| Table J-5. Studies evaluating independent predictive value of BNP for the outcome of all-cause mortality (12 to 23 months) | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author**  **Year** | **Study Design**  **Population** | **n**  **Mean Age (SD)**  **% male** | **BNP Levels (pg/mL)** | **Prognostic Markers** | **Followup**  **Outcomes**  **(#events, #risk)** | **Model** | **Adjusted/Non-adjusted Covariates** | **Measure(s) of Risk**  **(95% CI,)** |
| Arenja37  2011  BASEL | Cohort  Patients with acute HF | n=377  mean age:  79y (72 - 84)\*\*  53% male | ADM mean: 848(471–639)  D/C mean: NR  Cutpoint: per 100 pg/mL | BNP, NYHA, BMI, age, cTnI, HT, DM, smoking, CAD, previous MI, creatinine | 12m  All-cause mortality  (130, 377) | Multivariable cox regression | NYHA, BMI, age, cTnI, HT, DM, smoking, CAD, previous MI, creatinine | ADM: HR=1.01 (1.00, 1.05) per 100 pg/mL, p=0.02 |
| Reichlin13  2010  BASEL | Cohort  Patients presenting to the ED with acute dyspnea and acute HF | n=377  mean age:  79y (72-84)\*\*  53% male | ADM mean:  847\*\*  D/C mean: NR  Cutpoint: >847 | BNP, MPO, age, sex, BMI, HT, DM, smoking, CAD, history of MI and HF, NYHA class | 12m  All-cause mortality  (130, 377) | Multivariable cox regression | CV risk factors (age, sex, BMI, HT, DM, smoking, CAD, history of MI and HF), NYHA class | ADM: HR=1.65 (1.15-2.37) |
| Dieplinger,27  2009  Mueller et al, 2005;  Gegenhuber et al, 2006 | Cohort  Patients consulting the ED with acute HF | n=137  mean age:  survivors= 75y (65,80)\*\*  deceased= 79y (72-83)\*\*  93% male | ADM mean: NR  D/C mean: NR  Cutpoint: >1,250 | BNP, adiponectin, CRP, renal dysfunction | 12m  All-cause mortality  (41, 137) | Multivariable cox regression | Adiponectin, age, systolic BP, renal dysfunction, systolic dysfunction, NYHA class III/IV, arterial hypertension, CAD, smoking, BMI, CRP | ADM: RR=2.45 (1.29-4.65) |
| Gegenhuber7  2007  Mueller et al, 2005;  Gegenhuber et al, 2006 | Cohort  Patients consulting the ED with acute HF | n=137  mean age:  alive= 75y (65,80)\*\*  dead= 79y (72-83)\*\*  93% male | ADM mean: alive=668\*\*  dead=1,461\*\*  D/C mean: NR  Cutpoint: >1,250 | BNP, advanced age, low systolic BP, renal dysfunction, systolic dysfunction, NYHA III/IV | 12m  All-cause mortality  (41, 137) | Multivariable cox regression | Advanced age, low systolic BP, renal dysfunction, systolic dysfunction, NYHA III/IV | ADM: HR=3.34 (1.61 - 6.97) |
| Rehman43  2008  PRIDE | Cohort  346 patients with acute HF | n=346  mean age:  73y (13)  68% male | ADM Mean:  494 (203, 1,180)\*\*  D/C Mean: NR  Cutpoint: >494 | BNP, ST2, CRP, BNP, age, prior CHF, BB, ACE inhibitor, NYHA, systolic BP, creatinine | 12m  Mortality  (97, 346) | Multivariable cox regression | ST2, CRP, NT-proBNP, age, prior HF, BB, ACE inhibitor, NYHA, BP, BMI, S3 gallop, rates on lung exam, creatinine, BUN, WCC, Hb, pleural effusion | ADM: HR=2.12 (1.37-3.27), |

| Table J-5. Studies evaluating independent predictive value of BNP for the outcome of all-cause mortality (12 to 23 months) (continued) | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Author**  **Year** | **Study Design**  **Population** | **n**  **Mean Age (SD)**  **% male** | **BNP Levels (pg/mL)** | **Prognostic Markers** | **Followup**  **Outcomes**  **(#events, #risk)** | **Model** | **Adjusted/Non-adjusted Covariates** | **Measure(s) of Risk**  **(95% CI,)** |
