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Are cardiac rehabilitation pathways influenced by diabetes: A cohort study

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ABSTRACT

Background: Cardiac rehabilitation (CR) is recommended following acute coronary syndrome (ACS). Diabetes is a common long-term condition associated with ACS, and the inclusion of these patients in CR has been less studied. This study examines the referral, uptake, and completion rates in the CR pathway for ACS patients with and without diabetes to identify potential barriers in the CR pathway.

Methods: The study included patients aged 18 or above who were discharged after a diagnosis of ACS in the Central Denmark Region between 1 September 2017 and 31 August 2018. Diabetes information was obtained from three sources. Logistic regression models were used to examine the associations between having diabetes and the three outcomes: non-referral, non-uptake and non-completion. Results were reported as odds ratios (OR) with 95% confidence intervals (CI).

Results: A total of 2447 patients were eligible for the study, of which 457 (18.7%) had diabetes. Only non-uptake was found to be significantly associated with diabetes after adjustment for prespecified variables (OR = 1.38, 95% CI 1.01–1.90). Associations for non-referral (OR = 1.11, 95% CI 0.87–1.41) and non-completion (OR = 1.06, 95 %CI 0.73–1.53) were not found to be statistically significant between ACS patients with diabetes and those without diabetes.

Conclusion: This study highlights a significant disparity in the uptake of CR between patients with and without diabetes following ACS, demonstrating that patients with diabetes require early promotion and increased assistance to enrol in CR.

1. Introduction

Cardiac rehabilitation (CR) is strongly recommended for patients after acute coronary syndrome (ACS) due to its proven beneficial effects in reducing mortality and hospitalisation and improving health-related quality of life [1,2]. However, patients with multiple long-term conditions are underrepresented in CR programmes and are at higher risk of non-participation and dropout [3].

Diabetes is one of the most prevalent long-term conditions in patients with ACS, estimated to be present for 26–54% of the population eligible for CR [4,5]. The combination of diabetes and ACS is associated with higher mortality rates, accelerated loss of physical function, and a poorer health-related quality of life than that of patients without diabetes undergoing CR [6–8]. In addition, diabetes is an established independent risk factor for recurrent ACS [9]. Recommendations for the secondary prevention of diabetes involve a multifactorial approach, including exercise, lifestyle changes, and pharmacological strategies [10]. These strategies serve as key components of CR [11], providing a compelling rationale for ensuring that patients with diabetes participate in CR following an event of ACS [12,13]. However, it is concerning, that studies find ACS patients with diabetes are less likely to receive CR compared to those without diabetes [5,14–16]. There are several critical stages throughout the CR pathway that present barriers to utilising CR. Starting with referral, barriers are often related to systemic or

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organisational factors, such as the knowledge of CR and endorsement of CR by healthcare professionals, and less to individual patient characteristics [16–18]. In contrast, uptake and programme completion are more closely related to individual patient characteristics such as age, gender, associated long-term condition and socioeconomic factors [16,19–21]. Existing studies on the participation of patients with diabetes in CR have been limited to examining isolated stages of CR, such as referral, uptake or completion. What is lacking is a comprehensive understanding of the entire CR pathway and the underlying barriers at different stages of CR for patients with diabetes. Identifying where these barriers differ between ACS patients with and without diabetes is the first step towards addressing this issue [22,23]. This knowledge will help determine the extent of non-participation and identify the specific stages of CR that need increased focus to improve participation among patients with diabetes. Furthermore, the interaction of patient characteristics with non-participation in CR among patients with diabetes has not been investigated. Identifying the barriers and factors that influence non-participation may help to develop strategies to improve the integration of services for patients with ACS and diabetes.

1.1. Aim

The study aims to compare CR participation rates divided into referral, uptake, and completion along the CR pathway in ACS patients with diabetes compared to ACS patients without diabetes. Secondly, it examines the extent to which patient characteristics are associated with the CR pathway for ACS patients with diabetes. It is hypothesised that ACS patients with diabetes will have lower rates of participation in the CR pathway [5,14,15], but it is unclear whether this is related to all stages or only specific CR stages, such as non-referral, non-uptake and non-completion, compared to ACS patients without diabetes. In addition, it is hypothesised that specific patient characteristics, such as multiple long-term conditions and socioeconomic factors, will interact with diabetes to varying degrees in the likelihood of CR engagement in ACS patients with diabetes.

