Clinical Epidemiology

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ORIGINAL RESEARCH

Evaluation of algorithms for registry-based detection of acute myocardial infarction following percutaneous coronary intervention

This article was published in the following Dove Press journal:
Clinical Epidemiology
19 October 2016
Number of times this article has been viewed

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Background: Registry-based monitoring of the safety and efficacy of interventions in patients with ischemic heart disease requires validated algorithms.

Objective: We aimed to evaluate algorithms to identify acute myocardial infarction (AMI) in the Danish National Patient Registry following percutaneous coronary intervention (PCI).

Methods: Patients enrolled in clinical drug-eluting stent studies at the Department of Cardiology, Aarhus University Hospital, Denmark, from January 2006 to August 2012 were included. These patients were evaluated for ischemic events, including AMI, during follow-up using an end point committee adjudication of AMI as reference standard.

Results: Of 5,719 included patients, 285 patients suffered AMI within a mean follow-up time of 3 years after stent implantation. An AMI discharge diagnosis (primary or secondary) from any acute or elective admission had a sensitivity of 95%, a specificity of 93%, and a positive predictive value of 42%. Restriction to acute admissions decreased the sensitivity to 94% but increased the specificity to 98% and the positive predictive value to 73%. Further restriction to include only AMI as primary diagnosis from acute admissions decreased the sensitivity further to 82%, but increased the specificity to 99% and the positive predictive value to 81%. Restriction to patients admitted to hospitals with a coronary angiography catheterization laboratory increased the positive predictive value to 87%.

Conclusion: Algorithms utilizing additional information from the Danish National Patient Registry yield different sensitivities, specificities, and predictive values in registry-based detection of AMI following PCI. We were able to identify AMI following PCI with moderate-to-high validity. However, the choice of algorithm will depend on the specific study purpose.

Keywords: Danish National Patient Registry, registry, percutaneous coronary intervention, validity, sensitivity, specificity

Introduction

First-time ischemic events such as acute myocardial infarction (AMI) are used to study the risk and to improve the prognosis of ischemic heart disease. AMI is often treated with percutaneous coronary intervention (PCI). To monitor the safety and efficacy of this intervention, robust registry-based algorithms are required for the detection of AMI in this population.[1]

In Denmark, record linkage using the ten-digit civil registration number offers unique possibilities for epidemiological studies.[2] As the key registry, the Danish National Patient Registry contains data on all Danish hospital admissions and outpatient clinic visits, starting in 1997.[3] Thereby, the Danish National Patient Registry can be utilized for the detection of AMI in the Danish population. However, to what

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extent the Danish National Patient Registry can be used to identify AMI in patients with existing ischemic heart disease undergoing PCI is unknown.[3] In this study, we aimed to create an algorithm for using the Danish National Patient Registry to identify patients with AMI following PCI.

Methods

Study design, setting, and participants

We performed the evaluation in a population of patients treated with drug-eluting coronary stents as a part of clinical drug-eluting coronary stent studies. These patients were enrolled in the Central Region of Denmark, which covers a population of ~1.3 million inhabitants corresponding to 23% of the Danish population. The patients were treated with PCI at the Department of Cardiology, Aarhus University Hospital, Denmark, from January 2006 to August 2012.[4–7] Using this cohort with end-point committee adjudication of AMI as reference standard, we compared different algorithms for the detection of AMI in the Danish National Patient Registry following PCI.

Definition of AMI

Clinical end-point committee adjudication of AMI was performed in each trial as previously described.[4–7] Briefly, possible AMI events were screened using the Danish National Patient Registry[3] and the Western Denmark Heart Registry.[8] Possible events were subsequently reviewed by a clinical end-point committee, with reference to the contemporary universal definitions of AMI.[9] The end-point committee also reviewed all deaths in order to classify these as cardiac or noncardiac. In case of cardiac death, the end-point committee evaluated whether it was secondary to AMI.

