



# Implementation of systematic screening for anxiety and depression in cardiac rehabilitation: Real world lessons from a longitudinal study

Cecilie Lindström Egholm<sup>a,\*</sup>, Charlotte Helmark<sup>b</sup>, Henriette Knold Rossau<sup>a</sup>, Pia Munkehøj<sup>a,c</sup>, Stig Brøndum<sup>d</sup>, Susanne S. Pedersen<sup>e,f</sup>, Ann-Dorthe Zwisler<sup>a,f</sup>

<sup>a</sup> REHPA, The Danish Knowledge Centre for Rehabilitation and Palliative Care, Odense University Hospital, Vestergade 17, 5800 Nyborg, Denmark; Department of Clinical Research, University of Southern Denmark, Odense, Denmark

<sup>b</sup> Department of Cardiology, Zealand University Hospital Roskilde, Vestermarksvej 21, 4000 Roskilde, Denmark

<sup>c</sup> Københavns Professionshøjskole, Campus Sigurdsgade, Sigurdsgade 26, 2200 Copenhagen N, Denmark

<sup>d</sup> Danish Heart Foundation, Copenhagen, Denmark

<sup>e</sup> Department of Psychology, University of Southern Denmark, Campusvej 55, 5230 Odense M, Denmark

<sup>f</sup> Department of Cardiology, Odense University Hospital, J. B. Winsløvsvej 4, 5000 Odense C, Denmark

## ARTICLE INFO

### Keywords:

Cardiac rehabilitation  
Screening  
Anxiety  
Depression  
Implementation  
Quality improvement  
Delivery of health care

## ABSTRACT

**Aims:** Systematic screening for anxiety and depression is widely recommended as a core component of cardiac rehabilitation in ischemic heart disease, however, recommendation-practice gaps are common and limited knowledge exists about factors hindering and supporting implementation. The study aimed to assess adherence to national clinical guideline recommendations and to gain a greater understanding of the implementation of screening in real-world practice.

**Methods:** An observational, longitudinal mixed-methods design including hospitals and municipalities in Denmark. We retrieved nationwide survey data from 2013, 2015, 2018 and 2021 to assess adherence to screening on programme level, and clinical quality registry data from 2016 to 2020 to assess proportion of patients screened. Data were analysed descriptively. Semi-structured interviews with healthcare professionals were conducted in 2015 ( $n = 11$ ) and 2020 ( $n = 11$ ) to explore how screening was conducted and factors supporting implementation. Normalization Process Theory guided interviews and content analysis.

**Results:** Screening on programme level increased from 61% to 88% in hospitals and 20% to 89% in municipalities. The individual proportion of patients screened remained relatively stable in both hospitals and municipalities overall, however with considerable inter-site differences. Screening practices became more aligned to guidelines, pushed by formal recommendations and monitoring, and pulled by activities strengthening the knowledge and motivation among staff.

**Conclusion:** Screening for anxiety and depression improved considerably over the seven-year period, from a scattered practice driven by individuals to a movement where healthcare professionals had a feeling of going with the flow. Nationwide implementation of screening requires national and local supporting activities and a continuous effort.

## 1. Introduction

Anxiety is prevalent in up to one in three [1,2] and depression in about one in five [3,4] patients diagnosed with ischemic heart disease (IHD) and are associated with increased risk of mortality [4–6], poor prognosis for overall and cardiovascular death [4,7], as well as being barriers for lifestyle changes and completion of cardiac rehabilitation

(CR) [5,8]. In order to identify these high-risk patients, systematic screening for anxiety and depression has been recommended as a standard component of CR for years [9–11].

In Denmark, systematic screening for anxiety and depression was first recommended in national clinical guidelines in 2013 [12]. Initiatives to advance the implementation of screening in practice have been encompassed in national CR quality improvement initiatives. These

\* Corresponding author at: REHPA, The Danish Knowledge Centre for Rehabilitation and Palliative Care, Odense University Hospital, Vestergade 17, 5800 Nyborg, Denmark; Department of Clinical Research, University of Southern Denmark, Odense, Denmark.

E-mail address: [cecilie.lindstrom.egholm@rsyd.dk](mailto:cecilie.lindstrom.egholm@rsyd.dk) (C.L. Egholm).

<https://doi.org/10.1016/j.jpsychores.2022.110909>

Received 21 December 2021; Received in revised form 31 March 2022; Accepted 4 April 2022

Available online 8 April 2022

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initiatives include regional guidelines, monitoring and feedback [13], and educational activities aimed specifically at implementing screening procedures (Appendix A). Comprehensive initiatives to enhance the uptake are, however, no guarantee that screening is actually implemented. The challenge of implementing new clinical practices is well documented, and uptake is often slower than expected [14,15]. Screening for anxiety and depression as part of CR is no exception. One review found that only 29–68% of CR programmes comply with recommendations [16], whereas higher proportions were seen in a survey of Australian CR programmes, where 83% reported screening for depression and 75% for anxiety [17]. A mixed picture was reported in a Danish study, where the proportion of hospitals screening for anxiety and depression increased from 67% to 97% in the first two years following launch of the national clinical guidelines [18], whereas it remained stable at approximately 20% of municipalities.