2. Methods

This population-based cohort study links patient-level data from seven national registries with data collected in a routine CR setting. The study population was identified from the administrative Danish National Patient Register (NPR), which contains mandatory registration of comprehensive administrative and clinical information on patients discharged from non-psychiatric hospitals in Denmark since 1977 [24]. Data on routine CR practice were obtained from the Danish Cardiac Rehabilitation Database [25]. This database contains mandatorily recorded data on key outcome and performance indicators for CR from all hospital units in Denmark that provide CR since 2015. Since 2017, data has also been mandatorily recorded in community health centres in the region of Central Denmark Region. Data are linked through a unique personal identification number from the Danish civil registration system, which is assigned to all Danish residents at birth or immigration [26]. The study was reported according to the STROBE checklist of observational studies [27]. The study protocol has been preregistered on the Open Science Framework Registries (osf.io/zkh2v). The project was approved by the Danish Patient Safety Authority (ID: 3–3013-3289/1). Informed consent from the patients was not required.

2.1. Setting

This study was conducted in the Central Denmark Region (population ≈ 1.3 million people in 2017) where patient CR pathways are jointly managed by five hospitals and 18 community healthcare centres [28]. National clinical guidelines recommend systematic referral for CR and by Danish law, uptake to the programme must be initiated within seven days from referral or when deemed medically feasible [11,28]. Hence, at hospital discharge following a cardiac event, a medical doctor assesses the patient's eligibility for CR. The CR referral is electronically sent to the closest community healthcare centre available to the patient's residence. The community health centre administers phase II cardiac rehabilitation in accordance with national guidelines and schedules an initial consultation with the patient. During this meeting, both the patient and a healthcare professional agree upon a tailored plan for the rehabilitation programme. The outpatient phase II programme extends for 12 weeks, incorporating supervised exercise training as well as educational sessions [29].

2.2. Participants

Eligible participants included patients aged 18 or above who were discharged with an ACS diagnosis in the Central Denmark Region between 1 September 2017 and 31 August 2018. ACS events were identified using the International Classification of Diseases (ICD-10) [30] through NPR [24]. Inclusion diagnoses were determined based on the criteria outlined in the Danish Cardiac Rehabilitation Database [25].

Included diagnoses were acute coronary syndrome (ST-elevation myocardial infarction, non–ST-elevation myocardial infarction, and unstable angina) and stable angina pectoris. For patients with stable angina pectoris, they also had to be registered with an invasive cardiac procedure, such as percutaneous cardiac intervention (PCI) or coronary artery bypass graft (CABG). Patients with comorbid heart failure were included. The study population included hospitalised patients who did not have a diagnosis of ACS requiring hospitalisation in the 12 months prior to discharge. Similarly, patients treated electively, who had not been registered with an ACS diagnosis within six months before the inclusion, were also included. Exclusion criteria were: 1) patients who died $\leq$30 days from discharge. 2) patients registered with a referral for specialised hospital-based rehabilitation for patients with highly complex needs. Supplementary material A and B provides specific codes on included diagnoses and excluded referral codes.

2.3. Outcomes

The study examined the CR pathway divided into three outcomes: non-referral, non-uptake, and non-completion. 1) Non-referral covered patients who were not registered with a procedure code indicating a CR referral. 2) Non-uptake covered patients who did not attend the initial CR meeting at the healthcare centre. 3) Non-completion covered patients who did not attend the final CR meeting. Information on the outcomes was obtained from two sources: the NPR and the Danish Cardiac Rehabilitation Database. Supplementary Material C provides a specification of outcome codes.

2.4. Diabetes

Information on diabetes was obtained from three sources; the Danish Adult Diabetes Registry [31], the NPR, and the National Health Insurance Service Register, which collects diabetic podiatry billings. Supplementary material D provides additional details on the specific codes and criteria used by each registry.