The Danish National Patient Registry

The Danish National Patient Registry contains information on all nonpsychiatric hospital admissions since 1977 and emergency room and outpatient clinic visits since 1995.[3] The registry contains data from each admission including the admission and discharge dates, admission type, discharge diagnoses, and procedures performed during the admission.[3] The International Classification of Diseases tenth revision (ICD-10) codes have been used since 1994. All admissions have one primary discharge diagnosis reflecting the primary reason for the admission. Additionally, admissions may have one or more secondary discharge diagnoses reflecting coexisting conditions. Discharge diagnoses are determined exclusively by the discharging physician.

The Danish national health care service is tax supported and provides free health care. Mandatory reporting to the Danish National Patient Registry, which is managed by the Danish Health Authority, ensures nationwide coverage of AMI hospitalisations.[3]

Algorithms for detection of AMI in the Danish National Patient Registry

To establish an algorithm for the detection of AMI in the Danish National Patient Registry, we identified AMI from discharge diagnoses using the ICD-10 code I21. Diagnoses were identified as primary (only) and primary or secondary discharge diagnoses. Furthermore, algorithms were based on patient contact type (inpatient admission), admission type (acute or elective), and hospital type (with or without coronary angiography capability). Table 1 shows the details of the different algorithms.

Statistical analyses

Follow-up of the trial participants started upon discharge after drug-eluting stent implantation.[4–7] Patients were followed until a first AMI was detected in the Danish National Patient Registry, by the end-point committee, or in both simultaneously.

For each algorithm for identifying AMI following PCI in the Danish National Patient Registry, we calculated sensitivity, specificity, and predictive values using the end-point committee adjudicated cases of AMI as reference. We stratified the results according to AMI status at the time of PCI (AMI before PCI, AMI at same date of PCI, or PCI without prior AMI) to determine whether recurrent AMI could be detected equally well as first-time AMI. We also stratified according to sex, age (≤65 years vs >65 years), indication for PCI (acute coronary syndrome vs stable angina pectoris), and time from index procedure to AMI. Confidence intervals were calculated with Jeffrey's method.[10]

Table 1 Algorithms for detection of acute myocardial infarction following percutaneous coronary intervention in the Danish National Patient Registry

Algorithm	AMI diagnosis	Admission type	Hospital
A	Primary or secondary	All inpatients	All hospitals
B	Primary only	All inpatients	All hospitals
C	Primary or secondary	Acute admissions only	All hospitals
D	Primary only	Acute admissions only	All hospitals
E	Primary or secondary	Acute admissions only	Hospitals with CAG capability
F	Primary only	Acute admissions only	Hospitals with CAG capability

Abbreviations: AMI, acute myocardial infarction; CAG, coronary angiography.

All statistical analyses were performed using SAS software Version 9.4 (SAS Institute Inc., Cary, NC, USA). The study was approved by the Danish Data Protection Agency (Ref no 2012-41-0164) and the Danish Health Authority (Ref no 6-8011-270/2). Registry studies do not require ethical committee approval or patients consent in Denmark.

Results

We evaluated 5,719 patients with a mean follow-up time of 3 years. Of these, 285 had an end-point committee adjudicated AMI. Baseline characteristics of the PCI cohort are presented in Table 2.

Table 2 Baseline characteristics of patients with percutaneous coronary intervention

	N=5,719
Demographics and comorbidities	
Age, years, median (IQR)	66 (58–73)
Male sex	4,271 (74.7)
Body mass index >30 kg/m^2	1,308 (22.9)
Active smoking[a]	1,819 (31.8)
Treatment for hypertension[a]	3,046 (53.3)
Treatment for hypercholesterolemia[a]	3,625 (63.4)
Diabetes[a]	905 (15.8)
Charlson comorbidity index =0	2,679 (46.8)
Charlson comorbidity index =1	1,448 (25.3)
Charlson comorbidity index ≥2	1,592 (27.8)
Procedure characteristics	
More than one stent	2,212 (38.7)
Stent length ≥20 mm	3,025 (52.9)
PCI indication ACS	2,650 (46.3)
PCI indication SAP	2,878 (50.3)
Calendar year of percutaneous coronary intervention	
2006	718 (12.6)
2007	643 (11.2)
2008	643 (11.2)
2009	1,050 (18.4)
2010	1,005 (17.6)
2011	942 (16.5)
2012	718 (12.6)

Notes: Data presented as number (%) unless otherwise stated. [a]Missing information was <3%, missing values on smoking, diabetes and treatment were considered "not smoking", "not having diabetes", and "not treated", respectively.
Abbreviations: IQR, interquartile range; PCI, percutaneous coronary intervention; ACS, acute coronary syndrome; SAP, stable angina pectoris.

