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Executive briefing

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Regional data on transportation time and survival in connection with primary percutaneous coronary intervention (PPCI) in Central Denmark Region

1. Background

Percutaneous coronary intervention (PCI) is a treatment where a flexible hollow tube (catheter) is inserted in the groin to open blocked vessels in the heart to restore blood flow to the heart muscle. Acute PCI has proven successful in restoring blood flow of an occluded coronary artery, so-called STEMI heart attack, when the patient is transported quickly to a PCI centre.

In recent years, cardiologists in Central Denmark Region have discussed whether to establish one more PCI centre in the western part of the region or maintain the present structure with only one PCI centre in the region. Some cardiologists have proposed establishment of a PCI centre in the western part of the region. Internally among the cardiologists there is disagreement about the beneficial effect (in terms of improved survival) of this potential decentralisation of PCI treatment. Part of the disagreement is rooted in different interpretations of existing regional data on transportation time and survival as well as current international guidelines on PCI treatment.

Consequently, it was decided that an international expert panel should make an evaluation based on available regional studies and data concerning PCI treatment. The results are presented in this report and are a contribution to decision-making on the future organisation of cardiology in Central Denmark Region.

2. Current organisation of PCI treatment in Central Denmark Region

The Danish Health and Medicines Authority decides the framework for and placing of all specialised treatment in Denmark including acute PCI, which is considered a highly specialised treatment. In Denmark, four hospitals have been approved to perform acute PPCI (= primary PCI, PPCI); in Central Denmark Region, all acute PCI treatments are performed at Aarhus University Hospital. The other hospitals approved for acute PCI treatment in Denmark are Rigshospitalet (Copenhagen University Hospital), Odense University Hospital and Aalborg University Hospital. Planned non-acute (elective) PCI is also performed at Gentofte Hospital and Roskilde Hospital.

The decision to offer acute PCI treatment at only four hospitals in Denmark is in line with the overall strategy of the Danish Health and Medicines Authority to gather highly specialised functions at fewer hospitals (based on the assumption that practice makes perfect).

Treatment of STEMI with acute PCI also depends on efficient "24/7" pre-hospital services – the acute treatment performed prior to hospital admission. In Central Denmark Region, pre-hospital treatment has been strengthened and reorganised in recent years. Nationally, it has been decided to establish a physician-staffed emergency helicopter service in Ringsted, Billund and Skive; these locations are evenly spread geographically in Denmark.

Pre-hospital services in Central Denmark Region currently consist of:

- Access to one emergency helicopter (staffed with an anaesthesiologist, a paramedic and a pliot)
- 64[1] ambulances (staffed with paramedics)
- 9 mobile emergency care units (staffed with an anaesthesiologist, and a medical assistant (specially trained paramedic)
- 3 mobile care units (staffed with a nurse anaesthetist and a paramedic)

Today, the goal is that all acute patients with suspected STEMI will be evaluated and diagnosed in the pre-hospital phase, i.e. before possible admission to hospital. STEMI can be detected by an electrocardiogram (ECG, heart diagram) where the electrical rhythm of the heart and myocardial ischemia is examined using electrodes attached to the patient's chest. The STEMI diagnosis is made by the doctor present or by a cardiologist at the closest acute hospital who can confirm or reject suspicion of STEMI based on a tele-ECG (i.e. results of the heart diagram sent electronically). Patients diagnosed with STEMI are transported directly to Aarhus University Hospital for acute PCI.

The PCI centre at Aarhus University Hospital has an uptake area of 1.3 million inhabitants equivalent to the total number of inhabitants in Central Denmark Region. Patients are distributed between the five acute hospitals[2] in the region for other acute treatments.

- Aarhus University Hospital (uptake area 314,551 inhabitants)
- Regional Hospital West Jutland (uptake area 285,248 inhabitants)
- Regional Hospital Central Jutland (uptake area 230,334 inhabitants)
- Regional Hospital Horsens (uptake area 208,027 inhabitants)

[1] After 1 December 2014 upgraded to 66 ambulances.

[2] 2011-figures.

- Regional Hospital Randers (uptake area 221,810 inhabitants)

3. Purpose of analysis

This study reports the conclusions of an international expert panel based on regional data/studies on acute PCI, including simulation analyses and updated data on transportation time and health care system delay (i.e., time from Emergency Medical Services (EMS) call to PCI), considering the changes in the pre-hospital set-up implemented in 2011.

The international expert panel has specifically been asked to answer the following questions:

- On the basis of regional data/studies is it possible:
  - To demonstrate a significant difference in transportation time and system delay for PPCI patients in Central Denmark Region according to place of residence?
  - To demonstrate a prognostic difference in mortality among PPCI patients in Central Denmark Region according to place of residence?
  - To demonstrate treatment benefits of establishing an additional PCI centre in Central Denmark Region?

4. Process

The process has included two phases:

- Phase 1: Preparatory work prior to including the expert panel
- Phase 2: Evaluation of expert panel and reporting of results

4.1 Preparatory work (phase 1)

The involved parties in the region have agreed that there was a need to make the following prior to including the expert panel:

- An audit of a specific regional study on transportation time in Central Denmark Region (facilitated by Department of Health Planning and Department of Quality and Data in Central Denmark Region).
- A validation of available regional data and results on transportation time and system delay (performed by Department of Clinical Epidemiology, Aarhus University Hospital).
- A validation of available regional data and results on mortality following PPCI according to place of residence (performed by Department of Clinical Epidemiology, Aarhus University Hospital).
- An update of regional data on transportation and system delay (performed by representatives of cardiologists at Aarhus University Hospital).
- Preparation of a simulation model on the importance of decentralisation (performed by representatives of cardiologists at Aarhus University Hospital).