2.5. Covariates

Additional patient characteristics were retrieved from national registries; age at hospital admission, gender, cohabitant status and ethnicity were based on data from the Danish Civil Registration system [26]. Data on treatment procedures, diagnoses, and comorbidities were obtained from the NPR. The number of additional long-term conditions was measured as the number of comorbidities recorded by ICD-10 codes during a 10-year period before the patient's discharge. The Charlson Comorbidity Index [32] categories were used to organise and identify the relevant ICD-10 codes. Notably, the Charlson score was not calculated, and categories linked to myocardial infarction and diabetes were not included in the count. The highest educational attainment before discharge was extracted from the Danish Education Register [33], and then categorised into high, medium, and low levels according to the International Standard Classification of Education [34]. Disposable family income, obtained from the Danish Income Register [35], was calculated as the equivalent disposable income, which accounts for the number of people including children, living in the household. Income was then categorised into high, medium, and low levels using 33% percentiles as cut-offs.

2.6. Statistical analysis plan

Demographic and clinical variables were summarised by means, standard deviations (SDs) and percentages separately for patients with and without diabetes. Regression models were conducted to examine the association between diabetes status and the three outcomes: non-referral, non-uptake and non-completion. The models were carried out as separate analyses using logistic regression and reported as odds ratio (OR) with 95% confidence intervals (CI). All regression models were initially presented as crude OR (model 0). Model 1 was adjusted for gender and age. In Model 2, comorbidities and treatment procedure (CABG/PCI) were added to Model 1. In Model 3, the SES indicators—educational level, disposable family income, and cohabitant status—were added to Model 2. Lastly, interaction analyses of additional long-term conditions and SES indicators were performed based on Model 3. Analyses were performed as complete case analysis. Valid case analyses were carried out to investigate the robustness of the analysis when accounting for missing values in Model 3. Level of statistical significance $P < 0.05$ and 95% confidence intervals (CI) were used. All data management and statistical analyses were carried out using STATA17 [36].

3. Results

From 1 September 2017 to 31 August 2018, a total of 2765 patients were discharged from the hospitals due to ACS. Out of these, 2447 (88.5%) were deemed eligible for the study. Of the eligible population, 1664 patients (68.0%) were referred to CR. Of all discharged patients, 457 patients (18.7%) were registered with diabetes. During the CR pathway, a total of 27 patients with diabetes (5.9%) versus 41 patients without diabetes (2.1%) died before being registered as referred, taken up or completion of CR and were, therefore, excluded from the subsequent analysis. From the study population, 292 patients with diabetes (63.9%) were referred to CR compared to 1372 patients without diabetes (68.9%). Subsequently, 179 patients with diabetes (39.2%) took up CR in contrast to 1031 patients without diabetes (51.8%). Finally, 125 patients with diabetes (27.4%) completed CR while 734 patients without diabetes (36.9%) did so. Fig. 1 illustrates the flow of the CR pathway grouped by patients with and without diabetes.

Patient characteristics, stratified by patients with and without diabetes, are presented in Table 1 and described across discharge, referral, and uptake stages. Among the discharged population, patients with diabetes tended to be older (mean difference of ≈ 2.5 years) compared to patients without diabetes ($p < 0.05$). Additionally, patients with diabetes were more likely to be women, have comorbidities including heart failure, possess a lower educational level, a lower income, and more frequently living alone (all $p < 0.05$). The observed disparities persisted within the referred population, except for differences related to sex. In the subset of the population that took up CR, the discrepancies between the two groups diminished across all observed patient characteristics. For instance, the age gap lost statistical significance, with a mean difference of approximately 1.7 years. Nevertheless, patients with diabetes maintained a higher burden of comorbidities, including heart failure, lower educational attainment, reduced income, and more frequently living alone (all with a p-value <0.05).