The results from different algorithms are reported in Table 3 and Figure 1. Since patients with a detected AMI, either by the algorithm or by the end-point committee, were censored from the time of AMI detection, the number of patients with AMI and the average follow-up period vary between algorithm evaluations. Two-way tables for each algorithm evaluation are provided in Tables S1–S6.

The algorithms with the best performance were the combination of AMI as primary (algorithm D) or primary or secondary (C) discharge diagnosis combined with acute admission. A broader algorithm (A) combining AMI as primary or secondary discharge diagnosis and all inpatients, instead of acute admissions, improved the sensitivity (95%), but decreased the positive predictive value considerably (42%). Restricting the algorithm to admissions at a hospital with coronary angiography capability increased the positive predictive value. However, these narrower algorithms all had a decreased sensitivity (Table 3, Figure 1).

Evaluation of a broad algorithm of AMI diagnosis (code I21) as either primary or secondary diagnosis and inpatient (algorithm A, Table 3) showed that 13 patients with a validated AMI were not detected (Table S1). These AMIs resulted in cardiac arrest (n=6) and were recorded as such with the corresponding ICD-10 code in the Danish National Patient Registry. For the remaining patients, the discharge diagnosis codes covered various ICD-10 codes for ischemic heart disease, examination for angina, and examination for acute coronary syndrome.

Evaluation of a narrow algorithm of AMI diagnosis (code I21) as both primary or secondary diagnosis and acute admission (algorithm C, Table 2) showed that 95 patients were recorded with AMI diagnoses in the Danish National Patient Registry without having an end-point committee adjudicated AMI (Table S3). The majority of these were patients admitted for examination for angina or examination for acute coronary syndrome.

Table 3 Performance of algorithms for detection of acute myocardial infarction following percutaneous coronary intervention in the Danish National Patient Registry

Algorithm	Sensitivity, % (95% CI)	Specificity, % (95% CI)	Negative predictive value, % (95% CI)	Positive predictive value, % (95% CI)
A	95.2 (92.2–97.3)	93.4 (92.7–94.0)	99.7 (99.6–99.9)	41.7 (37.9–45.7)
B	85.0 (80.5–88.8)	98.2 (97.8–98.5)	99.2 (99.0–99.4)	70.4 (65.4–75.1)
C	93.9 (90.6–96.3)	98.3 (97.9–98.6)	99.7 (99.5–99.8)	73.4 (68.6–77.8)
D	82.1 (77.3–86.3)	99.0 (98.7–99.2)	99.1 (98.8–99.3)	81.0 (76.1–85.2)
E	67.7 (62.1–73.0)	99.0 (98.7–99.2)	98.3 (98.0–98.7)	78.0 (72.5–82.8)
F	58.0 (52.1–63.6)	99.5 (99.3–99.7)	97.8 (97.4–98.2)	86.8 (81.4–91.0)

Note: A, diagnosis type: primary or secondary, all inpatients; B, diagnosis type: primary, all inpatients; C, diagnosis type: primary or secondary and acute admission; D, diagnosis type: primary and acute admission; E, diagnosis type: primary or secondary and acute admission at a hospital with coronary angiography capability; and F, diagnosis type: primary and acute admission at a hospital with coronary angiography capability.
Abbreviation: CI, confidence interval.