4.2 Expert panel evaluation and reporting of results (phase 2)

An international expert panel consisting of two experts was appointed to make an evaluation of regional data/studies within the area of PCI:

- *Stefan James,* Senior Consultant Cardiologist and Associate Professor of Cardiology, Director of Interventional Cardiology, Uppsala, Sweeden

- *Kari Niemelä,* CEO, Medical Director, Professor, Heart Hospital, Tampere University Hospital, Tampere Finland

During the spring of 2014, the panel has examined the regional data/studies, participated in a one-day conference together with representatives from both cardiologists and administrative staff in Central Denmark Region. The purpose of the conference was to enable a dialogue between the panel and regional representatives before the panel made their final evaluation.

At the conference the international expert panel was presented with an introduction to the overall pre-hospital structure in Central Denmark Region, the results of the validation of existing regional data/studies made by the Department of Clinical Epidemiology, results of new analyses made by representatives of cardiologists at Aarhus University Hospital (simulation analyses and updated data on transportation time and system delay) as well as contributions from representatives from both Aarhus University Hospital and Regional Hospital West Jutland. The programme of the conference including list of participants is included as an appendix.

5. Results

In the following the results of both preparatory studies, the review of the expert panel as well as the panel's evaluation of the complete material are presented.

5.1 Results of the preparatory work (phase 1)

As mentioned above, a number of preliminary investigations were made prior to inclusion of the international expert panel. The results of these investigations are briefly presented below.

5.1.1 Audit of regional study on transportation time in Central Denmark Region

A major source of disagreement among professionals has been the data quality of a specific study from Regional Hospital West Jutland published in Danish Medical Bulletin. It has been decisive for the further process to agree whether this study should be part of the material on which the expert panel should make an overall evaluation of the PCI area. Thus, an audit was made of this study in the autumn of 2013.

The result of the audit was that there was a misclassification of a number of the included patients in this particular study. Part of the misclassification can be explained by the previous organisation of the pre-hospital services where ambulances often took PCI patients to the local hospital to pick up a doctor before the ambulance continued to the PCI centre at Aarhus University Hospital. In a number of cases this was not registered correctly and it appeared as if

the patients were transported directly to the PCI centre in Aarhus although they had been taken to a local hospital first.

The published article with results of this study has been withdrawn after this misclassification was demonstrated.

5.1.2 Validation and recalculation of regional data and results on transportation time and system delay

Representatives from Regional Hospital West Jutland have stated that the prolonged transportation time for PCI patients in the western part of Central Denmark Region is a major problem. Representatives from Aarhus University Hospital have stated that although transportation time is longer, the delay after arrival to hospital is shorter and there has been time to prepare the arrival of the patient. Moreover, Aarhus University Hospital has argued that transportation time is only part of the overall system delay from the emergency call to initiation of PCI treatment.

The Department of Clinical Epidemiology has made a validation and recalculation of data and results on transportation time and overall system delay provided by Aarhus University Hospital and has confirmed the validity of these. In the following, the western part of the region has been defined as the on-scene address, from which the patient was transported, belonging to the municipalities of Herning, Ikast-Brande, Holstebro, Lemvig, Ringkøbing-Skjern and Struer.

There is thus documented evidence – based on established scientific methods – of the following main results on transportation time and system delay for patients with STEMI transported directly to the PCI centre:

- The average distance (median) to the PCI centre from 1999 to 2011 was 113 km (quartiles 88-132 km) from the western part of the region and 27 km (quartiles 9-48 km) from the eastern part of the region. In the last three years studied from 2009 to 2011 the average distances were 120 km and 35 km, respectively.
- The average system delay was 130 minutes for patients with STEMI in the western part of the region and 87 minutes for patients in the eastern part. In the last three years studied from 2009 to 2011 the system delay was 130 and 90 minutes, respectively. This means that system delay on average is 40 minutes longer for patients with STEMI in the western part of the region compared with the eastern part.
- The difference in overall system delay of approximately 40 minutes was primarily related to an approximately 45 minutes longer average transportation time for patients with STEMI in the western part of the region compared with the eastern.
- ”In-hospital” delay, the time from a patient with STEMI arriving in hospital (PCI centre) and to of the PCI procedure, is approximately 30 minutes. This ”in-hospital” delay is increased if the transportation distance to the PCI centre is below 25 km.

5.1.3 Validation and recalculation of regional data and results on mortality after PPCI depending on residence

Representatives from Regional Hospital West Jutland have stated that transportation times from the western part of the region are too long according to international guidelines and that the expected prognosis for PPCI patients in the western part of the region is poorer but there is

probably too few deaths to be able to demonstrate a poorer survival with statistical certainty. Subsequently, representatives from Aarhus University Hospital have stated that specific data from the West Denmark Heart Registry from 1999 to 2011 show that STEMI patients in the western part of the region *do not* have an excess mortality rate and that there is a sufficient number of patients in the database to reject an excess mortality rate with statistical certainty.

The Department of Clinical Epidemiology has made a recalculation of the results Aarhus University Hospital representatives refer to and they confirm the validity and that the data material from 1999-2011 would be large enough to demonstrate a substantially increased mortality (e.g. 50% increased mortality) in the western part of the region with statistical certainty, if such an increase existed.

There is thus documented evidence – based on established scientific methods – of the following main results concerning mortality after PPCI:

- 805 STEMI patients from the western part (i.e., from the six municipalities defined in 5.1.2 above) and 3,292 patients from the eastern part of the region underwent PPCI at Aarhus University Hospital (previously Aarhus University Hospital Skejby) between 1999 and 2011.
- Patients were comparable concerning gender and age; patients from the western part had slightly fewer comorbidities (chronic diseases) and slightly fewer in the western part were smokers.
- Far more STEMI patients from the western part were transported to the PCI centre after stopping at a local hospital instead of being transported directly to the PCI centre.
- One year mortality after PPCI *was not* higher for patients in the western part of the region (8.0%) but was in fact lower than the one year mortality of patients in the eastern part of the region (9.9%)
- After adjusting for a number of prognostic factors, mortality among STEMI patients undergoing PPCI was similar in the western and eastern part of the region (adjusted relative risk 0.97%; 95% confidence interval 0.73-1.27).
- In patients transported directly to the PCI centre, the mortality was lower in the western part (relative risk 0.45; 95% confidence interval 0.21-0.98).