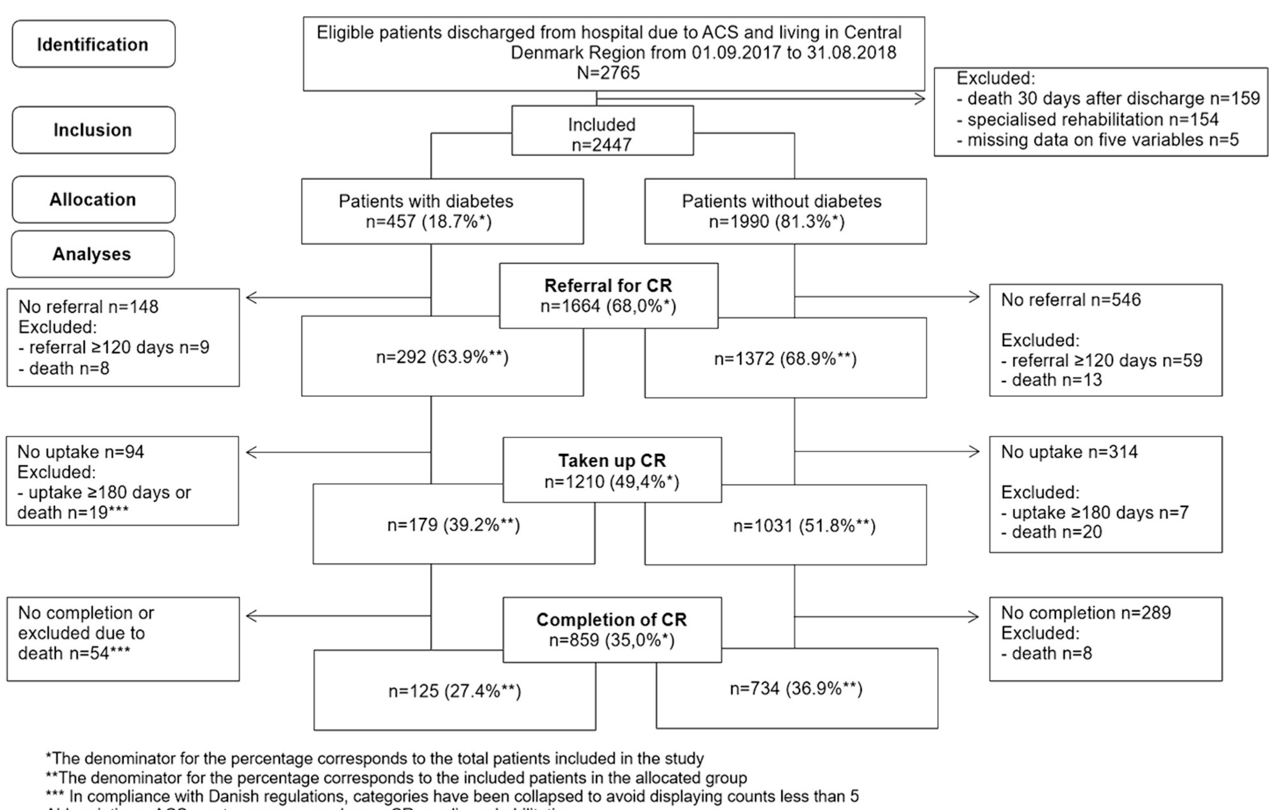

Fig. 1. Patient flow through the CR pathway.

Table 1
Patient characteristics at discharge, CR referral and CR uptake.