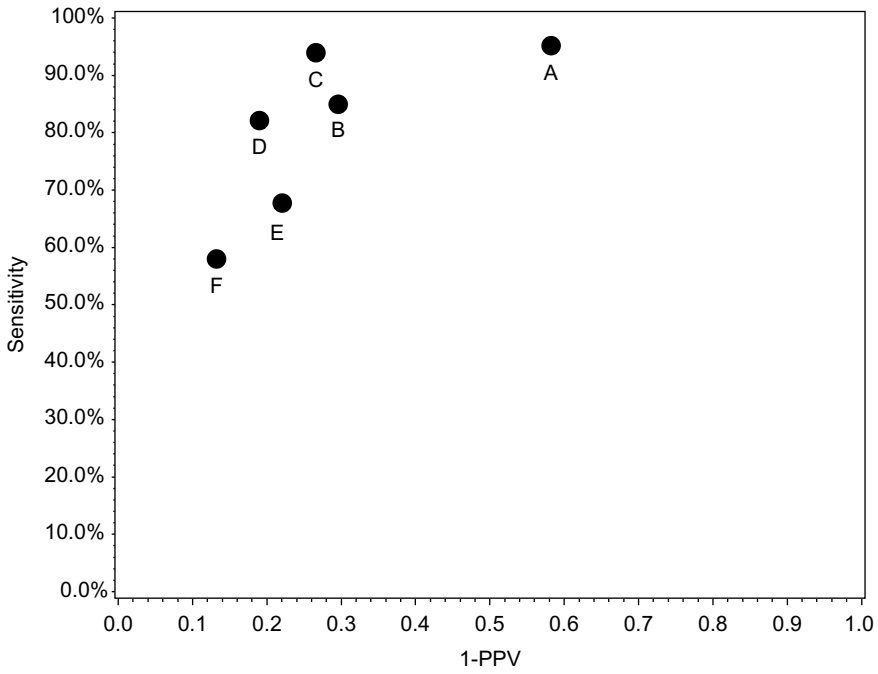

Figure 1 Sensitivity vs 1-positive predictive value for algorithms A–F.
Notes: A, diagnosis type: primary or secondary, all inpatients; B, diagnosis type: primary, all inpatients; C, diagnosis type: primary or secondary and acute admission; D, diagnosis type: primary and acute admission; E, diagnosis type: primary or secondary and acute admission at a hospital with coronary angiography capability; and F, diagnosis type: primary and acute admission at a hospital with coronary angiography capability.
Abbreviation: PPV, positive predictive value.

The stratified analyses of algorithm C are reported in Table 4, with corresponding two-way tables provided in Tables S7–S23. Sex and age had no major impact on the parameters. Among patients with acute coronary syndrome, positive predictive value was lower than among patients with stable angina pectoris. Time from index procedure to AMI seemed to influence positive predictive values, which were lowest within the first 30 days after discharge following PCI and improved thereafter.

Discussion

We found that different algorithms yielded different sensitivities, specificities, and predictive values to detect AMI in the Danish National Patient Registry. The choice of algorithm will depend on the specific study purpose. However, combining the discharge diagnosis of AMI (I21) and acute admission yielded a better positive predictive value for patients with prior PCI than use of a discharge diagnosis of AMI alone.

Apart from the diagnosis AMI, our algorithms relied on the variable "acute admission", which has been shown to have a high validity in the Danish National Patient Registry.[11] Previously, the validity of AMI diagnoses in the general population, as registered in the Danish National Patient Registry, has been validated using medical records,[12,13] discharge summaries,[14,15] or a clinical registry.[16] We recorded a lower positive predictive value of first-time AMI in the Danish National Patient Registry than in these earlier studies.[12–14] This was expected as our study population consisted of patients with established ischemic heart disease undergoing PCI. These patients are therefore more likely to be given a later discharge diagnosis of AMI, ie, to be misclassified due to their prior medical history. Similar misclassification has also been previously shown for other conditions, eg, venous thromboembolism.[16] In agreement with this interpretation, we found a lower positive predictive value of the algorithm among patients with AMI during the index admission or with acute coronary syndrome as indication for stent implantation and within the first 30 days after stent implantation as compared to later.