5.1.4 Update until 2013 on regional data on transportation time and system delay

Most studies referred to in connection with the discussion about PCI have been conducted before the introduction of the emergency helicopter on 1 June 2011. It has been decisive that the evaluation of the expert panel was based on correct and updated data reflecting the current organisation of pre-hospital services. Therefore, Aarhus University Hospital was asked to update regional analyses that have been presented in the case previously on transportation time and total system delay. Aarhus University Hospital has complied with this. The analyses have subsequently been validated and recalculated by Department of Clinical Epidemiology and they confirm their validity and accuracy.

The figure below illustrates all patients undergoing PPCI due to STEMI at the PCI centre in Aarhus from 1 January 2001 to 30 September 2013 after being transported *by ambulance* (not by helicopter) directly from an address in Central Denmark Region to Aarhus with suspected STEMI. The figure below shows the association between the distance in km from the pick-up place to the PCI centre (x-axis) and the system delay in minutes from the emergency call to

completion of the PPCI treatment (y-axis). Each dot illustrates one patient with STEMI; all have been transported by ambulance. The red curve illustrates an increase in system delay with increase in distance transported in ambulance.

Figure 1: PPCI-STEMI patients transported by ambulance between 1999 and 2013 and transported directly to the PCI centre in Aarhus. Association between transportation distance (x-axis) and system delay in minutes (y-axis)

