this difference between the

Table 3 Overall results related to the study questions in southwestern Norway, northern Norway and Iceland.

	Hordaland County n = 67 n (%)	Nordland County n = 20 n (%)	Iceland n = 75 n (%)	Total n = 162 n (%)
1. The diagnosis diabetes is clearly documented and available in the patients' medical records	54 (81)	11 (55)	75 (100)	140 (86)
2. Treatment goal for HbA_{1c} is defined and available in the patients' medical records	2 (3)	2 (10)	1 (1)	5 (3)
3. Individual routines for blood glucose measurement are clearly defined and available in the patients' medical records	12 (18)	10 (50)	55 (73)	77 (48)
4. HbA_{1c} value measured within the past 6 months is available in the patients' medical records	37 (55)	6 (30)	17 (23)	60 (37)

countries may be that Iceland uses the interRAI MDS 2.0 (Minimum Data Set 2.0) to monitor whether significant care needs are met. The interRAI MDS 2.0 is a client-centered assessment instrument used to inform and guide care planning in nursing homes[3] completed for all nursing home residents at least three times a year, including documenting all patients' diagnoses.

In regard to the recommendations of well-defined and individual treatment goal for blood glucose regulation, individualized routines for blood glucose measurements and regular assessment of HbA_{1c}, we identified insufficient diabetes management routines in both Norway and Iceland. Few patients had an individual and documented treatment goal and an individualized and documented routine for blood glucose measurements as recommended in the guidelines.[12,14–18]

Regarding the stricter HbA1c recommendation given in the newest guidelines for frail older people with diabetes with HbA1c between 7.5 and 8.5% (NGSP/DCCT units) (58.5–69.4 mmol/mol (IFCC units))[12,18], our study indicated too strict glycaemic control for many of the patients. The mean HbA_{1c} in the study was 8% (63.9 mmol/mol) in northern Norway and 7.2% (55.2 mmol/mol) in southwestern Norway and Iceland. This is comparable to the results from Andreassen *et al.*,[4] reporting a mean HbA_{1c} of 7.3% (56.3 mmol/mol) in 19 nursing homes in Norway. In that study, 46% of the residents had HbA_{1c} lower than 7% (53.0 mmol/mol). In accordance with Andreassen *et al.*, the International Diabetes Federation guidelines[18] consider HbA_{1c} <7% (<53.0 mmol/mol) to indicate potential overtreatment. Accordingly, some residents in our study may be overtreated. The overtreatment could result from insufficient documentation routines and inadequate diabetes management and subsequent absence of adjusting the required medication. The study of Basso *et al.*[22] confirms recent findings in nursing homes on HbA_{1c} values well below recommended targets. They identified a mean HbA_{1c} of 6.5% (47.5 mmol/mol) in nursing homes in Italy and concluded that glycaemic control in the nursing homes in generally is too strict. Andreassen *et al.*[4] found that 60% of the nursing home residents with diabetes in Norway had one or more blood glucose levels <4 mmol/l during daytime or fasting blood glucose <6 mmol/l during a period of 4 weeks. Both individual treatment goals for blood glucose regulation (HbA_{1c}) and individual routines for measuring blood glucose may be important tools to prevent such episodes of low blood glucose. The extensive lack of individual treatment goals and written routines for measuring blood glucose in our study constitute a huge challenge in preventing hypoglycaemia and improving the quality of diabetes care among older people in nursing homes in these countries. In accordance with a systematic review by Garcia *et al.*,[2] this may also apply to many other countries.

Less strict glycaemic control for frail older people with diabetes is recommended primarily to lower the risk of hypoglycaemia.[12,18] The altered and often atypical symptoms of hypoglycaemia, in addition to the high prevalence of cognitive impairment among nursing home residents with diabetes, increase the risk of hypoglycaemic episodes among older people with diabetes. The hypoglycaemia symptoms in this group can easily be confused with general aging symptoms.[11] Hypoglycaemia could also cause aggressive behavior. Validating the presence of hypoglycaemia with finger-stick blood glucose testing and documenting the results are vital. Systematically and regularly assessing the risk of hypoglycaemia could also be recommended to reduce the frequency of hypoglycaemia among older people in nursing homes. The McKellar guidelines for managing older people with diabetes in Australian residential and other care settings[23] have developed and recommend the use of a specific risk assessment tool to prevent hypoglycaemia among older people with diabetes.