The choice of algorithm will depend on the specific study purpose. For example, in registry-based randomized clinical trials with end-point adjudication by an end-point committee, it is important to detect as many of the potential events as possible. In this case, a broad algorithm, like algorithm A, seems the optimal choice. The low positive predictive value for this algorithm will be corrected by the end-point committee. In traditional randomized cohort studies relying on registry-based end points, ie, without adjudication by an end-point committee, algorithms C and D are preferable due

Table 4 Performance of algorithm C (all acute admissions with acute myocardial infarction as primary or secondary discharge diagnosis) across subgroups

	Sensitivity, % (95% CI)	Specificity, % (95% CI)	Negative predictive value, % (95% CI)	Positive predictive value, % (95% CI)
Sex				
Female	91.7 (83.6–96.4)	98.0 (97.2–98.7)	99.6 (99.1–99.8)	71.0 (61.2–79.4)
Male	94.7 (91.0–97.1)	98.3 (97.9–98.7)	99.7 (99.5–99.9)	74.2 (68.7–79.2)
Age				
≤65 years	95.7 (90.8–98.3)	98.3 (97.7–98.7)	99.8 (99.6–99.9)	70.7 (63.3–77.4)
>65 years	92.6 (87.9–95.9)	98.2 (97.7–98.7)	99.6 (99.3–99.8)	75.5 (69.2–81.1)
Indication for stent implantation				
Acute coronary syndrome	93.0 (87.9–96.3)	97.5 (96.9–98.1)	99.6 (99.3–99.8)	68.0 (61.2–74.3)
Stable angina pectoris	94.9 (90.2–97.7)	98.9 (98.4–99.2)	99.8 (99.5–99.9)	79.8 (73.1–85.4)
Prior myocardial infarction				
Myocardial infarction prior to index admission	96.1 (90.9–98.7)	97.8 (96.8–98.5)	99.7 (99.2–99.9)	78.4 (70.6–84.9)
Myocardial infarction at index admission	92.4 (85.0–96.8)	97.3 (96.4–98.0)	99.6 (99.2–99.8)	62.9 (53.9–71.3)
No prior myocardial infarction	92.9 (86.5–96.7)	99.1 (98.6–99.4)	99.7 (99.5–99.9)	78.4 (70.3–85.2)
Time from stent implantation to detection of acute myocardial infarction				
0–30 days	89.7 (74.9–97.0)	99.5 (99.3–99.7)	99.9 (99.9–100)	50.0 (36.7–63.3)
>30–1 year	94.2 (87.7–97.7)	99.3 (99.1–99.5)	99.9 (99.8–100)	67.5 (58.8–75.4)
<1 years	94.8 (89.6–97.8)	98.8 (98.5–99.1)	99.9 (99.8–100)	63.0 (55.6–69.9)
1–<2 years	98.1 (91.7–99.8)	99.5 (99.2–99.7)	99.9 (99.8–100)	72.6 (61.6–81.8)
2–<3 years	89.8 (80.2–95.6)	99.8 (99.6–99.9)	99.8 (99.7–99.9)	88.3 (78.5–94.6)
3–<4 years	94.1 (82.4–98.8)	99.8 (99.6–99.9)	99.9 (99.7–100)	88.9 (75.7–96.1)
4–<5 years	88.2 (67.3–97.5)	100 (99.8–100)	99.9 (99.7–100)	100 (78.2–100)
>30 days to 5 years	93.6 (90.1–96.1)	98.7 (98.4–99.0)	99.7 (99.5–99.8)	77.2 (72.3–81.7)

Abbreviation: CI, confidence interval

to the combination of high sensitivity (although lower than algorithm A) and higher positive predictive values. Finally, in case–control studies, a high positive predictive value is preferred to correctly detect cases.

A small number of patients with adjudicated AMI did not have this diagnosis in the Danish National Patient Registry. One half of these patients died from cardiac arrest and were diagnosed with AMI by the end-point committee when the cause of death was reviewed. The other half had various ischemia-related diagnoses and were diagnosed by end-point committee review of all angiographies and coronary interventions during the study period. A composite end point of registry-based AMI and all-cause death, often used in registry-based studies, would thus include half of the missed AMIs, ie, only very few true events would be overlooked by a use of combined end point and thereby improve sensitivity.