The screening should be undertaken with all eligible patients and validated tools to fulfil recommendations for systematic screening. A study among Australian cardiologists documented lack of systematic screening for depression with only 3% using a validated screening tool [19]. In a general practice study, 27% of patients were screened, of which 12% were with a symptoms checklist [20], and a study based on British quality registry data showed that 60% of patients were screened using validated tools [21]. These studies indicate a remaining gap between clinical guidelines and clinical practice, with inter-site variability.

There is limited understanding of factors supporting and hindering implementation of systematic screening for anxiety and depression in CR. One trial investigated screening feasibility in inpatient cardiac units, indicating that screening was acceptable and quick to administer [22]. Real-life experiences were reported in another study where barriers included competing priorities, logistic issues, concerns about patients' reactions, lack of ownership, and lack of education and feedback [23]. More recent real-life studies, covering multiple sites and sectors are, to the best of our knowledge, lacking.

Thus, the overall aim of the present study was to assess adherence to national clinical recommendations and to gain greater understanding of the implementation of screening practices in CR in Denmark since launch of the national clinical guidelines in 2013. We specifically aimed to describe, over time: 1) the proportion of hospitals and municipalities screening for anxiety and depression as a standard component of CR, 2) the proportion of CR programmes screening with a recommended validated tool, and 3) the proportion of patients with IHD screened as part of CR. Furthermore, we 4) explored screening practices and factors supporting and hindering implementation of systematic screening for anxiety and depression in CR, as perceived by healthcare professionals who perform the screening in practice.

## 2. Methods

We used an observational, longitudinal mixed-methods design to study implementation of screening for anxiety and depression in the Danish health care system from 2013 to 2020. Longitudinal assessment in implementation studies has been recommended as uptake of interventions take place over time [15] and it helps identify contextual influences and adaptations [24]. Data included longitudinal quantitative data from programme level surveys and individual based clinical quality registries combined with qualitative data generated from interviews in 2015 and 2020. While each of the methods addressed the different sub-aims, the mixed-methods design permits a breadth and depth in understanding the overall research question [25]. We applied the approach of analysing the different sets of data separately, and integrated the results during interpretation [26].

### 2.1. The intervention studied: Screening for anxiety and depression

According to Danish clinical guideline recommendations, screening for anxiety and depression should be undertaken as part of CR;

systematically and by using a validated questionnaire as a screening tool [12]. The Hospital Anxiety and Depression Scale (HADS) [27] is suggested as screening tool [12], and this questionnaire has been made available to CR programmes reporting to clinical quality registries through a shared license since 2015.

### 2.2. Programme level data from national surveys

To explore whether screening is a standardised component of CR and which screening tool is being utilised, programme level data were retrieved from national surveys conducted in 2013, 2015, 2018 and 2021. The methodology is described in detail elsewhere [18,28], and briefly outlined here. The surveys were conducted under the auspices of the Danish Cardiac Rehabilitation Database (DHRD) [13], comprising questions regarding screening for anxiety and depression. The surveys were electronically distributed to coordinators or mid-level managers of CR in all Danish hospitals ( $N$  changed from 36 to 32 due to organizational changes) and municipalities ( $N = 98$ ). Variables of interest for the present study included: organization (i.e., programme), year, screening for anxiety and depression (*yes responsible/yes partly responsible/no*), and screening tool (*HADS/other*). The surveys had high (82–100%) response rates (Appendix B).

Data were descriptively analysed, for hospitals and municipalities respectively, as proportions screening for anxiety and depression (assessed as 'yes' to screening) and, among sites screening, the proportion using HADS.

### 2.3. Proportion of screened patients – data from clinical quality registries

Individual level data regarding screening were retrieved from annual reports from two clinical quality registries: the DHRD [29] and the Danish Database for Cardiac Rehabilitation in Primary Health Care Setting (HjerteKom Database) [30]. DHRD monitors routine practice on individual patient level in hospitals. Data has been collected since 2015 from all hospitals conducting CR, with mandatory reporting due to Danish law and approximately 4500 registrations annually. Danish municipalities are not encompassed in the mandatory reporting, but a minor proportion of municipalities (18 of 98) have since 2017 been voluntarily reporting to the HjerteKom Database, with approximately 1700 registrations annually. Data were available until 2019.

The screening proportions retrieved from these registries were depicted in graphs.

### 2.4. Implementation experiences obtained by interviews

We conducted interviews in both hospitals and municipalities in 2015 and again in 2020 to explore possible changes between sites and over time. To collect a broad variety of implementation experiences, we approached high and low performing sites with regards to screening. Invited sites were asked to appoint one staff member with a thorough knowledge of local screening practices. If a site declined to participate, an equivalent site was invited. The interview guide (Appendix C) was inspired by the Normalization Process Theory, as this implementation theory can be applied to identify, understand and explain key mechanisms that support and hinder the implementation of complex interventions in healthcare [31]. The semi-structured interviews were performed in person in 2015, and the same method was intended in 2020 however disrupted by the corona pandemic, making telephone-based interviews a necessity.