The medication treatment should be based on the individual risk of hypoglycaemia. New recommendations for medication treatment for older people with diabetes recommend using sulphonylurea medications with caution due to the risk of hypoglycaemia.[12,18] New treatments are emphasized such as GLP-1 analogs or dipeptidyl peptidase 4 (DPP-4) inhibitors. In our study, no resident used GLP-1 analogs, but two used DPP-4 inhibitors (Table 2). This is comparable with the results from a study among 6275 nursing home residents in France that did not identify any using GLP-1 analogs.[24] The study identified, however, that 3% of the residents were treated with DPP-4 inhibitors. About 20% of the residents with diabetes in that study were not taking drugs.

Health care authorities both demand and anticipate evidence-based practice in health care. Nevertheless, the fact that evidence-based guidelines and clinical procedures are often not successfully implemented in clinical practice represents a great challenge.[25–27] Diehl *et al.*[28] conclude that little is known about how guideline implementation strategies affect professional practice and patient outcomes in nursing homes while few studies exist on how to successfully implement guidelines in nursing homes. Understanding the factors affecting how diabetes care guidelines are implemented in nursing homes is vital to overcome barriers to change and sustaining best practices. A qualitative study on the challenges facing nurses and nursing assistants managing older people with diabetes in primary health care revealed a discrepancy between the level of expertise the participants described as important to delivering high-quality care and established systems to developing this expertise.[29] Other studies have documented that nurses' knowledge about diabetes and the care needs of older people with diabetes in nursing homes, is inadequate.[30,31] It has also been shown that there is potential for improving nursing documentation in diabetes care in nursing homes.[32] Thus, nurse-led quality improvement projects are needed to facilitate greater awareness and use of evidence-based guidelines in nursing homes in the future.

After we collected the data, we used clinical audit as a method for improving quality in four of the nursing homes. The results will be reported elsewhere. The method is described as a cyclical process, including the stages: (1) identifying areas needing improvement, (2) developing criteria and standards for desired and anticipated practice, (3) mapping clinical practice, (4) comparing clinical practice with the criteria and standards, (5) implementing actions and (6) evaluation.[21,33] This method enables nurses to take responsibility for quality improvement by making visible unsatisfactory management routines and being prime mover for interdisciplinary meetings for decision-making based on the best evidence available and provided in clinical guidelines. The care needs of older people with diabetes in nursing homes cannot be maintained without well-defined and individual goals and routines that are also stated and adequately documented in medical records.

This study has limitations. First, the sample size limited the possibilities to perform subgroup analysis. Based on the identified deficient documentation of the diabetes diagnosis in the nursing homes in Norway, a group of residents solely treated through dietary intervention might not have been identified for inclusion. Not collecting data simultaneously in all the nursing homes in both countries could be a limitation. However, data were collected at the same time in the three groups of nursing homes (southwestern and northern Norway and Iceland). Although international diabetes guidelines[12,18] were updated and published during the study period, the recommendations related to our research questions were stable and uniform throughout the period. A strength was the ability to compare data across health services in two countries.

Conclusion

The results show potential for improving diabetes care in nursing homes. The need for these basic improvements, in addition to the challenges related to declining cognitive functioning, often comorbidity and polypharmacy among residents with diabetes, may indicate a need for more nurses with advanced competence within diabetes in nursing homes. Furthermore, nurse-led quality improvement projects are needed to facilitate greater awareness and use of evidence-based guidelines in nursing homes in the future.

Authors' contributions

AH designed the study, collected data, analyzed the data and drafted the manuscript; MG contributed to designing the study and drafting the manuscript; MA contributed to adapting data, the statistical analysis and the final manuscript; LSH, HJ and IH contributed to designing the study, collecting data and contributing to the final manuscript; AKS designed the study, collected data, analyzed the data and drafted the manuscript. All authors read and approved the final manuscript.

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