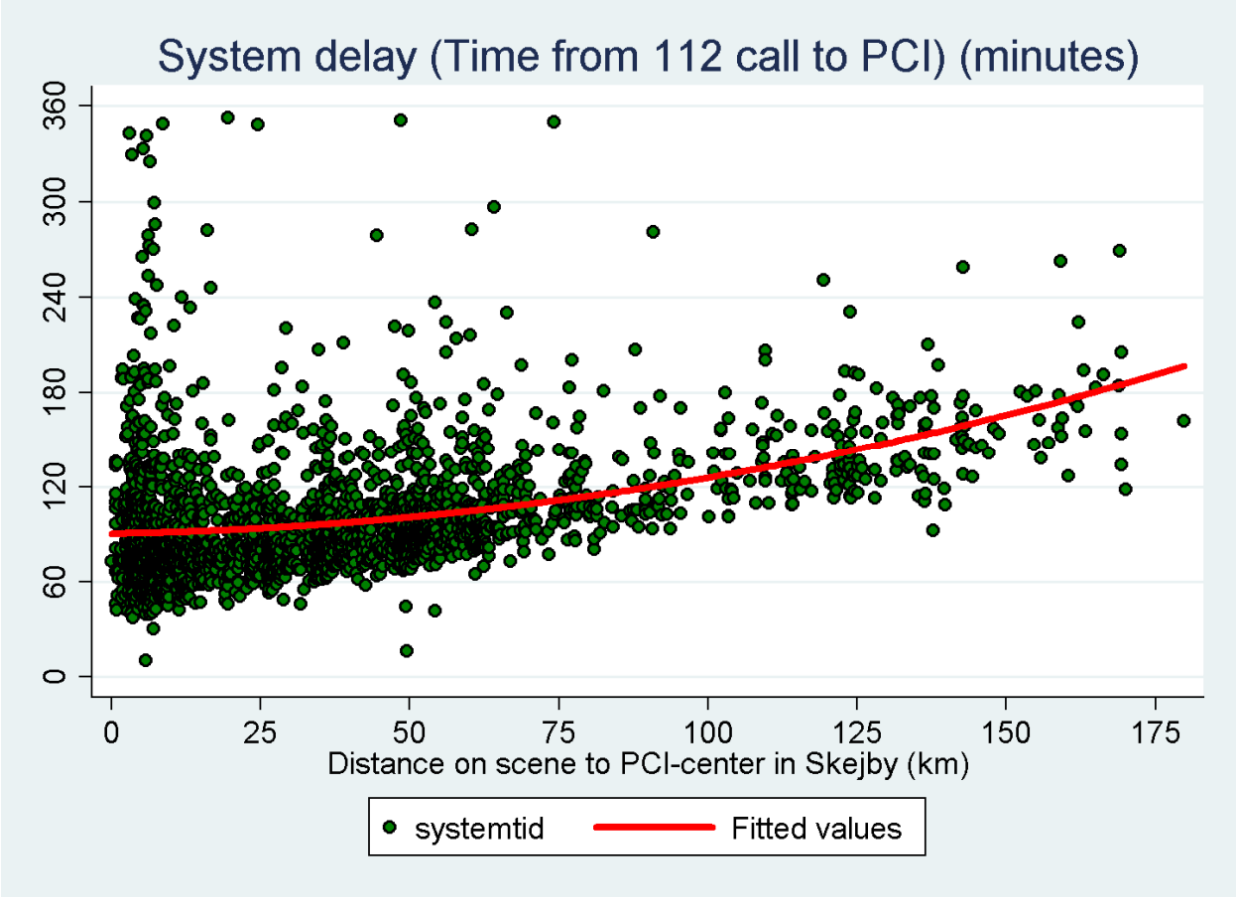


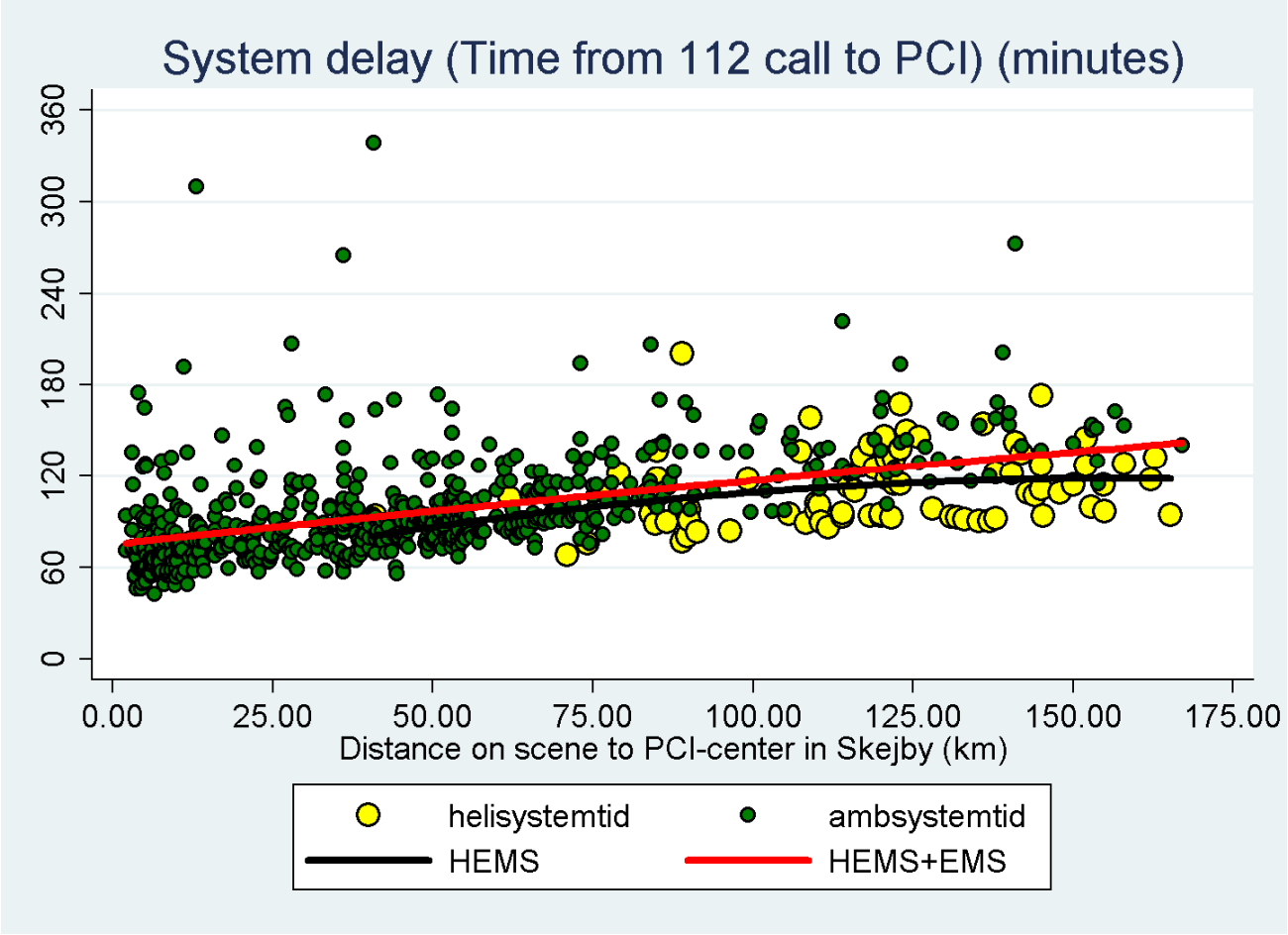
Figure 2 is similarly constructed and applies to the observation period between 2010 and 2013. Figure 2 thus applies to all patients who underwent PPCI due to STEMI at the PCI centre in Aarhus from 1 June 2010 to 30 September 2013 and who were transported either by ambulance (green dots) or helicopter (yellow dots). Transportation by helicopter was introduced in 2011.

The figure illustrates the increasing use of the helicopter (yellow dots) in patients with a longer distance to the PCI centre. The red curve applies to the combination of helicopter and ambulance transportation (all patients transported by helicopter or ambulance) and is no longer as steep as in Figure 1. This means that the increase in system delay has been reduced for patients with long distance to the PCI centre.

The black graph shows the system delay for patients only transported by helicopter. Among this group, system delay has on average been less than 120 minutes, regardless of distance of

transportation. The figure also shows that the benefit in time by helicopter transportation seems to increase at distances exceeding 100 km.

Figure 2: PPCI-STEMI patients transported by ambulance or helicopter between 2010 and 2013 transported directly to the PCI centre in Aarhus. Association between transportation distance (x-axis) and system delay in minutes (y-axis)



5.1.5 Preparation of simulation model on the importance of decentralisation

Aarhus University Hospital was requested to make a simulation model illustrating what the influence of establishing a PCI centre in the western part of the region would be on transportation time and system delay. The main question was, how many minutes of system delay could potentially be saved by a 2-centre compared with a 1-centre PPCI strategy in the region. The two models were: 1) One PCI centre in Aarhus and potential use of helicopter for transportation if patient was 70 km or more away from the PCI centre; and 2) One PCI centre in Aarhus and one in Gødstrup, and potential use of helicopter for transportation if patient was 70 km or more away from a PCI centre.

The simulation model was based on the observed actual transportation distances and system delays with transportation by ambulance (<70 km) and transportation by ambulance or heli-

copter (>=70 km) as illustrated by Figures 1 and 2 above (5.1.4). The principles of the simulation model are illustrated in Figures 3, 4 and 5 below.

Figure 3: Model for the association between total system delay in minutes and distance to PCI-centre in km when combining transportation by ambulance and helicopter from 2011.