In total, 22 interviews were conducted. All invited sites participated in 2015, whereas three sites declined without stating reason in 2020. An overview of interviewee characteristics is provided in Table 1. The participating sites were located throughout the country, covering all five regions.

Interviews were audio-recorded, transcribed verbatim, and deductively analysed [32] based on the four constructs in the Normalization

**Table 1**

Characteristics of interview participants in 2015 (n = 11) and 2020 (n = 11).

Interview year	Number of interviewed staff pr. type of site <sup>a</sup>	No. sites screening systematically with validated tool	Profession	Staff level	Interview mode	Interview length	Participation
2015	6 hospitals 5 municipalities	4 <sup>c</sup> of 11	11 nurses	2 first-level managers, 5 CR coordinators, 4 CR frontline nurses	In person	30–55 min	All invited agreed to participate
2020	5 hospitals <sup>b</sup> 6 municipalities	10 of 11	10 nurses, 1 physio-therapist	1 first-level manager, 4 CR coordinators, 6 CR frontline staff	Telephone	21–47 min	3 invited low performing sites did not respond

<sup>a</sup> Two hospitals and three municipalities took part in the interviews at both occasions.

<sup>b</sup> Two of the hospital nurses had split positions with a municipality in conjunction with the hospital – these interviews thus covered practices in both settings.

<sup>c</sup> Two more sites reported screening systematically, but with non-validated tools.

Process Theory: coherence, collective action, cognitive participation and reflexive monitoring [31]. Two authors (CLE and LH) independently coded the interviews and then compared codes. The level of agreement was high, and in case of different codes, these were discussed until consensus was reached. Codes were condensed into key-findings for each of the four main constructs (examples in Appendix D). Findings from 2015 and 2020 were compared for each construct, analysing similarities and differences over time. Remaining authors acted as critical peers. NVivo software version 12 (QSR International) was used to organize and analyse data.

### 2.5. Ethics and data approvals

The study conforms to the principles of the Helsinki Declaration and was approved by the Region of Southern Denmark data protection agency, registration number 20/8761. Approval from the Regional Committee on Health Research Ethics was not necessary according to Danish law [33]. Permission to use survey data was granted from the DHRD. The individual level data were publicly available, so no permission was needed. For interviews, informed consent (2015: verbal, 2020: written) was retrieved and the identities of informants kept confidential.

## 3. Results

### 3.1. Programme level screening

The proportion of hospitals including screening as a standard component of CR increased from 61% in 2013 to 97% in 2015, after which it fell slightly to 88% in 2021. Municipalities reported 20% in 2013 with an increase to 89% in 2021 (Table 2) (Curve illustrated in Appendix E 1a).

Among hospitals reporting screening as a standard component, the use of HADS as a screening tool rose from 41% in 2013 to 100% in 2021. The corresponding numbers for municipalities were 42% to 79% during the same period (Table 2) (Curve illustrated in Appendix E 1b).

### 3.2. Proportion of screened patients

Fig. 1a depicts the overall development in proportion of patients screened as part of their CR in hospitals in 2016–2020 aggregated at regional level while Fig. 1b depicts the corresponding numbers in our sample of municipalities in 2017–2019, aggregated in clusters. The national mean proportion of patients screened in hospitals was 60% (575/965) (range for individual hospitals 0–100%) in 2016, and four years later, in 2020, 63% (2631/4160) (range 0–100%), indicating a relatively stable overall proportion of patients screened but with a great variability among individual hospitals. Among municipalities, the overall screening proportion was 79% (702/892) (range for clusters 48–94%) in 2017, and 71% (1225/1715) (range 51–85%) in 2019.

**Table 2**

Proportion of hospitals and municipalities screening for anxiety and depression as a standard component of cardiac rehabilitation programmes, and proportion of those screening that are screening with the Hospital and Anxiety Depression Scale (HADS).

	2013		2015		2018		2021	
	%	n/N	%	n/N	%	n/N	%	n/N
<b>Hospitals</b>								
Screening as standard component of programme	61	22/36	97	33/35	94	30/32	88	29/33
Screening with HADS	41	9/22	93	25/27	93	28/30	100	28/28 <sup>b</sup>
<b>Municipalities</b>								
Screening as standard component of programme	20	12/60	19	13/67	58	55/95	89	85/95
Screening with HADS	42	5/12	62	8/13	67	33/49 <sup>a</sup>	79	63/80 <sup>c</sup>

For hospitals, the numbers are based on complete overall response to the questionnaires. For municipalities, there were high but not complete response rates.

<sup>a</sup> 6 missing responses.

<sup>b</sup> 1 missing response.

<sup>c</sup> 5 missing responses.

