

Prevalence of Chronic Kidney Disease and Care Giver’s Awareness in Patients Hospitalized for Coronary Heart Disease

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Background: Aside from classic cardiovascular risk factors (e.g. blood pressure, LDL-cholesterol, diabetes, obesity, smoking)¹, chronic kidney disease (CKD) has been identified as an important risk modifier in patients with coronary heart disease (CHD)^{2,3}. CKD disposes the patient to complications during hospital stays due to CHD, such as acute kidney injury (AKI)⁴. Both, CKD and AKI represent risk factors for the progression of CKD, progression of CHD, and impaired outcomes in CHD^{4,5}. Therefore, reporting CKD and/or AKI in discharge letters is important to transfer information on these major events to the physician in the ambulatory setting. From the hospital’s perspective, adequate ICD-coding of CKD and AKI is relevant for reimbursement. In the current study we describe the prevalence of renal dysfunction in patients admitted due to CHD. We also analyzed reporting of CKD and/or AKI in the discharge letter and ICD-coding, both reflecting the care giver’s awareness of CKD.

Methods: We used data of n=494 patients of the University Hospital Wuerzburg, enrolled in the EUROASPIRE IV study¹. These patients were hospitalized for CHD (myocardial infarction or ischemia, angioplasty/stent, coronary bypass grafting) 6 mo to 3 yrs prior to the EUROASPIRE IV study visit, at which subjects consented to detailed retrospective chart review (**figure 1**). Information on CKD and AKI in diagnoses or summary of the discharge letters was extracted by doctoral students. Data collection of ICD-codes and serum creatinine (SCr) measurements was supported by the CHFC Datawarehouse, which enables data of clinical routine to be used for scientific purposes with digitized (semi-)automated data-transfer. All SCr-values (n=2332) were used to define AKI (any rise in SCr ≥0.3 mg/dl during the hospital stay)⁴ and CKD (glomerular filtration rate GFRCKDEPI at admission or at discharge <60 ml/min/1.73m², i.e. CKD stage 3+)⁵. Relevant ICD-codes included N18, N19, I12.0, I13 for CKD, and N17 for AKI.

Results: Participants were on average 67 yrs old and 83% were of male gender (**table 1**). The index event was CABG in 15.9%, PCI/stent in 69.1%, acute MI with conservative therapy (without PCI/stent or CABG) in 4.2%, and myocardial ischemia in 10.8%. A total of 161 (32.6%) patients had CKD or AKI during their hospital stay: CKD at admission 87 (17.6%]); CKD at discharge 94 (19.0%); AKI 90 (25.1%). Patients with either CKD or AKI were older (73 vs. 64 yrs), more likely having undergone CABG (32.3% vs. 8.1%) and less likely having received PCI/stent (50.3% vs. 77.8%, all p<0.01) as compared to subjects without renal impairment. CKD or AKI was mentioned in the discharge letter in 22.3% of patients with CKD or experiencing AKI during the hospital stay. Renal ICD-codes were coded in 72.7% of patients with CKD or AKI (**table 2**).

Conclusion: A substantial proportion of patients experience AKI (25%) during a hospital stay due to CHD and leave hospital with compromised kidney function (19%). The majority of subjects with renal impairment appears correctly ICD-coded. Yet, further improvement of ICD-coding of CKD and/or AKI carries the potential of monetary benefits for the hospital. In contrast, “physician’s awareness of CKD” as reflected by clearly stating CKD and/or AKI in the discharge letter, appears insufficient indicating considerable room for improvement. Stringent reporting of CKD and AKI may improve information transfer to care givers in the outpatient setting, and may thus lead to better informed patients and better management of CKD.

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Literature:

1. Kotseva K. et al EUROASPIRE IV: A European Society of Cardiology survey on the lifestyle, risk factor and therapeutic management of coronary patients from 24 European countries, Eur J Prev Cardiol. 2016 Apr;23(6):636-48
2. Gansevoort RT et al. Chronic kidney disease and cardiovascular risk: epidemiology, mechanisms, and prevention, Lancet 2013; 382: 339–52
3. Di Angelantonio E et al., Chronic kidney disease and risk of major cardiovascular disease and non-vascular mortality: prospective population based cohort study, BMJ 2010;341:c4986.
4. Kidney Disease: Improving Global Outcomes (KDIGO) Acute Kidney Injury Work Group, KDIGO Clinical Practice Guideline for Acute Kidney Injury. Kidney inter., Suppl. 2012; 2: 1–138.
5. Kidney Disease: Improving Global Outcomes (KDIGO) CKD Work Group, KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease. Kidney inter., Suppl. 2013; 3: 1-150.