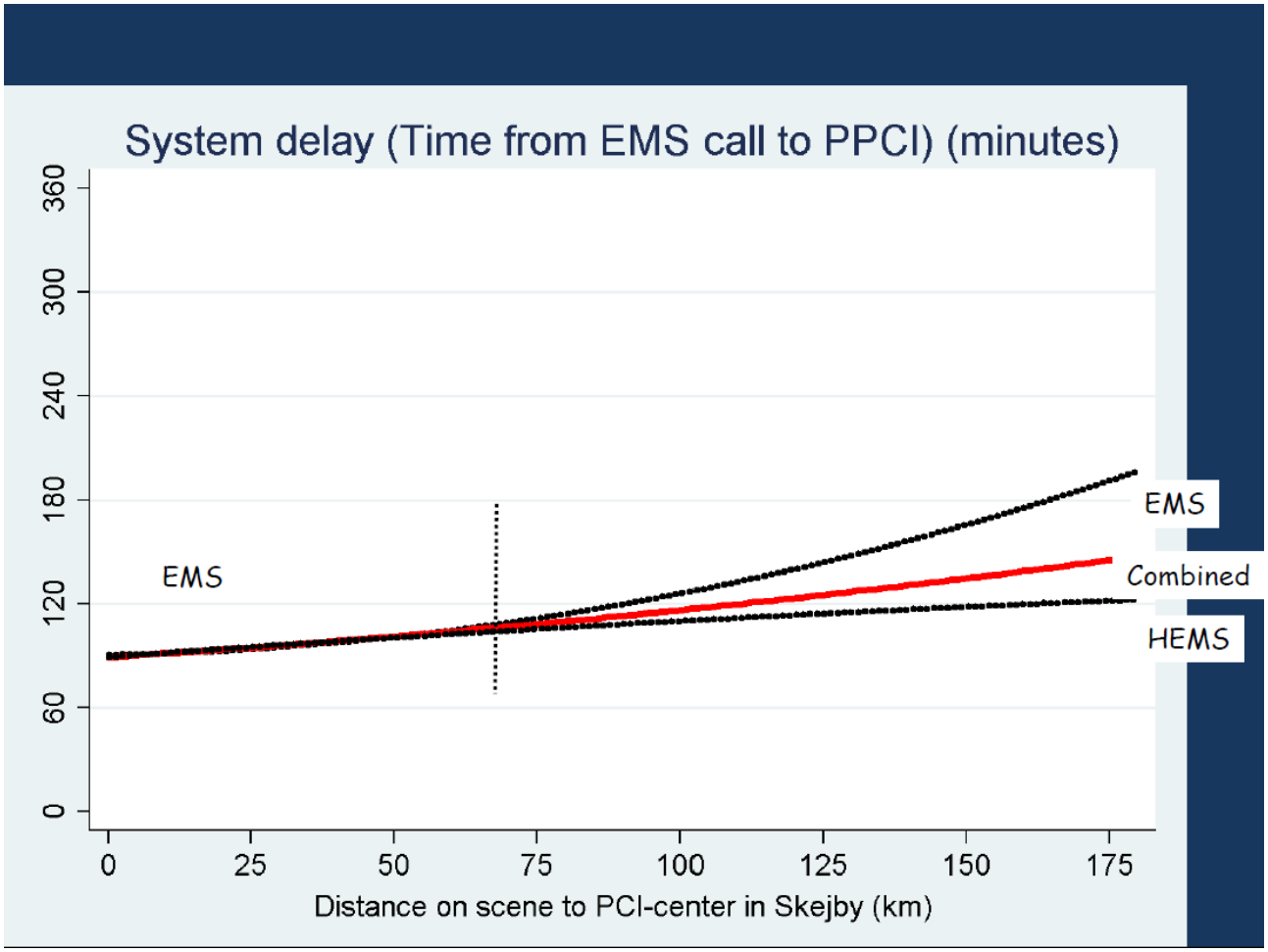


Figure 4: Development of a two-centre simulation model with an additional PCI centre in Gødstrup. The yellow dots represent the actual address locations of patients with STEMI who are transported to PPCI in a given year. As shown, patients from e.g. Lemvig or Viborg would have shorter transportation distance to Gødstrup than to Aarhus.