### 3.3. Implementation experiences

#### 3.3.1. Screening practices in 2015 and 2020

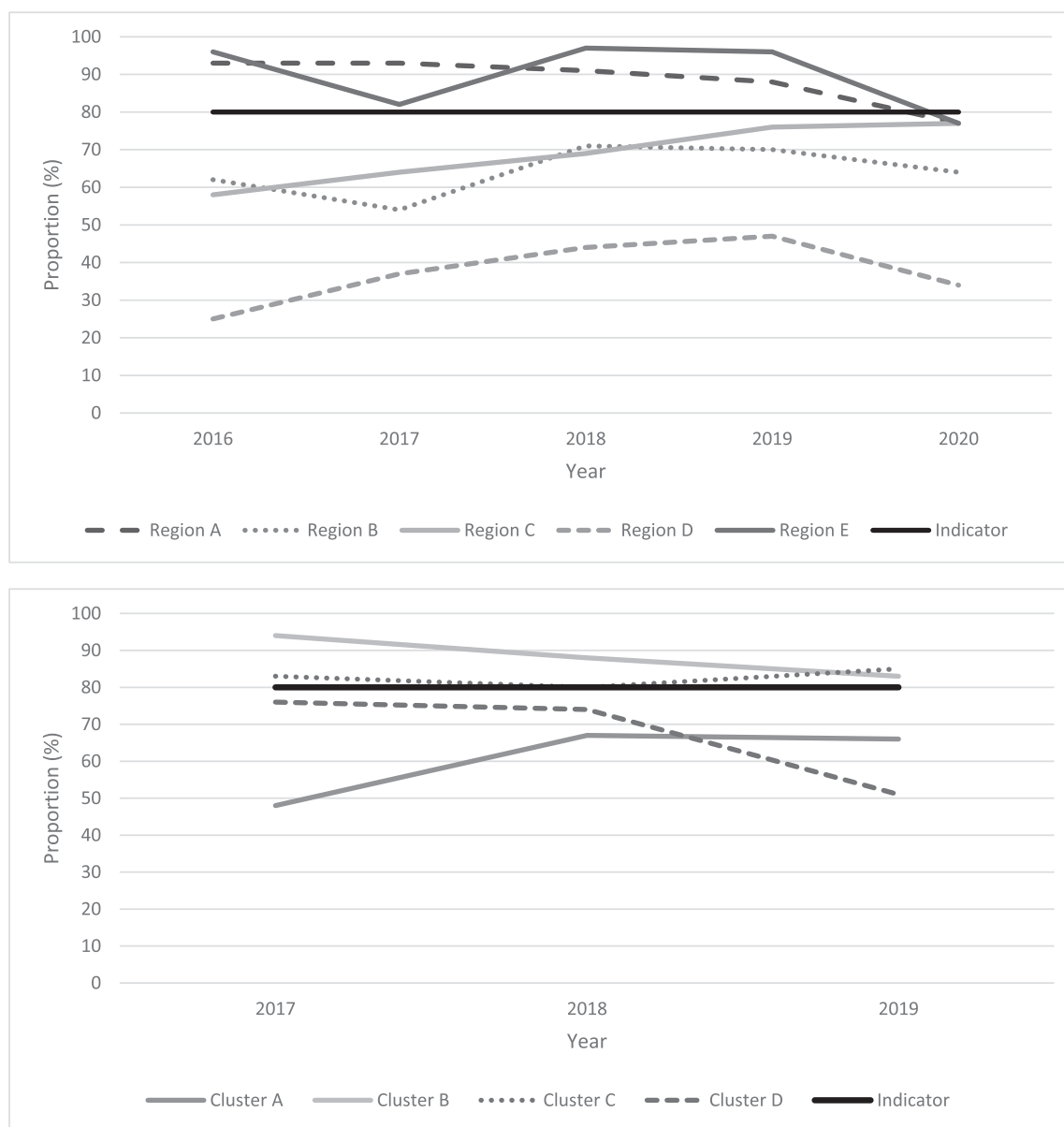
A summary of screening practices described by interviewed sites is provided in Table 3. Overall, the interviews reflect great variability between – and in some cases within – hospitals and municipalities in 2015, whereas screening practices were more conform to guidelines and with less variation between sites in 2020.

#### 3.3.2. Experiences of implementing screening

Key findings from the interviews are displayed according to the Normalization Process Theory main constructs in Table 4.

The *coherence* construct deals with the sense-making work that individuals and groups engage with when faced with a new intervention [31]. Whereas a focus on the psychosocial issues was acknowledged as an important part of CR in both 2015 and 2020, the confidence in the value of screening with a questionnaire tool was low in 2015. In 2015, most informants stated trusting their clinical experience and asking about symptoms to identify patients with signs of anxiety and depression. Some questioned the prevalence of anxiety and depression and the relevance of ‘labelling’ psychosocial reactions regarded as natural following a cardiac event.

“All of us have a barrier against it, since we don’t know why it’s relevant. (...) So we need input about why to do it, to get inspired – to go with it.” (Municipality 2015, not screening).



**Fig. 1.** a. Proportions of patients screened for anxiety and depression as part of their CR in hospitals, aggregated at regional level. b. Proportions of patients screened for anxiety and depression as part of their CR in municipalities, aggregated at health clusters.

Accordingly, there was no felt need to change. Instead, mandatory registration requirements from clinical quality registries pushed implementation efforts.

*“It became a natural part of starting to use the clinical quality registry. Screening was mandatory to report and thus we had to do it.”* (Hospital 2015, screening).