	Patients discharged $n = 2447$		Patients referred to CR $n = 1664$		Patients taken up CR $n = 1210$	
	with diabetes	without diabetes	with diabetes	without diabetes	with diabetes	without diabetes
Excluded, n(%)	17 (3.7)	72 (3.6)	19 (9.9)	27 (2.0)	<5 (<2.7)	8 (0.8)
Included in analyses, n	440	1918	273	1345	178	1023
Sex, n(%)						
Women	150 (34.1)*	560 (29.2)	87 (31.9)	377 (28.0)	46 (25.8)	262 (25.6)
Men	290 (65.9)	1358 (70.8)	186 (68.1)	968 (72.0)	132 (74.2)	761 (74.4)
Age, years, mean (SD)	69.3(11.5)*	66.8(12.6)	67.9(10.8)*	65.5(12.0)	65.4(9.9)	63.7(11.1)
Ethnicity, n(%)						
Danish	405 (92.0)	1800 (93.8)	253 (92.7)	1268 (94.3)	168 (94.4)	959 (93.7)
Non-Danish	35 (8.0)	118 (6.2)	20 (7.3)	77 (5.7)	10 (5.6)	64 (6.3)
Diagnosis						
Acute coronary syndrome	270 (61.4)	1256 (65.5)	166 (60.8)	882 (65.6)	101 (56.7)	644 (63.0)
Stable angina pectoris	170 (38.6)	662 (34.5)	107 (39.2)	463 (34.4)	77 (43.3)	379 (37.0)
Treatment, n(%)						
PCI	318 (72.3)	1371 (71.5)	208 (76.2)	1004 (74.6)	139 (78.1)	784 (76.6)
CABG	44 (10.0)	199 (10.4)	38 (13.9)	179 (13.3)	30 (16.9)	158 (15.4)
Nonsurgical	78 (17.7)	348 (18.1)	27 (9.9)	162 (12.0)	9 (5.1)	81 (7.9)
Additional long-term conditions, n (%)						
None	205 (46.6)*	1213 (63.2)	149 (54.6)*	916 (68.1)	115 (64.6)*	756 (73.9)
1	126 (28.6)	449 (23.4)	74 (27.1)	299 (22.2)	40 (22.5)	207 (20.2)
≥2	109 (24.8)	256 (13.3)	50 (18.3)	130 (9.7)	23 (12.9)	60 (5.9)
Disposable family income, n(%)						
Low	195 (44.3)*	586 (30.6)	106 (38.8)*	353 (26.2)	58 (32.6)*	219 (21.4)
Medium	142 (32.3)	631 (32.9)	90 (33.0)	430 (32.0)	57 (32.0)	325 (31.8)
High	103 (23.4)	701 (36.5)	77 (28.2)	562 (41.8)	63 (35.4)	479 (46.8)
Educational level, n(%)						
Low	203 (46)*	688 (36)	108 (40)*	461 (34)	67 (38)*	306 (30)
Medium	176 (40)	814 (42)	124 (45)	582 (43)	82 (46)	470 (46)
High	49 (11)	386 (20)	35 (13)	285 (21)	<30 (<17)	236 (23)
Missing	12 (3)	30 (2)	6 (2)	17 (1)	<14 **	
Living alone, n(%)						
Yes	179 (40.7)*	615 (32.1)	103 (37.7)*	380 (28.3)	57 (32.0)*	239 (23.4)
No	261 (59.3)	1303 (67.9)	170 (62.3)	965 (71.7)	121 (68.0)	784 (76.6)
Heart failure, n(%)						
Yes	83 (18.9)*	195 (10.2)	36 (13.2)*	98 (7.3)	19 (10.7)*	51 (5.0)
No	357 (81.1)	1723 (89.8)	237 (86.8)	1247 (92.7)	159 (89.3)	972 (95.0)

* $p < 0.05$ (*t*-test for continuous variables and chi square test for categorical variables).
** In compliance with Danish regulations, categories have been collapsed to avoid displaying counts <5.

Figure 2 shows the OR for patients with diabetes in relation to non-referral, non-uptake and non-completion of CR. In the unadjusted model (Model 0), patients with diabetes had 1.27 times higher odds of non-referral (95% CI: 1.02–1.59, $p = 0.032$) compared to patients without diabetes. Nevertheless, in the fully adjusted model (Model 3), an OR of 1.11 (95% CI: 0.87–1.41, $p = 0.393$) showed no statistically significant association with non-referral for patients with diabetes compared to patients without.

In the analysis of CR uptake among referred patients, the unadjusted model (Model 0) showed that patients with diabetes had a statistically significant 1.72 times higher odds of non-uptake (95% CI: 1.30–2.28, $p < 0.01$). This association remained statically significant in all adjusted models, with an OR of 1.38 for not taking up CR (95% CI: 1.01–1.90, $p = 0.043$). Regarding uptake, no statistically significant interactions were found in the tests of interactions between having diabetes and number of comorbidities ($p = 0.46$), disposable family income ($p = 0.59$), educational level ($p = 0.26$) and cohabitant status ($p = 0.58$). In the analysis of CR completion among patients who took up CR, no significant association was found between having diabetes and not completing CR across all models (OR: 1.06 95% CI: 0.73–1.53, $p = 0.753$) (Model 3). The valid case analyses for the three outcomes conducted on patients included in model 3 showed minimal changes in estimates, with significant findings remaining unchanged (results not shown).