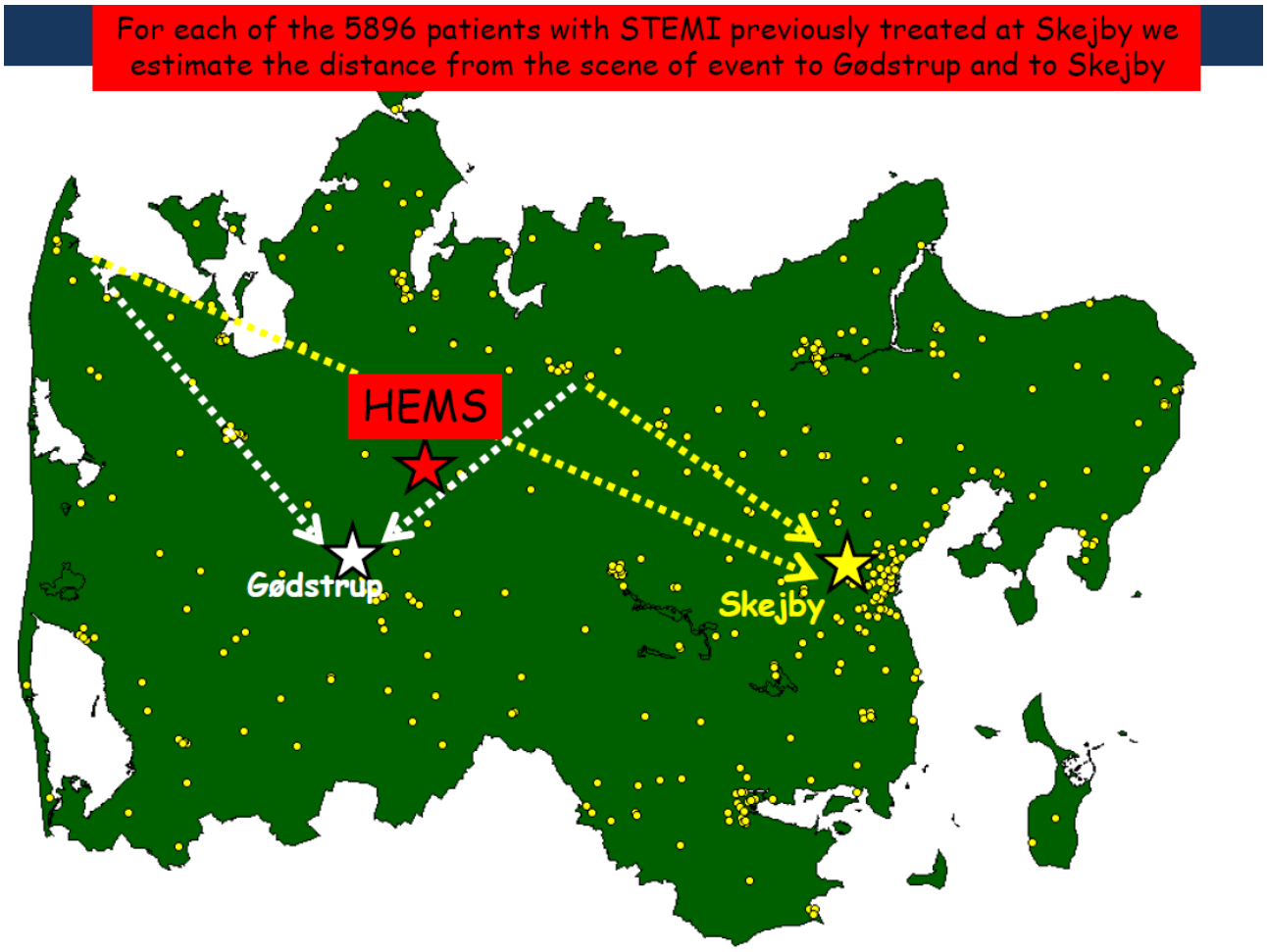
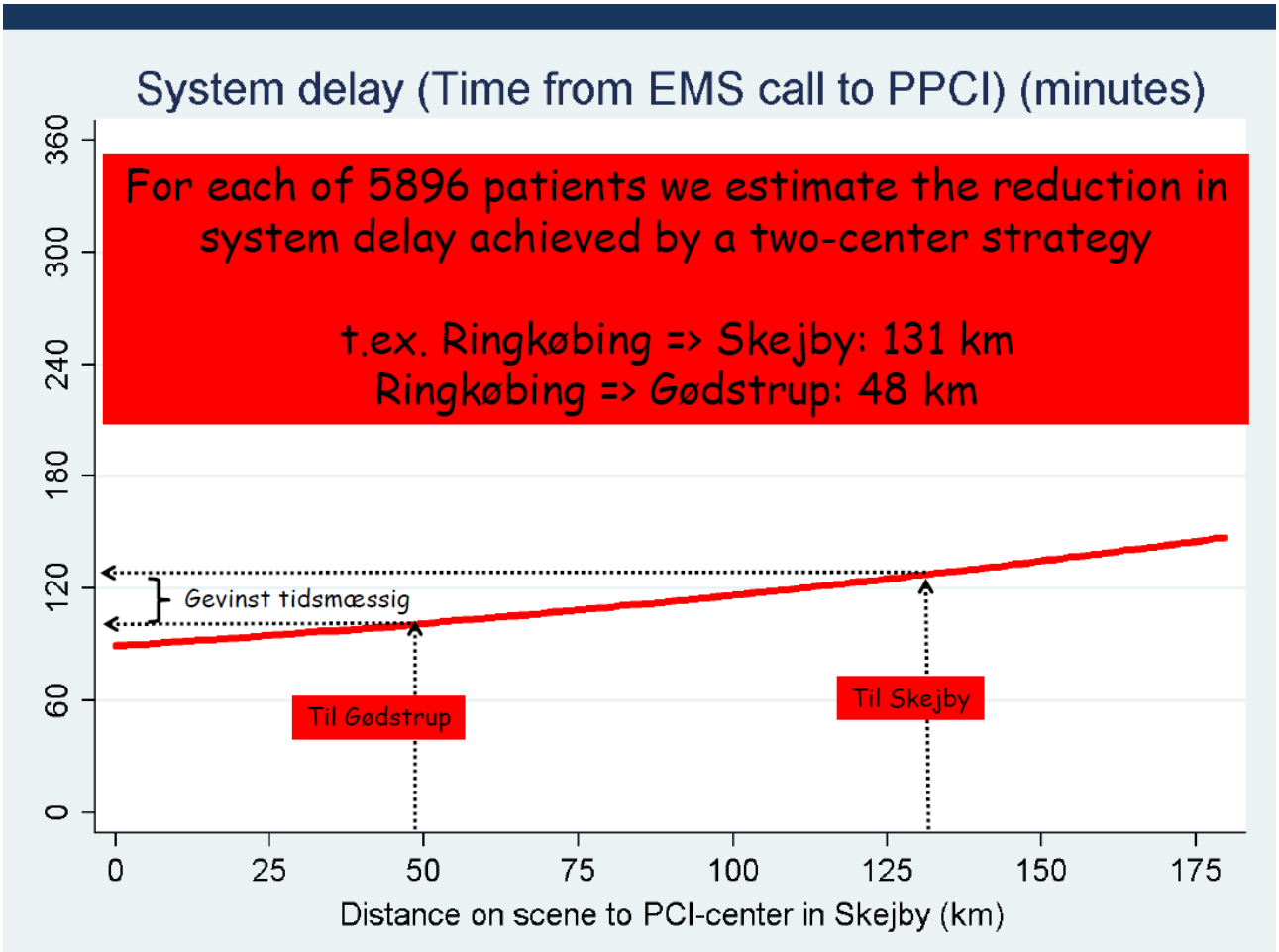


Figure 5: Creation of a simulation model displaying the potential reduction in system delay achieved by a two-centre strategy



Department of Clinical Epidemiology has made a validation and recalculation of data and confirmed the validity of the simulation model[3]. There is documented evidence – based on established scientific methods – of the following main results of the simulation analysis (see Table 1):

- 28% of patients with STEMI undergoing PPCI between 1999 and 2013 (1,676 patients out of 5,896) would have had a shorter distance to a PCI centre in the western part of the region (Gødstrup) than to the PCI centre in Aarhus[4].
- If the emergency helicopter is used in 50%[5] of the cases where patients are more than 70 km away from the PCI centre, establishment of a PCI centre in the western part of the region (Gødstrup) would result in an average reduction in system delay of 18 min-

[3] In connection with an evaluation of the emergency helicopter services in Central Denmark Region and North Denmark Region conducted by the Danish Institute for Health Services Research it has also been documented that there is a significant gain of time by using the helicopter.