Figure 1: study design

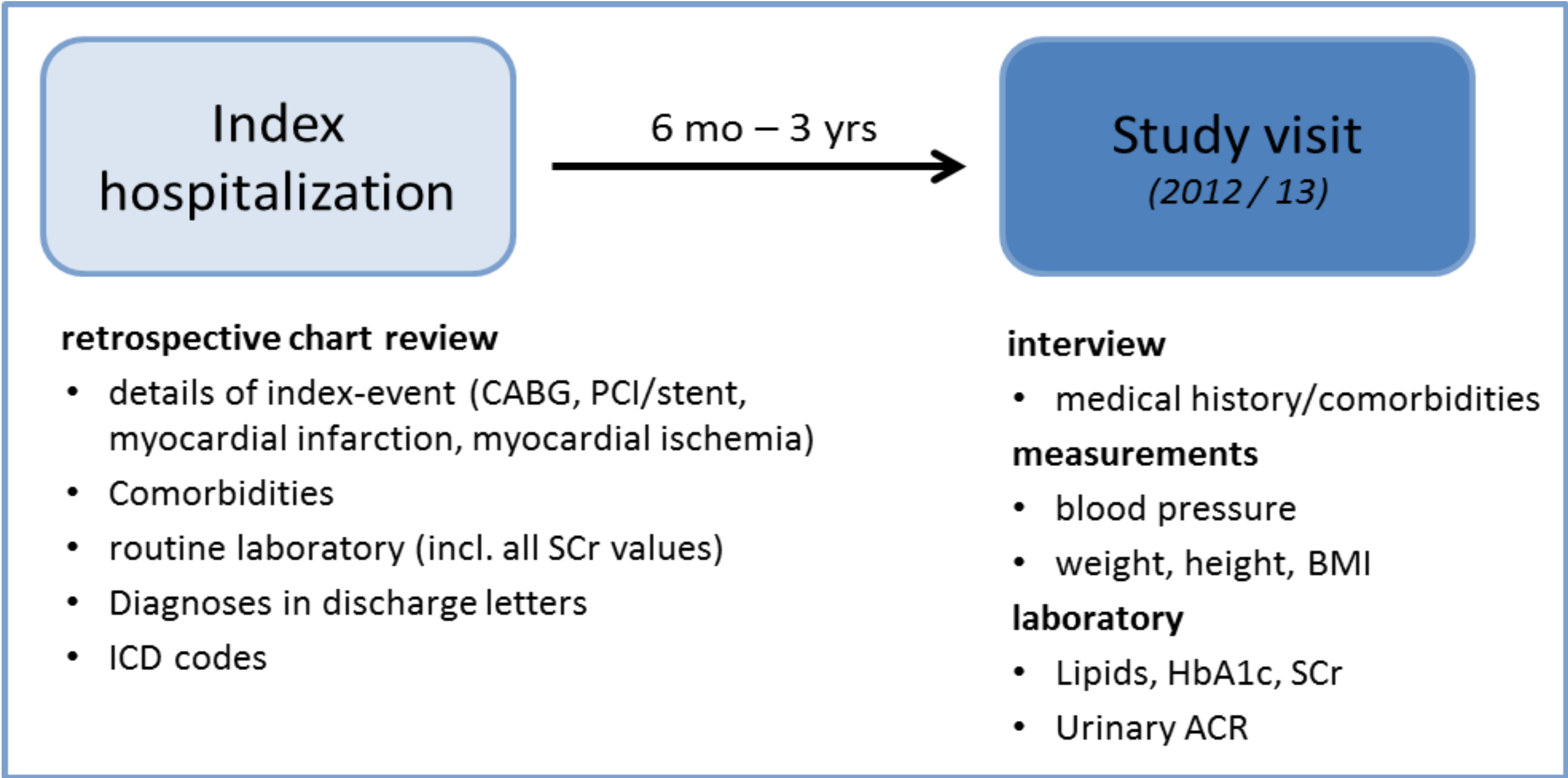


Table 1: Patient characteristics during index hospital stay

	Total n=494	No CKD or AKI n=333	CKD or AKI n=161	p- value
Age (yrs)	67.2 (59.9; 72.7)	64.1 (58.8; 70.4)	72.5 (65.8; 75.3)	<0.001
Sex (male)	415 (83.3%)	281 (84.4%)	131 (81.4%)	0.4
Index event				<0.001
CABG	79 (15.9%)	27 (8.1%)	52 (32.3%)	
PCI/stent	344 (69.1%)	259 (77.8%)	81 (50.3%)	
Acute MI, conservative treatment	21 (4.2%)	8 (2.4%)	13 (8.1%)	
Myocardial ischemia	54 (10.8%)	39 (11.7%)	15 (9.3%)	
Index procedure				0.8
Elective	5 (1.0%)	4 (1.2%)	1 (0.6%)	
Acute	347 (69.8%)	231 (69.6%)	112 (69.6%)	
Emergency (24h)	144 (29.0%)	96 (28.9%)	48 (28.8%)	
Kidney function				
eGFR at admission (ml/min/1.73m²)	81.1 (66.3; 93.3)	86.6 (75.3; 95.6)	59.2 (51.3; 79.6)	<0.001
eGFR at discharge (ml/min/1.73m²)	78.4 (64.0; 90.9)	85.0 (74.7; 93.7)	57.4 (49.0; 73.1)	<0.001

Table 2: CKD or AKI in discharge letter and in ICD-codes

	Total	No CKD or AKI	CKD or AKI	p- value
Information from discharge letters				
CKD	33 (1.4%)	5 (1.6%)	28 (20.1%)	<0.001
AKI	7 (1.6%)	1 (0.3%)	5 (6.9%)	0.002
Either CKD or AKI	36 (8.1%)	5 (1.6%)	31 (22.3%)	<0.001
ICD-coding				
CKD (N18, N19, I12.0, I13)	177 (35.8%)	65 (19.5%)	112 (69.6%)	<0.001
AKI (N17)	8 (1.6%)	0	8 (5.0%)	<0.001
Either CKD or AKI	182 (36.8%)	65 (19.5%)	117 (72.7%)	<0.001