In 2020, informants recalled that while they had been pushed to take the first steps into implementation by registries and guideline recommendations, they had *learned* about the value of systematic screening by attending educational meetings and from peers in their network. Also, most informants expressed a personal appreciation of screening learned through their own experiences, e.g. when screening helped identify patients with symptoms of anxiety or depression that they realized they would not have detected by clinical experience alone.

The second construct, *cognitive participation*, targets relational work to build and sustain support for the new practice [31]. In 2015, informants reported working rather independently, often with little

interference by management and often in small CR teams or alone. Screening was thus dependent on personal initiative and motivation. Some expressed great concern about not having adequate treatment options to refer to, as general practice was not trusted to have the competencies, and there was a lack of resources to engage relevant staff for treatment, e.g. psychologists. When informants found themselves lacking (perceived) possibilities for referral, screening was regarded as unethical. In 2020, informants emphasized their formal responsibility to work with practice improvement, including to follow guidelines. Educational material distributed by the Danish Heart Foundation explained the evidence base and ‘how to’, and thus helped build support. Several informants expressed commencing screening as a feeling of going with the flow, referring to both the formal requirements and that more and more other sites already had implemented screening. Consequently, they experienced no resistance in their teams. Management support was regarded as important, and while some described their managers as supporting, others found their managers largely absent in daily practice, however occasionally showing interest due to requirements to perform according to national quality standards.



**Table 3**  
Summary of screening practices as described in interviews in 2015 and 2020.

Interview reports 2015	Interview reports 2020	Interpretation of development
<ul style="list-style-type: none"> <li>Overall great variation in methods for detecting anxiety and depression in practice – within and between sites. More hospitals than municipalities report using HADS<sup>a</sup> and systematizing screening procedures</li> <li>Some screen systematically, others use an unsystematic, individually based approach</li> <li>Both hospitals and municipalities use a variety of questionnaire tools, both for systematic and less systematic screening: validated tool (HADS, Major Depression Inventory, WHO-5<sup>b</sup>); ‘home-made’ tools inspired by other questionnaires; no tool – prefers talking to the patient using words or phrases found useful based on experience</li> <li>Mainly paper based questionnaire tools with varying mode of delivery: questionnaires filled out at home or on site, where patient fills out alone or interviewed by clinician</li> </ul>	<ul style="list-style-type: none"> <li>Systematic screening with HADS implemented in the majority of interviewed sites (hospitals and municipalities)</li> <li>Common with adaptations to fit local procedures, e.g. mode of delivery (electronic vs. paper-based questionnaires), when in the CR pathway screening is performed, and screening once or twice (follow-up) during CR</li> <li>Variation in whether sub-groups are considered eligible for screening: some make great efforts to screen <i>all</i> patients (e.g. by reading questions out loud or by translating into foreign languages), others omit patients with cognitive impairment or language barriers.</li> <li>In hospitals, nurses perform the screening, whereas in municipalities the task is more often divided within multidisciplinary teams</li> </ul>	<ul style="list-style-type: none"> <li>Screening tool in general aligned with guidelines in 2020, thus, inter-site variation was reduced</li> <li>Systematic screening increased in the period, but procedures are still varying and locally adapted</li> <li>Which patients to screen or exclude from screening is an unsolved issue</li> </ul>

<sup>a</sup> HADS = Hospital Anxiety and Depression Scale.

<sup>b</sup> WHO-5 = World Health Organization Well-Being Index.

The construct *collective action* involves operational work to enact the new set of practices [31]. In 2015, informants found little guidance and training available, and those that had commenced screening at the time described using a team-based trial-and-error approach to implementation. Some were inspired by other sites.

*“It was difficult to get going. Because our starting point was: how were we going to do it? Should we send [the questionnaire] to patients by mail? We had actually made an invitation letter that stated that we attach a depression screening questionnaire, which we would like you to fill out at bring together with your list of medicines at your first visit. But then we had a meeting, where we decided that that was not the way we would like to do it. We wanted to try out if we could do it [in the outpatient clinic]. Because we had attended a conference, where different hospitals presented different ways of doing it. There was one department where I thought this sounds like something we should do instead.”* (Hospital 2015, screening).

In 2020, the majority of informants stated that educational meetings and material (made nationally available) had fulfilled most of the perceived need for knowledge and greatly guided the organizing of local screening practices. In both 2015 and 2020, most sites described some degree of adaptation to fit screening procedures into existing local practices. As there was no clear guidance available regarding whether to screen patients with language barriers and cognitive impairment, some sites had decided locally not to do this, while others had developed

flexible modes of conducting screening to reach all patients. The one site not screening in 2020 was hesitant about implementation of HADS as they were awaiting a national initiative to use patient-reported outcome measures including screening for anxiety and depression with a different questionnaire tool. They feared that a shift might cause confusion among staff and expressed – similar to accounts in 2015 – a trust in clinical experience to detect symptoms of anxiety and depression.