4. Discussion

This study compared participation rates along the CR pathway in patients with and without diabetes after ACS. Patients with diabetes were found to be less likely to take up CR, regardless of known risk factors. Specifically, 10% fewer patients with diabetes took up CR compared to those without diabetes. In contrast, there was no difference in the likelihood of referral or completion of CR for patients with diabetes compared to those without diabetes. In addition, patient characteristics such as having one or two comorbidities or being of lower SES did not affect the likelihood of uptake any more for patients with diabetes than for those without diabetes.

Although referral is required to access the CR pathway, the influence of diabetes at the referral stage in CR has not been well studied. This study found a difference in referral rates, suggesting that patients with diabetes were less likely to be referred (approximately 36% compared with 31%), but the adjusted analyses clarified that this difference was due to a greater presence of recognised risk factors for non-referral, such as older age, comorbidities and low SES, and therefore not independently related to their diabetes. This finding is consistent with prior research [18], which reported limited influence of individual patient characteristics such as multimorbidity on referral. Evidence shows that referral is primarily related to organisational processes [17,37] rather than individual patient level factors – in line with our findings.

In contrast to referral, uptake has been found to be strongly associated with patient-level factors [3,20,38]. This was supported in this study, showing that having diabetes was an independent barrier to accepting the offer and engaging in CR, even after accounting for known risk factors. Our findings align with existing evidence. A study by Harrison et al. showed a 12% reduction in patients with diabetes from the eligible population to those starting CR [5]. Dunlay et al. [39] showed a lower likelihood for patients with diabetes for participating in CR (OR:

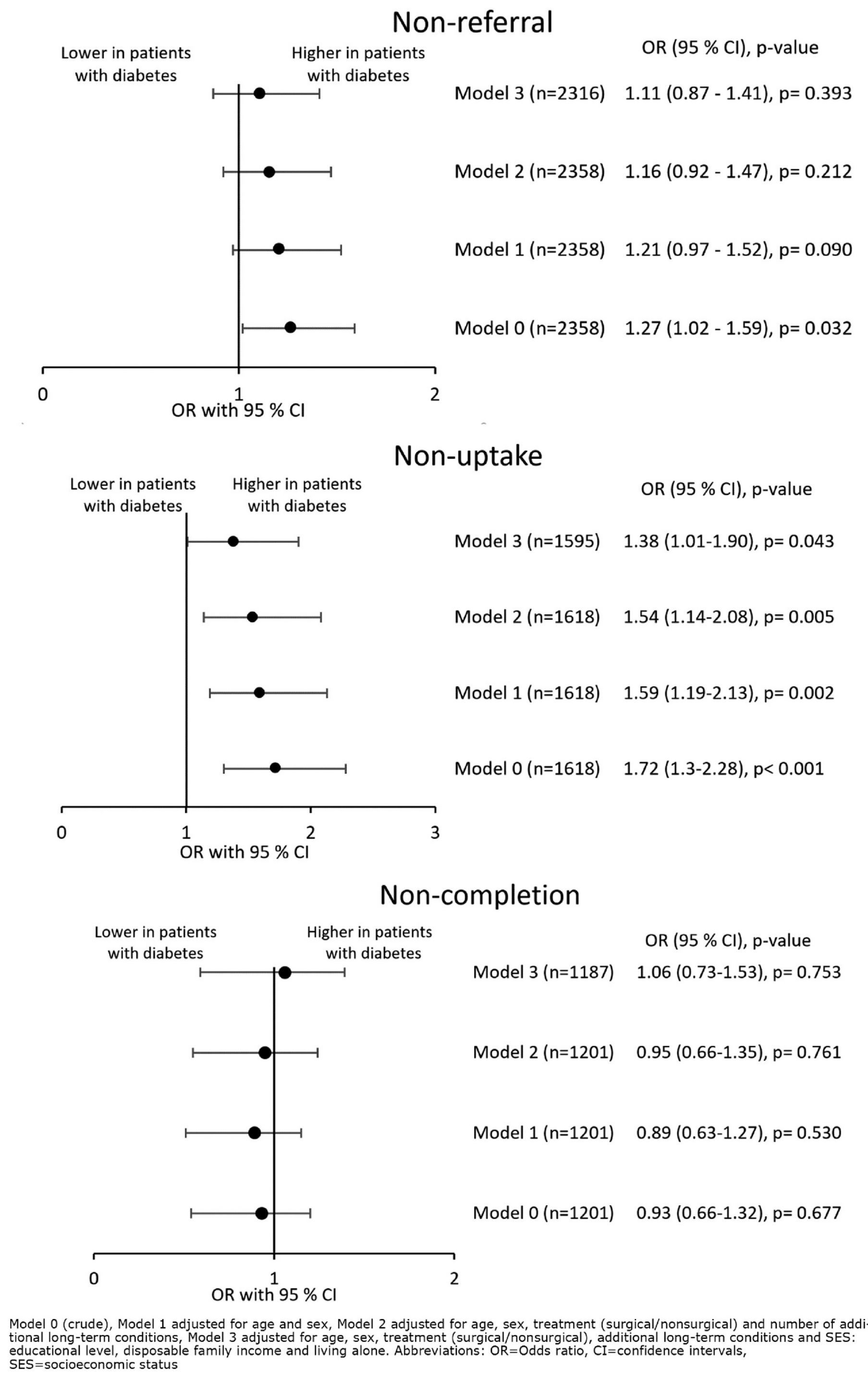

Fig. 2. Logistic regression analysis on the association between patients with diabetes, compared to those without diabetes (reference) on non-referral, non-uptake, and non-completion.

0.40 (95% CI: 0.20–0.81)) compared to patients without diabetes. The lower uptake rate in our study was not explained by an interaction between patient characteristics such as additional long-term conditions and SES, as hypothesised. For patients who have lived with diabetes for a long time before the ACS diagnosis, the ACS is a particularly critical time, further complicating their medical status and triggering psychological and psychosocial complications that can lead to vulnerability and diabetes-related distress and a failure to access appropriate support [40]. For patients who have recently been diagnosed with diabetes, barriers to self-management and exercise have been found to include feeling overwhelmed by the new diet and exercise routine [41]. Similarly, the type of diabetes may influence concerns of physical activity and therefore affect engagement in CR. Patients with type 1 diabetes, in particular, have been shown to struggle with fear of hypoglycaemia during exercise [42]. All such factors could potentially influence the uptake and further research most establish the causality between diabetes and uptake and investigate the influence of specific diabetes-related factors, such as the type and duration of diabetes on the likelihood of taking up CR to gain a better understanding of the underlying mechanisms. Additionally, in various countries, including Denmark, the discharge period, involves a transition of care providers from the hospital to community healthcare centres. In previous studies, non-uptake to CR during transitions has been linked to a lack of support from healthcare professionals, particularly for patients who are vulnerable [17]. Further providing an organisational barrier for taking up CR in patient with diabetes.

The fact that diabetes did not affect CR completion is in contrast to a study by Armstrong et al. 2015 showing that 41% of patients with diabetes completed CR compared with 56% without [43]. Our finding is however encouraging and supports current guidance in the field, that the majority of patients with diabetes can fully take part in and benefit from the program without any issues [12,13,22]. One reason for our findings could be that Table 1 shows a decrease in the number of risk factors from the discharged population to the population participating in CR. The differences between diabetic and nondiabetic populations also reduce throughout the CR pathway. This suggests that there might be a selection process when it comes to CR, resulting in patients with diabetes who participate in CR having fewer risk factors for non-completion compared to those who are discharged. Hence, promoting the use of CR among patients with diabetes at the early stages of the CR pathway seems essential from our finding. These findings highlight the need for a more intensive approach and support to promote CR enrolment, especially around the time of uptake, among patients with diabetes.

4.1. Strength and limitations

To the best of our knowledge, this study is the first to examine the entire CR pathway, with a focus on patients with diabetes, from the population eligible for CR to those who ultimately complete it. This study benefits from linking high-quality data from national registries with population coverage, enabling the identification and tracking of a large patient cohort eligible for CR [44]. This tracking allowed us to investigate specific barriers in the CR pathway for patients with diabetes and its relation to patient characteristics along these stages. Routinely collected data reduced the risk of systematic information bias and enhances the study's generalisability. We used data collected from 2017 to 2018 which were the most appropriate timeframe available. However, it is important to note that utilising data from the post-COVID period in future research can further enhance the generalisability of the study's findings.