[4] Calculations are based on a distribution where all STEMI patients from Viborg are transported to Gødstrup.

[5] Today the emergency helicopter is used in approx. 55% of the situations where a STEMI patient is more than 70 km from the PCI centre.

utes for the 28% of the region's inhabitants who live closer to Gødstrup than to Aarhus[6]; this is in comparison with the current one-centre + helicopter strategy.

- This 18-minute reduction would save an expected 0.3 lives per 100 patients undergoing PPCI per year[7].

Table 1. Main results of the simulation analysis.

	Number of STEMI-PPCI patients 1999-2013	One centre (Aarhus) + helicopter: estimated median system delay	Two centres (Aarhus, Gødstrup) + helicopter: estimated median system delay
Patients living closer to Aarhus than to Gødstrup	4,220 (72%)	97 minutes	97 minutes
Patients living closer to Gødstrup than to Aarhus	1,676 (28%)	117 minutes	99 minutes
Difference in median system delay		20 minutes	2 minutes

5.2 Results of the expert panel

Prior to the one-day conference the expert panel studied a background material on results of a number of regional data/studies on PPCI in Central Denmark Region. As a supplement to this, the panel has been presented with updated results on transportation time and system delay (updated data for the period 2011 to 2013 reflecting the situation after changes in the pre-hospital services in Central Denmark Region) as well as results of the simulation analysis.

The overall remark by the panel was that Denmark has generally obtained very good results in the field of cardiology in recent years and that Denmark is mentioned as one of the countries achieving the largest decrease in cardiac mortality. The decrease in cardiac mortality is ascribed to improved treatment methods, particularly in the acute phase[8].

Below is a summary of conclusions from the expert panel discussions of specific questions, constituting the framework for the evaluation of the expert panel.

5.2.1 Difference in transportation time and system delay?

[6] These calculations have not taken into account that there currently is no helipad immediately at the PCI centre and that small PCI centres must be expected to have longer "in-hospital" delays because there can be waiting time to enter the catherisation facility as this can be occupied by ongoing elective procedures.

[7] These calculations have not taken into account other factors which could influence survival after STEMI (e.g. the importance of the presence of high volume operators, cardiac surgery back-up etc.).

[8] OECD (2013), Health at a Glance 2013: OECD Indicators, OECD Publishing.

The expert panel acknowledged the validity of the results from Aarhus University Hospital showing there is a difference in transportation time for patients in the eastern and western part of the region, respectively. The results also document that following the changes in the organisation of pre-hospital services in Central Denmark Region there has been an increase in the number of acute PCI patients transported directly to the PCI centre at Aarhus University Hospital.

The expert panel also acknowledged the validity of the results of the simulation analysis showing that 28% of the patients with STEMI undergoing PPCI between 1999 and 2013 would have had a shorter distance to a PCI centre in Gødstrup than to the PCI centre in Aarhus. The expert panel acknowledged that a PCI centre in the western part of the region would reduce transportation time for a specifically defined group of patients where the acute event would take place in or close to Gødstrup. At the same time the expert panel acknowledged that the presence of an emergency helicopter means that a number of patients in the western part of the region do not have a prolonged transportation time by helicopter compared with being transported by ambulance to Gødstrup.

However, both experts remarked that there is no practice similar to the Danish for using transportation by helicopter of PCI patients in Finland and Sweden. It should be noted that PPCI patients is a specific target group in the Danish emergency helicopter services and that the decision to establish a national helicopter service in Denmark also was made on the basis of results of an evaluation of a project with emergency helicopters in Central Denmark Region and North Denmark Region where pre-hospital service with an emergency helicopter was compared with pre-hospital service without an emergency helicopter. Among the results of the project it was shown that the time from the emergency call to specialist treatment and the time from emergency call to arrival at a highly specialised centre was significantly reduced in the study period (reduction of 30 minutes (emergency call to specialist treatment) and 23 minutes (emergency call to highly specialised treatment) for patients with STEMI in Central Denmark Region)[9].

Regarding the current "in-hospital" delay, the panel questioned whether it would be possible to optimise and reduce the delay, which is currently on average 30 min.

The expert panel briefly related to the discussion among cardiologists in Central Denmark Region on the interpretation of the European guidelines for PCI treatment. It was established that the disagreement concerning use of the European guidelines was caused by a different definition of First Medical Contact (FMC) in the European guidelines compared to the general definition in Denmark. In the European guidelines FMC is understood as the time of making the first ECG; in Denmark, FMC is defined as the time of emergency call. In this connection, it should be noted that there is a large amount of calls for chest pain, which are not due to myocardial infarction. It was concluded that both definitions were correct in the context they are used. However, the panel remarked that it is challenging to have a different definition in Denmark compared to the standard European definition. Due to the different use it does not make sense to transfer recommendations on time in the European guidelines to a Danish context.

[9] Emergency helicopter in Jutland; evaluation of a project with emergency helicopter as part of the pre-hospital service in Central Denmark Region and North Denmark Region. The Danish Committee for Health Education, April 2012 (Akutlægehelikopter i Jylland. Evaluering af forsøg med akutlægehelikopter i Region Midtjylland og Region Nordjylland. Dansk Sundhedsinstitut. April 2012).

The panel thus agreed that if the current discussion of PCI treatment in Central Denmark Region includes references to the European recommendations on time, it is important to make sure measurements are based on the same.