The final construct, *reflexive monitoring*, regards the work to assess and evaluate the ways that the new intervention influences daily practices [31]. In 2015, the trial-and-error approach involved rounds of testing and evaluating, including both tools and procedures, until a satisfactory practice was found. Formal monitoring of practices had recently been initiated at hospital level through the DHRD registry; however, reporting of data was regarded as a duty and not a need emanating from practice. In 2020, the mandatory reporting of screening practices to the DHRD registry was described as relatively well established at hospital level, and while this created a focus on conducting the screening, only some of the interviewed sites stated using data for quality improvement. At municipality level, a formal monitoring infrastructure was still not established for all sites. Among those who did report to a quality registry some expressed using data for quality improvement, while others were not aware of the possibility to retrieve data. In addition to formal monitoring and feedback, team meetings were used at some sites, which was perceived as valuable for reflection and shared learning.

*“We have prioritized having regular team meetings, most frequently in the beginning. [...] I think we have benefitted a lot from having each other. If there is something I find, uh what do I do with this, then I discuss it with one or two of the others, and we find out what to do.”* (Hospital 2020, screening).

#### 4. Discussion

This longitudinal, observational mixed-method study, using data from three sources, indicate that systematic screening for anxiety and depression as part of CR improved considerably in hospitals and municipalities over a seven-year period, moving from a scattered practice driven by individuals to a movement where healthcare professionals had a feeling of going with the flow. Despite the improvements, however, there are still sites not screening systematically and thus not following clinical guidelines.

There are, to our knowledge, no similar studies to which we can compare our longitudinal findings of national uptake. However, theory provides a useful lens through which we can view our results. As illustrated by Rogers [15] in the diffusion of innovations theory, new practices often spread over time in an S-shaped curve: after an early slow phase, uptake often takes off when approximately 20% of sites have implemented the practice, then levelling off with incomplete penetration in the end. This curve is relevant in the present case too, although the slightly decreasing numbers for hospitals since 2015 can be attributed to the transfer of non-specialized services to the municipalities. Notably, the improvement in the municipalities seem more rapid than in the hospitals, and a possible explanation, informed by our interview data, is that the municipalities are venturing into the field at a point when there is a growing awareness of guidelines and available guidance. Despite clinical guidelines and mandatory reporting to clinical quality registries, the results indicate that screening on a programme level has not reached 100%. While our interviews offered sparse explanation, the diffusion of innovations theory suggest that the last possible adopters tend to hold on to traditional methods until they are practically forced to change [15].

Screening with HADS improved considerably in the study period. The survey data correspond with the findings from the interviews, indicating that diverse tools and approaches were used in 2015, whereas

**Table 4**

Key findings from interviews in 2015 and 2020 displayed by constructs in the Normalization Process Theory (NPT).

NPT constructs	Key findings 2015	Key findings 2020	Interpretation of factors supporting development
<b>Cohherence</b> ( <i>individual and collective sense-making work when faced with task to implement new practice</i> )	<ul style="list-style-type: none"> <li>• General unawareness of national guidelines</li> <li>• Psychosocial intervention is emphasized as important/making sense, but the majority has no confidence in the value of systematic screening - fear screening being time-consuming and a tick-box exercise</li> <li>• Nurses trust their clinical experience/expertise and talking to patients</li> <li>• Mandatory reporting to national clinical quality registry is a push-factor to implement screening among hospitals</li> </ul>	<ul style="list-style-type: none"> <li>• General awareness of regional guideline recommendations – a push-factor to implement screening</li> <li>• Personal practice experiences lead to insights in the advantages of systematic screening</li> <li>• Experiences shared at educational meetings and in networks</li> <li>• Confidence in the value of systematic screening</li> </ul>	<ul style="list-style-type: none"> <li>• A wave of awareness has flooded the field – through national clinical registries, regional guidelines, educational meetings and networks</li> <li>• Practice experience has altered the perception of the value of systematic screening in a positive direction - regardless of incentive for commencing screening</li> <li>• Quality registries and regional guidelines are incentives pushing implementation of systematic screening</li> </ul>
<b>Cognitive participation</b> ( <i>relational work to build and sustain support for new practice</i> )	<ul style="list-style-type: none"> <li>• Cardiac rehabilitation nurses work independently and autonomously</li> <li>• The concept and benefit of systematic screening is in general poorly understood</li> <li>• Insecurity about appropriate screening processes leads to a hesitant approach</li> <li>• Lack of motivation due to frustration about the possibilities to take action on 'positive cases' – perception of not having competent healthcare professionals to refer patients to (general practice distrusted to act)</li> </ul>	<ul style="list-style-type: none"> <li>• Cardiac rehabilitation coordinators execute their formal role as responsible for quality improvement work</li> <li>• Cardiac rehab team follows coordinator – little resistance</li> <li>• Initiating screening evokes a sense of 'going with the flow'</li> <li>• Management pushes systematic screening due to monitoring – but offers little practical support</li> <li>• Referral to general practice not an issue</li> </ul>	<ul style="list-style-type: none"> <li>• Systematic screening has become mainstream and familiar – thus easier to engage with</li> <li>• Management is in general distant – but has become more aware of mandatory requirements</li> <li>• Availability of and trust in referral options in other healthcare sectors is important for building support</li> </ul>
<b>Collective action</b> ( <i>operational work to enact new practice</i> )	<ul style="list-style-type: none"> <li>• Neither CR coordinators nor frontline staff properly prepared/educated to perform systematic screening – and sparse guidance/training available</li> <li>• Among those screening with tool: Trial-and-error in how to go about screening in practice</li> <li>• Lack of resources in hospitals</li> </ul>	<ul style="list-style-type: none"> <li>• Nationwide available educational material supports engagement and planning once the decision to implement has been made</li> <li>• Different procedures for screening have been tried and evaluated and most have found a workable procedure, fitted into existing local practices</li> <li>• Flexible modes of conducting the screening process have been developed to screen as many patients as possible</li> <li>• Mandatory monitoring carried out at hospital level whereas most municipalities still lack infrastructure for monitoring (quality registries)</li> <li>• Monitoring creates a focus on performing screening - emerging use of data to improve practice</li> <li>• Team-meetings valuable for reflection, learning and alignment of practices</li> </ul>	<ul style="list-style-type: none"> <li>• Making educational material freely available has made a vital contribution to educating staff and planning processes</li> <li>• A general knowledge and the formal guide has been developed in the 'field' making it easier to get started – but it is still necessary to modify screening processes to fit local practices</li> <li>• The field of cardiac rehabilitation has a low staff turnover, allowing knowledge, competencies and routine to build</li> <li>• The local trial-and-error approach led the development in the early years in lack of alternatives</li> <li>• Increased monitoring to some degree creates a focus on suboptimal screening practices</li> <li>• Team-meetings contributes to continuous learning</li> </ul>
<b>Reflexive monitoring</b> ( <i>appraisal work to assess/ evaluate the influence of new practice</i> )	<ul style="list-style-type: none"> <li>• Trial-and error-approach involves testing and reflecting on both tools and procedures</li> <li>• Sparse formal monitoring practices, especially in municipalities due to lack of infrastructure. Very sparse use of data.</li> </ul>	<ul style="list-style-type: none"> <li>• Mandatory monitoring carried out at hospital level whereas most municipalities still lack infrastructure for monitoring (quality registries)</li> <li>• Monitoring creates a focus on performing screening - emerging use of data to improve practice</li> <li>• Team-meetings valuable for reflection, learning and alignment of practices</li> </ul>	