Strengths and limitations

We were able to evaluate the described algorithms using a large study population with end-point committee-validated AMIs. In comparison with earlier studies, this gave us an opportunity to evaluate sensitivity and specificity of the algorithms and also the positive predictive values in a subgroup of patients undergoing PCI. Thus, this study included patients treated with drug-eluting coronary stents, and the reported sensitivities and specificities of the different algorithms may not extend to the general population, to patients with ischemic heart disease without stent implantation, or to patients without previous ischemic heart disease.

Conclusion

Different algorithms utilizing additional information from the Danish National Patient Registry yielded different sensitivities, specificities, and predictive values in registry-based detection of AMI following PCI. The choice of algorithm will depend on the specific study purpose. However, it was possible to identify algorithms for AMI detection following PCI in the Danish National Patient Registry with moderate-to-high validity.

Disclosure

The authors report no conflicts of interest in this work.

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Supplementary Material

Table S1 Two-way table for detection algorithm A

	Detected in DNPR		
Detected in end-point committee	**AMI**	**No AMI**	**Total**
AMI	258	13	271
No AMI	360	5,088	5,448
Total	618	5,101	5,719

Note: I21 as either primary or secondary discharge diagnoses for an inpatient, all admission types (acute or elective), and hospital (with or without coronary angiography capability).
Abbreviations: DNPR, Danish National Patient Register; AMI, acute myocardial infarction.

Table S2 Two-way table for detection algorithm B

	Detected in DNPR		
Detected in end-point committee	**AMI**	**No AMI**	**Total**
AMI	238	42	280
No AMI	100	5,339	5,439
Total	338	5,381	5,719

Note: I21 as primary discharge diagnoses for an inpatient, all admission types (acute or elective), and hospital (with or without coronary angiography capability).
Abbreviations: DNPR, Danish National Patient Register; AMI, acute myocardial infarction.

Table S3 Two-way table for detection algorithm C

	Detected in DNPR		
Detected in end-point committee	**AMI**	**No AMI**	**Total**
AMI	262	17	279
No AMI	95	5,345	5,440
Total	357	5,369	5,719

Note: I21 as either primary or secondary discharge diagnoses, acute admission, and hospital (with or without coronary angiography capability).
Abbreviations: DNPR, Danish National Patient Register; AMI, acute myocardial infarction.

Table S4 Two-way table for detection algorithm D

	Detected in DNPR		
Detected in end-point committee	**AMI**	**No AMI**	**Total**
AMI	230	50	280
No AMI	54	5,385	5,439
Total	284	5,435	5,719

Note: I21 as primary discharge diagnoses, acute admission, and hospital (with or without coronary angiography capability).
Abbreviations: DNPR, Danish National Patient Register; AMI, acute myocardial infarction.

Table S5 Two-way table for detection algorithm E

	Detected in DNPR		
Detected in end-point committee	**AMI**	**No AMI**	**Total**
AMI	191	54	245
No AMI	91	5,384	5,475
Total	282	5,438	5,719

Note: I21 as either primary or secondary discharge diagnoses, acute admission, and hospital with coronary angiography capability.
Abbreviations: DNPR, Danish National Patient Register; AMI, acute myocardial infarction.

Table S6 Two-way table for detection algorithm F

	Detected in DNPR		
Detected in end-point committee	**AMI**	**No AMI**	**Total**
AMI	164	119	283
No AMI	25	5,411	5,436
Total	189	5,530	5,719

Note: I21 as primary discharge diagnoses, acute admission, and hospital with coronary angiography capability.
Abbreviations: DNPR, Danish National Patient Registry; AMI, acute myocardial infarction.