5.2.2 Difference in mortality?

The expert panel agreed that time is an important factor for survival of patients with STEMI. On the basis of the regional analyses it has, however, not been possible to demonstrate differences in mortality among patients undergoing primary PCI from the western and eastern part of the region. Similarly, it has not been possible to demonstrate that confounders, e.g. the differences in basic prognostic factors between patients from the western and eastern part of the region, respectively, can explain the results of similar mortality rates. It could be a selection mechanism that cannot be elucidated by the available data, that STEMI patients in the western part of the region on average contact the healthcare system later in the course of their disease compared with the patients in the eastern part. It is possible (but cannot be demonstrated by the available data) that STEMI patients in the western part – especially during the study period – have been selected (singled out) for transportation i.e. some patients with severe acute illness from the western part of the region have not been transported by road. This could explain that patients from the western part transported directly to the PCI centre appeared to have a lower mortality compared with patients from the eastern part. The expert panel therefore noted that further analyses could be beneficial to uncover potential confounders related to differences in general health behaviour and condition (e.g. alcohol consumption, mental disease, use of drugs and pattern in use of healthcare services) between inhabitants in the western and eastern part of the region. There is, however, nothing in the current data indicating that patients transported directly to the PCI centre from the western part of the region have a *higher* mortality than similar patients in the eastern part.

5.2.3 Treatment benefits by establishing an extra PCI centre?

The expert panel remarked that Denmark in relation to countries we normally compare with does not have the same geographical challenges and that the difference between having one or two PCI centres in Central Denmark Region would not have a considerable treatment benefit seen in an international perspective. Based on experiences from the experts' home countries (Finland and Sweden), it would, in principal, not be a problem to establish an extra PCI centre in the region, if this is possible and appropriate considering aspects of economy, recruitment and management of other services. However, it has been noted by the Finnish expert that in his view Finland is an illustrative example of what happens, when small hospitals have started interventional cardiology programs with the aim of improving quality in cardiac care in that particular hospital. However, without central guidance the overall outcome has proved to be the quite opposite of what was intended.

According to the expert panel, the establishment of another PCI centre in the region would be beneficial for the particular hospital for many reasons (e.g. more complete course of treatment, less transportation, facilitating recruitment of skilled doctors). On the other hand, it may have negative consequences in the form of e.g. lower volumes at the university hospital affecting the impact of research and education etc. Thus, the panel stated that consequences for education and research should be included in the evaluation. It was a clear perception of the expert panel that the issue should not and cannot be separated from the general discussion on

health and prioritisation in the Danish healthcare system on how we in Denmark wish to develop our healthcare system and if the resources invested in establishing an extra PCI centre could be better spent in other areas of the healthcare system.

6. Recommendations

On the basis of reviewing regional data/studies including the updated data presented at the conference, the expert panel has made the following recommendations to Central Denmark Region:

- The most appropriate organisation of PCI treatment should be discussed at national level and a decision on the future organisation of this area should not only be based on consideration for the PCI patients but be based on an overall consideration of health economy and prioritisation in the Danish healthcare system.

- The top priority for the field of cardiology in Central Denmark Region in the future should be to re-establish a well-functioning collaboration between the cardiology environments to ensure that the daily collaboration between professionals will run smoothly to the benefit of the patients. The effort to achieve this should not be overshadowed by disagreements related to the issue of PCI.

- In the immediate future, Central Denmark Region should focus on ensuring viable cardiology services at all five acute hospitals, including sufficient recruitment and education at the acute hospitals outside the university hospital.

Program – PCI meeting 21st of March, 2014

1. General introduction, incl. presentation of the prehospital setup in the Central Denmark Region, by Christian Boel

2. Presentation of results from Department of Clinical Epidemiology
    a. Validation of regional data on transportation delay and mortality in the Central Denmark Region (up to 2011), by Reimar W. Thomsen
    b. Basic explanatory models, by Henrik Toft Sørensen
    c. Summing up

3. Presentation of simulation models as well as updated regional data on transportation delay and mortality, including data on the effect of recent prehospital changes/upgrading with helicopter emergency medical service operations, by Christian Juhl Terkelsen
    a. Summing up

4. Presentations by representatives from the cardiological communities at Regional Hospital West Jutland and Aarhus University Hospital, respectively
    a. Regional Hospital West Jutland, by Leif Thuesen
    b. Aarhus University Hospital, by Christian Juhl Terkelsen
    c. Summing up

5. Plenum dicussion

6. Closing discussion in panel (without representatives from Aarhus University Hospital and Regional Hospital West Jutland)

Participants:

- *Stefan James*, Senior Consultant Cardiologist and Asscociate Professor of Cardiology, Director of Interventional Cardiology, Uppsala Clinical Research, UCR, Department of Cardiology, Uppsala University and University Hospital, Sweden
- *Kari Niemelä*, CEO, Medical Director, Professor H.C., Center of Cardiology, Tampere Docent, Finland
- *Hans Erik Bøtker*, Professor, Department Chair, MD, DMSci, Department of Cardiology, Aarhus University Hospital
- *Christian Juhl Terkelsen*, Associate professor, MD, DmSc, PhD, Department of Cardiology, Aarhus University Hospital
- *Claus Thomsen*, Chief Medical Officer, Aarhus University Hospital
- *Steen Husted*, Director of Medical Department, Associate Professor, DSc, Medical Department, Cardiological Devision, Regional Hospital West Jutland
- *Leif Thuesen*, Senior Consultant Cardiologist, MD, DSc, Medical Department, Cardiological Devision, Regional Hospital West Jutland
- *Jens Friis Bak*, Chief Medical Officer, Regional Hospital West Jutland
- *Henrik Toft Sørensen*, Professor, Chair, PhD, DMSc, Department of Clinical Epidemiology, Aarhus University Hospital
- *Reimar W. Thomsen*, Consultant, Clinical Associate Professor, MD PhD, Department of Clincial Epidemiology, Aarhus University Hospital
- *Hans Peder Graversen*, Chief Medical Officer, Chief of Department of Quality and Informatics
- *Christian Boel*, Deputy Director, Health Planning
- *Katrine Svane Jørgensen*, Head of Section, Health Planning