all the interviewed sites screening in 2020 used HADS. This may to a great extent be explained by the fact that HADS has been explicitly mentioned in guidelines as a valid screening tool, and the questionnaire was made available to the programmes reporting to the clinical quality registries. Furthermore, the practice guidance launched by the Danish Heart Foundation in 2017, which was extensively referred to in our 2020 interviews, also focused on HADS. Thus, although there in theory are other options, such as the Patient Health Questionnaire-9 or the Major Depression Inventory, HADS has gained ground as the standard tool in Denmark. This corresponds to e.g. UK, where HADS is explicitly mentioned as an option in guidelines and made available through the national audit [9].

Despite the advances in adopting screening at a programme level, the overall proportion of patients screened interestingly remained relatively stable over time, with considerable inter-site variation. The standard in the Danish clinical quality registries is set at 80% [13,30], and although some hospitals and municipalities reach this level, data suggest overall room for improvement. The regional variation in the data attracts attention. Data on the regional level were retrieved from the national clinical quality registry's annual report, which does not take into account the transition of CR to municipalities. Consequently, regions where screening for anxiety and depression is largely taken over by the municipalities will be depicted as having poor results. This is the case in region D (Fig. 1a) and to a lesser degree in other regions. It would greatly improve data if this could be regulated for in future registry reporting. Further explanation to why the 80% standard is not met is provided by

our interviews. They add interesting nuances to the registry data as the informants report different approaches to how they deal with eligibility, that is, whether they screen *all* patients or make exceptions in case of e.g. cognitive impairments or language barriers. Until national official guidance is made available, the healthcare professionals are left to decide on this locally or even individually. Additional explanation is offered by a recent study indicating that healthcare professionals may make more or less unconscious choices, e.g. excluding patients with certain characteristics from screening, which could also influence screening proportions [21].

Our interviews were conducted to provide information about factors supporting and hindering implementation of systematic screening for anxiety and depression (Table 1). According to Normalization Process Theory, implementation starts with a sense-making process where individuals find out whether the new practice is perceived to be beneficial and compatible with their beliefs, values and needs. Although we found an overall genuine interest in the psychosocial wellbeing of CR patients, the poor knowledge of and confidence in the value of systematic screening, particularly in 2015, were central barriers. The important sense-making and engagement was stimulated by networking and educational activities – which therefore stand out as necessary supporting activities. While lack of knowledge and education are previously described as implementation-barriers [23], the longitudinal design of the present study added important information about the evolvement of nurses' perceptions, where full appreciation of the value of screening came with personal experience. This has not been reported in the

previous studies of implementation of screening for anxiety and depression in CR and may seem difficult to overcome in the efforts to accelerate the adoption of screening. Advice include supporting first movers and make early experiences visible [15,34], which is in line with our findings.