Table S7 Two-way table for algorithm C stratified for female sex

	Detected in DNPR		
Detected in end-point committee	**AMI**	**No AMI**	**Total**
AMI	66	6	72
No AMI	27	1,349	1,376
Total	357	1,355	1,448

Note: I21 as either primary or secondary discharge diagnoses, acute admission, and hospital (with or without coronary angiography capability).
Abbreviations: DNPR, Danish National Patient Registry; AMI, acute myocardial infarction.

Table S8 Two-way table for algorithm C stratified for male sex

	Detected in DNPR		
Detected in end-point committee	**AMI**	**No AMI**	**Total**
AMI	196	11	207
No AMI	68	3,996	4,064
Total	264	4,007	4,271

Note: I21 as either primary or secondary discharge diagnoses, acute admission, and hospital (with or without coronary angiography capability).
Abbreviations: DNPR, Danish National Patient Registry; AMI, acute myocardial infarction.

Table S9 Two-way table for algorithm C stratified for age ≤ 65 years

	Detected in DNPR		
Detected in end-point committee	**AMI**	**No AMI**	**Total**
AMI	111	5	116
No AMI	46	2,647	2,693
Total	157	2,652	2,809

Note: I21 as either primary or secondary discharge diagnoses, acute admission, and hospital (with or without coronary angiography capability).
Abbreviations: DNPR, Danish National Patient Registry; AMI, acute myocardial infarction.

Table S10 Two-way table for algorithm C stratified for age > 65 years

	Detected in DNPR		
Detected in end-point committee	**AMI**	**No AMI**	**Total**
AMI	151	12	163
No AMI	49	2,698	2,747
Total	200	2,710	2,910

Note: I21 as either primary or secondary discharge diagnoses, acute admission, and hospital (with or without coronary angiography capability).
Abbreviations: DNPR, Danish National Patient Registry; AMI, acute myocardial infarction.

Table S11 Two-way table for algorithm C stratified for indication of index stent, acute coronary syndrome

	Detected in DNPR		
Detected in end-point committee	**AMI**	**No AMI**	**Total**
AMI	132	10	142
No AMI	62	2,446	2,508
Total	194	2,456	2,650

Note: I21 as either primary or secondary discharge diagnoses, acute admission, and hospital (with or without coronary angiography capability).
Abbreviations: DNPR, Danish National Patient Registry; AMI, acute myocardial infarction.

Table S12 Two-way table for algorithm C stratified for indication of index stent, stable angina

	Detected in DNPR		
Detected in end-point committee	**AMI**	**No AMI**	**Total**
AMI	130	7	137
No AMI	33	2,899	2,932
Total	163	2,906	3,069

Note: I21 as either primary or secondary discharge diagnoses, acute admission, and hospital (with or without coronary angiography capability).
Abbreviations: DNPR, Danish National Patient Registry; AMI, acute myocardial infarction.

Table S13 Two-way table for algorithm C stratified on acute myocardial infarction prior to index admission

	Detected in DNPR		
Detected in end-point committee	**AMI**	**No AMI**	**Total**
AMI	98	4	102
No AMI	27	1,189	1,216
Total	125	1,193	1,318

Note: I21 as either primary or secondary discharge diagnoses, acute admission, and hospital (with or without coronary angiography capability).
Abbreviations: DNPR, Danish National Patient Registry; AMI, acute myocardial infarction.

Table S14 Two-way table for algorithm C stratified on acute myocardial infarction at index admission

	Detected in DNPR		
Detected in end-point committee	**AMI**	**No AMI**	**Total**
AMI	73	6	79
No AMI	43	1,541	1,584
Total	116	1,547	1,663

Note: I21 as either primary or secondary discharge diagnoses, acute admission, and hospital (with or without coronary angiography capability).
Abbreviations: DNPR, Danish National Patient Registry; AMI, acute myocardial infarction.

Table S15 Two-way table for algorithm C stratified on no prior acute myocardial infarction

	Detected in DNPR		
Detected in end-point committee	**AMI**	**No AMI**	**Total**
AMI	91	7	98
No AMI	25	2,616	2,641
Total	116	2,623	2,739

Note: I21 as either primary or secondary discharge diagnoses, acute admission, and hospital (with or without coronary angiography capability).
Abbreviations: DNPR, Danish National Patient Registry; AMI, acute myocardial infarction.