The referral proportion of 68% in this study was comparable to those found in previous studies [45]. Nonetheless, it was possible that the criteria used to select the study population may have exaggerated the number of patients eligible for CR. The use of secondary data restricted the examination of clinical factors like cognitive dysfunction or terminal illness that could result in the inclusion of unsuitable patients for CR. Given that diabetes was more prevalent among patients that were ineligible for CR, it was possible that the association between diabetes and non-referral may have been overestimated. Furthermore, selection bias may have occurred due to the significantly higher number of deaths observed in the group of patients with diabetes compared to those without diabetes. However, post hoc analyses of all three outcomes, including all patients regardless of death status from discharge to the end of CR, did not alter the findings of this study (results not shown). Additionally, the analysis of valid cases indicated that the missing observations in Model 3 were missing at random and did not appear to have any impact on the outcomes.

The diabetes proportion observed was 18.7%, which is lower than that reported in comparable study populations reporting proportions of 26–35% [4,46]. This may be attributable to differences in detection methods and CR populations. Data from the Danish Adult Diabetes Registry encountered data security issues, which may have led to an underestimation of diabetes prevalence, particularly among patients with type 2 diabetes who are receiving diabetes care in general practice [31]. Incorporating data from prescription registries tracking antidiabetic medication purchases, could have qualified the diabetes identification in this study. Misclassification may have led to an underestimation of the actual proportion of patients with diabetes. However, it was anticipated to be non-differential, potentially introducing bias towards the null hypothesis and thus obscuring an association.

The prevalence of patients with one or more additional long-term conditions was, as expected, higher in patients with diabetes compared to those without, and this was accounted for in the analyses. It could have been interesting to make analyses based on different types of additional long-term conditions, but the size of the group of patients with diabetes does not allow for further subdivision. Future studies could advantageously examine whether specific types of additional long-term conditions might have an impact on participation in CR. Another important issue is the level of disability, which could have been another interesting factor to examine. We recommend that this should be tested in future studies.

While the regression models addressed common confounding variables, it is important to acknowledge that other factors associated with the CR pathway may impact the study's findings. Similarly, the conclusions of the study could be affected by the lack of including service-level factors, such as the manner in which CR was delivered. Previous studies have linked non-uptake to distance from the CR centre [20]. However, as distances to CR were presumed to be consistent between patients with and without diabetes, this is unlikely to impact the results. Moreover, CR is provided within short distances (<30 km) in the study area, with free transportation offered to patients unable to travel independently, thus mitigating the importance of distance in this study.

5. Conclusion

This study highlights a significant disparity in the uptake of CR between patients with and without diabetes following ACS. Despite similar referral and completion rates, patients with diabetes are less likely to participate in CR, representing a significant barrier to successful completion of the CR pathway. Notably, this discrepancy is not worsened by patient characteristics such as additional long-term condition or socioeconomic status. Our findings demonstrate that patients with diabetes need early promotion and increased support to enrol in CR during the initial phase following their hospital discharge.

CRediT authorship contribution statement

Birgitte Bitsch Gadager: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Lars Hermann Tang:** Writing – review & editing, Writing – original draft, Validation, Supervision, Methodology, Investigation, Funding acquisition, Conceptualization. **Patrick Doherty:** Writing – review & editing, Supervision, Methodology, Conceptualization. **Marie Louise Svendsen:** Writing – review & editing, Supervision, Methodology, Formal analysis, Data curation. **Kirstine Lærum Sibilitz:** Writing – review & editing, Validation, Supervision, Resources, Methodology. **Alexander Harrison:** Writing – review & editing, Validation, Supervision, Resources, Methodology. **Thomas Maribo:** Writing – review & editing, Writing – original draft, Supervision, Resources, Methodology, Investigation, Funding acquisition, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no conflicts of interests.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ijcard.2024.132275.

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