The interviews consistently pointed to a need for local adaptations of screening practices to find a mode of delivery that suited local resources and processes. The issue of fidelity, i.e. performing an intervention as it is intended, is a longstanding discussion within the implementation science literature [35]. Whereas finding a way that fits established local practices “is nearly universal property of successful dissemination” ([34] p. 1971), at the same time this creates a multitude of practices that are similar but yet different, and the possible clinical consequences of this are not known. Regardless, the experiences can be seen as a reaction to the relative methodological freedom reflected in the national guidance, which in turn is a consequence of scarce evidence regarding when and how to perform the screening in order to best identify patients with symptoms of anxiety and depression. A need for more research in this area therefore seem relevant, further supported by studies indicating that screening once may not be sufficient as anxiety and depression may develop up to two years after an acute cardiac event or ICD-implant [1,36,37]. Furthermore, although patients in the cardiac rehabilitation setting in Denmark are not asked if they have had previous depression, this may be important to include in the future given that a history of depression constitutes a risk factor for recurrent and potentially treatment resistant depression [38].

Clinical quality registries are generally perceived to play an important role in quality improvement, and our study clearly indicates that registries pushed the implementation of screening for anxiety and depression. But registries do not contribute to motivation, creating engagement or explaining how to, and in practice, healthcare professionals in the present study and others [39] often seem to view registries as a tick-box exercise, at least until they start using data for local quality improvement. In practice, such use of data was sparsely reported, similar to findings in previous studies [40,41] and is an area for possible future supporting activities.

#### 4.1. Strengths and limitations

A main strength of the study is the high survey response rates (82–100%), and thus near complete national data on programme level screening. However, self-reports are at risk of social desirability bias, with over-estimates of reality due to perceived pressure to perform. Second, it is a strength that screening proportions were based on real-world data from a large number of patients in a clinical quality registry covering all hospitals in Denmark. Municipality data at a patient level were, however, only collated in about 1/5 of Danish municipalities, which limits the generalizability of our findings. Furthermore, clinical registry data quality may vary due to different reporting practices [29,39,42] and we therefore aimed to interpret data cautiously, supplemented with our qualitative data. Third, the transition of CR from hospitals to municipalities and consequently the drift of responsibilities – including screening for anxiety and depression – challenges the interpretation of survey and registry data, especially over time. We aimed to mitigate this by including three sources of data and a mixed-methods approach. Finally, the interviews in our study covered a broad range of experiences from different sites throughout the country. However, there may be experiences that are not fully covered, in particular, the views of sites not screening systematically may be underrepresented. This limits the understanding of reasons for remaining poor uptake.

## 5. Conclusion and perspectives

This longitudinal study on implementation of systematic screening for anxiety and depression in CR in Denmark supports the abundant

literature showing that guidelines alone are not sufficient to change practice. Our findings emphasise that uptake of screening takes place when guidelines are supplemented with supporting initiatives at both national and local level, and point to the importance of a continuous effort. Despite the relatively extensive initiatives in Denmark, there are still sites not screening, and even among those screening, data indicate that not all eligible patients are screened. Continuous quality improvement work is necessary, and national guidelines for how to deal with non-eligibility seem warranted.

Systematic screening increases healthcare professionals' awareness of patients' needs and psychosocial support, but it is still only an essential first step. It remains a vital focus to follow up on screening results to make sure that relevant patients are offered evidence-based treatment.

## Funding

The study was supported by Helsefonden grant no. 2014A216, and the Danish Heart Foundation, the Lund Fund, and the Karl Peder Christensen & Lilly Edeling Christensens Fund (no grant numbers). The funders had no role in the collection, analysis and interpretation of data; in the writing of the report; or in the decision to submit the article for publication.

## Authors' contributions

HKR, CLE and ADZ planned, carried out and analysed the survey data. CLE and HKR retrieved and analysed the clinical quality data. HKR, SB, PM and SSP planned and carried out the 2015 interviews, while CLE and LH carried out the 2020 interviews and analysed all interviews. All authors have acted as critical peers to all analyses. CLE drafted the manuscript, and all authors have read and accepted the final version.

## Data availability statement

The data underlying this article will be shared on reasonable request to the corresponding author.

## Patient and public involvement

A representative (SB) from the Danish Heart Foundation was involved in all the phases of the study including planning, development of study questions, interpretation of the findings and writing of the article. Furthermore, healthcare professionals are regarded as recipients in implementation studies, and this perspective was also included in all phases of the study via two of the authors being clinically active CR specialists (CH, ADZ).

## Declaration of Competing Interest

SSP is currently the chief investigator of a programme of research with the overarching aim of developing and evaluating internet-based treatment of anxiety and depression in patients with ischemic heart disease attending cardiac rehabilitation: NCT04172974. ADZ and LH are co-investigators of the same trial. ADZ, SSP and LH is involved in developing a national PRO screening tool as part of CR. CLE, HKR, PM and SB declare that there is no conflict of interest.

## Acknowledgments

We thank all survey participants and interviewees for taking time to contribute to the study. We are also grateful to Maiken Bay Ravn and Sara Frausing who conducted the national survey on behalf of the Danish Clinical Registries in 2018, from which we retrieved data. OPEN, Odense Patient data Explorative Network, Odense University Hospital,



Odense, Denmark provided infrastructure for data analysis and provided practical guidance.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jpsychores.2022.110909>.

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