Table S16 Two-way table for algorithm C stratified on time from admission, 0–30 days

	Detected in DNPR		
Detected in end-point committee	**AMI**	**No AMI**	**Total**
AMI	26	3	29
No AMI	26	5,664	5,690
Total	52	5,667	5,719

Note: I21 as either primary or secondary discharge diagnoses, acute admission, and hospital (with or without coronary angiography capability).
Abbreviations: DNPR, Danish National Patient Registry; AMI, acute myocardial infarction.

Table S17 Two-way table for algorithm C stratified on time from admission, >30 days to 1 year

	Detected in DNPR		
Detected in end-point committee	**AMI**	**No AMI**	**Total**
AMI	81	5	86
No AMI	39	5,527	5,566
Total	120	5,532	5,652

Note: I21 as either primary or secondary discharge diagnoses, acute admission, and hospital (with or without coronary angiography capability).
Abbreviations: DNPR, Danish National Patient Registry; AMI, acute myocardial infarction.

Table S18 Two-way table for algorithm C stratified on time from admission, < 1 year

	Detected in DNPR		
Detected in end-point committee	**AMI**	**No AMI**	**Total**
AMI	109	6	115
No AMI	64	1,628	1,692
Total	173	1,634	1,807

Note: I21 as either primary or secondary discharge diagnoses, acute admission, and hospital (with or without coronary angiography capability).
Abbreviations: DNPR, Danish National Patient Registry; AMI, acute myocardial infarction.

Table S19 Two-way table for algorithm C stratified on time from admission, 1–2 years

	Detected in DNPR		
Detected in end-point committee	**AMI**	**No AMI**	**Total**
AMI	53	1	54
No AMI	20	90	110
Total	73	91	164

Note: I21 as either primary or secondary discharge diagnoses, acute admission, and hospital (with or without coronary angiography capability).
Abbreviations: DNPR, Danish National Patient Registry; AMI, acute myocardial infarction.

Table S20 Two-way table for algorithm C stratified on time from admission, 2–3 years

	Detected in DNPR		
Detected in end-point committee	**AMI**	**No AMI**	**Total**
AMI	53	6	59
No AMI	7	1,489	1,496
Total	60	1,495	1,555

Note: I21 as either primary or secondary discharge diagnoses, acute admission, and hospital (with or without coronary angiography capability).
Abbreviations: DNPR, Danish National Patient Register; AMI, acute myocardial infarction.

Table S21 Two-way table for algorithm C stratified on time from admission, 3–4 years

	Detected in DNPR		
Detected in end point committee	**AMI**	**No AMI**	**Total**
AMI	32	2	34
No AMI	4	61	65
Total	36	63	99

Note: I21 as either primary or secondary discharge diagnoses, acute admission, and hospital (with or without coronary angiography capability).
Abbreviations: DNPR, Danish National Patient Register; AMI, acute myocardial infarction.

Table S22 Two-way table for algorithm C stratified on time from admission, 4–5 years

	Detected in DNPR		
Detected in end-point committee	**AMI**	**No AMI**	**Total**
AMI	15	2	17
No AMI	0	2,077	2,077
Total	15	2,079	2,094

Note: I21 as either primary or secondary discharge diagnoses, acute admission, and hospital (with or without coronary angiography capability).
Abbreviations: DNPR, Danish National Patient Register; AMI, acute myocardial infarction.

Table S23 Two-way table for algorithm C stratified on time from admission, >30 days to 5 years

	Detected in DNPR		
Detected in end-point committee	**AMI**	**No AMI**	**Total**
AMI	234	16	250
No AMI	69	5,333	5,402
Total	303	5,349	5,652

Note: I21 as either primary or secondary discharge diagnoses, acute admission, and hospital (with or without coronary angiography capability).
Abbreviations: DNPR, Danish National Patient Register; AMI, acute myocardial infarction.