| Sakhuja39  2007  PRIDE | Cohort  Patients with acute HF presenting to urban academic center | n=209  mean age:  increased cTnT= 74.3y (11.6)  no increased cTnT= 71.4y (14.9)  52% male | ADM mean: increase cTnT = 544\*\*  no-increase CTnT= 221\*\*  D/C mean: NR  Cutpoint: 352 | BNP, cTnT, age, GFR, NYHA class | 12m  All-cause mortality  (NR) | Multivariable cox regression | cTnT, age, GFR, NYHA class | ADM: HR=2.53 (1.53-6.21) |
| Dunlay16  2009 | Cohort  HF patients | n=593  mean age:  76.4y (NR)  48% male | ADM mean:  350 (174-647)\*\*  D/C mean: NR  Cutpoint: 350 | BNP>350, age, BMI, creatinine clearance, NYHA III/IV, serum Na, systolic BP, CRP, cTnT | 12m  All-cause mortality  (122,593) | Multivariable logistic regression | Age, BMI, creatinine clearance, NYHA, serum Na<135mmol/L, systolic BP | ADM: HR=1.29 (1.03-1.62) |
| Noveanu42  2011 | Cohort  Patients with acute decompensated HF presenting at ED | n=171  mean age:  80y (73-85)\*\*  60% male | ADM mean:  1,315 (759, 2,349)\*\*  D/C mean: NR  Cutpoint: NR | BNP at 24h, age, cTn, eGFR, NYHA | 12m  All-cause mortality  (60, 171) | Multivariable cox regression | age, cTn, eGFR, NYHA | 24 hours: HR=1.02 (1.01-1.04) per 100 pg/mL increase, p = 0.013 |
| BNP at 48h, age, cTn, eGFR, NYHA | 12m  All-cause mortality  (60, 171) | Multivariable cox regression | age, cTn, eGFR, NYHA | 48 hours HR=1.03 (1.01-1.06) per 100 pg/mL increase, p=0.002 |
| BNP D/C, age, cTn, eGFR, NYHA | 12m  All-cause mortality (60, 171) | Multivariable cox regression | age, cTn, eGFR, NYHA | D/C: HR=1.02 (1.01-1.03) per 100 pg/mL increase, p<0.001 |
| Coyne35  2011  COACH Study | Case series  Secondary analysis of RCT  Patients in hospital for symptomatic HF | n=706  mean age:  70.7y (11.5)  61.8% male | ADM mean:  674 (720)  D/C mean: NR  Cutpoint: NR | BNP at D/C, CES-D, type D | 18m  All-cause mortality  (192, 706) | Multivariable cox proportional hazard regression | CES-D, type D | D/C: HR=1.588 (1.391-1.812) |

**Abbreviations:** ACE = angiotensin converting enzyme; ADM = admission; BASEL = B-type Natriuretic Peptide for Acute Shortness of Breath Evaluation; BB = betablocker; BMI = body mass index; BNP = B-type natriuretic peptide; BP = blood pressure; BUN=blood urea nitrogen; CAD = coronary artery disease; CES-D = Center for Epidemiologic Studies Depression; 95% CI, = confidence interval; COACH = Coordinating study evaluating Outcomes of Advising and Counselling in Heart failure; CRP = C-reactive protein; cTnI = cardiac troponin I; cTnT = cardiac troponin T; CV = cardiovascular; d = day(s); D/C = discharge; DM = diabetes mellitus; eGFR = estimated glomerular filtration rate; GFR = glomerular filtration rate; h = hour(s); Hb = hemoglobin; HF = heart failure; HR = hazard ratio; HT = hypertension; m = month(s); mmol/L = millimoles per liter; MI = myocardial infarction; MPO = myeloperoxidase; n=number; Na = sodium; NR = not reported; NT-proBNP = N-terminal pro-B-type natriuretic peptide; NYHA = New York Heart Association; pg/mL = picograms per milliliter; PRIDE = Pro-BNP Investigation of Dyspnea in the Emergency Department; RR = relative risk; SD = standard deviation; w = week(s); WCC = white cell count; y = year(s)